1st International Conference on Agroecology Transforming Agriculture and Food Systems in Africa

Reducing Synthetic Fertilizers and Pesticides Through Scaling Up Agroecology and Promoting Ecological Organic Trade

An Action towards Sustainable Health, Nutrition, Consumption and Trade:

Conference Report 2019

Organized By:

Safari Park Hotel & Casino Nairobi, Kenya

18th – 21st June 2019

Report prepared by:

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ACKNOWLEDGEMENTS

The inaugural agroecology conference was a success, thanks to the dedication of the local and international partners who worked tirelessly around the clock either individually or through their organizations to achieve the registered achievement.

The Local Organizing Committee (LOC) wishes to extend its gratitude to those who contributed to make the event a success. The LOC extends special gratitude to the Swiss Agency for Development and Cooperation (SDC), The Germany Federal Ministry for Economic Cooperation and Development (BMZ) through GIZ, Swedish International Development Agency (Sida) through IFOAM Organics International, Swedish Society for Nature Conservation (SSNC), Biovision Foundation of Switzerland, Regeneration International and HIVOs for providing financial support to the agroecology forum. Special thanks to Dr. Charles L. Wilson the President – World Food Preservation Centre®LLC who though sick was able to share his opening remarks to the delegates through tele-conferencing.

The LOC also acknowledges the people of Kenya for being excellent hosts and a special thank you to the Government of Kenya through the Ministry of Agriculture, Livestock, Fisheries and Irrigation and County Governments through the Council of Governors for their contribution in shaping the forum programme and for participating in the forum sessions. Indeed this was a solid confirmation that the Government of Kenya is committed to the transformation of the agricultural and food systems in the Country.

The LOC is indebted to all the distinguished speakers who brought a wealth of knowledge from research and practice that contributed to enrich the discussions both during the main plenary sessions, breakout sessions and even during the one-on-one consultations. The speakers played a very significant role in shaping the conference programme making it more relevant and reaching out to real-time cases and data for reference and evidence sharing.

Special thanks to all the exhibitors for showcasing the latest innovations, technologies and for sharing knowledge and skills when delegates visited their stands. The exhibitors were drawn from across the world making the conference a truly international platform for sharing and learning.

To all the more than 400 delegates who graced the conference, the LOC will forever be indebted because without your participation the conference would not have taken place. Not only did you make the event a success, but also made it the largest inaugural agroecology conference in Africa outside the FAO's forums which coincided with Biovision Africa Trust's 10th year anniversary fete further making it a memorable event indeed.

The LOC is indebted to the Safari Park Hotel and Casino's conferencing and security team who ensured the safety of the delegates and their wares/properties, smooth transitioning to various conference sessions, providing equipment and other facilities in the conference halls, provision of technical support as and when needed, provision of excellent meals and drinks that kept the conference attendees energized, working closely with the LOC to organize entertainment for the delegates through their

magnificent Safari Cats Crew and for being willing partners during the pre and post planning of conference activities. By extension, gratitude is also extended to the other excellent service providers whom we may not be able to mention one by one here for their exemplary and timely delivery of services that saw the seamless delivery of the conference.

We would also like to send a special thank you to the conference delegates who hid to the call by the LOC team to host delegates during the field visit to see and experience fast hand organic farming and technologies. These were Sylvia Basket Farm (Limuru), Limbua Group Limited (formerly Macadamia Fans (UK) Ltd) in Kirinyaga and Jatflora Farm in Gilgil.

We would like to thank most sincerely ELEA Africa, the event organizers for enabling the LOC to navigate through all the processes of preparations and hosting of this great conference. That team, exhibited high level of professionalism in the coordination of the various aspects of the conference delivered as per the expectations of the Conference Organizers and the LOC.

Last but not least, to all the friends, partners and advocators of Agroecology who participated in one way or another, individually and or collectively may the good God bless you abundantly because without your participation and support the conference would not have seen the light of day.

To the LOC team our reward was the success celebrated at the end of the conference: a culmination of all your tireless and self-yielding sacrifice.

CONFERENCE ORGANIZERS

The World Food Preservation Center® LLC is a consortium of 29 major agricultural research universities and three major research institutes on six continents (including the Volcani Center in Israel that is comparable to the USDA in the USA). It is leading the "Food Preservation Revolution TM". The World Food Preservation Center® LLC was established in response to a pending global food shortage that is destined to increase world hunger if not sustainably addressed. Further World Food Preservation Center® LLC was formed to address intellectual postharvest gaps in developing countries by: (1) promoting the education (M.S. and Ph.D.) of young student/scientists in developing countries; (2) having young student/scientists in developing countries conduct research on much needed new postharvest technologies adaptable to their native countries; (3) organizing continent-wide postharvest and food security congresses and exhibitions; (4) publishing much needed new texts/reference books on postharvest technologies/methods for developing countries; and (5) developing a comprehensive database on all postharvest knowledge relative to developing countries with access portals for researchers, students, administrators, industry, businesses, and farmers. For more details visit their **Website:** http://www.worldfoodpreservationcenter.com/index.html.

Founded in 1972, IFOAM Organics International is an international umbrella organization for the organic world, uniting a diverse range of stakeholders contributing to the organic vision. Day by day, they work towards true sustainability in agriculture, from the field, through the value chain to the consumer. From building awareness among the public and advocating for sustainable policy, to building capacity and facilitating the transition of farmers to organic agriculture, everything the organization does aims to strengthen the organic movement and lead it forwards. IFOAM Organics International I has Affiliates in more than 120 countries. In order to unify, lead and assist this broad-based constituency in a fair, inclusive and participatory manner, the body organizes a General Assembly every three years. For more details visit their **Website:** https://www.ifoam.bio/en.

The Biovision Africa Trust (BvAT) is a not-for-profit organization established under Kenyan Laws in 2009 by the Biovision Foundation for ecological development, Switzerland (www.biovision.ch). The organization promotes development, dissemination and application of sustainable ecological agricultural practices, empowering small-scale farmers and helping them to diversify their livelihoods. BvAT's vision is to have sustained and productive smallholder agriculture of the highest quality. The main goal of the Trust is to support the dissemination of appropriate technologies and practices to improve human, animal, plant and environmental health in rural areas and this is to be achieved through focusing on finding and putting into use ecological innovations leading to market-led sustainable agriculture for development in East Africa. The mission of BvAT is to improve the welfare of resource limited small-holder farmers in Kenya and other African countries through supporting sustainable agricultural projects and initiatives focusing on generation and

dissemination of information on ecologically sound practices to improve human, animal, plant and environmental health. **Website**: http://biovisionafricatrust.org

CONFERENCE SPONSORS

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Swiss Agency for Development and Cooperation SDC

Federal Ministry for Economic Cooperation and Development
BMZ

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

CONFERENCE PARTNERS AND EXHIBITORS

CONFERENCE PROGRAM

1st INTERNATIONAL CONFERENCE ON AGROECOLOGY TRANSFORMING AGRICULTURE & FOOD SYSTEMS IN AFRICA – PROGRAMME OUTLINE

DAY ONE: TUESDAY 18 JUNE, 2019		
	Timings	**Activity**
Day 1 Tuesday June 18, 2019	**7.00am – 6.00 pm**	Registration and Viewing of posters/ exhibitions
	8.30am – 10.00am	**PLENARY SESSION 1: IMPACT OF SYNTHETIC FERTILISERS & PESTICIDES: NEED FOR HEALTHY AND SUSTAINABLE AGRICULTURE & FOOD SYSTEMS** **Keynote Speaker:** Prof. Tyrone Hayes**,** American Biologist and Professor of Integrative Biology at University of California: *Impacts of Synthetic Fertilizers and Pesticides on Health and on Sustainable Systems* **Presenter 1:** Prof. Gilles-Eric Seralini, Co-director of the Network on Risks, Quality and Sustainable Environment (MRSH, University of Caen, France) – *Pollutants and the Major Pesticides of the World* **Presenter 2**: Prof. Don Huber, Professor Emeritus of Plant Pathology at Purdue University - *Understanding glyphosate's universal toxicity to soil, plants, animals, and humans* **Presenter 3:** Prof. Ratemo Michieka, Professor at The University of Nairobi, Kenya: **Fertilizers and Pesticides in Agriculture, Environment and Health** **Presenter 4:** Dr. Judy Carman, Director, Institute of Health and Environmental Research, South Australia - *Are GMOs safe to eat? Current inadequate safety requirements* **Panelists**: Madame Ndeiye Maimouna Diene /Dr. Darcy Ogada /Ms. Ivy Saunyama / Prof. Tyrone Hayes / Prof. Ratemo Michieka / Dr. Mwatima Juma **Moderator:** Dr. Peter Mokaya, Executive Director, Organic Consumers Alliance
	10.00am – 10.30am	**TEA BREAK**
	10.30am – 11.00am	**OFFICIAL OPENING AND TOUR OF THE EXHIBITION** • H.E. Ambassador Josefa Sacko - African Union Commission (AUC), Commissioner for Rural Economy and Agriculture • Hon. Mwangi Kiunjuri, Cabinet Secretary - Ministry of Agriculture, Livestock, Fisheries & Irrigation
	11.00am – 11.45am	**OFFICIAL OPENING CEREMONY** • **National and East Africa Anthem and Opening Prayers** • **Entertainment** • **Remarks and Speeches** ❖ Welcome remarks by Dr. David Amudavi, Executive Director, Biovision Africa Trust (BvAT) ❖ Remarks by Prof. Judi Wakhungu**,** Ambassador of Kenya to the French Republic, Portugal, Serbia and Holy See and BvAT Board Member ❖ Remarks by Ms. Louise Luttikholt, Executive Director, IFOAM Organics International (IFOAM OI) ❖ Remarks by Dr. Manuel Flury, Co-Head Global Programme Food Security, Swiss Agency for Development and Cooperation (SDC) ❖ Remarks by Ms. Karin Lexen, Secretary General, Swedish Society for Nature Conservation (SSNC) ❖ Remarks by Dr. Gabriel Rugalema, Kenya Country Rep, Food and Agriculture Organisation (FAO) of the United Nations ❖ Speech by H.E. Ambassador Josefa Sacko, AUC Commissioner of Agriculture ❖ Speech by Hon. Mwangi Kiunjuri, Cabinet Secretary, Ministry of Agriculture, Livestock, Fisheries & Irrigation **Master of Ceremony**: Norman Mudibo

	11:45am – 12:05pm	**KEYNOTE SPEAKER**: Dr. Hans Rudolf Herren, President of Millennium Institute (Washington DC) and President of Biovision Foundation (Zurich, Switzerland): **Pathway to Food System Transformation in Africa**			
	12:05pm – 1:00pm	**PLENARY SESSION 2: LEADERSHIP ROUNDTABLE** • H.E. Ambassador Josefa Sacko • Dr. Gabriel Rugalema, FAO Kenya Country Rep • Andreas Schriber, CEO Biovision Foundation and Chairman, BvAT Board of Trustees • Louise Luttikholt, Executive Director IFOAM OI • Fahari Marwa, Principal Agriculture Economist, East Africa Community (EAC) • Hon. Patrick Wainaina MP Thika Town and Chairman Jungle Macs Ltd • Justus Mwololo, National General Secretary, Kenya Small Scale Farmers Forum **Moderator:** Dr. David Amudavi, Executive Director, BvAT			
	1.00 pm – 2.00 pm	**LUNCH BREAK**			
	2:00 pm – 3:30 pm	**PLENARY SESSION 3: AGROECOLOGY PRACTICES AND SYSTEMS** **Keynote Speaker:** Prof. Zeyaur Khan, Distinguished Research Fellow and Principal Scientist, International Centre of Insect Physiology and Ecology (ICIPE) - *Push Pull Technology for Food Security and Environment Sustainability in Africa and Beyond* **Presenter 1**: Dr. Emma Siliprandi , FAO - *Agroecology Scaling up Initiative* **Case Study 1:** Mr. Zachary Makanya, PELUM Kenya - *Ecological Organic Agriculture Initiative in Africa* **Case Study 2:** Ms. Dorith von Behaim , GIZ **-** *Knowledge Centers for Organic Agriculture in Africa* **Panelists**: Prof. Zeyaur Khan / Zachary Makanya / Dorith von Behaim / Dr. Emma Siliprandi / John Njoroge **Moderator:** Ms. Louise Luttikholt, Executive Director IFOAM OI			
	3.30pm – 4.00pm	**TEA BREAK AND EXHIBITION VIEWING**			
	4:00pm – 5.30pm	**BREAKOUT SESSION 1:** **Focus:** Impact of synthetic inputs **Main Speaker: Dr. Darcy Ogada, Assistant Director of Africa Programs -** *Breaking the silence: Africa's wildlife poisoning crisis* **Presentation 1: John Bosco Muhumuza -** Contrasting effects of vegetative heterogeneity, pesticide use and plant nutrition on fall armyworm, termites and ladybird beetles. **Presentation 2: Loki Robert Okongo -** A Multi-Land Use Knowledge, Attitude and Practice Survey of Pesticides Use in Lake Victoria Basin	**BREAKOUT SESSION 2:** **Focus:** Alternative technologies and methodologies to reduce synthetic input use and contamination **Main Speaker: Prof. Tyrone Hayes, American biologist and professor of Integrative Biology at University of California** **Presentation 1**: **Robinson Rue** **Presentation 2**: **Dr. Fabiyi. O. A** - Environmental Protection for Food Safety and Security: Application of Agro-biocide in the Management of Meloidogyne incognita	**BREAKOUT SESSION 3:** **Focus:** Frameworks, methods of performance assessment and scaling up strategies **Main Speaker: Ms. Venancia Wambua, Project Manager, EOA Initiative in Africa –** *Key achievements, lessons learnt and future prospects of EOA Initiatives* **Presentation 1: Mr. El Hadji Faye ENDA Pronat, Senegal** – FAO Global Knowledge Product Experience **Presentation 2: Ivy Saunyama, Agricultural Officer, Pest and Pesticide Management Team (AGPMC) FAO –** Phasing out Highly	**BREAKOUT SESSION 4:** **Focus:** Impact of Genetic Engineering and GMOs **Main Speaker - Dr. Judy Carman, Director, Institute of Health and Environmental Research, South Australia –** *Impact of genetic engineering and GMOs* **Presentation 1: Irena Zdziarski -** The importance of histopathological analyses containing qualitative methods in the assessment of novel food safety

		Moderator: Prof. Raphael Wahome	**Presentation 3: Washington Mutatu** - Impact of atrazine and other herbicides on animal health in the Zimbabwe sugar industry **Moderator:** Dr. Edith Kareko – Munene	Hazardous Pesticides (HHPs) with Agroecology **Presentation 3**: **Gerard Lawry** - Case study: Eaglerise Farm – Vision, Philosophies & Goals **Moderator:** Dr. Million Belay	**Moderator:** Dr. Nicholas Ozor
	5.30pm – 6.00pm	**EXHIBITION AND POSTER VIEWING SESSION**			

DAY TWO: WEDNESDAY 19 JUNE, 2019					
	Timing	**Activity**			
Day 2 Wednesday 19 June, 2019	**6.30am – 8:30am** **8.30am – 6.00pm**	Breakfast meetings organized by different organizations Viewing of posters/ exhibitions			
	8.30am – 10:30am	**PLENARY SESSION 4: STRENGTHENING REGIONAL ECOLOGICAL ORGANIC TRADE AND ITS OPPORTUNITIES AND CHALLENGES TOWARDS DIFFERENT MARKETS** **Keynote Speaker:** Mr. Malick Kane, Project Coordinator, National Green Export Country Project UNCTAD **–** *Organic Markets and Africa; State of the Play and Perspectives* **Presentation 1**: Ms. Barbara Zilly, Head of Capacity Development, IFOAM OI - *Impact of SIDA support to the Organic Sector in East Africa* **Presentation 2:** Mr. Fahari Marwa, Principal Agriculture Economist, EAC - *Opportunities and Challenges in Regional Trade in East Africa* **Presentation 3:** Mr. Bo van Elzakker, AgroEco Louis Bolk Institute - *Agroecology and Organic Trade in Symbiosis or as Counterparts* **Case Study 1:** Ms. Martha Kihara, Fun Zone - *Experiences of Developing Local Markets for Organic Products* **Panelists**: Malick Kane / Barbara Zilly / Fahari Marwa / Bo van Elzakker / Martha Kihara **Moderator:** Eustace K. Gacanja, CEO Kenya Organic Agriculture Network (KOAN)			
	10.30am – 11.00am	**TEA BREAK**			
	11.00am– 1.00pm	**<u>BREAKOUT SESSION 5:</u>** **Focus:** Impact of synthetic inputs **Main Speaker: Dr. Don Huber, Professor Emeritus of Plant Pathology at Purdue University -** *Impact of glyphosate and its remediation* **Presentation 1**: **Kenyanya Teresa Mogoi** Determination of pesticide	**<u>BREAKOUT SESSION 6:</u>** **Focus:** Alternative technologies and methodologies to reduce synthetic input use and contamination **Main Speaker: Ms. Christine Zimmerman - Founder of the Asia Network Information Center** **Presentation 1**: **Aggrey Atuhaire**	**<u>BREAKOUT SESSION 7:</u>** **Focus:** Linking Organic Farmers and aggregators to the retail sector **Main Speaker: Bert-Jan Ottens** – *Experiences from Profound* **Presentation 1**: **Lillian Kamathi,** Project Director,	**<u>BREAKOUT SESSION 8</u>** **Focus:** Organic Guarantee Systems and Policy Environment in East Africa **Main Speaker: Louise Luttikholt** **Presentation 1**: **Jack Juma**, Organic Standards

		residues in organic and conventional exotic vegetables **Presentation 2**: **Adeoluwa Oluwaseyi Adeleye** Dietary exposure assessment of organochlorine pesticides in two commonly grown leafy vegetables in South-western, Nigeria **Presentation 3**: **Edson Kemoi** Fungicide use in horticulture linked to antifungal resistant aspergillus species in Kajiado County **Moderator:** Dr. Daniel Maingi	Best practices to reduce consumer dietary exposure to synthetic pesticides: Insights from Uganda **Presentation 2**: **David Bautze** Impact of organic and conventional farming systems on agriculture sustainability: results from the Long-term Farming Systems Comparisons Trials in Kenya (SysCom) **Presentation 3**: **John J Anyangoa** Effects of farming systems under organic and conventional systems on physiochemical soil changes at central Kenya **Moderator:** Ms. Ann Maina	Biioto@TuskysLtd - **Presentation 2: Caroline Mbugua, Bridges Organic Restaurant** **Presentation 3**: **Dr. Pietro Campus** - Organic farming and the role of certification systems: A success story in Italy. **Presentation 4: Dr. Upendra Nath Roy -** Development and Organisation of Organic Farmers Market at Chandigarh, India **Moderator:** Dr. Frank Eyhorn	and Certification Expert **Presentation 2**: **Andrien Sibomana**, **BOAM** - *The use of local fertilizers and bio pesticides is the winning solution* **Presentation 3**: **Samuel Ndungu, Programme Manager, KOAN** - Case study of consumer attitudes and preferences on organic foods in East Africa **Presentation 4**: **Lise Chantal,** CEO ROAM **Presentation 5**: Martha Kihara, Fun Zone Organic Farmers **Moderator:** Prof. Charles Ssekyewa
	1.00pm – 2.30pm	**LUNCH BREAK**			
	2.00pm – 3.30pm	**PLENARY SESSION 5: FOOD SECURITY, NUTRITION AND SUSTAINABLE CONSUMPTION** **Keynote Speaker:** Mr. Andre Leu, Co-Founder Regeneration International, Former President IFOAM OI: ***Why We Need Agroecological Food And Farming Systems*** **Presenter 1**: Dr. Million Belay, Coordinator of Alliance for Food Sovereignty in Africa (AFSA): ***Adapting Agriculture to Changes in Africa – The Path to Agroecology*** **Presenter 2:** Ms. Gladys Mugambi, Ministry of Health: ***Nutrition, Health and Agriculture*** **Presenter 3:** Dr. Dennis Garrity, Drylands Ambassador, UN Convention to Combat Desertification: **and Chair, Evergreen Agriculture Partnership:** ***The Perennialization of Agriculture: Vision for an Agroecological Future*** **Case Study 1**: Ms. Barbara Zilly IFOAM OI - *Drivers of Change for Sustainable Nutrition based on Nutrition in Mountain Agro-Ecosystems (NMA*) **Panelists**: Andre Leu/ Dr. Million Belay/ Dr. Peter Mokaya / Barbara Zilly /Gladys Mugambi / Esther Bett/ Caroline Mbugua/ Sylvia Kuria - Farmer **Moderator:** Ms. Anne Maina – National Coordinator, Biodiversity and Biosafety Association, (BIBA) of Kenya.			

	3:30pm – 5.30pm	**BREAKOUT SESSION 9:** **Focus:** Impact of synthetic inputs **Main Speaker: Dr. Million Belay, Coordinator AFSA** **Presentation 1**: **Gideon Oluwasogo Odewale -** Human health risk assessment of Dichlorodiphenyl trichloroethane (DDT) and Hexachlorocyclohexanes (HCHs) in fruit vegetables in South western Nigeria **Presentation 2**: **Prof. Ratemo Michieka** - The Compromise: Pesticides Use, Food Security or Environmental Pollution **Presentation 2**: **Dr. Bollmohr, S. -** Banned pesticide use in Kenya- an urgent need to move towards sustainable agriculture **Moderator:** Ms. Barbara Zilly	**BREAKOUT SESSION 10:** **Focus:** Alternative technologies and methodologies to reduce synthetic input use and contamination **Main Speaker: Dr. Julius Mwine** **Presentation 1**: **Jane W. Wangu -** Effect of organic and inorganic amendments on the population of nematode destroying fungi **Presentation 2: Dr. Victor Dania** - Biocontrol efficacy of Trichoderma species against rot-inducing post-harvest fungal pathogens of white-fleshed sweetpotato (Ipomoea batatas L. **Presentation 2: Toyin Abolade -** Perception of the effect of climate variability on maize yield among organic crop faarmers in Anambra State, Nigeria **Moderator:** Prof. Rhoda Birech	**BREAKOUT SESSION 11:** **Focus:** Drivers of adoption of Agroecological systems **Main Speaker: Anne Majani, Hivos -** *Contributing towards transforming food system* **Presentation 1: Dr. Ann Muriuki** - Motivation for organic agriculture practice and input use in selected counties in Kenya **Presentation 2**: **Dr. Charles Odhong -** Investment in agricultural research for development: what role for agroecology? **Moderator:** Mr. Samuel Ndungu	**BREAKOUT SESSION 12:** **Focus :** Creating an enabling policy and legislative environment for the organic sector **Main Speaker: Mathius Wafula, Ministry of Agriculture, Livestock, Fisheries & Irrigation –** *Progress towards development of national organic policies: The case of Kenya* **Presentation 1: Prof. Rapahel Wahome -** Policy implications raised by the results from the ProGrOV project **Presentation 2: Dr. Daniel Maingi -** Beyond industrial Agriculture: Pesticide use and the legislative landscape in Eastern Africa and beyond **Moderator:** Mr. Eustace Gacanja
	5.30pm – 6.00pm	**POSTER VIEWING AND B2B NETWORKING SESSION**			
	6.00pm – 10.00pm	**GALA DINNER – BIOVISION AFRICA TRUST (BvAT) 10TH ANNIVERSARY CELEBRATION**			
DAY THREE: THURSDAY 20 JUNE, 2019					
DAY 3	**Timings**	**Activity**			
	7.00 am – 8.30 pm	Breakfast meetings organized by different organizations Viewing of posters/ exhibitions			
	8.30am – 10:00am	**PLENARY SESSION 6: POLICIES AND LEGISLATION: MILESTONES IN SYNTHETIC FERTILIZERS AND PESTICIDES REDUCTION, SCALE UP OF AGRO-ECOLOGY AND ECOLOGICAL ORGANIC TRADE**			

Thursday 20 June, 2019		**Keynote Speaker:** Dr Simplice Nouala, Head of Division, Agriculture and Food Security, Africa Union Commission (AUC) **Presenter 1:** Dr. Frank Eyhorn (PhD), Vice-President, IFOAM OI and Senior Advisor, Helvetas - *Coherent policies driving sustainable agriculture and food systems* **Presenter 2:** Mr. Hakim Baliraine, Chair - East and Southern Africa Farmers Federation **Case Study 1**: Dr. Edith Kareko – Munene, Policy and Legislation Consultant - *The Legislation and Policy Environment for Ecological Organic Agriculture in Ethiopia, Kenya and Uganda* **Case Study 2**: Mohammed Anwar, Heliopolis University, Egypt **Panelists**: Dr Simplice Nouala / PS Prof. Hamadi Boga / Daniel Maingi / Hakim Baliraine / Edith Munene / Wanjiru Kamau / Hon. Dr. Jack Gutu, CEC Agriculture Kirinyaga County **Moderator:** Prof. Raphael Wahome, University of Nairobi, (UoN)			
	10:00am – 11.30am	**BREAKOUT SESSION 13:** **Focus:** Impact of Synthetic inputs **Main Speaker: Prof. Rhoda Birech –** *Pesticides residues on Vegetables* **Presentation 1**: **Valence Mutwedu** Growth and reproductive parameters impairment of glyphosate (herbicide) in male guinea Pig (Cavia porcellus) **Presentation 2**: **Prof. Timothy Olabiyi** Comparative effects of biological and synthetic nematicides in the management of nematode pests of okra **Moderator:** Ms. Ivy Saunyama	**BREAKOUT SESSION 14:** **Focus:** County Government Experiences in Policies & Legislations in Support of Agroecology based Programmes **Main Speaker: Stella Lutalo - Pelum Uganda** *– Uganda experiences in Agroecology Scale up Initiatives* **Presentation 1**: **Mr. Gathuru Mburu, MCA Lari, Githunguri** **Panelists:** Hon. Joseph Kamau, CEC Kiambu Hon. Jack Ngutu, CEC Muranga **Moderator:** Ms. Wanjiru Kamau	**BREAKOUT SESSION 15:** **Focus:** Role of knowledge platforms in promoting the Organic Sector **Main Speaker**: **Laura Tibet,** Access Agriculture **Presentation 1: Gerald Herrmann** The importance of digital transformation for a sustainable economic development of the organic sector **Presentation 2: Su Kahumbu, CEO Green Dreams TECH –** Experiences of iCOW platform as a knowledge service **Presentation 3: Monique Hunziker and Belinda Weya –** Infonet - User friendly knowledge platform **Moderator:** Mr. Willis Ochilo	**BREAKOUT SESSION 16:** **Focus:** Partnerships, Networking and Financing Innovations **Main Speaker: Malick Kane, UNCTAD** **Presentation 1**: **Dr. Nicholas Ozor** **Presentation 2**: **Hon. Patrick Wainaina MP Thika Town and Chairman Jungle Macs Ltd -** Smallholder farmer access to finance through Jungle Mhela system **Moderator:** Zachary Makanya

	12.00pm – 1.30pm	**PLENARY SESSION 7: OFFICIAL CLOSING CEREMONY** **Awards:** Winners of the Pesticides Challenge **Reading:** Communiqué and Call to Action **Reflection:** Outcomes of the Meeting and Lessons Learnt **Closing Remarks:** Host and Partner **Launch:** Call to Action **Vote of Thanks:** Alex Mutungi, EOA Continental Steering Committee Secretariat **Moderator:** Dr. David Amudavi, BvAT
	1.30pm – 2.30pm	**LUNCH AND DEPARTURE**
	2.30pm 5.00pm	**CITY TOUR FOR INTERNATIONAL GUESTS (OPTIONAL)**
DAY FOUR: FRIDAY, JUNE 21, 2019		
DAY 4: Friday 21 June, 2019	**7.00 am – 4.30 pm**	**EXCURSION: FARM VISITS – ORGANIZED BY KOAN & GreenRhino LTD**

EXECUTIVE SUMMARY

The inaugural conference on Agroecology Transforming Agriculture and Food Systems in Africa was convened in Nairobi, Kenya at the Safari Park Hotel and Casino from the 18th – 21st June 2019. Jointly convened by Biovision Africa Trust, IFOAM Organics International and World food Preservation Centre LLC, the conference brought together an unprecedented number of national, regional continental and international agroecology and agribusiness development stakeholders under the theme: ***Reducing Synthetic Fertilizers And Pesticides By Scaling Up Agro Ecology And Promoting Ecological Organic Trade*.** In total 410 delegates attended the conference. Over the four days, the delegates were afforded an opportunity to participate in pre-events, one-on-one breakfast/lunch/dinner side events, the seven (7) conference plenary sessions and the sixteen (16) breakout sessions. In addition, there were more than 20 exhibitors who displayed innovative products and technologies including educative posters, organized field excursion to selected organic enterprises where delegates were able to experience hands-on the on-going organic agriculture efforts, the notable celebration of the 10th anniversary of the co-convener Biovision Africa Trust at a colourful one of its kind purely organic gala dinner hosted at the venue and award giving ceremony to the top agroecology champions who had been nominated, vetted and approved. The conference rallying mantra was: ***An Action towards Sustainable Health, Nutrition, Consumption and Trade.***

The response by international renown speakers of agroecology drawn from all the continents representing international organizations validated the conference as " a truly international conference". Indeed it was a knowledge packed-experience based, thought leadership focused- learning based and solution oriented conference. Presentations were anchored on best practice, evidence backed revelation that was aimed at eliciting discourse around fundamental issues that affect humans, animals, plants and the planet in the context of sustainable development not just now but also for the coming generations. The conference also provided a platform for a wide spectrum of stakeholders to network, engage socially and intellectually as they look at transformation of Africa's agriculture and food systems.

The conference structure was designed in such a way that the seven plenary sessions were used for discussing the key thematic subjects namely*: 1)* ***Impact of synthetic fertilizers and pesticides: need for healthy and sustainable agriculture and food systems, 2) scaling up agroecology practices and systems, 3) strengthening regional ecological organic trade, 4) food security, nutrition and sustainable consumption, and 5) Policies and legislation, milestones in synthetic fertilizer and pesticides reduction.***

The hallmark of the conference was the leadership roundtable that drew executive directors/chief executive directors from renowned organizations including FAO and EAC who set the scene by grounding the conference through insights of the current status of agriculture and food systems in Africa with comparison from across the globe. The Keynote speaker Dr. Hans Herren, President Millennium Institute and Biovision Foundation anchored the conference by delivering a powerful presentation on: **Pathway to food system transformation in Africa**. He reiterated that, when handling the challenge of food system transformation in Africa there are four questions that leaders and stakeholders must strive to address: **Why** transformation? **What** needs to transform? **How** will Africa transform? and **Who** is responsible for the transformation? The pathway to transformation is possible however it will need a radical paradigm shift from 'doing business as usual' as it is no longer an option for Africa, to doing things differently and responsibly. The desirable transformation must take a systemic approach that looks at the entire ecosystem as one huge complex yet interdependent unit whose functionality/and or dysfunctionality in one unit has an impact on all other connected units. Africa therefore will require moving from uniformity

to biodiversity and FAO has already laid a basis for scaling out through the 10 agroecology principles that have been experimented and proven to work.

The 16 breakout sessions further provided delegates opportunities to expound on the thematic subject areas coupled with cases that demonstrated best practice in the subject areas. The Communique was developed and captured the call to action and plans that emerged from the agroecology conference 2019. Included, in the Communique was the decision of the delegates and partners to be holding biannually Africa's agroecology conference to maintain the conversation, momentum and progressively celebrate milestones as well as measure progress on agreed upon action plans. The second international agroecology conference in Africa will be held in 2021.

Figure 1: Biovision Africa Trust 10th Anniversary Celebration

LIST OF ACRONYMS

AfCFTA	Africa's Continental Free Trade Area
AFSA	Alliance for Food Sovereignty in Africa
AR4D:	Agricultural Research for Development
AUC	African Union Commission
AU:	African Union
AU-EOAI	Africa Union (Heads of State Decision) on Ecological Organic Agriculture Initiative in Africa
BvAT	Biovision Africa Trust
CAADP	Comprehensive Africa Agriculture Development Programme
CAET	Characterization of Agroecology Transition
CDC	Centers for Disease Control and Prevention
CFTA	Continental Free Trade Area
DDT	Dichlorophenyltrichloroethane
EOA	Ecological Organic Agriculture
EOAM	East Africa Organic Agriculture Movement
EPOPA	Export Promotion of Organic Products from Africa
ESS	Environmentally Sustainable Systems
FAO	Food and Agriculture Organization of the United Nations
FSANZ	Food Standards Australia New Zealand
GE	Genetic Engineering
GHGs	Green House Gases
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
GIZ	Deutsche Gesellschaft Fur Internationale
GMOs	Genetically Modified Organisms
GWP	Global Warming Potential
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
IFOAM OI	International Federation of Organic Agriculture Movement – Organics International
IIED	International Institute for Environment and Development
IPES - Food	International Panel of Experts on Sustainable Food
IPM	Integrated Pest Management
KCOA	Knowledge Centre for Organic Agriculture in Africa
KESSFF	Kenya Smallscale Farmers Forum
KOAN	Kenya Organic Agriculture Network
MOALF&I	Ministry of Agriculture, Livestock, Fisheries and Irrigation
MRLs	Maximum Residual Limits
NCDs	Non Communicable Diseases
NEPAD	New Partnership for Africa's Development
OCA	Organic Consumer Alliance
OGS	Organic Guarantee Systems

OSEA	Organic Standards and Certification Capacity in East Africa
PELUM	Participatory Ecological Land Use Management
PGS	Participatory Guarantee Systems
RAC	Rainforest Alliance Certification
RECs	Regional Economic Communities
SANREM	Sustainable Agriculture and Natural Resource Management
SDGs	Sustainable Development Goals
SIDA	Swedish International Development Agency
SSNC	Swedish Society for Nature Conservation
TOAM	Tanzania Organic Agriculture Movement
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USD	United States of America Dollar
USDA	United States Department of Agriculture
VVS	Voluntary Sustainability Standards
WFPC	World Food Preservation Centre ®LLC

1.0 BACKGROUND OF THE CONFERENCE

Revisiting Synthetic Pesticides and Fertilizers in Africa

Worldwide, an estimated 3.5 billion kilograms of pesticides is applied to crops each year, and that number is steadily increasing as developing nations are gradually transitioning over to chemical-based industrial agriculture in a seemingly misguided and misinformed effort to increase yield and lower cost. The use of chemical fertilizers and pesticides has been linked to a number of environmental problems and issues. The chemicals contained in them not only stay on the plants they are used on, but also seep into the soil, the ground water, and are carried by the breeze sometimes for miles where they then contaminate other plants. The risk these chemicals pose to human health is even more worrying. According to the UN, 90% of synthetic pesticide fatalities come from developing countries and estimated costs from synthetic pesticide poisonings in sub-Saharan Africa now exceed the total annual overseas development aid given to the African region for basic health services. By 2020, if not curbed, the accumulated cost of illness and injury linked to pesticides in small-scale farming in sub-Saharan Africa could reach US$90 billion. Moreover, the future of food production will not and cannot look like current conventional agriculture. The negative externalities of just one part of that system–synthetic nitrogen fertilizer– is compounding and accelerating the interrelated problems of fossil fuel dependency, soil degradation, water pollution, human health and global warming.

To reduce the increasing negative effects of the chemical-based agriculture, various partners coordinated by the World Food Preservation Centre©LLC (WFPC) decided to organize the "All-Africa Congress on Synthetic Pesticides, Environment, Human and Animal Health" aimed at reducing the deadly impact of synthetic pesticides in Africa. It is the first conference of its kind, to bring together experts from the agricultural, environmental and health sectors to deliberate strategically and effectively tackle this "wicked" problem.

The planned conference considered for the first time the total impact of synthetic pesticides on African populations, their animals, their living environment, and government/household economies. The most effective technologies and strategies to mitigate the negative impact of synthetic pesticide contaminations were encouraged for presentation and recommendations made.

Making Agroecology the foundation of food and agriculture systems

There has been a growing interest in agroecology in recent years as an innovative and sustainable response to the challenges facing our food and agriculture systems. In particular, this has been since 2014 with FAO playing a leading role in facilitating global dialogue on agroecology. By holding 9 regional and international multi-stakeholder meetings, more than 2,100 participants from 170 countries have come together to discuss the potential of agroecology to transform food and agriculture systems, as well as identify needs and priorities to scale up agroecology as a strategic approach to achieve Zero Hunger and the rest of the Sustainable Development Goals (SDGs). This process culminated in the 2nd International Symposium on Agroecology in April 2018 in Rome, where FAO and UN Partners launched a Scaling Up Agroecology Initiative, marking a shift in focus from dialogue to action. With the Scaling Up Agroecology

Initiative by FAO, there has been drive for sharing enough evidence of how application of knowledge and practices of agroecology are creating impact to inform policy and continued wide-scale application by farmers. This further is pushing the need for:

- Harnessing the growing body of evidence demonstrating positive impacts of agroecology using a unified and robust framework to allow for local context – specificity analysis and flexibility for data aggregation and meta-analysis on the multi-dimensional performance of agroecological systems to inform practice and policy action.
- Sharing success practical examples of agroecological systems and practices demonstrating multiple benefits (economic, environmental, social, cultural, etc.) to motivate wide-scale adoption and application.
- Strategies of using evidence and successful cases to promote scaling up of agroecological systems.
- Strategies to promote local and export marketing and utilization of produce from Agroecological practices.

Scaling Up Agroecological Practices and Systems through the Global Advocacy Project (GAP)

The "Global Advocacy Project (GAP) 2017-2020" implemented by Biovision Africa Trust (BvAT) and Participatory Ecological Land Use Management (PELUM) Kenya, funded by Swedish Society for Nature Conservation (SSNC) and others aims at contributing to the Scaling up Agroecology Initiative and at bringing the agroecology discussion to policymakers and other key stakeholders in Eastern Africa, particularly Kenya, Ethiopia and Uganda. The conference was a key moment to spread the ideas to stakeholders, media, policy makers and interested public. It was also a key output for the SSNC supported GAP project. The outcomes of this conference will directly influence Ecological Organic Agriculture (EOA) at national, regional and continental levels. Thus, the GAP project offers complementary and side support to the EOA six pillar work through civil society support action. Through the GAP project BvAT and PELUM Kenya are supporting the advocacy component of the EOA work in East Africa. The project incorporates a trade component of the ongoing Organic Trade and Value Chain Development in East Africa (OTEA). The regional conference was considered appropriate for strengthening organic markets and trade.

The Organic Trade and Value Chain Development in East Africa (OTEA) Project

The Organic Trade and Value Chain Development in East Africa (OTEA) project is in the last phase of a long standing (starting with the Export Promotion of Organic Products from Africa –EPOPA project 1995 - 2008) investment by Swedish International Development Cooperation and Agency (Sida). The project is implemented across five East African countries: Kenya, Uganda, Tanzania, Rwanda and Burundi through the National Organic Agriculture Movements (NOAMS). The main objective of OTEA is "to increase trade with organic products, by supporting development of enabling regional policies, a capacitated production and trade environment, and an increased consumer awareness".

The following aspects are in focus:

- Emphasizing the policy / advocacy component at local, national and regional level and facilitating processes for organic policies to mainstream organic agriculture.

- Supporting regional African processes to better exchange information, learn from each other and identify most critical issues to be addressed.
- Inclusive approach that involves governments, private sector representatives, NGOs, and considering gender and youth aspects

During the final year of the project it is planned that there will be the organization and implementation of a regional conference that will focus on showcasing the OTEA achievements and good practices at grassroots level up to the national and regional policy dialogue. It is expected to pave the way for a sustainable organic trade development in East Africa in particular and Africa in general.

1.2 CONFERENCE SUMMARY

Biovision Africa Trust jointly with IFOAM Organics International and World food Preservation Centre LLC organized the maiden international conference on Agroecology Transforming Agriculture and Food Systems in Africa themed: *Reducing Synthetic Fertilizers and Pesticides by Scaling up Agroecology and Promoting Ecological Organic Trade.* The main goal of hosting the conference was to provide a platform that will facilitate a conversation on how to move towards establishing more truly sustainable food and agriculture systems in Africa through Agroecology including Ecological Organic Agriculture. Based on evidence of successful practitioners in the field and in the global trade, and based on the calls of world leaders in agriculture including from FAO and the African Union, agroecology/ecological organic production systems are the true future of Africa's food systems. As such the conference premised itself at coming up with "*An Action towards sustainable Health, Nutrition, Consumption and Trade".*

The four (4) day conference brought together stakeholders from Farmers and Farmer Organizations, Researchers, Extensionists and Practitioners, Civil Society and NGOs, Traders and Private Companies in the Organic Industry, Consumer Associations, Strategic Partners and Donor Agencies, Policy Makers, Academia and the Media who engaged in dialogue on sustainable agriculture and food systems. The event attracted more than 20 exhibitors who show-cased their technologies and innovations to an audience of over 400 participants creating a network for business and exchange of ideas.

The conference was organized around five thematic areas that attracted 20 Keynote speakers and 59 presenters from across the world. The thematic areas were:

1. Reducing Synthetics fertilizers and pesticides: sharing on the impact of synthetic inputs and proposing alternative environmentally based technologies and methodologies to reduce synthetic pesticide use and contamination.
2. Scaling up Agroecology: this theme looked at frameworks, methods of performance assessment and scaling up strategies for Agroecology and shared on available and potential partnerships, networking and financing innovations
3. Best practices towards food security, nutrition, consumption and health.
4. Strengthening ecological organic trade, markets and economy.
5. Policies and legislation success efforts in synthetic fertilizers and pesticides reduction, agroecology and ecological organic trade.

On the thematic area of **impact of synthetic fertilizers and pesticides** presentations demonstrated the impact of indiscriminate use of synthetic pesticides and fertilizers on human, plants, animals and environmental health and the possible mitigation measures to reduce the associated health risks. Scientific studies undertaken on animals particularly frogs, rats, fish and selected wildlife showed the impact of pesticides on growth and development of animals. For instance, a study conducted on frogs demonstrated that Atrazine affects sperm count and contributes to sub fertile male frogs to a larger extent leading to feminization of male frogs. From the study, Atrazine's effects on rats included: prostate and mammary cancer, immune failure, neural damage, abortion, impaired mammary development and generally impaired growth and development. This implies that, these manifestations in animals are likely

to be similar manifestations in humans. Cutting edge data and information were presented that showed while Monsanto claims that glyphosate is the "active ingredient" in Roundup formulations, to the contrary they deliberately concealed the so called "inert" compounds in Roundup which are the actual active ingredients and are up to 100,000 more toxic than glyphosate. The results are akin to an international fraud and a human rights abuse of monumental proportions. This is particularly relevant in view of the recent court cases, three in the USA and one in France where Monsanto has been sued and couldn't successfully defend the cases; an indication of the toxicity of Roundup, the most widely used and sold herbicide in the world.

A big concern was noted on the misuse of pesticides on wildlife. Selected studies presented during the conference demonstrated how the use of pesticides on wildlife affects the ecosystem. The pesticides do not only affect the wildlife's environment but also other life forms like humans, plants and even organisms in the water systems.

Important questions to answer regarding the use of synthetic fertilizers and chemicals are: Why do we apply synthetic fertilizers and chemicals? Do we have the knowledge and understanding of these chemicals? What are the policies behind them and who stands to benefit in all these? Why can't we promote alternative bio pesticides that have been developed by Africans and have proven to give scalable results instead of being recipients of what other continents are producing and, in some instances, dealing in pesticides that are already banned elsewhere? How do we want to produce food and have a healthy environmental relationship?

On the thematic area of **Scaling up Agroecology Practices and Systems**, the conference noted that the current agriculture and food production systems cannot withstand the rising global challenges such as exponential population growth, climate change, environmental degradation, and poverty among others. They are intertwined with triple burden of malnutrition (hunger, micronutrient deficiencies and obesity) non-communicable diseases such as cardiovascular conditions, respiratory complications, cancer and diabetes, environmentally unsustainable systems as a result of biodiversity losses, water pollution, soil degradation, Green House Gas emissions, unsustainable use of natural resources, low resilience); and social inequities such as poverty, disempowerment and neglect of cultural values. Agroecology and associated systems such as the Ecological Organic Agriculture (EOA) and Sustainable Land Management (SLM) can overcome such challenges while harnessing emerging opportunities. A meta-analysis of 50 case studies from 22 African countries shows the contribution that Agroecology can make in this respect and to the attainment of the United Nation's Sustainable Development Goals. Agroecology offers the agricultural sector the platform for broad based sustainable solutions that deliver beyond food and nutrition security, economic development to ensuring that, there is ***healthy planet, people and sustainable profits for the current and future generations.*** There is need for shifting the paradigm to focus on increasing production but in a sustainable manner. There is need to look at entire agricultural systems and have a systemic approach on how we practice agriculture. We need to focus on systems change and not just climate change.

The thematic area of **Food Security, Nutrition and Sustainable Consumption** reiterated that production and productivity are declining at an alarming rate and research has shown that from the 1960s, there has been 10% less food per person in Africa since the inception of pesticide based industrial agriculture. The

population is increasing exponentially and according to FAO reports (2019), this population is projected to hit a high of 9.1 billion by 2050 which by extension demands the raising of the current food production by over 70% between 2005/7 and 2050 with production of the same food in developing countries having to almost double. The planet is straining to produce enough food, fodder, fuel and feed for humans and animals. Nutrition is important for the wellbeing and health for all and boosts gross national product by 11% in Africa and Asia. It prevents child deaths by more than one third per year, improves school attainment by at least one year, increase wages by 5-50% and reduces poverty. However, due to poor diets, there has been rising cases of lifestyle diseases and malnutrition linked to poor consumption habits. There is need to change the food and agriculture systems with safety and nutrition at the core of decision making. Replication and scaling up sustainable agriculture practices to promote improved nutrition and resilience driven by an action network of empowered multipliers should be targeted to create broad impact at micro, national and global levels. Whereas there are pressures such as the push for GMO - based technologies, they continue to attract mixed reactions due to inadequate information and knowledge. Most GMOs research have been done on animals which do not provide a comparable and convincing basis for extrapolating conclusions on their effects on humans.

On **Strengthening Regional Ecological Organic Trade, Markets and Economy** the conference noted, there exist minimal data and statistics available on domestic organic markets in Africa. There were key concerns that organic production targets export markets and the elite consumers with limited promotion for domestic market consumption. The critical question the session tried to answer was: Why should healthy and organic products be more expensive than junk and unhealthy foods? Organic agriculture products should be ideally cheap given the inputs being utilized. Organic Agriculture should be driven by its health and safety factors on plants, animals, humans and environment. Making certification work for smallholder producers and expanding intensified consumer awareness are important aspects for promoting organic trade particularly at the domestic market level.

On the thematic area on **Policy and Legislation** the conference decried that the policy and regulatory development processes in most African countries were lengthy and tedious. Moreover, most policymakers do not believe that agroecology can feed the growing global population; hence they do not invest in it contrary to the growing evidence for its multiple benefits about economic and social development and environmental conservation. Agroecology contributes to the achievement of the global Sustainable Development Goals (SDGS) and Africa's Agenda 2063 in many ways including sustaining livelihoods, fighting hunger, environment protection and climate change among others. With African Heads of State and Government Decision on Organic Farming Doc. EX.CL/631 (XVIII) the African Continent has authority from all heads of state to move systems of Agroecology and have a transformative change in the continent. Therefore, valuable policies geared towards transforming agriculture should answer the following key questions; How can we produce more food without destroying the environmental support systems? How can we produce more safe, nutritious and healthy food in a sustained way without affecting the biosphere? How can we produce culturally appropriate food which is nutritious and healthy in a just way?

1.3 SUMMARY OF THE CONFERENCE ABSTRACTS

Together with a dedicated and experienced team of scientists and developments practitioners, with trans-disciplinary knowledge and skills, ranging from pesticides and agro-ecology expertise, to practitioners of agro-ecology and organic trade, the abstract review team achieved the unviable task of delivering a well selected "mixed bag" of abstracts which contributed to the body of scientific knowledge, in general and specifically in the area of the science and practice of agroecology and its benefits to the ecosystem. The committee received a total of 156 abstracts; 105 under thematic area 1; 11 under thematic area 2 and 27 under thematic area 3; 10 under thematic area 4; and 3 under thematic area 5. The Abstracts Review Committee assessed all of them and accepted 49 for oral presentation, 74 for poster presentation, and 33 abstracts were rejected. To ensure the highest quality and eliminate reviewer bias, each abstract was reviewed by at least two reviewers, who were paired with one regional and international reviewer.

The scope and range of abstracts, for both oral and poster presentation, came from among others: genetic scientists, toxicologists, endocrinologists, ecologists, plant pathologists, soil scientists, weed scientists, environmental experts, sociologists, a range of plant and animal scientists, veterinarians, nutritionists, epidemiologists and finally, food safety and health experts. The abstracts were selected to highlight the challenges/problems of the conventional paradigm of food production and consumption, especially with regard to food safety concerns and to inform policy shift and transformation towards scaling up of agroecological practice and trade, as part of sustainable food systems, in Africa. This focus is in tandem with various national and global declarations including the Sustainable Development Goals (SDGs) call for: ***"People, Planet and Profits, Leaving no one Behind***".

The Agroecology Conference presented a unique platform for business unusual- informed by the realization that previous Conferences addressed "piece-meal" issues of the disjointed and dysfunctional current conventional "chemical mono-culture industrial" food system which is unsustainable, due its reductionist and "silos' approach. This Conference identified abstracts with top quality scientific evidence to transform policies towards a more sustainable agro-ecological food system and related trade practices. Towards that end, a *systems thinking approach* and agro-ecological model informed the basis of abstracts selection in addition the standard rigor of scientific relevance and appropriateness of the content of the abstract to address the "triple goal" of the Conference, namely; to identify the problem (synthetic pesticides and fertilizers), and the two phase solution of an alternative food system, scaling up agro-ecology while concurrently scaling up organic trade to support livelihoods and trade.

The committee envisaged that the content of the Conference Proceedings was going to positively inform and influence policy and practice. The proceedings of the 3-day Conference, will result in a "take home" package in the form of the Book of Abstracts and Conference Proceedings Booklet (including e- copies) which convey this one message: " That sustainable food production and consumptions systems contribute to the health of the environment, the soil and ultimately human health..". *A One Health Approach*: Like Hippocrates stated in 431 BC, "*let food be there medicine*…" from the evidence in the Conference Proceedings, let there be a realization that "*without food safety, there cannot be food security*"-WHO-FAO and that "*without* food security, there cannot be Universal Health Coverage (UHC)"…pillars of the Big 4 Agenda in Kenya including similar efforts in other African countries, and including reducing new cases of cancer.

1.4 COMMUNIQUÉ/CALL TO ACTION

Communiqué of the *1st International Conference on* Agroecology Transforming Agriculture and Food Systems in Africa Held From 18th – 21st June 2019, at the Safari Park Hotel and Casino Nairobi, Kenya

Biovision Africa Trust, jointly with *IFOAM Organics International* and *World food Preservation Centre* organized the maiden conference on Agroecology Transforming Agriculture and Food Systems in Africa with the theme: *Reducing Synthetic Fertilizers and Pesticides by Scaling up Agroecology and Promoting Ecological Organic Trade.* The main goal was to provide a platform that will facilitate a conversation on how to transform and establish more truly sustainable food and agriculture systems in Africa.

Following the presentations, discussions and recommendations at the Conference attended by almost 500 participants from 20 countries around the world a Call to Action was made as presented below:

1. The Conference **CALLS UPON** all African Governments to comply with their commitments and coherently align respective policies to the declarations and agreements including SDGs, Agenda 2063, United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD) agreements and to implement the African Union Heads of States and Governments' Declaration on Ecological Organic Agriculture of 2011.

2. The Conference **APPLAUDS** efforts being undertaken by individuals, organizations, companies and government agencies to promote agroecological transformation that provides diverse, safe, healthy and nutritious food in the face of challenges including climate change, biodiversity crisis and growing demand, and that is inclusive of women, youth and indigenous knowledge.
3. The Conference **REJECTS** promotion of harmful practices especially the highly hazardous pesticides, banned harmful pesticides, GMOs and the channeling of rejected export food commodities to Africa.
4. The Conference **CALLS UPON** all key stakeholders to allocate resources to scale up agroecology based interventions to generate safe and innovative alternatives to improve soil regeneration and pest control while working with small scale women, youth and men farmers in promoting and safeguarding farm managed seed systems and indigenous knowledge.
5. The Conference **URGES** all stakeholders in agricultural value chains and related sectors (e.g. health, education, environment, trade and finance) to increase awareness and education on the adverse effects of synthetic pesticides, fertilizers and GMOs on health of humans, animals, plants and the environment and to promote ecological organic trade and consumption of safe, accessible, affordable and acceptable organic products by all.
6. The Conference **CALLS UPON** governments and their relevant institutions, farmers and farmer organizations, development partners and the private sector to avail resources to implement the agreed agroecology agenda and to convene platforms including a biannual African Agroecology Conference for experience sharing, learning and collaboration and thereby build the basis for a sustainable, long-term food and nutrition security and poverty reduction.

1.5 COMPONENTS OF THE CONFERENCE

Introduction

The world is facing multiple challenges including poverty, hunger and malnutrition. The global society has unfair distribution of wealth and power. There is wanton destruction and loss of biodiversity which for some is already forever. The natural resources like soils and water are deteriorating and the planet's climate is changing at an alarming and almost irreversible rate. Agriculture and related value chains, as presently practiced, are among the main causes of these challenges and are also responsible for bringing the planet to its limit. But it's also recognized that agriculture, done differently, can be part of the solution. If we get it right with agriculture and food systems, we get it right for people and the planet. There is a wide consensus that we need to move towards more sustainable agriculture and food systems and that business as usual is no longer an option. Agroecology, including ecological organic agriculture, offers practical solutions to most of the major global challenges.

Previous conference held in Addis Ababa in November 2016 dubbed: Addis Ababa Declaration on Agroecology, Ecological Organic Agriculture and Food Sovereignty: The Way Forward for Nutrition and Health in Africa called upon and urged the African continent leadership, the private sector, the farmers and their associations, the development partners and other actors to adopt and support a compelling, appropriate and inclusive narrative for sustainable and equitable food systems in Africa. Based on evidence of successful practitioners in the field and in the trade around the world, based on the calls of world leaders in agriculture including from FAO and African Union, the conference is compelled to believe that agroecology and ecological organic production systems are the true future of Africa's food systems. These systems are very knowledge intensive and take advantage of both traditional knowledge and modern science through collaboration between farmers and researchers based on mutual respect. They can deliver not only on economic objectives, but also on environmental, social, cultural, nutritional and health objectives.

Such new strategies acknowledge that small-scale farmers already produce 70% of the world's food, and that following agroecological and organic principles and practices, African small- scale farmers can produce adequate food to feed the continent sustainably, provided they have secure access to land, water, seeds/breeds and other natural resources. Acting responsibly, the private sector and its processing food and trade activities can contribute to wealth without hampering ecological, social and economic environments.

In this context, the Conference underscored the call for private and public decision makers to support food and agricultural systems and practices that are healthy, equitable, efficient, resilient, and culturally diverse, using renewable energy resources. The Conference also emphasized and strongly supported women's role in the production of nutritious food, recognizing the importance of engaging the women, youth and communities as active partners in sustainable food systems. Finally, the Conference endorsed the right of people, communities and countries to define their own food systems, which are ecologically, socially, economically and culturally appropriate to their unique contexts and to empower producers and consumers to make better decisions and choices.

Conference Thematic Topics

The conference was organized around five thematic areas and attracted 20 Keynote speakers and 59 presenters from across the world. The thematic areas were:

1. Reducing synthetics fertilizers and pesticides.
2. Scaling up agroecology.
3. Best practices towards food security, nutrition, consumption and health.
4. Strengthening ecological organic trade, markets and economy.
5. Policies and legislation success efforts in synthetic fertilizers and pesticides reduction, agroecology and ecological organic trade.

Conference Objectives

The overall objective of the conference was to deliberate how to facilitate the establishment of truly sustainable food and agriculture systems in Africa on grassroots, trade and policy levels guided by the following specific objectives:

Reducing synthetic fertilizers and pesticides

i. Raise awareness of synthetic pesticides and fertilizers contamination in the African continent through data and information sharing.
ii. Document the impact of synthetic pesticides and fertilizers contamination on human/animal health and environment in the African continent.
iii. Identify and disseminate appropriate and effective technologies and practices to reduce synthetic pesticides and fertilizers contamination in the African continent.
iv. Identify synthetic pesticides and fertilizers 'skill gaps' and 'knowledge gaps' in Africa's educational and extension systems.
v. Identify effective strategies and policy interventions.
vi. Provide platform for participants to build networks and partnerships for resource mobilization geared towards synthetic pesticides and fertilizer use reduction.
vii. Generate a comprehensive action plan for the reduction of synthetic pesticides and fertilizers contamination in the African continent.

It is increasingly recognized that technologies, practices and innovations drawn on agroecology provide the "solutions" to synthetic pesticide contamination.

Scaling up Agroecology Initiative in Eastern Africa

i. To provide opportunity for sharing concepts and frameworks for implementing and analyzing impacts of agroecological based systems.
ii. To provide a platform for sharing successful processes and cases of agroecological based systems and interventions to motivate information exchange and sharing, scaling up and replication.
iii. To provide opportunity for networking – sharing knowledge and solutions.

iv. To provide a forum to stimulate a multi-sectoral policy dialogue in Agroecological based systems and interventions to contribute to influencing policy decisions and actions towards mainstreaming at local, national and regional levels.
v. To provide an opportunity for a multi stakeholder engagement with Women, Youth, NGOs, Private sector, Governments etc to promote and sustain future partnerships in Agroecology.

Showcasing opportunities and potential of Ecological Organic domestic and regional trade in East Africa

i. To provide evidence of achievements and effectiveness of best practices in processing, marketing and trade of organic products.
ii. To highlight best policy development tools and best practices for supporting public and private sectors.
iii. To share and facilitate business development opportunities and access to knowledge and networks.
iv. To highlight consumer concerns and solutions on how to address them.
v. To discuss private sector needs to accelerate ecological organic trade.

1.6 WELCOME ADDRESS

Welcome Remarks from the Overall Event Organizer

The conference kicked off with welcoming remarks from the overall event organizer Ms. Sylvia Mwichuli who acknowledged the sacrifice made by every delegate represented to come and attend the event. She particularly thanked the farmers and farmer representatives in the room as they are the producers of what humans and animals feed on. They were thus a key stakeholder in the ensuing discussions. Being the 1st ever Agroecology and organic trade conference in Africa, it was envisaged that the conference was the long-awaited platform to contribute to solutions to the agricultural and food systems in the world with regard to production, food and nutrition security.

Sylvia explained the following elements about the conference:

1. Main ball room called Jambo was to host all the plenary sessions.
2. Bougainville, Ivory, Samburu and Tsavo were the breakout sessions conference halls.
3. The foyer of the main ballroom was designated for the exhibitions where delegates were afforded the opportunity every day after sessions and during tea and lunch breaks to visit and learn about selected success cases of agroecology and organic farming including associated practices.
4. The conference had seven (7) structured plenary sessions out of which five (5) were technical based on the thematic areas and the other two were official ceremonial plenaries (i.e. official opening and closing plenaries).
5. There was organized Gala Dinner on the 2nd day of the conference.

Welcome Remarks from the BvAT Executive Director and Co-Organizer of the

Dr. David Amudavi, the Chair of the Local Organizing Committee (LOC), welcomed all to the conference and urged the delegates to use the opportunity afforded to them to discuss, dialogue, talk and envision on agroecology and organic agriculture. The conference was the golden hope for a conversation on how to plant the seed for change in the way Africa does its agriculture and manages its food systems. Further, the conference provided opportunities for establishing collaboration networks beyond the event on agroecology and organic agriculture. The inaugural conference drew interest of 22 exhibitors and was expected to attract an estimated attendance of 500 delegates. He welcomed the participants to spare some moments after the conference to visit farms around the country and enjoy the hospitality that Kenya offers through its beautiful tourist attractions.

1.7 PLENARY PROCEEDINGS

1.7.1 Plenary Session 1: Impact of Synthetic Fertilizers and Pesticides: Need for Healthy and Sustainable Agriculture and Food Systems

Session Moderator: Dr. Peter Mokaya, Executive Director, Organic Consumers Alliance

Keynote Speaker: Prof. Tyrone Hayes Biologist and Professor of Integrative Biology at University of California, Berkley USA: **Impacts of synthetic fertilizers and pesticides on health and on sustainable systems**

Presentations by:

1. Prof. Gilles-Éric Séralini: Co-director of the Network on Risks, Quality and Sustainable Environment (MRSH, University of Caen, France)
2. Prof. Don Huber: Professor Emeritus of Plant Pathology at Purdue University - *Understanding glyphosate's universal toxicity to soil, plants, animals, and humans*
3. Prof. Ratemo Michieka: a former Director-General of the National Environmental Management Authority (NEMA) in Kenya, and founding Vice-Chancellor of Jomo Kenyatta University of Agriculture and Technology and now Professor at the University of Nairobi.
4. Dr. Judy Carman: an Australian medical researcher, Institute of Health and Environmental Research, South Australia - *Are GMOs safe to eat? Current inadequate safety requirements*

Panelists: Madame Ndeiye Maimouna Diene /Dr. Darcy Ogada /Ms. Ivy Saunyama / Prof. Tyrone Hayes / Prof. Ratemo Michieka / Dr. Mwatima Juma

Session Prelude

Worldwide, an estimated 3.5 billion kilograms of pesticides is applied to crops each year, and that number is steadily increasing as developing nations are gradually transitioning over to chemical-based agriculture in a misguided and misinformed effort to increase yield and lower cost. The use of chemical fertilizers and pesticides has been linked to a number of environmental problems and issues. The chemicals contained in them not only stay on the plants they are used on, but also seep into the soil, the ground water, and are carried by the breeze sometimes for miles where they then contaminate other plants. The risk these chemicals pose to human health is even more worrying. According to the UN, 90% of synthetic pesticide fatalities come from developing countries and estimated costs from synthetic pesticide poisonings in sub-Saharan Africa now exceed the total annual overseas development aid given to the African region for basic health services. By 2020, if not curbed, the accumulated cost of illness and injury linked to pesticides in small-scale farming in sub-Saharan Africa could reach US$90 billion. Moreover, the future of food production will not and cannot look like current conventional agriculture. The negative externalities of just one part of that system–synthetic nitrogen fertilizer– is compounding and accelerating the interrelated problems of fossil fuel dependency, soil degradation, water pollution, human health, and global warming.

The aim of this session was to demystify the thematic area on ***reducing synthetic fertilizers and pesticides*** with focus being on creating awareness on ***the impacts of synthetic fertilizers and pesticides*** contamination in the African Continent (on plants, animals, humans and environment) through data and information sharing. Further, based on the evidence from research and experiences on potential best agroecological practices identify, consider, explore and disseminate alternative and effective technologies and practices to reduce synthetic pesticides and fertilizers use and contamination in the African Content.

Key Recommendations

- Chemical pesticides are dangerous to animals, humans, plants and the planet. The effects may not be immediately observed, but in the long term the cumulative damage is almost impossible to reverse. As such, there is need for collaborative effort in addressing challenges of synthetic pesticides and fertilizers by all stakeholders. Integrated pest management approach that utilizes ecologically sustainable technologies is one of the ways to consider in the process of reducing dependence on synthetic chemicals and fertilizers.
- The world needs more tools NOT LESS for combination and comparison including appreciating the contribution of indigenous technical knowledge, plant breeding, conservation tillage, organic farming, variety selection, sustainable resource use and management and biotechnology.
- Monetary value should not be assigned more value when discussing synthetic fertilizers and chemicals than environmental values and that as stakeholders we should not jeopardize the future generations because of science. Guided by these, there is need for development of enforceable regulatory policies and laws to manage production and use of synthetic fertilizers and chemicals and the public MUST speak and take proactive steps. The public can only speak if they have the facts and evidence. This will be achieved through enhancing their capacities through training and awareness creation.
- Decisions to produce and use synthetic fertilizers should be based on evidence from continuous research and stakeholders should be prepared to take bold and sometimes very painful decisions. The same evidence should be used in facilitating the process of influencing formulation of policies and regulations. This will ensure the use of pesticides is based on the right formulations and recommended dosages including application amount, time and duration as clearly specified by the manufacturers. These facts should be known by the public through awareness creation and training.
- As to whether GMOs are safe or not, the conference concluded that all GMOs are organisms whose genetic materials has been altered through genetic engineering techniques. There is lack of comprehensive studies on the effects of GMOs on humans and animals and where some information is available; the research was conducted by industry players and on animals that are not comparable to humans. Further, the tests were done only on selected organs of the animals to observe for tumours and not on cells in the tissue culture. As such conclusions have been based on organisms that are not comparable to humans. The conference therefore recommended a need for: conducting a comprehensive bioinformatics to identify any likely side effects on intended and unintended targets, enforced regulation on production and utilization of GMOs including enforceable regulation on labelling and if GMOs are intended for humans then toxicology and epidemiology studies and tests have to be conducted on people. Government agencies responsible for GMOs regulations should embrace new techniques as the world is changing rapidly and the GMOs are also evolving.

Presentations Highlights

Prof. Tyrone Hayes, Biologist and Professor of Integrative Biology at University of California, Berkely USA: Key Note Address on Impacts of Synthetic Fertilizers and Pesticides on Health and on Sustainable Systems

In his presentation Prof. Tyrone Hayes noted that, by the end of the World War II (1945) the then technologies that were being used for making warfare bombs were transformed and became the same that are currently used in making of synthetic chemical fertilizers for the agricultural sector. The chemicals used in the weapons were designed to kill the target and by the same breath when they are used in the manufacture of pesticides the aim is to kill and cause destruction to pests. Unfortunately, these pesticides designed to kill the target pests sometimes intentionally or unintentionally kill some non-targeted organisms by way of drifting. Groups of biocides used in agricultural production systems include: insecticides, fungicides and herbicides. Drifting of these chemicals causes: contamination of air, water and soils the key natural resources needed for survival by animals, plants and humans.

Figure 2: Images of the World War II Arsenals (L) and Photo of Crop Field Showing Spraying of Pesticides in Progress (R)

D**ichlorodiphenyltrichloroethane,** (DDT) one of the chemicals that has been in use for manufacturing of insecticides has since been banned in most developed countries but is still in use in many African countries. It is one of the biocides that has been responsible for causing cancerous tumours, hormonal imbalance and infertility in humans following its long-term use in agricultural systems. **2,4-Dichlorophenoxyacetic acid** (usually called **2,4-D** Amine) a selective and systemic broadleaf weed killer has been found to be responsible for brain damage, cancerous tumours, birth defects, body malformations and other developmental disorders in humans.

Figure 3: Birth Disorder *2,4-D Amine* *Skin ulcerations/cancerous skin*

Research conducted on frogs has shown that exposure of frogs to Atrazine weed killer has been found to affect sperm count and being responsible for feminization of male frogs (where male frogs produces eggs instead of sperms).

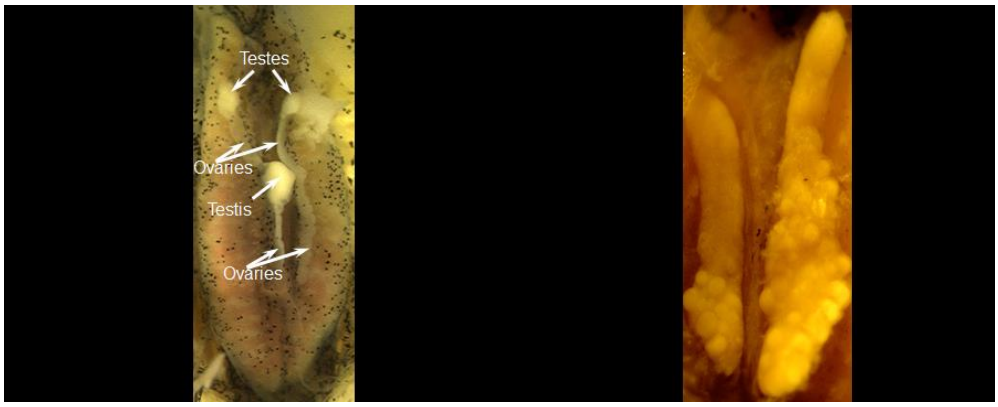


Figure 4: Plate showing male frog's reproductive system with both testis and ovaries (L) with dominant ovaries producing eggs (R)

Cancerous tumours have been observed in fish, reptiles, birds and mammals exposed to Atrazine. In rats Atrazine has been found to cause: prostrate and mammary cancer, immune failure, abortion, impaired mammary development, prostate diseases, neural damage and generally impaired growth and development.

Based on these observations, research has proven that, Atrazine is an example of an endocrine disruptor chemical responsible for mimicking hormones resulting in interference with hormone synthesis, transport, action or degradation. Atrazine causes births defects in humans such as Gastroschisis and Choanal Atresia. Gastroschisis is a birth defect in which the baby's intestines extend outside of the abdomen through a hole next to the belly button. Choanal atresia is a congenital disorder where the back of the nasal passage (choana) is blocked, usually by abnormal bony or soft tissue (membranous) due to failed recanalization of the nasal fossae during fetal development.

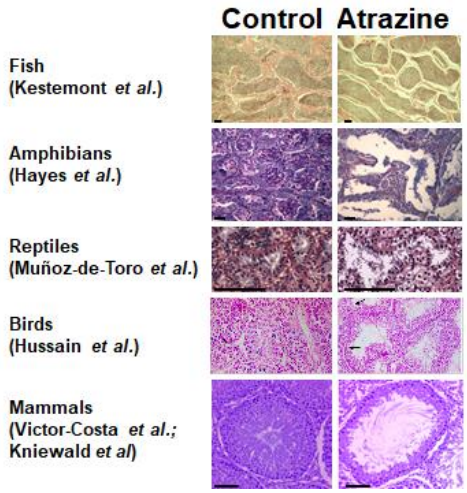


Figure 5: Plate showing research conducted on fish, frogs, birds and mammals cells exposed to Atrazine against a control group

Research conducted in Washington State in 2010, on agricultural related chemical exposures, season of conception and risk of gastroschisis showed that, maternal exposure to surface water atrazine was associated with foetus gastroschisis particularly in spring conceptions. In a related research conducted between 1999 and 2008 in Texas, USA and published in 2013 on the maternal residential atrazine exposure and risk for choanal atresia and stenosis in offspring showed that, offspring of mothers with high levels of atrazine exposure had nearly 2-fold increase risk for choanal or stenosis diseases. A stenosis is an abnormal narrowing in a blood vessel or other tubular organ or structure. Separate research was conducted to establish the extent of atrazine maternal exposure on genital malformations. The findings confirmed that offspring of mothers with high levels of atrazine exposure had a high risk of male genital malformations.

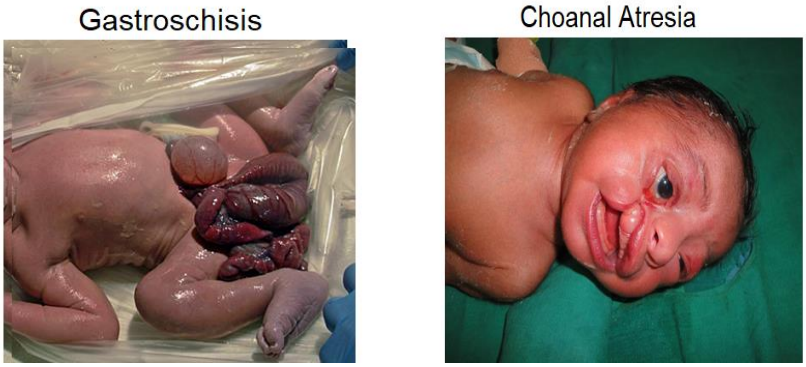


Figure 6: Images of gastroschisis and choanal atresia conditions in children caused by maternal exposure to atrazine

From the research conducted on humans, fish, amphibians it is clear that chemical pesticides are dangerous to animals, humans, plants and the planet. The effects may not be immediately observed, but in the long term the cumulative damage is almost impossible to reverse. The public must speak and act, and this can only happen if awareness creation and education is done on the effects of these chemicals on plants, animals and environment.

Professor Prof. Gilles-Eric Seralini Co-Director of The Network On Risks, Quality and Sustainable Environment (Mrsh, University of Caen, France): Pollutants and the Major Pesticides of the World

Prof. Seralini delivering his presentation through livestreaming informed the delegates that in his over 30 years of research he has never trusted the pesticides toxicology analysis and assessment that is conducted by industry players such as Monsanto. This is because it is always a conflict of interest from the pesticide industry mainly driven by making of profits and against health and safety for humans, plants, animals and environment. Through research, glyphosates pesticides have been found to be very toxic and dangerous. This is because glyphosates are not used alone as chemicals in Roundup formulations, instead they are mixed with hidden compounds that are termed as inert diluents. These inert compounds are assumed to be inactive and non-toxic principles in the glyphosates when in fact research has proven that they are very toxic particularly to non-targeted organisms. The chemicals include petroleum residues and heavy metals. They are more toxic to human cells than their declared active principles. These chemicals are affecting human cells causing malformations, malfunctions, high levels of cholesterol, tumours, liver and kidney diseases and indigestion.

Prof. Seralini informed participants that they tested the toxicity of 9 pesticides, comparing active principles and their formulations, on three human cell lines (HepG2, HEK293, and JEG3). Glyphosate and others the active principles of 3 major herbicides, 3 insecticides, and 3 fungicides. Roundup was among the most toxic herbicides and insecticides tested. Most importantly, 8 formulations out of 9 were up to one thousand times more toxic than their active principles. The conclusion was that the formulations are more toxic than the active ingredients. contain petroleum waste and heavy metals that are very toxic. He commented that formulants are the real active ingredients (petroleum residues and heavy metals) and this fact is confounded with two frauds: Declaration of wrong Active Ingredients (1) and Declaration of Real Active Ingredients as Inert and inconsequential. In fact, he commented that large-scale GMO plantations are all pesticides-dependent plants and the most commonly used chemicals are glyphosates. He thanked the conference organizers and underscored the need for shifting to agroecology so that Africa would be safe of chemical fertilizers and pesticides in the future.

Prof. Don. H Huber: Professor Emeritus of Plant Pathology at Purdue University: Understanding GMOs and Glyphosate's Universal Toxicity to Soil, Plants, Animals and Humans

Genetic Engineering (GE) has been promoted as the 21st Century silver bullet to solve various challenges related to: hunger and malnutrition, climate change, economic well-being, food safety and security, toxic chemical usage, environmental degradation and agricultural sustainability. Unfortunately, GE has failed in delivering on its promises of these proposed solutions. Consequently, GE and indiscriminate use of glyphosates has led to sick soils which are sterile/infertile and contaminated. Further, GE has contributed to the vanishing of ecological support through killing of pollinators, malnutrition, deteriorating water quality and retention capacities, deteriorating crop and animal health and acute and chronic

diseases that have increased human suffering. Genetic engineering is based on fossil science and since it is gene manipulation; GE is like a viral infection and not breeding as is purported by proponents. GE is simply false promises on flawed science just for commercial enterprises gains.

Regarding glyphosates, this refers to the broad-spectrum herbicides that have proven to be toxic, systemic, persistent, synthetic amino acids, antibiotic in nature, pathogen virulence enhancers, growth regulators and mineral chelators that are being used in the agricultural sector. These chemicals have been found to have far reaching ecological impacts on humans, animals, plants and environment as illustrated in the figure below.

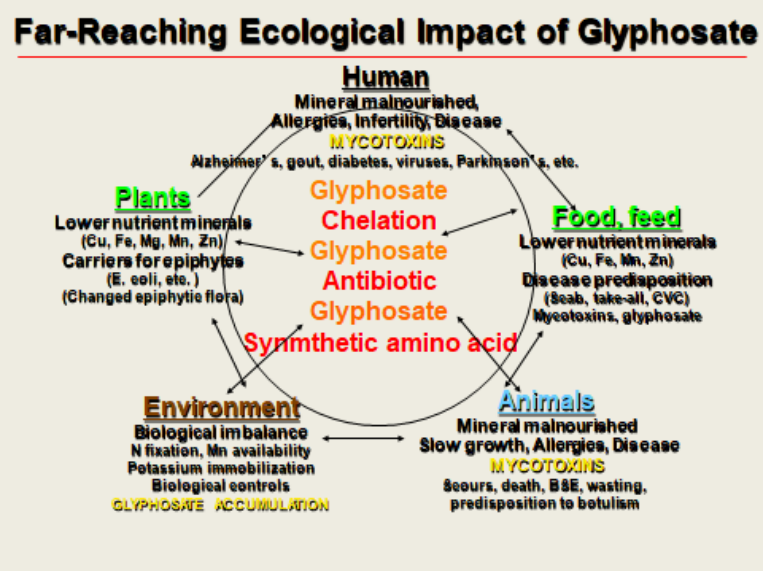


Figure 7: Illustration of some of the far reaching impacts of glyphosates on humans, plants, animals and environment

Research has shown that there is increased disease susceptibility and epidemics in both plants and humans that have been exposed to glyphosates. The unfortunate reality is that these diseases have grown resistance to treatment.

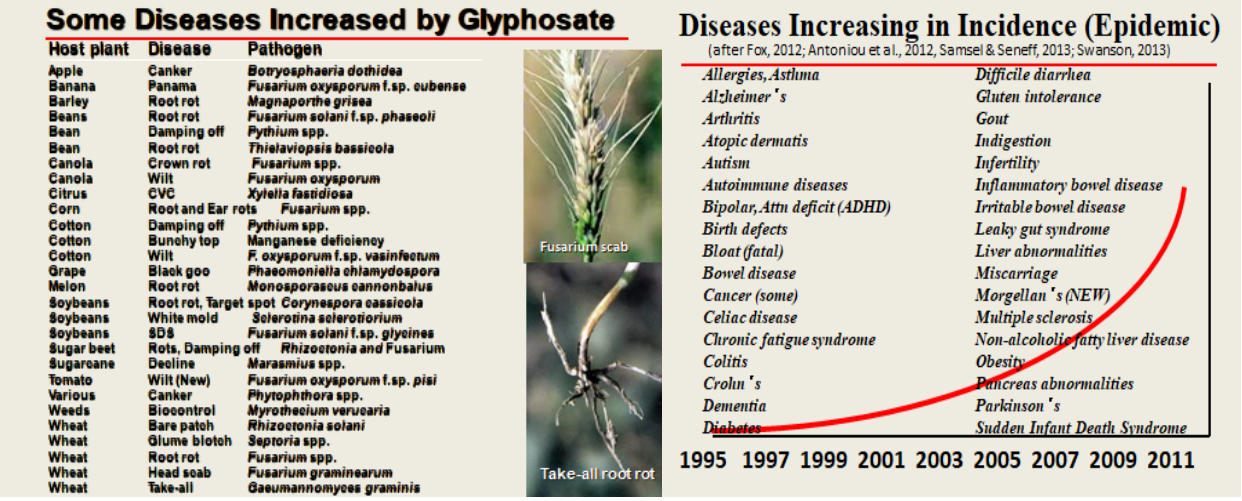


Figure 8: Some plant (L) and human diseases (R) whose prevalence has increased as a result of continuous use of glyphosates

From the figure above, indiscriminate use of glyphosates has resulted into reduced nutrient density for minerals such as Copper, Cobalt, Iron, Manganese and Zinc. There are increased levels of toxic products (mycotoxins, aflatoxins and metabolic toxins), premature ageing, immune failure, disease susceptibility, infertility, birth defects, reproductive failure in humans and ecological disruption such as reduced populations of bees, amphibians and plant diversity.

> ***Future historians may well look back and write about our time, not about how many pounds of pesticide we did or did not apply; but about how willing we are to sacrifice our children and jeopardize future generations with this massive experiment we call genetic engineering that is based on false promises and flawed science, just to benefit the "bottom line" of a commercial enterprise. Dr. Don M. Huber, Professor Emeritus, Purdue University***

Dr. Judy Carman- Director Institute of Health and Environmental Research, South Australia: Are GMOs Safe to Eat? Current Inadequate Safety Requirements

Genetically Modified Organisms (GMOs) are biolistics inserted randomly to affect function of an organism resulting into production of new substances. These can be plants, animals, bacteria, fungi or even viruses. GMOs are resistant to herbicides and instead they try to make their own pesticides. The adoption of GMOs requires that gold safety testing standard be conducted to provide information on the positive and negative side of these organisms. The standard clinical tests conducted on animals are done in five phases where Phase I assesses the toxicity of GMOs on healthy volunteers, Phase II assesses the therapeutic effect, Phase III is conducted on randomised controlled trials and Phase IV is basically monitoring short, medium- and long- term effects of GMOs. This is usually at the meta-analysis level that will attract the need for Cochrane collaboration.

GMOs use and regulation requires strong regulations in every country. For instance, in Australia and New Zealand the Food Standards Australia New Zealand (FSANZ) is the government regulator responsible for developing standards that regulate the use of ingredients, processing aids, colourings, additives, vitamins and minerals, composition of some foods and foods developed by new technologies and regulating the production and adoption of GMOs technologies. So far, the FSANZ has reviewed 12 reports covering 28

GM crops to determine safety assessments of GM crop by companies and how they compare with the gold standard. These GMO tests are conducted to test for allergies, cancer, reproduction and toxicity.

In Australia and New Zealand, testing of effects of GMOs on humans is conducted by feeding the GMO crops to animals. Unfortunately, the animals being used for conducting these tests do not compare with humans. The results from such analysis can be reliably used to inform decisions regarding humans. These animals do not have comparable physiological characteristics to man and even the endpoints are not relevant to human health for instance death, body weight and breast meat yield. In other words, long-term toxicology studies that have been conducted on animals relevant to human health are uncommon. Even in studies and examinations where animals are used for assessment, the animals are not fed for long enough for adverse effects to develop, manifest and be analysed. The conclusions are therefore not very accurate plus the numbers of animals being studied are usually too low. Also, the tests conducted on animals have demonstrated that internal organs are rarely inspected meaning there is no blood biochemistry analysis done and hence adverse effects are not investigated deeper. The information available is therefore not conclusive and therefore decisions being made are misguided.

Bottom-line position is that there is need to regulate the use of GMOs and more studies need to be conducted on effects on humans with relevant subjects and clear labelling done on GMO products. There are now two new techniques in the market that are currently being used in GMOs testing. These are: CRISPR –type technique (**CRISPR** technology is a simple yet powerful tool for editing genomes which allows researchers to easily alter DNA sequences and modify gene function. The protein **Cas9** (or "**CRISPR**-associated") is an enzyme that acts like a pair of molecular scissors, capable of cutting strands of DNA) and dsRNA tests (Double-strand RNA (**dsRNA**) are signals for gene-specific silencing of expression used in a number of organisms. **Gene** silencing refers to the regulation of **gene** expression in a cell to prevent the expression of a certain **gene and** can occur during either transcription or translation and is often used in research.

Prof. Ratemo Michieka Professor at the University of Nairobi, Kenya: Fertilizers and Pesticides in Agriculture, Environment and Health

A healthy crop is good for food security and is also a sign of a healthy environment. However, crop health is facing a lot of threats ranging from acute, immediate, and chronic to long term threats. Crop pests and weeds are major causes of losses to food production globally estimated at between 50 – 80%, with weeds causing serious economic losses due to their competition with food crops for sunshine, water and nutrients.

Some of the acute to immediate threats to crop health include: severe weather disruptions, natural calamities, pest and disease outbreaks, sudden policy changes, economic factors such as price hikes, food contamination, rural–urban migration and ageing farmers.

Chronic to long term threats include: climate change, ignorance on how food is grown, shortage/ageing farmers > 65yrs, demographic changes, competition from bioenergy, underinvestment in infrastructure/technology, degradation of land, water resources for agriculture and unfriendly policies towards farmers.

The current statistics on selected cereals production around the world indicate low production in the African continent compared to production in other countries around the world and even against the global average as shown in the table below.

Country	Maize Yield (Mt/Ha)	Wheat Yield (Mt/Ha)	Rice Yield (Mt/Ha)
Global	**5.86**	**3.40**	**4.56**
USA	**11.07**	**3.20**	**8.62**
European Union	**7.67**	**5.43**	**6.88**
China	**6.11**	**5.42**	**7.03**
Brazil	**5.77**	**2.66**	**6.28**
Kenya	**1.82**	**<2.00**	**<2.00**

Table 1: World's staple food production in selected countries around the world. Source: FAS 2019

With the continued warming of the climate, crop yields will continue to decrease as growing-season temperatures increase. This effect may be exacerbated by insect pests which already are consuming between *5 to 20%* of major grain crops. It is estimated that for the three most important grain crops (wheat, rice, and maize) yield loss to insects will increase by *10 to 25%* per degree Celsius of climate warming. It is projected that an increase by 2 Degree Celsius will destroy almost *50% more wheat* than they do today, *30% more maize* and *20% more rice*. (FAO 2018)

The Use of Chemical Crop Protection as an Alternative

Chemical crop protection products or "pesticides" are used to help control insects, diseases, weeds, fungi and other undesirable pests. They comprise of a wide range of products for both professional and home applications including insecticides, fungicides, herbicides, sanitizers, growth regulators, rodenticides, and soil fumigants.

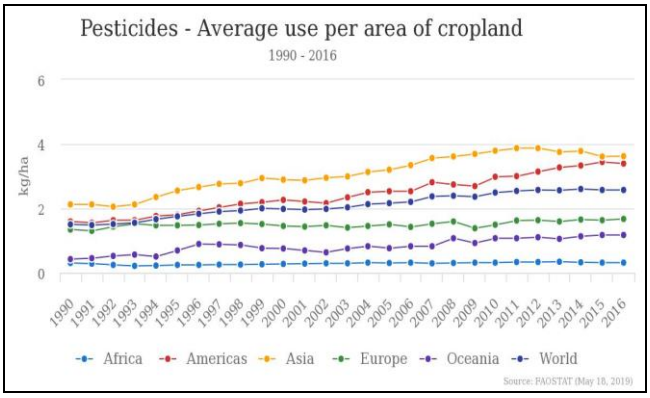


Figure 9: Status of global pesticide use

There exists regulatory framework for pesticides regulations which encompasses national, regional, and international legislation and conventions that help assure safety for users, consumers and the environment. Proper use of chemicals in crop protection offers: alternative pest control resulting in

reduced crop production cost (labor, time), protection of farmers' yield and health and increased return on farm investment. This is seen in their ability to protect plants or plant products against all harmful organisms (pesticides such as fungicides, insecticides, molluscicides, nematicides, rodenticides), influencers of life processes of plants (e.g. PGRs used as plant hormones), preserving plant products (e.g. fumigants as post-harvest management chemicals), destroying undesired plants or parts of plants (e.g. defoliants) and checking or preventing undesired growth of plants (e.g. herbicides). Crop protection products can also contribute to biodiversity conservation by enhancing agricultural productivity and controlling invasive species through increasing crop yields and minimizing losses caused by pests and diseases. Pesticides also help control invasive species in the game reserves thus contributing to protection of the wildlife. Through the use of Herbicides, practices such as conservation tillage are possible which contributes to improving soil quality and reduce erosion.

Fertilizer Significance in Agriculture

A wide range of fertilizers have been developed to help different crops grow in different soil and weather conditions. With the global population steadily growing, enough food, feed, fuel and fiber MUST be produced each year (4Fs). Fertilizers therefore play an important role in providing crops with the nutrients they need to grow and produce as long as they are used as per the recommendations. Fertilizers will continue to support the delivery of enough food to feed the world's population.

Regulations in Pesticides Use

There exists a comprehensive regulatory framework which closely examines all phases of the pesticides product life-cycle. The regulatory framework covers proper handling, transport and precautions during use; labeling, setting of allowable residue levels in food (known as Maximum Residue Limits or MRLs) among others. This ensures there are no unacceptable risks to human health and the environment from intended use(s) under practical conditions and further fosters responsible use and compliance throughout the food production chain.

Integrated Pest Management (IPM): Why we should embrace it

Integrated Pest Management is a flexible approach which makes the best use of all available technologies to manage pest problems effectively and safely. IPM strategies consist of three basic components namely: *Prevention* of pest build-up through use of appropriate crop cultivation methods, *Observation* of the crop to monitor pest levels as well as the levels of natural control mechanisms such as beneficial insects in order to make the correct decision on the need for control measures and *Intervention* where control measures are needed to be put in place.

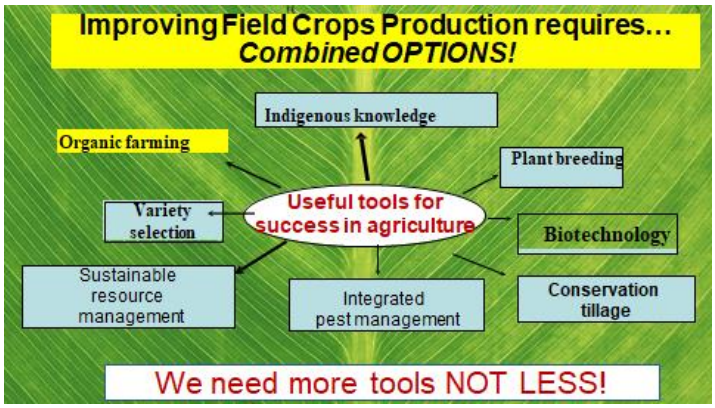


Figure 10: Illustrations of the Integrated Pest Management Principles

Panel Discussion: Prof. Don Huber, Prof Tyrone Hayes, Prof. Ratemo Michieka, Dr. Judy Carman, Ms. Ivy Saunyama, Dr. Mwatima Juma and Ndeiye, Maimouna Diene

The following are the issues that emerged from the panel discussions

1. To achieve food and nutrition security there is need to embrace sustainable development through systems intensification and paradigm shift from silo thinking to systemic thinking.
2. Synthetic chemicals and fertilizers have also found their way into the wildlife ecosystems and are equally causing saddening effects to the wild animals.
3. There is need to embrace sustainable agriculture principles such as the use of alternatives in fighting malaria instead of using the toxic DDT which is an already banned chemical across the world.
4. Critical questions that delegates in the conference need to answer: Why do we apply all these fertilisers? Do we have the knowledge and understanding of these chemicals? Which policies are behind their production and utilization? Who is benefiting in all these? Can we produce with less of these chemical fertilizers and pesticides? Why can't we manufacture and promote home-based solutions instead of being recipients of what others are producing and in some instances chemicals already banned in other countries? How do you continue to do research in such hostile environment where the chemical industry is determined to win the fight against use of pesticides for commercial gains?
5. Nature is self-regulatory so should we use pesticides safely or do away with them?
6. The presentations served as the eye opener for consumers who can now demand for safe and healthy foods.

Figure 11: Panelists: From Left to Right: Prof. Tyrone Hayes, Prof. Don Huber, Dr. Judy Carman, Prof Ratemo Michieka, Dr. Mwatima Juma, Ms. Ivy Saunyama, Dr. Darcy Ogada and Madame Ndeiye Maimouna.

1.7.2 Plenary Session 2: Official Opening of Conference, Leaders Round Table and Tour of Exhibition Arena

Session Moderator: Norman Mudibo

Keynote Speaker: Hon. Mwangi Kiunjuri Cabinet Secretary MoALF&I, Represented by Lucy Njenga (Policy Research and Regulations)

Presenters

1. Dr. David M. Amudavi
2. Mr. Zachary Makanya

3. Ms. Louise Luttikholt

Panellists: Prof. Don Huber, Prof. Tyrone Hayes, Prof. Ratemo Michieka, Dr. Judy Carman, Ms. Ivy Saunyama, Dr. Mwatima Juma and Madame Ndeye Maimouna Diene

Session Prelude

World population has exceeded 7 billion and is estimated to exceed 9 billion mark by 2050 and this is amidst challenges of food demand and supply for the growing population. Currently there is a push for acceptance of GMOs purported to be the solutions to food and feed insecurity. Even as we are discussing agroecology, there is an on-going debate in Kenya on GMOs whose outcome will define the way forward for agriculture and food systems in Kenya. The world needs food and, agriculture must deliver on this. Private sector players have a great role to play and as much as they are needed they should not be given the liberty window to regulate themselves particularly about GMOs and the production and promotion of synthetic chemicals and fertilizers. On policy engagements, both private and public sector should support opinions with factual evidence. From the conference, the agricultural sector should consider going back to the basics and start farming God's way. This should be done in full recognition that technology is advancing very fast and how best can stakeholders utilize these technological opportunities?

Key Recommendations

- There is need for transformation. Business as usual is not an option: Stakeholders must take a bold step to do things differently by embracing transformative change on food and agricultural systems. Since consumption unites people together, it can be used as a powerful tool to push for change. People everywhere should demand for safe and healthy foods. Farmers, who are producers should be empowered with the right agroecological solutions.
- There is need to look at entire agricultural systems and have a systemic approach on how we see and do agriculture. Sustainable Development Goals (SDGs) can be effectively achieved through a systemic approach and agroecology is a systemic approach that guarantees to deliver on this.
- The experts in the conference are part of a bigger global world and each one has a part to play as a solution giver for sustainable development. The conference has brought together policy makers, researchers and other stakeholders to provide solutions.
- The stakeholders should adopt and adapt successful and potential agroecological innovations. Agroecology is one sure approach that provides farmers unmatched platform to access benefits of food security and improved livelihoods. The cycle is made complete by promoting concerted efforts to secure markets for agroecological products.
- There is need to scale out the FAO agroecological initiative in Africa and stakeholders should continuously develop solutions as per the need of the location.

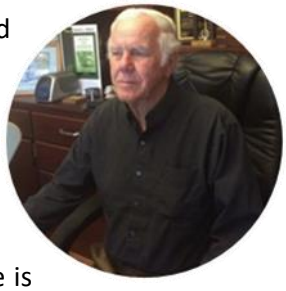
Highlights from Key Leaders Presentations

Opening Remarks by Dr. David M. Amudavi: Executive Director Biovision Africa Trust (BvAT)

Dr. Amudavi informed the delegates that the conference was very auspicious as it was bringing together 3 conferences into one (Pest contamination, organic trade and value chain development and agroecology initiative). The success being witnessed was as a result of BvAT working closely with IFOAM Organics International and WFPC ®LLC in organizing the conference. He was grateful to Dr. Charles Wilson for remotely supporting preparations of the conference. The conference was of truly international status that drew representation from all the

continents around the world. The conference outcome was geared towards giving directions on how to work against doubts and myths on what nature can do by regulating itself. Through the convening, stakeholders were encouraged to establish networks that would grow beyond the conference. Agroecological agriculture is evolving globally, and the conference has set the pace for discussion and therefore it should not fall anything less than being a very productive engagement. The Industry players should not be allowed to take shortcuts in conducting research to provide evidence for products they produce. The laid down protocols should be followed where experts will be allowed to conduct independent and blinded studies. The Director reiterated that technologies are tools and no single technology is safe hence there is need to treat each on its merit and when conducting GMOs studies relevant to animals that are comparable to humans should be used. Further, situational analysis of technology needs per country should inform decisions. Lastly, in as much as stakeholders appreciate the contribution of innovations and technology, there is need to preserve biodiversity.

Dr. Charles L. Wilson Founder, President - World Food Preservation Centre ®LLC



World population is on the increase and so is hunger. Synthetic pesticides and fertilizers have been fronted to provide accelerated solutions to food shortages being experienced around the world. However these chemicals have catastrophic effects on animals, plants and the planet. There is need to assess the negative impact of synthetic pesticides contamination on the African people, their animals, and environment and explore alternative synthetic-pesticide free forms of agriculture and agroecology that offer alternatives. There is need for this conference to chart a course to substantially and sustainably reduce synthetic pesticide contamination in the African continent.

The conference was coming at a time that is important when questions are being raised concerning the disease - causing capabilities and carcinogenicity of synthetic pesticides. World leading scientists addressing these problems are keynote speakers at this conference. Additionally, the conference was happening at a time when questions are being raised as to whether the world's exploding population might be fed without the use of synthetic pesticides. Reliance on hazardous pesticides is a short-term solution that undermines the rights to adequate food and health for present and future generations. Evidence from research and experience by speakers in the conference should provide solutions to this question as well. Advantages of agroecological principles should be brought on the fore and clear explanations given on how they contribute to health and environmental conservation. Likewise the conference and leaders should call for tougher global regulation of substances meant to control pests or weeds for plant cultivation.

Mr. Zachary Makanya Country Coordinator, Participatory Ecological Land Use Management (PELUM Kenya): Ecological Organic Agriculture Initiative In Africa

Participatory Ecological Land Use Management (PELUM) Kenya refers to a network of Civil Society Organizations and or NGOs with a current membership of 12 NGOs drawn from membership in the Eastern, Central and Southern Africa. The members of PELUM believe in the power of creation where nature was made to be self-regulating. The following question was posed to delegates for reflection: Why are farmers poor amidst all the technological advancement and development? Are people of the world aiming and shooting or are they shooting to aim? This conference should provide solutions and hope for smallholder farmers who are the critical mass of people engaged in farming and if they change the whole society and world will change. Digging and more digging won't help smallholder farmers, doing the same things with the same methods and hoping for different results is not even an option. Therefore, the time has come for change and actions should be undertaken based on new lessons to be learnt from the conference.

Louise Luttikholt, Executive Director IFOAM Organics International

Louise reiterated that the conference was very different and very timely because it was providing alternatives for reducing the production and use of synthetic chemicals in Africa. Agroecology is the way to go for production, consumption and trade. The world needs transformation by learning to do things differently. To achieve this transformation, stakeholders must look at the entire agricultural system through systemic approach lenses which will then guide on how agriculture and food systems should be undertaken. Africa needs to ask and reflect on this fundamental question: How do we want to produce food and have a healthy environmental relationship?

The SDGs provide a solid foundation and strategic directions against which interventions can be designed goal by goal through systemic approach to address all the 17 goals. Agroecology is a systemic approach that has the potential and can deliver on this. Humans are part of a bigger global world and by the mix in the conference room; appreciation goes to partners who are already engaged in good practices on agroecology. The expertise to tap in the future of agroecology are available in the conference including lessons from global experience on agro-ecological agriculture. Therefore, Africa let's share, dialogue and learn from this conference.

Prof. Zeyaur R. Khan, Principal Scientist at the International Centre of Insect Physiology and Ecology

The on-going conference on agroecology represents a powerful shift in agriculture. In its general terms, Agroecology and sustainable development refers to ecological production systems that promote increased biodiversity, food and nutrition security, income for farmers that contribute to improved sustainable livelihood. If the world embraces ecosystem services that are balanced, more than 800million who are who are critically malnutritional will have enough and balanced nutritious foods. As a result, hunger for more than 400 million will be reduced. Ten (10) of the SDGs can be achieved directly through agroecology. The world needs strong support from everyone hence this conference offers a call for each one represented here to be part of the solution for the future: policy makers, researchers, academia,

farmers, private sector and other stakeholders present must provide solutions to the challenges facing the planet.

Dr. Manuel Flury - Co-Head Global Program Food Security, Swiss Agency for Development and Cooperation (SDC)

Dr. Flury on behalf of Switzerland, welcomed and appreciated the 1st International Conference on Agroecology Transforming Agriculture and Food Systems in Africa. The SDC was particularly pleased that the two groups had joined efforts to host one conference on agroecology. Following the FAO and many international experts and organizations, Dr. Flury emphasized that Agroecology is perceived as paving way to sustainable and healthy food systems. In particular, Agroecology addresses the way on how to move away from problematic synthetic pesticides and fertilizers in agriculture and food systems to embracing agroecological practices.

The global food system is dysfunctional evidenced by poverty, hunger and malnutrition are prevailing. Environmentally critical conventional production methods are generating substantial costs due to degraded soils, overused water resources and lost agrobiodiversity. Agri trade and subsidization regimes on the other hand favour import of subsidized goods rather than promoting local production. Further, nutrient deficient "junk" food is cheap while wholegrain, healthy or even organic products demand an extra price. All this put together produces a system that is not healthy resulting in children suffering from stunted growth and being at a higher risk of mortality, there is increase in numbers of overweight and obesity persons increasing the risk of non-communicable diseases. The environmental and health costs associated by these ills have to be borne by the society as they are not factored in the costs of food.

There is therefore an urgent need for a transformative change for sustainable and equitable food and agricultural systems, in Africa and in the world. Just over one year back, the Director General of the FAO made an urgent call for transformation as there is consensus on the urgency to get out of the trap of conventional, high resource input systems with increasing productivity at any social and ecological costs, still not leading out of hunger for over 800 million people. For him there is need to redirect and proceed pathways towards sustainable food systems providing healthy food and preserving the environment and the resource base, and Agroecology leads this way. Agroecology through building of synergies such as sustainable resource efficiency, support towards conservation and sustainability of agricultural systems can support food production, food security and nutrition while restoring the ecosystem services and biodiversity and building of resilience and adaption of agri- systems to climate change. The FAO has laid down the foundation by proposing guidance through the 10 agroecology elements.

On what SDC is doing, Dr Flury informed delegates that, the SDC and the Swiss Government have made a commitment "to help reduce global risks in the field of sustainable agriculture, food security and nutrition". The Swiss Agency promotes initiatives and influences institutions of more sustainable, resource efficient, agro-ecological agriculture and sustainable use of agrobiodiversity. *Inter alia*, SDC focuses on initiatives and solutions to reduce the ecological footprint of agriculture and food systems, and supports the conservation and sustainable use of agrobiodiversity, in particular smallholder farmers' access to local and quality seeds. It is therefore obvious for SDC to partner with the Pan-African Ecological Organic Agriculture Initiative under the auspices of the African Union to increase visibility of the EOA-I on

the political level, not least by noting the intended integration of an EOA-I index indicator into the future Comprehensive Africa Agriculture Development Programme (CAADP) biennial reporting for 2022 onwards. Already efforts are in place that supports agroecology such as the CAADP reporting for organic farming 2022 onwards for policy makers, launch of FAO agroecology initiative in Kenya and the showcasing of potential agroecological innovations as is happening in the exhibition area.

It is therefore, anticipated that the four day conference should come up with specific actions on how to strengthen the knowledge base of agroecology, anchor agriculture and food systems on agroecology principles and practices, and catalyze appropriate policies and investments towards environmentally sustainable agriculture and food programmes. Likewise, with the support of the national governments of the region, as well as with the intergovernmental bodies such as the East African Community (EAC) and the African Union (AU) including the various partners, that transformation towards a sustainable food system that benefits all citizens can be achieved with a speed we normally only know from Kenyan marathon runners such as Rhonex Kipruto who won magnificently in the just concluded Stockholm marathon. With the African Union Ecological Organic Agriculture Initiative, all stakeholders have the mandate from the Heads of States and Governments to pursue the way towards safe and nutritious food for all and thereby helping to eradicate poverty.

Karin Lexen, Secretary General, Swedish Society for Nature Conservation (SSNC)

This dialogue is needed urgently and therefore is timely to create transformation. It is important to note that consumption is the one thing that unites all of us and we depend on farmers for food. By asking ourselves the one question which is: What would we like to eat tomorrow will make us shift our focus towards solution making. Agroecology gives farmers access to benefits that will result into food security and improved livelihoods and by extension the livelihoods of majority who depend on farmers to supply food for them.

Agroecology is becoming a global movement. The SSNC are very proud to be part of this powerful (paradigm) shift in agriculture together with its partners in Eastern Africa, in Kenya; the Biovision Africa Trust and the PELUM network, the Institute of Sustainable Development in Ethiopia and the PELUM network in Uganda. The SSNC together with many other partners and donors in Africa are part of the African Union effort known as Ecological Organic Agriculture Initiative that seeks to support adoption of agroecology and sustainable agriculture in the African continent. Agroecology provides ecological productions systems where its innovations and practices diversify farming landscapes and results in increased biodiversity. The benefits for smallholder farmers are many including among others low-cost techniques that are easy to multiply resulting in higher yields, improved health and increased food security. The farmers are able to get an income and produce for the growing demand of ecological products in the African market.

Through Agroecology the farmers get means to manage climate change effects with the possibility to be part of the solution in reducing climate change effects in the future. This will be achieved through establishment of carbon sinks and strengthening and improving of ecosystems services. Investing in Agroecology and the agriculture sector are key to reducing poverty and to ending of hunger. More than 800 million people are chronically undernourished today and 98% of them live in low-income countries. Agroecology contributes not only to SDG 2 of Zero Hunger but also to 10 of the 17 SDGs in Agenda 2030. One important step NOW is to overcome gender inequalities and empowering women and youth which

will result in powerful social and economic impacts for the farming family as well as an economic driving force for the agriculture sector. According to FAO, if female farmers access the same resources as men, for example access to land to farm, the number of people living in chronicle hunger would decrease by 150 million.

To the politicians and decision makers, every country involved in the agroecology movement benefits from inclusion of ecological agriculture in national plans and policy documents for long term sustainability. The scale-up of agroecology needs a strong support the political system. Everyone need to be part of the solution for the future and the conference brings politicians and decision-makers together with farmers and scientists to discuss next steps to take in sustainable development.

Justus Mwololo, National General Secretary Kenya Smallscale Farmers Forum

As a representative of smallholder farmers from Eastern, Central and Southern Africa, I wish to state that farmers have been doing agroecology and embracing farming the God's way. Currently there is a fight between those pushing for synthetic fertilizers and chemicals and those advocating for organic farming. All the food consumed in our continent is produced by small-scale farmers and therefore the conference should strive to come up with solutions that will empower small scale farmers so that they can produce healthy and safe food.

Official Opening by Hon. Mwangi Kiunjuri, Cabinet Secretary Ministry of Agriculture, Livestock, Fisheries and Irrigation Kenya, Speech Read by Ms. Lucy Njenga, Director for Policy Research And Regulations

Representatives from African Union Commission (AUC), Food and Agriculture Organization of the United Nations (FAO), Participatory Ecological Land Use Management (PELUM) Association Country Coordinator, IFOAM Organics International, BvAT, guests, ladies and gentlemen receive greetings from MoALF&I and special appreciation to organizers of this auspicious conference on agroecology. This conference is timely particularly on issues regarding scaling of agroecology and agroecological trade particularly with tenets being promoted by Kenya through its various development blue prints such as Vision 2030, Sustainable Development Goals, Agriculture Policy, Agricultural Sector Development Strategy and the Agricultural Sector Transformation and Growth. The Ministry is in support of facilitating the establishment of truly sustainable agricultural systems and launching of the FAO agroecology initiatives. The government of Kenya is committed to reducing the negative impacts of synthetic fertilizers and pesticides and strengthening of strategies for soil testing, analysis and management.

The Ministry will partner with any stakeholder engaged in effective technologies that support the reducing of the impact of synthetic fertilizers and chemicals that cause contamination in humans, animals and environment. This conference will give a boost in the initiatives that are aimed at scaling up of FAO agroecological systems initiatives in Africa and also through sharing of successful processes and cases that will provide opportunities to learn about potential agroecological practices that promote food and nutrition security including trade in Africa.

Most African countries are agri-based and depend on subsistence agriculture for food and survival. For instance, in Kenya, agriculture is the main stay contributing up to 33% of the GDP and millions of Kenyans

depend on agriculture for food and nutrition security. Kenya's Vision 2030 blue print is depending upon the agricultural sector to deliver the 10% annual growth of economy with the Ministry facilitating and providing an enabling environment for production and trade to take place. The agricultural sector blue prints have been drafted with very clear and specific targets with key indicators such as but not limited to: Increasing the incomes for smallholder farmers, increasing value addition and production and improving of households' food resilience. The agricultural sector is a priority in the President's Big 4 Agenda and is expected to deliver 100% food security in Kenya.

Agroecology makes best use of nature's resources and services becoming a potential avenue for achieving the UN SDGs and AU's Agenda 2063 including national development goals. The Kenya's draft agricultural policy highlights agroecology: services such as good agricultural practices that reduce climate change impacts, utilization of renewable systems of nature and organic production that reduce the use of synthetic fertilizers among others. Both government levels are expected to support the adoption of agroecological practices. The potential of agroecology in Kenya and many African countries is not fully utilized. There is need for critical analysis of agricultural challenges in order to come up with initiatives that are viable and continuously strive to develop solutions as per the need of the country. This will ensure there is sustainability and hence help in reducing the dependency syndrome that leads to chronic poverty and malnutrition. Innovations and technologies are playing a big role in development today. This conference should be able to provide an opportunity to showcase innovative practices that support agroecological food and agricultural systems. The government of Kenya is committed to the legislation process to support agroecology both at the County and National level. There is need to integrate conventional and organic approaches in interventions that address food production in Kenya. The delegates attending this conference should take advantage to network and share experiences and visit Kenya and sample the rich cultural heritage of our Country. With these few remarks, the conference was officially opened.

Dr. Hans Rudolf Herren, President of Millennium Institute (Washington DC) and President of Biovision Foundation (Zurich, Switzerland): Keynote Speaker on Pathway to Food System Transformation in Africa

The origin of agroecology started with International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) report that gave insights on how to reduce hunger and poverty, improve livelihoods and facilitate equitable, environmentally, socially and economically sustainable development through generation, access and use of agricultural knowledge, science and technology. The truly transformational pathway to food system in Africa is through a new mind-set. This can be made possible by answering four fundamental questions: ***Why, What, How and Who in Africa's food system.*** The process always seems impossible until it is done and therefore there is need to change and not to continue on the same path: deliberately chose to do things differently.

The people of the world need to start the change process on their eating habits and stop being manipulated by business people. The agricultural sector is among those sectors that are contributing to producing more than half of Green House Gases (GHGs). It is the same sector that we are looking upon to support the process of preserving our environment and biodiversity. This change begins with each and every one of us. Soil degradation is at a very scaring rate hence production systems need to change to make a difference. With the current statistics, if the Africa we know now does not change its agriculture

and food systems, it will cease to exist by 2050. Africa needs to move from ecosystems to business and not the other way.

Moving forward, business as usual is not an option. As such Africa needs a system change and not just climate change. Conventional industrial agriculture must transform to green agriculture. Green agriculture reduces emissions of CO_2 in the environment and contributes to creation of biodiversity and more resilient systems. Africa's governments should institute changes that govern agriculture and trade related activities. The Heads of states must sign policies and regulations and invest in the desired change and work together leveraging on synergies and speak with one voice. There is need to embrace more science, more extension as these are universally agreed upon interventions that support development. Currently 35 billion USD is spent by African nations to import food. This scenario can be reversed if we give knowledge to farmers who will in turn produce. Through Agroecology, the SGDs can be achieved as it offers contribution on each of the SDGs. Climate is changing the foot print of agriculture and is threatening the capacity of the earth to provide food for all. Hence business as usual is not an option. Africa needs a systemic change and is high time that stakeholders recognized and appreciated that agroecology is a science, practice and social movement. The ten elements of agroecology being promoted by FAO should form the basis for agriculture and food systems transformation.

Moving forward: business as usual is not an option by Dr. Hans Rudolf Herren

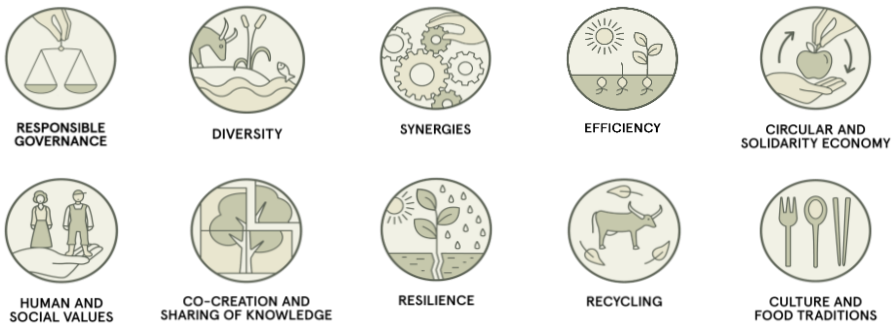


Figure 12: FAO's Ten Elements of Agroecology

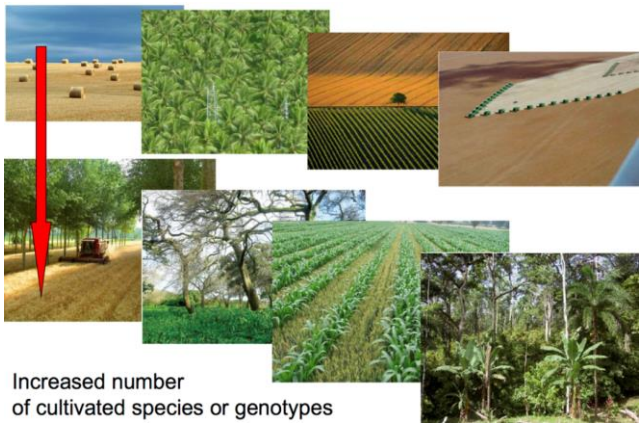


Figure 13: Illustration showing the transformation from uniformity to diversity

Exhibition Opening and Tour by Chief Guest Representative and Top Dignitaries

The official opening of the exhibition arena was conducted by Mrs. Lucy Njenga on behalf of the Cabinet Secretary Ministry of Agriculture, Livestock, Fisheries and Irrigation – Kenya assisted by President of Biovision Foundation and Millennium Institute Dr. Hans Herren, Executive Director IFOAM OI Ms. Louise Luttikholt, the Executive Director of Biovision Africa Trust Dr. David Amudavi and the Country Coordinator of PELUM Kenya, Mr. Zachary Makanya.

Figure 14: Photo Gallery of the Exhibition Opening and Tour by Chief Guest and Top Dignitaries

Entertainment for Delegates

The delegates at the conference were treated to a dance by a local entertainment group dubbed Safari Cats who performed a traditional African dance.

Figure 15: Session of Delegates Enjoying the Safari Cats Entertainment Group during the Conference

1.7.3 Plenary Session 3: Agroecology Practices and Systems

Session Moderator: Ms. Louise Luttikholt: Executive Director IFOAM OI
Keynote Speaker: Prof. Zeyaur Khan
Presenters

1. Dr. Emma Siliprandi, FAO - *Agroecology Scaling up Initiative*
2. Case Study 1: Mr. Zachary Makanya, PELUM Kenya - *Ecological Organic Agriculture Initiative in Africa*
3. Case Study 2: Ms. Dorith von Behaim , GIZ - *Knowledge Centers for Organic Agriculture in Africa*

Panelists: Prof. Zeyaur Khan / Zachary Makanya / Dorith von Behaim / Dr. Emma Siliprandi / John Njoroge

Session Prelude

This plenary session focused on selected best agroecological practices and systems already being implemented by stakeholders across the globe that have registered positive results. The aim was to demonstrate to the delegates that, these are scalable ecological and organically sound strategies and practices that can help Africa transit into sustainable agriculture and food systems. The cases in point that were shared include:

1. The push-pull technology for pest and weed management
2. The Implementation of the African Union led Ecological Organic Agriculture Initiative in Africa
3. The GIZ Knowledge Centres for Organic Agriculture and the
4. FAO Agroecology principles scaling up initiative

Key Recommendations

1. Knowledge and skills are critical for the adoption of agroecological technologies and innovations. There is need therefore to invest in knowledge generation, collation, analysis, packaging, dissemination and storage.
2. Africa and other stakeholders across the world should deliberately engage in continuous and structured research to gather evidence for best practices in agroecology.
3. Knowledge on the shelves is not good enough. It needs to reach the right people who can then use it. As such, there is need to invest in awareness creation and capacity building to help the populations adopt and adapt best agroecology practices.
4. There is need for stakeholders to work together through networking and collaboration at all levels - the National, Regional, Continental and International levels. These networking platforms provide a valuable avenue through which exchange of information, knowledge, skills and innovations/technologies can take place
5. There is need to continuously recognize the role played by agroecology champions. Therefore, Africa should identify, mentor, recognize and promote champions of agroecological practices.

Prof. Zeyaur R. Khan Keynote Speaker Principal Scientist International Centre of Insect Physiology and Ecology (Icipe)- Agroecology Practices and Systems: Push Pull Technology for Food Security and Environment Sustainability in Africa and Beyond

The Push-Pull technology is a perfect example of how agroecology works in addressing major constraints in agricultural systems and environment including climate change, poor soil fertility, pests (stem borers, fall army worm), parasitic weeds (striga weed) and aflatoxin contamination. This technology has been applied to tackle the major constraint of fall army worm in maize without chemical application. It is a Novel approach in pest management developed by understanding the complex mechanisms that govern the ecology of plants and insects. The technology is an Integrated Pest Management (IPM) approach which uses carefully-selected repellent intercrops and attractive trap plants. Insect pests are repelled from the food crop and are attracted to a trap crop. The repellent intercrop also effectively controls parasitic striga weed. The technology therefore is used to divert harmful insects and other organisms from main plant to the trap crop. The technology utilizes a border crop (attractive plant or trap plant) and the main plant intercropped with a repellent plant. For the 1st generation research that was conducted two plants: Napier grass and legume (desmodium) were used as intercrops with the main crop (maize). This research targeted high potential areas. In this demonstration, the Napier grass produces chemicals that attract the insects while the desmodium produces repellent chemicals that push away the insects from the main crop (maize).

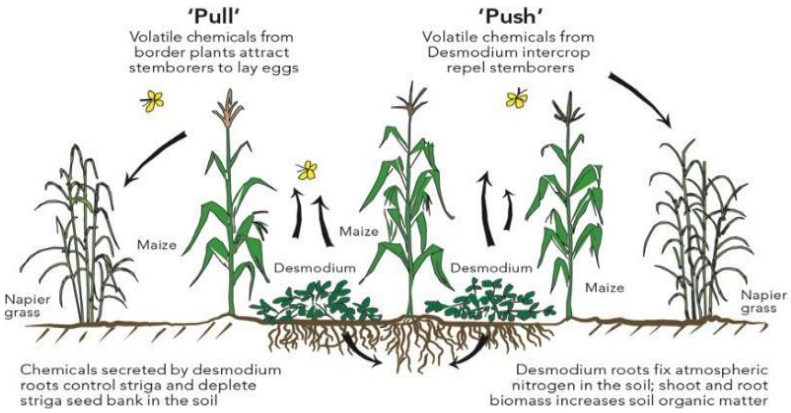


Figure 16: Graphical Illustration of the push-pull Technology

From the experiment it was observed that, there was an increase yield by 2 and ½ times in the maize grown with the push- pull technology compared to maize monocrop.

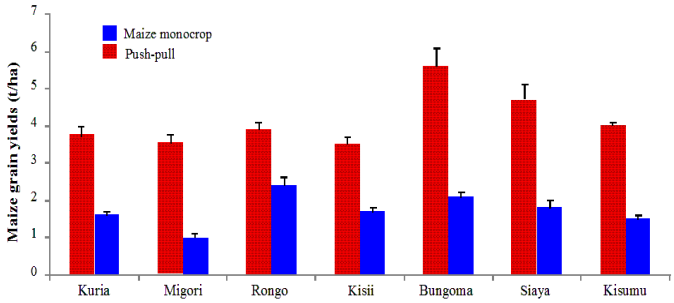


Figure 17: Before and after adopting push-pull technology

The conventional push-pull system had not been extended to drier areas of sub-Saharan Africa. To test the viability of the technology in arid and semi-arid areas, 2nd generation research trials were conducted for the cereal-livestock smallholders living in these areas. The push-pull technology needed to be adapted to the increasingly dry and hot conditions associated with the arid and semi-arid areas to test its viability and long-term sustainability. Improved yields have been observed in these areas which are an indication that, the technology is versatile and can be adapted to drier areas.

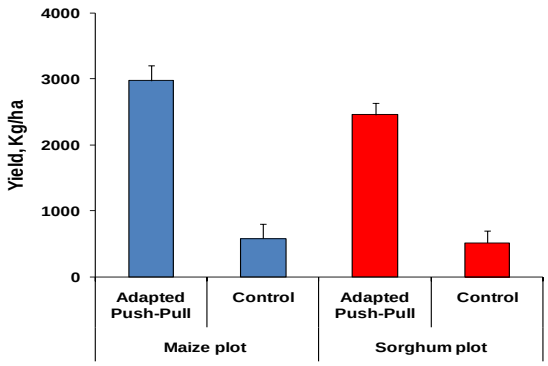


Figure 18: Yields comparison in maize (high potential area crop) and sorghum (low potential area crop)

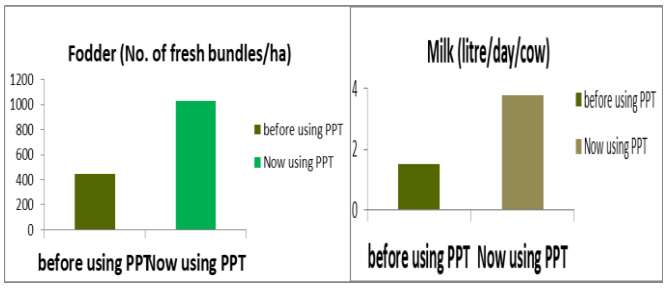
N/B: Although push–pull was originally developed for maize production systems, it has been applied equally successfully to sorghum, millet, sugarcane and upland rice. Research is also being carried out to

adapt its application to cotton, coffee and horticultural crops. This adaptability gives it enormous potential for reproduction elsewhere and the United Nations recognizes this technology and has been in the fore front to disseminate it through various channels to promote adoption and adaptation.

Benefits of Push and Pull Technology

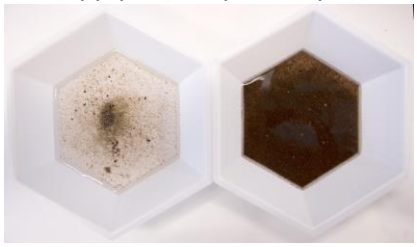
Push-Pull improves fodder and milk production

Both trap and repellent plants used in the push-pull strategy are of economic importance to farmers as livestock fodder and help increase milk production.



Push-Pull improves soil organic matter

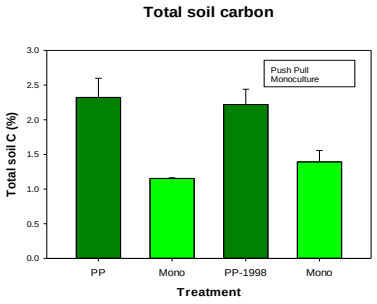
Organic matter plays an important role in giving the soil "crumb structure", so it impacts water infiltration/water holding capacity and is also an important nutrient reservoir that we believe can supply N (and probably P) to crops.



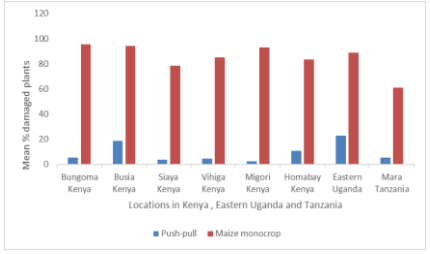
Control Field **Push-pull Field**

Push-Pull Improving Soil Health

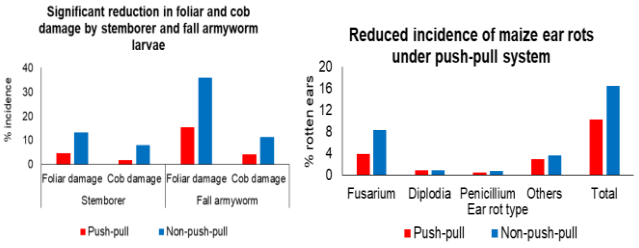
Desmodium adds nitrogen to the soil and has a trailing habit, helping conserve soil moisture. It reduces digging and adds to soil organic matter, enhancing the capacity of the soil to sequester carbon. It has a positive effect on plant and insect biodiversity and has been shown to result in soil that is rich in beneficial micro-organisms.



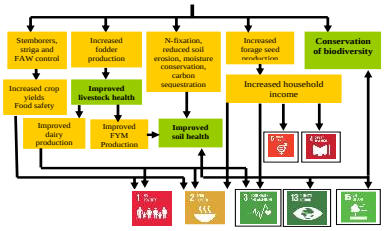
Push-pull Protects Maize from FAW Damage



Push-Pull reduces aflatoxin in maize



Push-pull and achievement of UN Sustainable Development Goals



Other benefits include: Control of stem borer, striga weed and contribution towards climate change adaptation and mitigation.

'There are at least 350 million smallholders in sub-Saharan who will benefit from adoption of push-pull technology', Prof Zeyaur Khan.

'Push-Pull technology, based on ecological principles in its development and dissemination, is a perfect example of how a low-cost, low-input production system can provide a pathway to an "evergreen revolution" without causing environmental and social harm', Prof. M. S. Swaminathan, Father of Green Revolution in India

Push-Pull fully supports our vision to boost green economy for Africa as the technology is wholly organic and ecologically sustainable and bypasses all the pitfalls and drawbacks of relying on outside sources and expensive inputs which African smallholders simply cannot afford, Dr. Hans R. Herren, World Food Prize Laureate

Zachary Makanya: Country Coordinator, PELUM – Kenya: Ecological Organic Agriculture Initiative in Africa

Background

The Ecological Organic Agriculture Initiative in Africa (EOAI) is an initiative by AU to implement the Africa Union Heads of State Decision on Organic Agriculture adopted in January 2011 (EX. Cl / Dec.621 (xvii) informed by challenges facing organic farmers. The heads of state requested the AUC and NEPAD planning and coordinating agency to initiate and provide guidance on an AU led coalition of international partners on the establishment of an African organic farming platform based on available best practices and provide guidance in support of the development of sustainable organic farming systems and improve seed quality systems. The initiative envisions resilient and vibrant Ecological Organic Agricultural systems for enhanced food and nutrition security and sustainable development in Africa. This will be achieved through scale up of ecologically and organically sound strategies and practices through institutional capacity development, scientific innovations, market participation, public policies and programs, outreach and communication, efficient coordination, networking and partnerships in Africa. The goal of the decision is to mainstream Ecological Organic Agriculture into national agricultural production systems by 2025 in order to improve agricultural productivity, food security, access to markets and promote sustainable development in Africa.

The key principles of ecological organic agriculture include: production management systems that consider the agro-ecosystem in all its diversity, focusing on biological diversity, healthy use of soils, air and water and relying on renewable resources in locally organized agricultural systems. It also combines modern science, innovative practices and traditional knowledge. Ecological organic Agriculture is more

accessible for resource-limited rural people and has therefore a high potential for improving the livelihoods of a large group of rural poor and particularly women.

AU – EOA initiative is anchored on the following strategic objectives:

1. Increasing documentation of information and knowledge on organic agricultural products along the complete value chain and support relevant actors to translate it into practices and wide application.
2. Systematically inform producers about the EOA approaches and good practices and motivate their uptake through strengthening access to advisory and support services.
3. Substantially increase the share of quality organic products at the local, national and regional markets.
4. Strengthen inclusive stakeholder engagement in organic commodities value chain development by developing national, regional and continental multi-stakeholder platforms to advocate for changes in public policy, plans and practices.

These strategic objectives are to be achieved through:

1. Research, Training and Extension
2. Information and Communication
3. Value Chain and Market Development
4. Networking and Partnerships
5. Policy and Programme Development
6. Institutional Capacity Development

Institutional Arrangements for AU – EOAI Implementation

a) National Platforms

This refers to Country-based platform with multi-stakeholder representations from across the country (CSOs, government, private Institutions, academia, research among others) steered by a national committee whose Chair is drawn from the relevant Ministry. In some cases, the chair may be drawn from the Civil Society Organizations. Each implementing Nation therefore has Country Lead Coordinating Organization (CLO) which also hosts the EOAI Country National Secretariat.

b) **Regional Platforms**

These platforms are made up of multi-stakeholder representations from the region drawn from CSOs, RECs, private institutions, academia among others. These platforms are currently in Eastern and Western Africa with each having Regional Steering Committee (RSC). Southern Africa cluster is still in its formative stages. There are three Regional Secretariats with a coordinator hosted by one of the partners in the cluster, for the Eastern Africa region the secretariat is hosted by PELUM Kenya and for West Africa by the Association of Organic Agriculture Practitioners in Nigeria (NOAN).

c) **Continental Platform**

This platform is multi-stakeholder and has a Continental Steering Committee (CSC) which is chaired by Africa Union Commission. This is supported by the Continental Secretariat headed by a Continental Coordinator and is based at Biovision Africa Trust (BvAT) in Kenya.

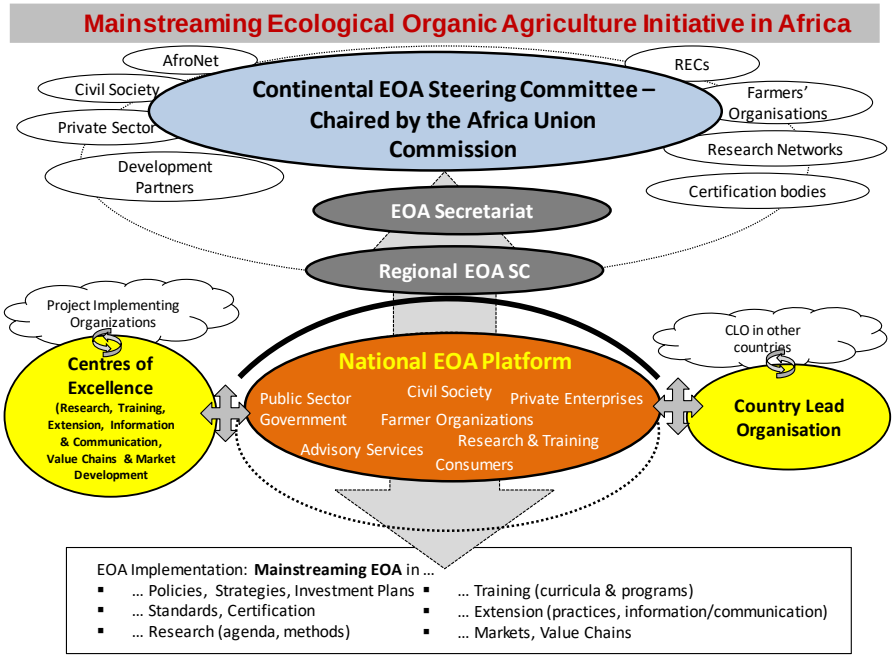
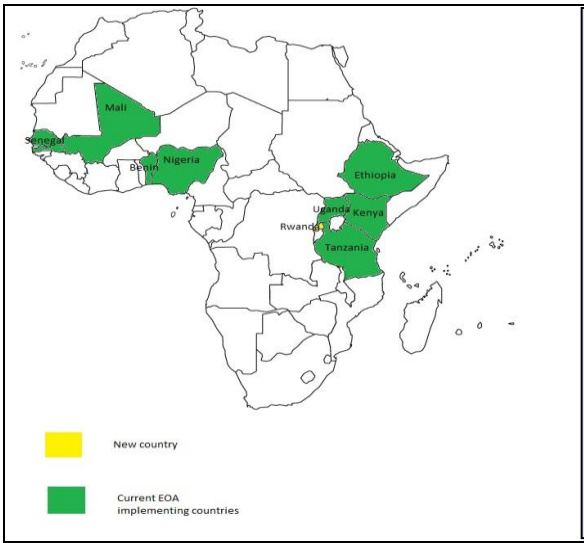


Figure 19: Graphical presentation of institutional arrangements for implementation on AU – EOAI



Country Lead Organization (CLOS)

1. Kenya – Kenya Organic Agriculture Network (KOAN)
2. Senegal – National Federation For Organic Agriculture (FENAB)
3. Mali - Association des Organisations Professionnelles Paysannes (AOPP)
4. Benin - Béninoise pour la Promotion de l'Agriculture Biologique (OBEPAB)
5. Nigeria – Association of Organic Agriculture Practitioners of Nigeria (NOAN)
6. Ethiopia – Institute for Sustainable Development (ISD)
7. Uganda – National Organic Agriculture Movement of Uganda (NOGAMU)
8. Tanzania – Tanzania Organic Agriculture Movement (TOAM)
9. Rwanda (Rwanda Organic Agriculture Movement (ROAM)

Overall, over 32 partners are involved

Figure 20: Coverage in Africa and Strategic partners

Key Achievements towards Mainstreaming of EOA into National Policies

- Kenya has developed the **Ecological Organic Agriculture 5th Draft Policy (2017)** currently undergoing review in the Ministry of Agriculture before submission to the Cabinet.
- Nigeria is currently working on its **3rd draft** of Organic Agriculture Act of 2017.
- In Tanzania, organic agriculture principles have been highlighted in the National Agriculture Policy of 2013.
- Uganda, the Ministry of Finance has issued the **Certificate of Financial Implication (CFI)** for the draft National Organic Agriculture Policy (NOAP) on its role on supporting organic agriculture.

- Benin, the Innovation for **Sustainable Agricultural Growth (2017) national plan** promotes use of organic herbicides and fertilizers in the rice and soya value chains.
- Senegal, **National Agricultural Investment Program for Food Security and Nutrition (PNIASAN)** that has incorporated organic farming is awaiting validation by stakeholders

N/B: Another great achievement for the AUC- decision on EOAI has been the identification, mentoring, promotion and recognition of EOA champions some of whom were present during the conference as depicted below.

Dr. Mwatima Juma

Mr. Ngugi Mutura

Mr. John Njoroge

The Key Challenges Facing AU-EOAI

1. EOA is implemented in many countries but and coordination of efforts and reporting on its implementation has been a challenge.
2. Inadequate documentation of success cases of EOA in the continent due to challenge of formalizing data collection procedures and bringing all countries on board.
3. Limited funds and resources to roll out / implement AU-EOAI in all the 54 countries.
4. Inadequate awareness of the AU – EOAI at the REC and the Member State levels hence low involvement.
5. Limited research on the link between the Ecological Organic Agriculture and human health.

Way Forward for AU – EOA Initiative

1. Map out all the actors implementing EOA in all countries and strengthen the coordination of the efforts by stakeholders including the RECs and the 55 Member States.
2. Establish and facilitate EOA favoring policies cascading from the County, National, RECs to Continental levels.
3. Deliberately incorporate the over 70 % smallholder farmers and especially the women and the youth who are potential beneficiaries of organic food and products.
4. Facilitate and invest in strong research in support of EOAI offering the solutions to support the smallholder organic farming in Africa.
5. Strengthen strong institutions like AFRONET, NOAMs, NOARA and Agro-ecological Networks working in harmony with other key stakeholders in moving the EOA agenda in Africa.

> ***"Do not go where there is a well-trodden path or a road to follow; it is very easy to do this! Instead, go to where there are no paths or roads and leave a trail of footprints for others to follow." By Harold R. McaAlindon***
>
> ***"If you find yourself in a hole – stop digging and come out of the hole. We have challenges / issues around pests and diseases, GMOs, climate change etc. Let us stop digging and let us truly embrace Agroecology", by Zachary Makanya.***

Ms. Dorith Von Behaim GIZ: Knowledge Centres for Organic Agriculture in Africa

Knowledge Centres for Organic Agriculture in Africa are funded by the Germany's Ministry for Economic Development and Corporation and implemented by GIZ. The current glaring global challenge is eradication of hunger and malnutrition by 2030 while ensuring the long-term conservation of natural resources such as soils, water and forests. Indeed, business as usual is not an option and therefore this calls for the transformation of the agriculture and food systems. Organic agriculture is one concept of agroecology that contributes to sustainable development and it has the potential to increase yields, conserve biodiversity, reduce cost of inputs and long-term sustainable development.

Africa has the greatest potential to expand its implementation of organic agriculture. Current statistics indicate that Africa has the lowest rate of organic agriculture compared to all continents with only 0.2% of agricultural land having been used in organic agriculture. To adopt organic agriculture there is need for in-depth understanding of ecological **interrelationships and extensive knowledge** of systems of **ecological** practices in agricultural production, processing and marketing. Clearly there is a knowledge gap that is limiting agroecology large scale adoption.

Knowledge Center for Organic Agriculture in Africa (KCOA-Africa)

The objective of establishing the KCOA Africa is to have an innovative strategy for promoting organic agriculture with actors in the regions of West, East and Southern Africa. This process of establishing knowledge hubs is anchored on three strategic thrusts/focus areas:

- **Knowledge Preparation:** This involves **v**alidation of the technical and methodological knowledge for the promotion of organic agriculture including processing. The preparation is context based depending on participating countries and stakeholder groups.
- **Knowledge Dissemination:** This involves dissemination of validated knowledge, strategies and good practices in the field of organic agriculture that are adapted to the contexts of the countries participating in the regional knowledge hubs.
- **Networking:** Key actors in the organic agriculture value chains of the participating countries in the three regions have been networked in an exemplary manner to ensure sharing and exchange of information and knowledge.

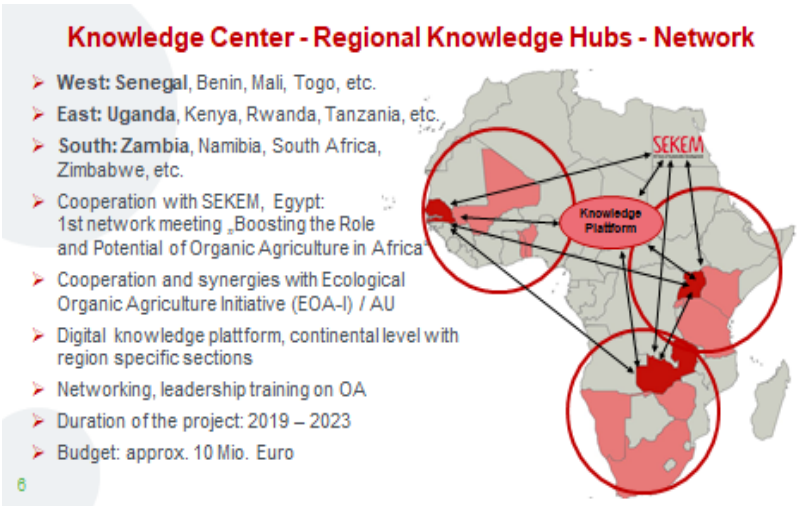


Figure 21: GIZ Knowledge Collection, Validation and Dissemination Model

N/B: GIZ is currently working in Eastern, Western, Northern and Southern Africa Regions with knowledge hubs in Uganda, Senegal, Egypt and Zambia respectively.

Knowledge Management Hub Actors

The current set up involves a host organization working with international partners and other stakeholders to collect, organize, package, validate and disseminate knowledge. The Eastern Africa Knowledge Hub will be coordinated by Biovision Africa Trust and co-hosted by PELUM-Uganda.

Dr. Emma Siliprandi - FAO: Scaling up Agroecological initiative: An integrated approach to achieve the SDGs

Agroecology involves the application of ecological science to the study, design and management of sustainable agriculture. There are other many versions of agroecology definition however, in all the definitions the following common points come to the fore: diversification (of production systems and products in space and time), contextualization (of approaches valuing local ecosystems and food heritage and culture**),** co-innovation (between farmers and researchers), knowledge sharing (and creating opportunities for women and youth) and territorial and decentralized approach.

Agroecology contributes to leaving no one behind by addressing the agricultural sustainability challenge in an integrated, holistic way and at FAO Ten (10) elements of agroecology have been identified for adoption and scaling up. They include: responsible governance, diversity, synergies, efficiency, recycling, resilience, human and social values, circular and solidarity economy, co-creation and sharing of knowledge and culture and food traditions as illustrated in the figure below.

Figure 22: FAO's 10 elements of Agroecology currently being scaled out in Mexico, India and Senegal

Currently FAO is working in three (3) priority national countries where it is promoting the 10 principles of agroecology.

1. **Mexico:** FAO is supporting the development of a National Plan of Agroecology which will address sustainable production, transformation, commercialization, and nutrition.
2. **India:** Based on the Zero Budget Natural Farming (ZBNF) programme, FAO is supporting policy and farmer field school in Andhra Pradesh and the same approach will be scaled out to other states.
3. **Senegal:** FAO is developing a 10 year program for Senegal and 4 Sahel countries. Senegal is used as a pilot country to launch the Agroecological Transition Support Programme in the ECOWAS.

FAO works through international and regional multi-stakeholders and so far meetings have been held in the sub-Saharan Africa, Asia and the Pacific, Europe and Central Asia, Near East and North Africa and Latin America and the Caribbean.

About FAO Global Knowledge Product on Agroecology

The aim of FAO global agroecology knowledge hub is to produce global and harmonized evidence (information and data) on the multi-dimensional performance of agroecological systems in order to inform policy-making and to support the process of transition to agroecology. The hub provides: uupdated contents from FAO and external stakeholders, publication of resources, experiences and events on agroecology, agroecology monthly newsletter and extensive databases on agroecology including AgroecologyLex which is a **s**election from FAOLEX Database on country legislation, agreements and policies on agroecology. It also provides a repository of publications, articles, courses and multimedia resources on Agroecology. To ensure efficiency and effectiveness of the knowledge hubs, FAO organizes knowledge in a 3 step approach:

Step 1: Context Description: This involves the process of describing the production systems, type of household, Agroecological zone and existing policies on agroecology including climate change.

Step 2: Characterization of Agroecological Transition (CAET): This involves describing the current system status in terms of transition based on the 10 agroecology elements. This is achieved through conducting of surveys with descriptive scales and also self-assessment by farmers and or with extension service providers.

Step 3: Criteria of Performance: This step involves measuring the progress and quantifies impact, across systems and regions informed by the 5 dimensions for policy makers linked with SDGs.

Why Scale up Agroecology Initiative by FAO?
FAO is supporting a programme that will accompany and support national agroecology transition processes through policy and technical capacity that builds synergies between countries to facilitate implementation of agroecology in target countries. The programme provides a framework for concerted action with other UN Agencies and partners through building alliances among different stakeholders and networks.

The strategies to be used include:

1. Strengthening the central role of family farmers and organizations in safeguarding, accessing and utilizing of natural resources.
2. Foster experience and knowledge sharing, collaborative research and innovations.
3. Promote markets for agroecological based products for health, nutrition and sustainability.
4. Review institutional policy, legal and financial frameworks to promote agroecology transitions for sustainable food systems.
5. Take agroecology to scale through integrated and participatory territorial processes.

This warrants the need to engage in production of global harmonized evidence to support policy making and transition processes that provide information and data for decision making and both public and private sector should focus on people beyond yield and incomes. Through these processes, agroecology will be taking a systematic approach for agriculture and food systems.

1.7.4 Plenary Session 4: Strengthening Regional Ecological Organic Trade and its Opportunities and Challenges towards Different Markets

Session Moderator: Eustace K. Gacanja, CEO Kenya Organic Agriculture Network (KOAN)
Keynote Speaker: Mr. Malick Kane, Project Coordinator, National Green Export Country Project UNCTAD – *Organic Markets and Africa; State of the Play and Perspectives*
Presentations

1. Ms. Barbara Zilly, Head of Capacity Development, IFOAM OI - *Impact of SIDA Support to the Organic Sector in East Africa*
2. Mr. Fahari Marwa, Principal Agriculture Economist, EAC - *Opportunities and Challenges in Regional Trade in East Africa*
3. Mr. Bo van Elzakker, AgroEco Louis Bolk Institute - *Agroecology and Organic Trade in Symbiosis or as Counterparts*
4. Ms. Martha Kihara, Fun Zone - *Experiences of Developing Local Markets for Organic Products*

Panelists: Malick Kane / Barbara Zilly / Fahari Marwa / Bo van Elzakker / Martha Kihara

Session Prelude
This session was dedicated to explore the opportunities available for trade in organic products at the national, regional and international level. The presentations for the session were aimed at highlighting what are the current status on organic trade (practices, processes including support and facilitation), challenges and opportunities. The following fundamental questions formed the basis for discussions and reflection for the session:

- *Are we only preaching to the believers who are already in the organic space?*
- *Where is the private sector (retailers, processors, exporters…) in the whole organic trade equation?*

- *Why aren't we focusing more on trade instead we tend to look at production side more?*
- *How can certification really work for African producers and consumers?*
- *How far can we go with a model centered on exporting raw products to a few markets?*

The principal challenge that was found to ail the organic industry was lack of awareness and capacity and inadequate focus on the off-take side of the organic value chains (trade).

Key Recommendations

1. Organic trade at all levels will flourish if we make certification process to work for small producers. Therefore as leaders and stakeholders there is need to continue supporting national/regional/continental certifications and PGS that should be linked to the Africa Continental Free Trade Area.
2. There is need to raise awareness outside of the organic community (reach out to those who are yet to embrace organic systems and products). Deliberately and structurally collect and disseminate strategic information on market trends and opportunities for African businesses, trade statistics by moving beyond number of producers and production area.
3. There is need to identify and support high potential value chains that are attractive for investment by private sector and develop linkages with other sectors such as retail, tourism, trade promotion agencies, finance institutions, Ministries and importers.
4. Develop innovative solutions such as agrifoodtech exhibition and platforms where display of organic products and services will be done for sharing information and knowledge.
5. Support start-ups organic businesses from developing countries that are creating innovative solutions to improve quality, traceability (from the farm to the fork), marketing and strengthen supply chains.
6. Explore technologies that can be tailored to small producers and businesses. They need to have simplicity of use (decentralized, mobile based) and replicability. Examples include credit scoring systems, portable fruit and vegetable analysis systems and drone operated crop health management systems.
7. Africa should embrace the South/South collaboration opportunities and explore opportunities offered by block chain technology that captures information at various points of the supply chain (e.g. production, processing, distribution, consumption…).
8. Invest in real time data to support improved produce estimation, production planning and sales of organic products. This can be supported by investing in mobile based advisory service provision and crop monitoring.
9. There is need to strengthen and scale up the already existing working markets for organic products. In the same strength consumers should be facilitated to tap into their immense power of influencing production, distribution and consumption of organic products.
10. There is need to tap into opportunities in the export and domestic markets by integrating smallholders into the main stream bigger markets through linkages.

Highlights from the Presentations

Keynote Speaker: Malick Kane - Project Coordinator, National Green Export Country Project UNCTAD – Organic Markets and Africa, State of Play and Perspectives

There is a positive relationship between trade and environment and for people to reap benefits from the environment there is need to make markets work for people. The leading sustainability standard in terms of land is the organic standard with 1.4% of the total agricultural land and products in the world being organic. There is a growing importance and multiplicity for Voluntary Sustainability Standards (VSS) exhibited in over 255 in 80 sectors.

Global Organic Markets

Current status indicates export cocoa is > 25% grown in certified area. Other standards include the UTZ 21%, Fair Trade 7%, Rainforest Alliance Certification (RAC) 6% and Organic 3%. The UTZ is a certification program for sustainable farming of coffee, tea, cocoa and hazelnuts and is part of the rainforest alliance an international non-profit organization working to create a better future for people and nature. Statistics also indicate >50% of fair trade production is organic with organic trade standing at > USD 90 billion globally. The market size of organic products in 2017 was estimated at USD 97 billion after experiencing an increase of >100% compared to 2008 estimates. Currently the largest markets for organic products and commodities are in the USA estimated at USD 45.2 billion; EU USD 39 billion; China USD 8.6 billion and Canada USD 3.4 billion. In Africa, only Tunisia has equivalence with EU standard. The key products in US Retail Sales include milk USD 1.4 billion, salads USD 1.1 billion, eggs USD 0.8 billion, chicken USD 0.5 billion and apples ± USD 0.4 billion. In the EU Imports of tropical fruits and spices is estimated at 27%; unroasted coffee and tea 9% , other fruits 7.3%, rice 5.5%, cocoa beans 4.6%, oilseeds 3.9% and olive oil 3.2%.

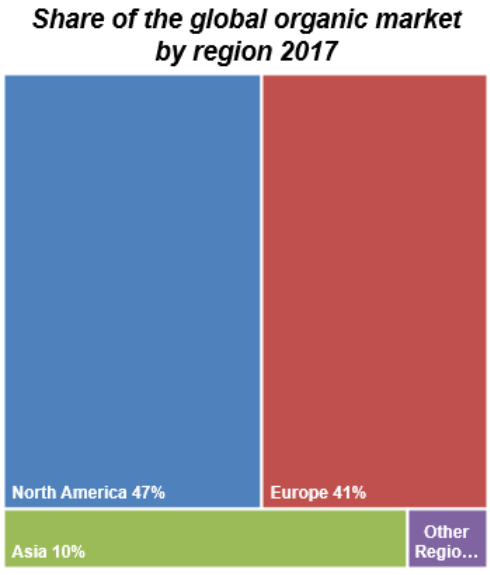


Figure 23: Share of global organic markets

Other major segments of organic products trade include: baby care products which have experienced more than 20% increase in the USA by 2018 compared to 2008, food, milk, skin care products, shampoo with customers now shifting focus on healthy and natural ingredients. With reference to aquaculture, 47% of global fishery production was organic as recorded in 2016. Share of certified aquaculture

production area is 6.3% but with 0.1% share of organic aquaculture production currently taking place. In Africa, Egypt and Nigeria registered 1.7% and 0.4% respectively of the global production in 2016.

With regard to animal feed, 352,000 tonnes of oilcake were imported in the EU in 2018 equivalent to 3.6% of the total value of organic imports. The projected market growth is >7% per year over the next 10 years. Regarding beverages, USD 412 million organic Kombucha was imported in the USA alongside other juices and alcoholic drinks. Global market for organic cosmetics is projected to grow by 8 - 10% annually and exceed USD 20 billion by 2022.

On price premiums, despite continuous market growth and increased supply, the average level of price premiums remains high estimated over 20% with significant disparities in average premiums. For example price disparities in eggs are 80%; fruits and vegetables is between 60% and 7% and baby food 20% compared to conventional products. Large share of the premium is enjoyed by retailers and intermediaries as a result limited access to organic products hence the need to engage in direct marketing channels for producers and consumers.

Organic Trade in Africa

Organic trade in Africa is mostly export oriented with some champions and success stories being experienced in East African Organic Standards, Tunisia and Uganda. There are however emerging domestic markets as a result of Participatory Guarantee Systems (PGS) and availability of farmers markets, direct sales, organic stores and supermarkets. Further in Africa, we have few countries with national organic legislation and a few regional standards. The major challenge in Africa is that, there is limited market information and access to finance for certification, research and extension.

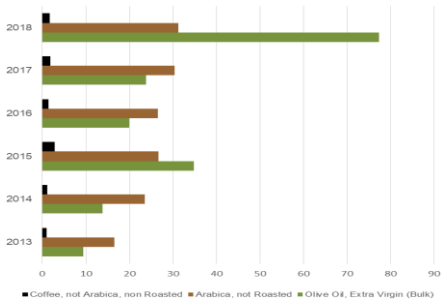


Figure 24: Organic Products Exports from Africa

Organic Trade in Africa: Exports to the USA

The main product being exported to the USA is the Extra Virgin Olive oil with the biggest recorded import by USA and significant average market share of 34%. The countries that exported include: Tunisia 96% and Morocco 4%. With regard to coffee, Arabica (non-roasted) was exported with an average markets share of 10% imported by USA from Ethiopia 80%, Uganda 7%, Rwanda 5%, Congo 3%, Kenya 3% and Tanzania 1%. Other Coffee (not Arabica/non roasted) exports came from Ethiopia 87%. There are no proper records for other commodities such as Mango, Banana and Cocoa. It should be noted that, in Africa most of these commodities are exported in bulk with very limited added value.

Organic Trade in Africa: Exports to the European Markets (EU)

Tunisia was recorded as the 9th largest exporter of organic agri-food products to the EU in 2018 with an estimated 4.1% share of total import value by EU. About nine (9) African countries export more than 10, 000 tons of organic agri-food products to the EU with the key commodities being tropical fruits, nuts, spices, coffee, tea and cocoa beans. Major African exporters include: Tropical fruits, nuts and spices: Ivory Coast (12,686t), Morocco (5,147t fruits) and Ghana (11,527t) who supply a 3.1% of total import volume by EU. Coffee and Tea: Ethiopia (5,255t) and Uganda (4,926t) contributing to 8% of total import volume by EU. Cocoa beans: Congo (9,864t), Sierra Leone (7,681), Uganda (5,062t), Tanzania (3,166t), Sao Tome

and Madagascar contributing 37.5% of total import volume by EU. Additionally Tunisia exports an estimated 30,000t of olive oil to the EU.

Organic Trade in Africa: Domestic Markets

There exist very little data on Africa's domestic organic market trade and certification. However, from available limited data the total organic market in Ethiopia, Kenya and Zimbabwe was estimated at USD 17.2 million 2017 (15.9€) with ± 83% of the sales taking place in Ethiopia. There are however, positive trends for the development of organic sales as a result of the dynamism of Participatory Guarantee Systems (PGS)initiatives that are helping to reduce bureaucracies involved in organic certification and making it possible for farmers to sell their products in both regional and local markets.

Positive Trends in Africa for Organic Trade

There is a rise of Africa's middle class with more than 100 million people with estimated total spending power of more than USD 400 million per day which provides an impressive frontier forecast for tapping into the domestic organic trade. Development of the retail sector where we have supermarkets/modern stores provides an opportunity for outlet sale of organic products. With the advert and expanding opportunities in ICT, Africa can enhance its direct sales through e-commerce platforms. Potential sales on e-commerce could range between USD 50 billion to USD 75 billion in 10 years and this can help Africa improve the marketing of African organic products. These opportunities can be explored on generalist platforms such as Jumia and Killmall (online stores selling all sorts of products) or through specialized platforms such as Kalimoni Green (Kenya), Epicerie verte (Morocco), Cooperative Sell-sellal (Senegal), Msongue family farm (Zanzibar) and Farmer's markets available in various Africa countries.

Barbara Zilly- Head of Capacity Development at IFOAM Organics International: Impact of Sida Support to Organic Sector in East Africa

IFOAM Organics International is a global agent of change that catalyzes systemic change towards truly sustainable agriculture through increasing adoption of organic agriculture. IFOAM OI envisions a world where there is broad adoption of truly sustainable agriculture, value chains and consumption in line with the principles of organic agriculture. This it achieves through providing information about Organic Agriculture and Markets, linking and collaborating with regional bodies and network partners thus forming part of the global network for Organic Agriculture, advocating at global level through representation on the contribution of organic agriculture to the achievement of SDGs, promoting verification systems from formal to informal, provision of advice to governments for organic regulation and providing capacity building to various stakeholders through the IFOAM Academy.

IFOAm OI activities and interventions are premised on 4 principles

Principle of Health: Organic Agriculture should sustain and enhance the health of soil, plant, animals, humans and the planet as one and indivisible.

Principle of Ecology: Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.

Principle of Fairness: Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

Principle of Care: Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well being of current and future generations and the environment.

The World of Organic Agriculture

Below is graphical illustration of the world of organic agriculture 2017.

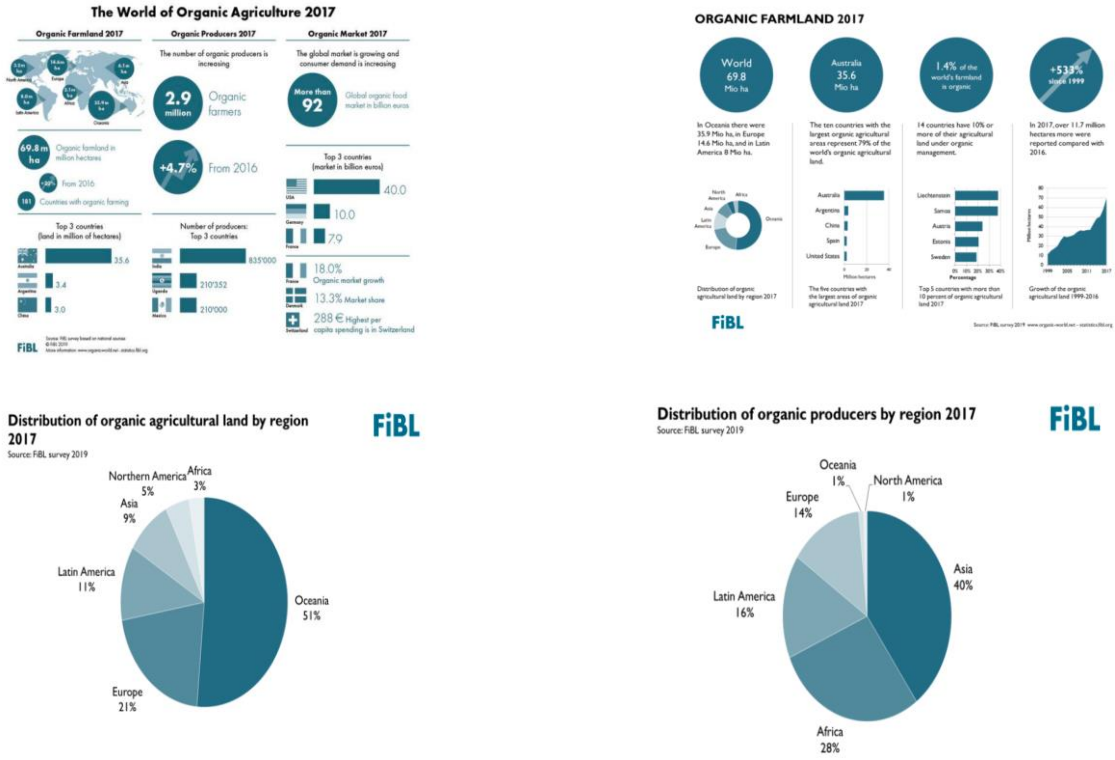


Figure 25: Worlds Organic Agriculture, Organic Land and Distribution of Organic Producers in the World 2017

Development of East Africa Organic Sector

By the year 1995 there was no formal organic sector in East Africa save for only a few pilot export projects for cotton and fruits in Uganda and for tea, cotton, herbs, spices and paprika in Tanzania being driven by NGOs whose focus was to support to address production decline and increasing input prices. Between 1998 and 2008 Sida supported the Export Promotion of Organic Products from Africa (EPOPA) trade based program that aimed at integrating smallholder farmers into the organic export market leads for improved livelihood. This program was premised on provision of solutions to lack of market access resulting in low agricultural development; responding to the existence of market demand for organic products and providing smallholder farmers' access to international export markets for better incomes.

The intervention approach employed was through contracting of farmers for organic farming, setting-up of extension systems, quality control and internal control systems. As a result, certification bodies were set up in Uganda (UgoCert) and Tanzania (TanCert) that facilitated the formation of Organic Agriculture Movements at the country level.

Following these interventions, some of the notable key benefits to the farmers that were recorded included better pricing structures, expanded market access resulting in higher incomes (ranging between 20-300% increase) as well as capacity enancement and training. To sustain the momentum of engagement in organic trade, the program had a clear market focus with tangible results and it enlisted the services of commercial actors to link farmers to markets. The program also supported group certification to facilitate the certification process.

Organic Standards and Certification Capacities in East Africa I (2006 – 2008) Programme
Sida supported the organic standards and certification process which resulted in the development of the East African Organic Products Standard (EOAPS) and regional organic trade mark "Kilimohai". A great milestone was achieved when the EOAPS standard was adopted in 2007 by the East Africa Community (EAC) Council as an official standard (EAS 456).

OSEA II - (2010 – 2013)
This programme supporetd by Sida aimed at improving the income and livelihoods of rural communities in East Africa. Its interventions focused on improving the certification services in the region, introduction of PGS and development of national certification bodies. Further the programme assisted in creating awareness on the EOAPS standard to promote its use and also provided organizational capacity to strengthen the East Africa Organic Agriculture Movement (EOAM). The key result of this programme was the introduction and management of PGS regional-wide, strengthened certification bodies in Uganda and Tanzania and increased awareness on organic products and policy developments and expansion to Burundi and Rwanda.

Organic Trade and Value Chain Development OTEA (2014 – 2018) Programme
Sida has also supported the organic trade and value chain devlopment programme whose aim was to contribute to improving the income and livelihood of rural communities in East Africa through the development of market oriented organic production. The focus on regional cooperation was anchored on the East Africa integration principles which are development of regional common market and regional customs union that will contribute to a stronger regional economy. The main interventions focused on consolidation of the Organic Guarantee System in East Africa with the aim to increasing regional trade, supporting the developmet of domestic, regional and international markets, facilitating the development of organic sector umbrella organizations (national and regional), advocating and lobbying towards good policies by governments and EAC and facilitating the process of data collection and dissemination.

As a result of these interventions, there has been an increase in the capacity in Organic Guarantee Systems (OGS) for inspectors at certification Bodies for National Organic Agriculture Movements (NOAMs) and also policy makers. The Joint Managament Committee under the EOAM Secretariat is operational and the EOAPs is a recognized standard in Bahrain, Dubai, Saudi Arabia and Quatar.

Comparison Consumer Surveys 2006, 2013 and 2017 through Sida Support
A comparison survey was conducted to establish the level of awareness of organic foods/natural foods. Compared to 2013, the results of the survey indicated there was improvement in awareness by 5% from 35% to 40% in 2013 as compared with 2006. Consumption in 2017 had increased further by 10% (49% to 59%) in the same period. Similar to both 2006 and 2013 findings, the health/nutrition, taste and safety factors were the key motivation for consumption of organic foods as was observed in the 2017 survey. Price/affordability was the second most important consideration. With regard to perceptions and

attitudes, consumers generally perceive organic foods as positive because of the exclusion of chemical fertilizers and the encouragement of biological natural processes. Most consumers are willing to purchase organic products if the prices are lower, similar or slightly higher than conventional foods.

Policy Symposium Arusha 2017 and African Organic Conference 2018

Sida supported the convening of a policy symposium on Africa's organic agriculture. In the policy symposium held in Arusha in 2017, several recommendations for the East African Community were proposed. These included:

1. Development of an organic agriculture policy in each of the East African country including assessing, reviewing and making recommendations for improvement of policies that discourage organic agriculture.
2. Development of harmonized regional East African Organic Policy to ensure better trade.
3. Engagement in awareness raising by regional and national governments on the benefits of organic agriculture.
4. Declaration was adopted that will put organic strategies for national and continental development in place in the context of the African Union Agenda 2063**.**

Other Important Outcomes from Sida Interventions in the Region

In 2011, at the African Union Summit, a Heads of State and Government Decision on Organic Farming Decision EX.CL/631 (XVIII), 2011) was adopted with the aim to mainstream Organic Agriculture into national agriculture systems by 2025. Ecological Organic Agriculture (EOA) Initiative for Africa to support the development of sustainable organic farming systems in Africa and mainstream ecological organic agriculture into continental and national policies has been put in place. Generally, there has been an increase in organic agriculture land in East Africa between the years 2006-2017.

Bo Van Elzakker – AgroEco Louis Bolk Institute: Agroecology and Organic Trade in Symbiosis or as Counterparts

AgroEco Louis Bolk Institute has been engaged in the development of organic markets in East and West Africa. The approach being used in the Institute's interventions include value chain approach, market push and pull approach, use of lead firms/farmer organisation/ field officers, grower group certification, training and follow up (annual inspection), group responsibility and group dynamics and quality assessment to access premium and export markets.

These interventions are applied in export commodities such as coffee, cocoa, sesame, peanuts, Tilapia, Tuna, processed products like marmalade, canned pineapple and instant coffee. Through the interventions, the Institute promotes subsistence (home consumption) production plus sales of excess crop to domestic or regional markets. To achieve this, there is promotion of diversified production for better biodiversity.

Martha Kihara – Fun Zone: Experiences of Developing Local Markets for Organic Products (I-NOGOF Organic Market)

Innovative Organic Group of Farms (I-NOGOF) refers to a group of small scale holder farmers founded in 2014 that is engaged in organic farming. The group started on the basis of shared vision and values among family and friends driven by the passion of providing safe and healthy foods to themselves and later outside their families. This was informed by the prevalence of lifestyle diseases such as cancer, diabetes and high blood pressure which are directly associated with the kind of foods that people eat. The membership is drawn from and is open to all Kenyan organic farmers. The pioneers' members were mostly those already practising organic agriculture. At the time of coming together and forming I-NOGOF, the overall production was not adequate and hence the group needed to quickly think of innovative ways to increase production to complement the organic family food basket.

As such, the group embarked on trainings on organic farming practices to enhance their production capacity and also to embrace quality assurance and standards compliance. The trainings were undertaken under the cover of the Participatory Guarantee System (PGS) through Kenya Organic Agriculture Network (KOAN).

So far, out of the six trainings on organic agriculture that have been conducted, about 50 members have benefitted. However, it should be noted that, not all trained farmers become members of I-NOGOF. To ensure momentum and continued improvement there is continuous coaching on specialized skills particularly during group meetings and exchange visits. The group utilizes a blend of internal and external trainers.

The first ever market on organic products took place between farmers exchanging produce after group meeting sessions (barter trade involving selling amongst themselves).

Following series of trainings and improvement it become obvious that the production had grown beyond demand at the farmer level and hence the farmers started looking into how to manage the excess harvest. This then led to the decision to look for a convenient location to avail the produce to interested community members beyond the group. This decision led to the current I-NOGOF community organic market, which is a designated market place for the organic produce. The marketing model in place now is direct farmer to consumer marketing.

With the opportunities now available on ICT platforms, the group engages in electronic media marketing to advertise their products and produce. Currently, the group uses the farmers and consumers whatsapp platform to market the organic produce (the group has 129 members) where the list of produce is posted on the platform and orders are made by consumers. Three farmers have volunteered to do home deliveries to consumers while at the same time farm gate sales are conducted through individual farmer initiatives. The home deliveries are organized in such a way that, the produce and or products will be

delivered using the mobile phone application enabled by taxi service providers such as Uber or Taxify taxi services at an additional cost borne by the consumers.

With regard to value addition, value added products are sourced directly from homes and weekly during the Saturday group market day where products such as honey, jam, yogurt, moringa powder, scalp oil are traded. To ensure quality control, the process of recruiting members considers quality aspects where farmers are identified and taken through trainings before they join the organic produce market. During training trainees continue to be monitored for good practice and after training, the selected farmers are given a transition period of between one to two years if the land they are using was not virgin land to clean out of any artificial chemicals and fertilizers remnants. For continued compliance, random and or on spot inspections are conducted to farmers by the trainers. It should be noted that, all farmers participating in the organic market undergo an annual peer inspection and reporting as a matter of policy. The group is keen to continuously improve its procedures and processes and therefore consumer feedback is taken seriously into consideration. One of the shortcomings for the organic market is that, there has been no laboratory based pesticide residue level conducted due to high cost per sample which is about USD 200.

Future Plans for I-NOGOF

There exist a lot of opportunities for growth and sustainability for the organic market as outlined below:

- There is a significant market growth potential through the home delivery service hence the group intends to invest in this new outlet.
- The group intends to provide on a continuous basis customer care training to the organic farmers to enhance customer satisfaction service delivery.
- The group through collective resource mobilization endeavours to undertake chemical laboratory residue level tests as this will greatly enhance market credibility.
- To address produce shortage during the off season periods, the group will engage in planned planting schedules including use of irrigation and value addition to sustain production and meet market demands all year round.
- The group intends to identify friendly financial institutions to organic farmers to provide capital that will help boost the production and market growth.

Figure 26: Group of organic farmers engaging in home delivery service- Case of I-NOGOF in KenyaGroup engaging in home delivery services

Summary from Panel Discussions

Panellists: Malick Kane, Barbara Zilly, Fahari Marwa, Bo Van Elzakker and Martha Kihara

- There is need to engage both the women and youth in organic farming as they form the majority of the population.
- There still exist low consumer awareness levels and hence as stakeholders we have an opportunity to reach out to the populations with knowledge and information on organic products.
- Quality assurance and standards are as important to organic agriculture as are in any sensitive sector that touches on the lives of the people

Parting shot

When it comes to organic foods, let's talk of quality, safety and standards including sales to promote organic products consumption, promote higher value products, projects to support the marketing of products and then allow for forces of market to determine the prices. Organic products have their own markets and target consumers who are willing to pay a little bit more over the conventional price that will meet the cost of production and offer a reasonable profit margin for the producers. There is no need for placing a premium price that will make organic products unaffordable to the majority; instead a better pricing will encourage production and consumption. Otherwise if the current price premiums continue, organic consumption will only be for the elite and not consumers in the local market.

1.7.5 Plenary Session 5: Food Security, Nutrition and Sustainable Consumption

Session Moderator: Ms. Anne Maina
Keynote Speaker: Mr. Andre Leu
Presentations

1. Dr. Million Belay
2. Ms. Gladys Mugambi
3. Dr. Dennis Garrity, Barabara Zilly

Panellists: Andre Leu/Dr. Million Belay/Ms. Gladys Mugambi/ Dr. Dennis Garrity/ Barabara Zilly/ Dr. Mokaya/ Sylvia Kuria/ Esther Bett/ Caroline Mbugua/ Farmer from Canada

Session Prelude

Functional biodiversity (agroecology) is essential for the production of food, feed, fodder and fuel which are fundamental for sustainable livelihoods. As such biodiversity is vital for satisfying basic human needs for food and livelihood security. Scaling agroecological systems will not only contribute to achieving food and nutrition security but also it will have an impact on all parts of the food system including economic, social, cultural and environmental benefits.

Key Recommendations

1. There is need to conservation of biodiversity and enhance diversification as they are essential for the production of food, fodder, fuel and feed.
2. There is need to explore the benefits of trees on agricultural systems.
3. Agroecology stakeholders including governments should support traditional food and seed systems.
4. There is need to increase access to diverse, safe and nutritious foods and this can only be made possible through diversification.
5. Food safety should be put at the core of achieving food and nutrition security.

6. Approach to food and nutrition security must be multidisciplinary and trans-disciplinary.
7. There is need to have soil testing systems in place.
8. There is need to advocate for and lobby to have policies that promote food and nutrition security.

Keynote Speaker: Andre Lue Co-Founder & International Director Regeneration, and Former President IFOAM Organics International – Why We Need Agroecological Food and Farming Systems

Why we need Agroecological Food and Farming Systems

The vast majority of the world's food insecure people live in the developing world (FAO). A report by the United National Conference on Trade and Development (UNCTAD) and the United Nations Environment Programme (UNEP) on good practice of Organic Agriculture of 2008 showed that, there is 10% less food per person in Africa since the 1960's when pesticide based industrial agriculture was introduced. Soil health is the key principle to successful agroecological/organic farming. Most pest and diseases are opportunistic and they 'attack' plants that are stressed. Therefore correctly balanced soils that are rich in organic matter, beneficial organisms, nutrients and have a good structure ensures minimal disease and insect damage. For instance studies conducted in Ethiopia indicated, wheat infested with stripe rust and sprayed with fungicides gave yield of 1.6 t/ha while wheat that was grown on composted soil resisted the rust and gave yields of over 6.5 t/ha.

Functional Biodiversity (Agroecology) and its Contribution to Food Security

Biodiversity is the basis of agriculture as it forms the origin of all species of crops and domesticated livestock and the varieties within them. Biodiversity is the foundation of ecosystem services (such as soil and water conservation, maintenance of soil fertility and biota, and pollination) essential to sustain agriculture and human well-being. Maintenance of this biodiversity is essential for the sustainable production of food and other agricultural products and the benefits these provide to humanity, including food security, nutrition and livelihoods. This is because biodiversity supports the continuous production of food, fibre, fuel and fodder. It helps in maintaining and supporting other ecosystems including adaptation to changing conditions such as climate change. Biodiversity is therefore essential to satisfy basic human needs for food and livelihood security. Enhanced biodiversity also provides a habitat for birds, frogs, lizards and beneficial insects including parasitic wasps, hoverflies and lacewings that have carnivorous larvae that eat harmful pests. Research has shown that, when you increase the host plants in farms, this facilitates the breeding of thousands of beneficial organisms that control pests and contribute to enhanced organic matter in the soil. For example, flowers provide nectar, pollen, mating sites and refuge for beneficial insects and they also help suppress weeds.

Other useful aspects of biodiversity include: the use of agroforestry trees as integral part of the crops, they help act as windbreaks that shelter the main crop, they can be used as stock feed, trap crops, cover crops and in legumes intercrop, the legumes help to fix nitrogen. Sustainably harvested biomass can be used for compost and biogas generation (recycling of waste products). Trees and or shrubs integrated in cropping systems act as nectaries for beneficial insects. They can be grown on the boundaries/boarder or as strips in between crop rows.

Boundary Insectaries **Strip Mowing Insectaries** **Border Insectaries**

The aforementioned are practices that can be adopted at scale by majority of smallholder farmers and they have been proven to enhance productivity and sustainability.

Dr. Million Belay, Coordinator – AFSA Panel Member – IPES Food- Adapting Agriculture to Changes in Africa – The Path to Agroecology

When discussing Africa's sustainability there are critical questions that need to be answered. These include:

- How can Africa produce more food?
- How can Africa produce more, nutritious and healthy food?
- How can Africa produce more food which is nutritious and healthy without affecting the biosphere?
- How can Africa produce culturally appropriate food which is nutritious and healthy and without affecting the biosphere and in a just way?

Even as stakeholders struggle to find answers to these questions there are key challenges that have plagued the continent which include: population explosion, malnutrition, land and forest degradation, decreased and loss of biodiversity, poverty and disempowerment, culture erosion, unplanned urbanization and climate change among others.

What needs to be done?

There are two competing narratives for Africa's sustainability and these are Productivist and Agroecological narratives.

Productivist/Industrial Agriculture Narrative

Productivist/industrial agriculture narrative focuses on productivity mainly through interventions such as use of agrochemicals, high yielding varieties, irrigation, adopting new technologies, training on new techniques and land consolidation among others. In Africa these interventions are receiving a lot of support from philanthro - capitalists, development agencies, businesses, local scientists and government bureaucracies including NEPAD, CAADP, AU and the RECs. For productivist the priority business is to feed Africa. The argument for this school of thought is that seed is part of the problem causing low productivity hence if indigenous low yielding seeds are replaced with patented hybrids that are high yielding then Africa's population will be fed by agriculture. Therefore, with more calories produced Africa's food problem will be solved. The same narrative advocates for science-based knowledge which is

considered superior and problem solving and hence science can produce one fits all solutions. As a result of these, regional industrialization strategies have focused on agricultural value chains of standardized grain and oilseed crops.

Further, policies and legal frameworks have and are being reformed to protect private investments and allow private ownership of land and other resources, including the protection of intellectual property on new plant varieties a guarantee that motivates the private sector to invest. Policy and law-making processes have therefore circumvented farmer and public participation, particularly on regional harmonized seed and intellectual property rights systems. The technical and practical support work ultimately is about the development and dissemination of a technological package that incorporates improved (mainly hybrid) seed, synthetic fertilizers, irrigation, land consolidation, interest- based credit and commercial markets. Much effort is spent on establishing and supporting functional technical and governance structures, institutions and arrangements.

The International Panel of Experts on Sustainable Food (IPES-Food) estimates that 3/4 of the American population will likely be overweight or obese by 2020. The latest figures from the Centers for Disease Control and Prevention (CDC) show that more than one-third (34.9% or 78.6 million) of U.S. adults are obese and 17% for children and adolescents aged 2–19 years. South Africa typifies this alarming new trend, with nearly double the average global obesity rates, and according to another report South Africa has become the world's third fattest nation. Nearly two-thirds of the population is overweight and, unlike in the developed world, the problem afflicts more women than men.

Incredibly, 69.3% of South African females display unhealthy levels of body fat and more than four in 10 are clinically obese (defined as having a BMI higher than 30). Noncommunicable diseases (NCDs), also known as chronic diseases such as heart attacks, stroke, cancer, chronic respiratory diseases and diabetes have become common due to poor eating habits. The United Nations Food and Agriculture Organization estimated that about 795 million people of the 7.3 billion people in the world, or one in nine, were suffering from chronic undernourishment between the period 2014 - 2016.

Despite the positivist narrative global food systems continue to display multiple forms of socio-economic and environmental vulnerability – as evidenced by persistent trends of food price volatility, rising malnutrition, social unrest and loss of biodiversity. These well-documented dynamics are signalling the inadequacy of conventional food security approaches. We need alternatives for change that is healthy and sustainable.

Agroecological Narrative

This refers to action and change that brings sustainability and resistance to all parts of the food system including ecological, economic, cultural and social sustainability. It is therefore a science, practice and a social justice movement. This is the sustainability model that embraces a systemic approach to agriculture and food systems.

About the Alliance for Food Sovereignty in Africa (AFSA)

The Alliance for Food Sovereignty in Africa (AFSA) is a Pan African platform representing food producers (farmers, fisher folks and pastoralists), hunter/gatherers, women, youth, faith based organizations, consumer groups, indigenous peoples and indigenous CSOs, citizens and environmentalists from Africa who possess a strong voice that shapes policy on the continent in the area of community rights, family

farming, promotion of traditional knowledge and knowledge systems, the environment and natural resource management. The alliance was created with the purpose of creating single African voice. Currently AFSA has 37 networks and works with 50 of the 55 countries in Africa potentially reaching 200 million Africans. AFSA is anchored on the strong belief of championing small African family farming/production systems through agro-ecology and Farmers Managed Seed System.

AFSA delivers on its mandate through four working groups categorized as; 1) Land and agroecology, 2) Citizens for agroecology, 3) Seed and agroecology and, 4) Climate change and agroecology. AFSA theory of change is premised on raising consumer awareness on safe and heathy food and environment based on reaserched evidence and supported by a strong network/movement that will contribute towards advocating for better policy and regulatory environment. AFSA supports agroecology because it has the potential for sustainable long-term solution for food and agricultural systems in Africa. AFSA has conducted several case studies to gather evidence on the benefits of agroecology approach.

The example below from Tigray Ethiopia demonstrates how agroecology can be used to redeem a degraded land.

Figure 27: A photo of a seriously degraded landscape in Ethiopia

The above photos display a seriously degraded land as a result of over-grazing and burning resulting in deep, wide and long erosion gullies, soils with low soil organic matter which translated to serious food insecurity and deaths of animals and humans during the dry years.

Below is the same piece of land after process of rehabilitation that has allowed for regeneration.

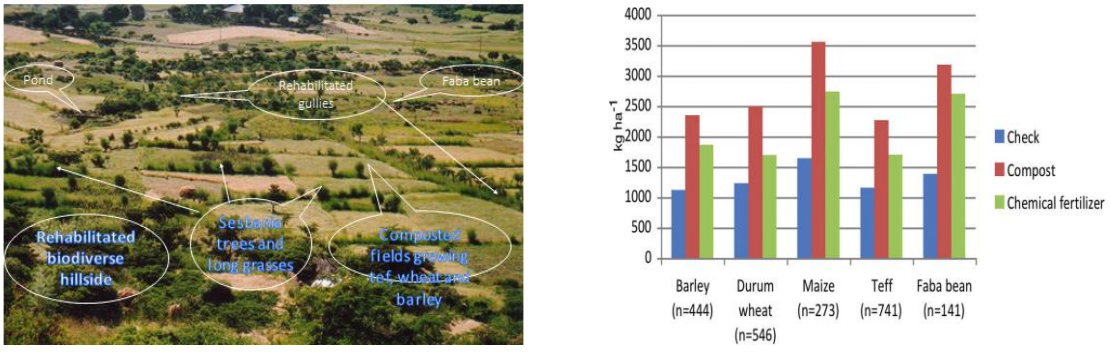


Figure 28: Regenerating Soils, Landscapes and Communities (L) and Associated Yields Outcome in Ethiopia (R)

The AFSA is currently supporting the following flagship projects:

- Campaign on climate change
- African food policy
- Bio-fertilizers for healthy life and ecosystems
- Promoting agroecological products

Gladys Mugambi, Ministry of Health Kenya on Nutrition, Health and Agriculture

"Those who think they have no time for healthy eating…will sooner or later have to find time for illness."
~Edward Stanley

Why Nutrition?

Nutrition is important as it ensures the wellbeing and health for all which by extension helps to boost gross national product. In Africa and Asia wellbeing as a result of good nutrition has been proven to boost GDP by 11%, prevents child deaths by more than one third per year, improves school attainment by at least one year and increases wages by 5 - 50%. Further, good nutrition reduces poverty as well and nourished children are 33% more likely to escape poverty as adults thus helping in breaking the inter-generational cycle of poverty.

Food Safety versus Food Quality

Food Safety: Refers to practices and conditions that preserve the quality of food to prevent contamination and food borne illness during preparation, handling and storage. Correct food safety measures and practices give assurance that food will not cause harm to the consumers when eaten and or prepared according to its intended use. This includes practices such as personal hygiene, personal presentation and preparations, pest control, cleaning and sanitization, temperature control among others.

Food quality: refers to the features and characteristics of a food product that is acceptable to consumers and meet their expectation, provides value for money, conforms to required specification and is profitable to the seller. The features include things like size, colour, shape, consistency, flavour, texture, labeling including packaging. Quality of food starts from the nutrients which are found in the soil.

Poor quality foods cause malnutrition which will manifest in ills as shown in the figure below.

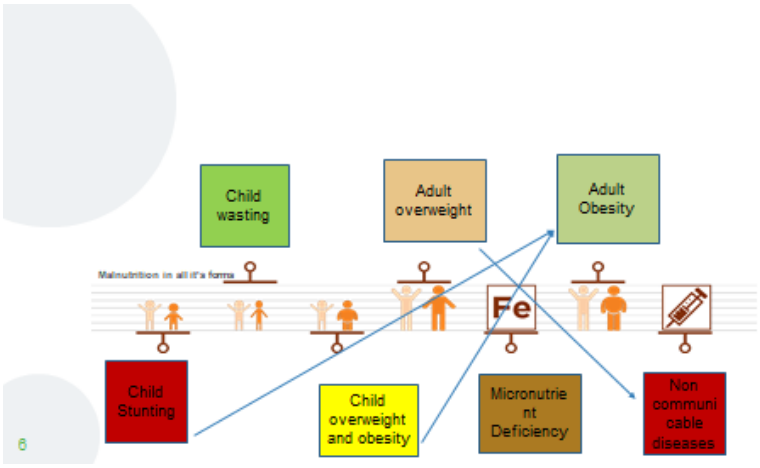


Figure 29: Effects associated with malnutrition in humans

No matter how much it gets abused, the body can restore balance. The first rule is to stop interfering with nature." **~Deepak Chopra**

Dr. Dennis Garrity - Drylands Ambassador, United Nations Convention to Combat Desertification and Chair, Evergreen Agriculture Partnership: The Perennialization of Agriculture: Vision for an Agroecological Future

Tree Cover on Agricultural Land and its Contribution to Food Security

Population keeps increasing demanding for annual increase in food production. However, there is decline in productivity as population continues to grow. Over 43% of the world's agricultural land now has ≥10% tree cover and between 2000 and 2010 there was an increase of tree cover by 2%. Highest tree cover on agricultural land (>45%) was found in the humid regions such as Southeast Asia, Central America, Eastern South America and central and coastal West Africa. Tree cover is 10–30% in South Asia, sub-humid Africa, Central and Western Europe, Amazonian South America, and Midwestern North America.

During the period in question, there was an increase in biomass carbon on agricultural land by 4.6% and the annual rate of increase in biomass carbon on farmlands due to tree cover is 740 metric tonnes CO_2. This is really good news as agriculture is overall gaining in carbon sequestration due to tree cover. This volume is expected to increase to 1500 metric tonnes CO_2 annually by 2035 and 5000 metric tonnes CO_2 annually by 2050. Trees are perennials that have demonstrated multiple benefits when integrated within agriculture and food systems among them: selected species act as bio-fertilizers through fixing of essential nutrients into the soils. Trees provide fodder to animals, restore degraded lands, increase biomass production of pasturelands and are a source of energy on the farm among others.

Critical questions for reflection during the conference

1. Are there alternative ways to vastly increase carbon capture that would not require the conversion of agricultural land?
2. Are there ways to deploy carbon capture on farmlands that would actually increase crop production?

About Evergreening Global Alliance

The EverGreening Global Alliance is an international NGO which coordinates the development and implementation of massive-scale environmental restoration and sustainable agricultural intensification projects in developing countries around the world. Established in 2012 as the EverGreen Agriculture Partnership (EVAP), it acts to facilitate a collaborative approach to the global problems of food insecurity, rural poverty, climate change and land degradation, and to develop and implement long-term solutions at a globally significant scale. It has brought leading research, technical and development organizations together to harness their collective energies and build on their shared vision to restore degraded land, and improve the sustainability, profitability and reliability of smallholder farming systems.

Its core members include World Vision, SOS Sahel, Conservation International, the World Resources Institute, the World Agroforestry Centre, CARE International, Oxfam and Catholic Relief Services. In 2018 Global EverGreening Alliance was officially incorporated as a not-for-profit public company. It is headquartered at the World Vision Australia building in Melbourne, Australia. In Africa Evergreening is currently focusing its initiatives in: Botswana, Burkina Faso, Burundi, Chad, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Namibia, Niger, Nigeria, Rwanda, Senegal, Somalia, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

Current Work by Evergreening Global Alliance in Africa

1. Accelerating the ongoing national scaling-up agroecology programmes in Malawi, Zambia, Burkina Faso and Niger.
2. There are National Agroforestry Food Security Programmes being developed for Senegal, Ethiopia, Rwanda, and Kenya
3. Preparatory work for new programmes is under way in Tanzania, Mali, and 12 other countries.
4. Following up on National policy commitments in Kenya to have >10% tree cover on agricultural land.
5. Ethiopia – 100 mill Faidherbia trees in Ag land - National Faidherbia albida programme.

You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete. R Buckminster Fuller

Barbara Zilly, Head of Capacity Development Department IFOAM Organics International: The Drivers of Change for Sustainable Nutrition Based on Nutrition in Mountain Agro Ecosystems (NMA)

Nutrition in Mountain Agroecosystems project aimed at production, replication and scaling up sustainable agriculture practices to promote improved nutrition and resilience driven by an action network of empowered rural service providers aiming at a broad impact on micro, national and global levels. The ultimate goal is to diversify diets to curb stunting in children, reduce poverty and malnutrition and facilitate agricultural and marketing practices.

Figure 30: The NMA model of agroecological agriculture and food systems

The NMA project achieves its objectives through a 10 intervention approach as illustrated below

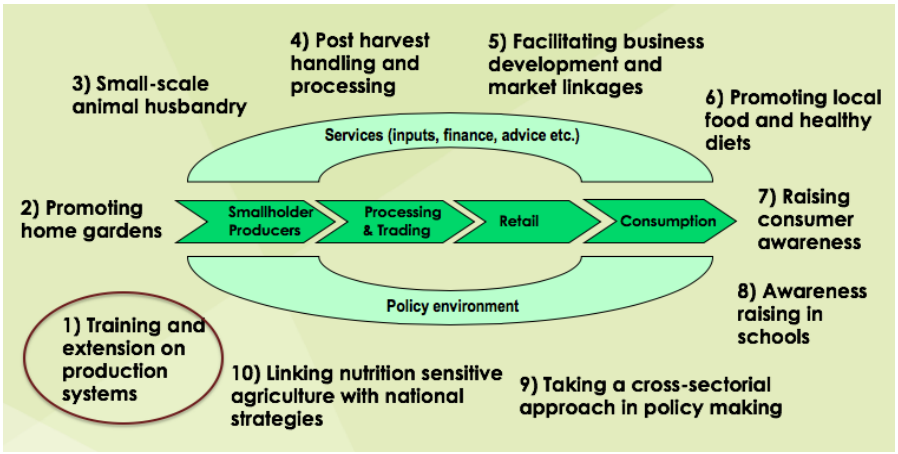


Figure 31: IFOAM NMA 10 Intervention Model

Through training and extension, communities are trained on practical know-how and skills on sustainable and diversification production systems which provide a basis for improving nutrition. The training focuses on compost and organic manure production, mulching, rain water harvesting, drip irrigation and facilitation to access markets. Communities are also given technical support on rearing of poultry, guinea pigs, goats, fish and honey production. Further there is training on improved post-harvest handling and small-scale processing at household or village community level to reduce food wastage. The project team works closely with departments of agriculture, cooperatives, local NGOs, extensionists, businesses, women groups and other forms of farmer groupings.

To support reviving of traditional food varieties and strengthening of local culture and provision of opportunities for marketing and tourism, communities are supported to grow highly nutritious traditional food varieties. This process is supported also by the production and dissemination of recipes for nutritious dishes during meetings and food fairs. Through the policy initiatives, NMA takes a cross sectoral collaborative approach to lobby and advocate for mainstreaming linkages between agriculture

and nutrition. NMA supports private businesses promoting nutrition sensitive agriculture. The project also facilitates the formation of Mountain Agro-ecosystems Action Network which is a social and knowledge network of rural service providers from the mountain areas around the globe.

"Instead of eating so much, we now eat so many: we have carbohydrate, protein and vitamin in our food." Beneficiary from NMA Initiative, Ergoye

1.7.6 Panel 6: Policies and Legislation: Milestones in Synthetic Fertilizers and Pesticides Reduction, Scale Up of Agroecology and Ecological Organic Trade

Session Moderator: Prof. Raphael Wahome, University of Nairobi, (UoN)

Keynote Speaker: Dr Simplice Nouala, Head of Division, Agriculture and Food Security, Africa Union Commission (AUC)

Presentations

1. Dr. Frank Eyhorn (PhD), Vice-President, IFOAM OI and Senior Advisor, Helvetas - *Coherent policies driving sustainable agriculture and food systems*
2. Mr. Hakim Baliraine, Chair - East and Southern Africa Farmers Federation
3. Dr. Edith Kareko – Munene, Policy and Legislation Consultant - *The Legislation and Policy Environment for Ecological Organic Agriculture in Ethiopia, Kenya and Uganda*
4. Mohammed Anwar, Heliopolis University

Panelists: Dr Simplice Nouala / PS Prof. Hamadi Boga / Daniel Maingi / Hakim Baliraine / Edith Munene / Wanjiru Kamau / Hon. Dr. Jack Gutu, County Executive Committee Member Agriculture Kirinyaga County

Session Prelude

This panel session sought to set discourse on the role of policies and legislation in supporting agroecology principles adoption at the national, regional and international levels including sharing of best practices from across the world.

Key Recommendations

1. There is need for policy makers to coherently align policies and legislations to global and regional commitments such as with the SDGs and Africa's Agenda 63.
2. The governments should deliberately support transformative systems like organic agriculture through investing in research, extension, technical assistance and support to agroecology based businesses. The same assistance should be extended to farmer institutions that are engaged in agroecology.
3. There is need for policy makers to support the processes of stimulating demand for organic pesticide free practices through raising consumer awareness on health and safety, encouraging effective and inclusive participation and engagement in policy making and implementation.
4. Incentivizing incremental improvements particularly on sustainable practices.
5. Raising legal requirements and industry norms that will enforce banning of highly hazardous pesticides and practicing good and fair trade practices that put health and safety at the core of decision making instead of profits.

Luckily, many policy makers and contributors across the world have already started working on this process and evidences by many good examples such as work being done by IFOAM OI, Helvetas, FAO and others working on programs that support agroecology.

Keynote Speaker Dr. Simplice Nouala Head of Division, Agriculture and Food Security, African Union Commission (AUC)

Dr. Sarah Olembo, former officer at the AUC and member of the Ecological Organic Agriculture Continental Steering Committee, talking on behalf of Dr. Simplice Noula informed the participants that the AU Heads of State Decision on Organic Agriculture (AU-EOAI) is an initiative to implement the decision adopted in January 2011 (EX. Cl / Dec.621 (xvii) by the African Union Heads of States and Governments addressing challenges facing the farmers in agriculture. This decision was arrived at during the conference of Ministers of Agriculture held in Lilongwe Malawi from the 28th and 29th October 2010 on organic farming. This was informed by the concern of exploitation of organic farmers in Africa. The ministers requested the Commission and its New Partnership for Africa's Development (NEPAD) Planning and Coordinating Agency (NPCA) to initiate and provide guidance for an Africa led coalition of international partners on the establishment of an Africa organic farming platform based on the available best practices that will provide guidance and support for the development of sustainable organic farming systems and improve farmer based seed systems. The conference also called upon the development partners to provide technical and financial support for the implementation of the decision.

Dr. Oscar Magenya (PhD) on Behalf of The Principal Secretary, Agricultural Research Ministry of Agriculture, Livestock, Fisheries and Irrigation: Policies and Legislations: Success in Synthetic Fertilizers and Pesticides Reduction, Scale up Agroecology and Ecological Organic Trade

Food systems are complex and they involve many stakeholders in the food value chain. This introduces safety risks along the farm-to-form continuum. The Constitution of Kenya (2010) recognizes the right to safe food as a fundamental right (Article 43 and 46) for all Kenyans. But, as a country Kenya faces the challenge of upholding high levels of food safety that meet international regulations and standards. Although, significant investments to address food safety risks in international trade have been made, incidences of interceptions and rejections of Kenyan exports still happen. The Ministry recognizes the importance of stakeholders coming together to discuss and drive investment in food safety systems.

In Kenya food safety and standards are regulated by a variety of laws including: The Public Health Act, Cap 242, The Food Drug Chemical Substances Act, Cap 254 and the various international standards agreements that Kenya is party to including the WTO Sanitary and Phytosanitary Measures (SPS) agreement that protects consumers, animals and plant health. The MoALF&I also has developed the Climate Smart Agriculture Strategy, which promotes healthy ecosystems and supports sustainable management of land, water and natural resources for increased food security. It incorporates improving

efficiency in resource use; conservation and protection of these resources and enhancing of resilience of the people. There exist more than 20 legislations that provide guidance for food safety in Kenya.

Relevant to the agroecology conference, attention is drawn to the Kenya's agricultural sector which is still mired with a lot of challenges which include: highly vulnerable to extreme weather events and climate variability which have resulted in deaths of humans, livestock and crops and none or low fertilizer use and blanket recommendations for smallholders. As a country Kenya needs transformation in its agricultural systems to make them more productive, resilient and competitive in generating incomes under changing climate. The interest in Agroecology has grown because it is an innovative and sustainable transformative response to the challenges facing Kenya's food and agriculture systems. The clientele for organic foods has been growing in the country due to sophistication of the citizenry. However, despite of the advantages of organic foods, majority of consumers in Kenya, either have scant knowledge of their existence or where to buy them or both. Either most consumers are as well not conversant with standards or certifications common in the organic food industry or because of pricing majority are still focusing on the conventional agriculture and food systems.

Dr. Frank Eyhorn Coherent Vice-President, IFOAM – Organics International Senior Advisor, Helvetas Swiss Intercooperation: Policies Driving Sustainable Agriculture

The way humans farm and eat has major implications on health, environment and social wellbeing and if man gets agriculture and food systems right, he can become a strong positive force that will contribute immensely into achievement of several if not all SDGs. The world is facing challenges of greenhouse gas emissions, soil erosion, biodiversity loss, water crisis, rural poverty and noncommunicable diseases. To solve these challenges there is need to enhance carbon sequestration, improve soil fertility and agri-biodiversity and promote healthy nutrition. The change to advocate for should be one that builds on a new global food system, based on equity, participation, democracy, and justice, that is not only sustainable but helps restore and protects earth's life support systems upon which we all depend. Thousands of studies have shown that organic / agroecology systems in average are more sustainable and stakeholders need to advocate for scaling them up while further improving their performance.

iCow Technology

iCow is a comprehensive solution for farmers designed not only to support them with livestock and crop production but also to connect farmers to the vital players in their agricultural ecosystem. These include input providers, agricultural financial service providers, veterinary experts, agricultural extension service providers, NGO's, Governments and much more. The technology is designed for the most basic feature phones and is available in different languages depending on the county of deployment. In Kenya and Tanzania, it is available in English and Swahili, in Ethiopia in Oromiffo, Amharic and Tigringnia.

The service providers pride themselves in creating an ecosystem of like-minded people, organizations, Governments and farmers across the world hell bent on solving Africa's food security problems. The

company is determined to harness the positives to contribute towards even greater positives. Driven by the belief that sustainable food security lies in the hands of the worlds' smallholder farmers, the company is committed to using its resources, networks and talents to work closely with farmers to improve their productivity, resilience, confidence and overall well-being. Food security depends on sustainable agriculture. iCow will make millions of Africa's farmers more productive and prosperous by offering easy access to relevant knowledge and connecting them with other agricultural players.

1.8 BREAKOUT SESSIONS BRIEFS

1.8.1 Breakout Session 1: Impact of Synthetic Inputs: Breaking the Silence

Session Moderator: Prof. Raphael Wahome
Main Speaker: Dr. Darcy Ogada

Dr. Darcy Ogada Assistant Director of Peregrine Funds Africa Program: Breaking the Silence: Africa's Wildlife Poisoning Crisis

Wildlife poisoning is happening as a result of Trade in animal products and plant products. There exist silent, cheap pesticides such as cyanide, break-fluid that are easy to acquire and very effective which although bought to target the wildlife, these poisons end up targeting the whole community including unintended species. The available data and statistics on the magnitude of damage are incomplete. This study was conducted in Maasai Mara, Ruaha, Amboseli and Tsavo.

In the African wildlife poisoning database, statistics indicate that: there are records of 451 poisoning incidents involving 15085 mortalities of 59 wildlife and 4 domestic species, majority of mortalities were in East Africa (n = 7636), closely followed by southern Africa (n = 7399). The largest number of mortalities for a single species has been recorded for White-backed Vultures (n = 4763). **Chemicals commonly used include:** carbofuran, strychnine, aldicarb, diazinon, cyanide and monocrotophos. It should be noted that these chemicals have either been banned or their use is severely restricted in countries such as the United States of America, Canada and European Countries. In Ruaha National Park in Tanzania, these poisons have been responsible for killing all scavengers such as the Hyenas and Vultures.

Human-wildlife conflict exists between communities bordering wildlife parks where monkeys, lions, elephants, blue cranes stray into the farms of the people. To reduce their menace, the communities have resulted into poisoning them a process that ends up killing also other animals that were not intended. In the early 1990s, the entire population of lions in Amboseli National Park was lost, mainly through poisoning events. Hyenas have been systematically targeted in poisoning campaigns across the continent.

There are also instances where humans harvest animals for food. Again, in such instances, pesticides have been used to lace baits which unfortunately end up being released into the water bodies. The humans who get to access such meat have no idea the animals they are feeding on have been harvested using poisons. In Ghana, an average of 25 – 30% of bushmeat is harvested using pesticides. In one of Kenya's rice schemes over 3000 birds were poisoned and sold for food over a 10 - month period. Pesticide fishing is a pervasive practice on the continent where 32% of global population of Lillian's Lovebird is threatened by poisoning in Liwonde National Park in Malawi.

Figure 32: Use of Poisonous pesticides to harvest wildlife for food

There is also rampant poaching of wildlife for their associated products. Elephants, rhinos and lions are killed for their body parts. Use of poisons to harvest lion parts for traditional medicine has been identified as a major threat to populations in west and central Africa. Over 100 elephants were poisoned with cyanide in Zimbabwe in 2013.

Other activities include intentional spraying of pests such as red-billed Quelea and other birds. Such large-scale poisoning causes massive contamination to the environment since such chemicals target thousands and millions of birds. This action ends up killing unintended birds and animals in the environment. In other related findings, the chemicals being used for poisoning particularly aerial spraying, they lead to long term health conditions.

There are also instances where these chemicals are used as fumigants at household level for bedbugs, snakes, cockroaches among others; such are also causing poisoning of environment in the soils and water. In South Africa and Zimbabwe and other Africa countries some animals are harvested for traditional cultures and beliefs. In South Africa, 35% of vultures found in medicinal markets were harvested through poisoning and in Northern Nigeria, 47% of traders reported they use poisons as the predominant means of obtaining vultures.

Peregrine Fund Program Solutions to Wildlife Poisoning in East Africa

Peregrine has been funding a program that offers co-existence training for the communities living around parks. The training module is on poisoning awareness and the process began in June 2017. This is a one-day training targeting 15 participants and covers the following topics:

- Hazards associated with using poisons and secondary poisoning
- Signs and symptoms of wildlife poisoning
- Basic information on chemicals commonly used
- Personal safety and basic equipment required
- Decontaminating a poisoning site

Another module is in livestock management and the trainings began June 2018. They are also a one-day training targeting 15 participants and covers the following topics:

- Building better bomas (livestock corrals)
- Improving daytime herding practices

- Improving livestock management

Through the training process: 1235 Individuals, 85 Groups have been trained with 931 individuals being trained on poisoning awareness and 304 being trained on livestock management.

Notable Impacts from the Trainings

- There has been 4 reports where trainees have intervened to stop wildlife poisoning that involved 2 lion prides, vultures and grey-crowned cranes
- 100% of the groups go out to train others in their communities
- Some of the trained teams have intervened in one case of suicide and this saved 10 poisoned cows
- Proper disposal of contaminated carcasses has been observed where 13 poisoning incidents involving 24 animals (mostly dogs) were either burned or buried by the trainees
- Illegal grazing in farms has reduced as pastoralists are now more aware of the risks. Communities no longer ignore dead animals, now burned/buried.

Proposed Scaling Out Recommendations to Stakeholders

1. Create awareness at all levels of society about the implications of the misuse of poisons for human health and the environment.
2. Tightening the regulation of pesticides and controlling their distribution.
3. Active involvement by the Ministry of Agriculture through their Agricultural Extension Officers (AEOs) to provide stewardship on agrochemical use.
4. Improving laboratory testing facilities and knowledge of wildlife toxicology.
5. Developing capacity within law enforcement and the judiciary.
6. The consumers need to be sensitized on the negative impacts of chemicals.
7. There is need to provide options for people to eat and live today to avoid desperate situations that provoke the use of poisonous chemicals.
8. Institutions need to make right decisions and enforce the right regulations: they need to be educated.

1.8.2 Break out Session 2: Alternative Technologies and Methodologies to Reduce Synthetic Input use and Contamination

Session Moderator: Dr. Edith Kareko – Munene
Main Speaker: Prof. Tyrone Hayes American biologist and professor of Integrative Biology at University of California
Speaker:

1. Robinson Rue

Prof. Tyrone Hayes American Biologist and Professor of Integrative Biology at University of California: "From Silent Spring to Silent Night: A Tale of Toads and Men"

In his presentation, Prof Tyrone Hayes brought to the fore the damning evidence of Atrazine herbicide on humans, plants and animals. In his research with amphibians and fish, Prof. Tyrone Hayes presented what he considered evidence on the damage Atrazine is causing in frogs including malfunctions such as hermaphroditic and demasculinization manifestations in frogs after exposure to the herbicide atrazine at low ecologically relevant doses. This is made worse as most governments and some powerful industry players tend to block anti-pesticides research. As such limited funds, are allocated to such processes

because they will interfere with vested interests. In situations where research findings are available, these findings emanate from the industry players who do not give independent and accurate assessments regarding their products.

Recommendations

1. There is need for concerted efforts to reduce and terminate the use of poisonous synthetic pesticides. This should be informed by evidence from research that provides factual analysis of the positive and negative side of the chemicals.
2. There is need for mobilizing resources to support continuous research on synthetic fertilizers and chemicals.
3. There is need for stakeholders to establish a precautionary platform to use science to challenge the use of harmful compounds in agricultural and food systems.

Robinson Rue: Rue Organics: Providing Safer, Sustainable Alternatives to Hazardous Chemicals Pesticides to Support Agroecological Agriculture

RUE organics are concentrated liquid manure made from rabbit urine, cow dung, green matter, selected water weeds and legumes. They offer organic alternatives to synthetic chemicals driven by the motivation to address people, planet and profit in a sustainable way. However, there is lack of adequate research to demonstrate the positive contribution of such products in comparison to the conventional products. There is also lack of knowledge sharing or various organic alternatives and policies to ensure these initiatives are acknowledged and scale out. The conference offers the opportunity for the stakeholders to advocate for sustainability initiatives such as organic initiatives. This process calls upon all actors including governments, donors and all stakeholders to get involved in the promotion of the organic pesticides and fertilizers like RUE Foliar Stop Gel, RUESIL Fruit and Flower Liquid Foliar and Emforte soil drench Biostimulant being manufactured by Rue Organics and any other manufacturer engaged in similar initiatives. However, there is need to note that, every agroecological zone is unique and hence there is need to conduct situation analysis of technology needs that will inform production of relevant organic products. This should be supported by knowledge sharing and innovation through partnerships. Rue Organics believes in sustainable Inclusive business models that integrate planet and human health.

Regarding whether Rue Organics has been subjected to regulations and testing: the answer is yes. Evaluation of RUE Organics products efficacy and demonstrations has been presented to the Ministry of Agriculture, Kenya Cereals and Produce Board and KALRO in Kenya. Field trials have been conducted by Egerton University out of which three research journal articles and certificate have been published.

1.8.3 Breakout Session3: Frameworks, Methods of Performance Assessment and Scaling up Strategies

Session Moderator: Ms. Louise Luttikholt, Executive Director IFOAM Organics International

Main Speaker: *Ms. Venancia Wambua, Project Manager, EOA:* Key achievements, lessons learnt and future prospects of EOA Initiatives

Presentations

1. by *Mr. El Hadji Faye ENDA Pronat* – FAO: Global Knowledge Product Experience
2. *Ivy Saunyama - Agricultural Officer, Pest and Pesticide Management Team (AGPMC) FAO:* Phasing out Highly Hazardous Pesticides (HHPs) with Agroecology

3. *Gerard Lawry* - Eaglerise Farm: Case study– Vision, Philosophies and Goals

Ms. Venancia Wambua, Project Manager, EOA: Key Achievements, Lessons Learnt and Future Prospects of EOA Initiatives

Ecological Organic Agriculture Initiative in Africa (EOA-I) has been in operation since 2011. The project is funded by the Swiss Agency for Cooperation and Development (SDC) and is being implemented in 8 countries including Kenya, Tanzania, Uganda, Ethiopia, Mali, Nigeria, Benin and Senegal. The main beneficiaries of the project are Smallholder farmers across Africa. The goal of EOA-I is to mainstream Ecological Organic Agriculture into national agricultural production systems by 2025 in order to improve agricultural productivity, food security, access to markets and sustainable development in Africa. EOA-I delivers this through its six main pillars: Research, Training and Extension, Information and Communication, Value Chain and Market Development, Networking and Partnerships, Policy and Programme Development and Institutional Capacity Development that strengthens partners to support and implement initiatives.

Key Achievements

- Overall, over 32 partners are involved in the implementation of the project.
- Countries have developed national organic policies for instance in Kenya there is an Organic Agricultural Policy 2017 (5th Draft) in place, Nigeria there is an Organic Agricultural Act of 2017 in place, in Uganda a Draft Organic Agricultural policy is awaiting Ministry of Finance to provide a certificate of financial implication and in Tanzania the Tanzania Agricultural Sector Development Programme has incorporated an element of the organic agriculture in the programme document.
- In the tertiary education front the programme is supporting the lobbying of organic agriculture inclusion in the curriculum in Nigeria, PhD students have been facilitated to carry out research on indigenous knowledge and organic agriculture in Uganda Martyrs University and there is a fully-fledged undergraduate course on organic agriculture and a Master's and PhD course in Agro-ecology and livelihood systems, at the University of Dakar – Senegal being supported by the program. Sokoine University of Agriculture in Tanzania is in the initial conceptualization process of developing an Organic Agriculture Degree at PhD and master's levels. Undergraduate course on organic agriculture has been running since 2014.
- EOA initiative is supporting the Kilimo Hai standards and certification mark

Emerging Issues of the project

- Effective, efficient and strong governance and management systems are a critical requirement for successful scale-up of EOA initiatives especially with partners.
- Beyond the resources, the sustainability of the uptake of EOA practices and technologies and changes at the farmer level will only be sustained by a well-thought-out market system approach that will make markets work for the poor.

- Organic farmers face serious competition from in-organic/conventional farmers and also proponents of chemical inputs. Therefore the gained momentum should be sustained through deliberate investment in EOA systems.
- Sourcing and harmonization of streams of funding, coordination, monitoring, and evaluation is still key for impact creation and scale-up.
- Change in attitude among farmers accepting ecological agriculture as a practice.

Recommendations

- There is need to create opportunities for scaling up through production market systems.
- Stakeholders of EOA should focus on the value chain development approach.
- There is need to develop and employ robust monitoring and evaluation frameworks for documenting evidence to support scale up initiatives.
- There is need for employing deliberate efforts to involve women, youth and vulnerable groups.
- Rolling out market system development approaches which embrace business development support infrastructure, value chain analysis and make markets work for the poor (M4P).

Mr. El Hadji Faye ENDA Pronat- FAO Global Knowledge Product Experience

There is still insufficient comprehensive and structured evidence on the potential of agroecology to build resilient livelihoods in the face of climate change. Agroecology is not yet considered as a key approach that would merit political backing to address climate change challenges as evidenced in its missing integration in COPs conferences on climate change. FAO is developing a tool to assess the characterization of agricultural systems based on the 10 elements of an agroecology developed FAO.

Currently studies on how agroecological practices contribute to climate change adaptation and mitigation are underway to establish the technical potential of these practices to build resilience to climate change. A global meta-analysis of current literature on the technical potential from peer-reviewed research and key reports is also underway. FAO is also conducting an assessment of the policy potential at the international level to understand the level of integration of agroecology within the NDCs, the potential for agroecology to be considered and recommended as a relevant approach in the agriculture-climate debate. Two country case studies, focusing on both the ecological, socio-economic resilience and policy potentials will be undertaken in Kenya and Senegal. The results will provide an understanding of the local and national context with concrete examples and snapshots for dissemination. The foreseen countries for these case studies are and will build on on-going field projects implemented by Biovision and FAO in Kenya and Senegal. For the Technical potential analysis, the study will be conducted in Busia and Tharaka Nithi, while in Senegal the study will be conducted in Niayes and Tambacounda. The aim of conducting these studies will be to gather **evidence** on how agroecology builds resilient livelihoods and food systems (and mitigation co-benefits) in smallholder systems and link agroecology to the Paris Agreement and the Koronivia Joint Work on Agriculture (KJWA) and other relevant international processes. The Koronivia joint work on agriculture is a decision that was reached at the UN climate conference (COP23) in

November 2017, officially acknowledging the significance of the agriculture sectors in adapting to and mitigating climate change.

Ivy Saunyama - Agricultural Officer, Pest and Pesticide Management Team (AGPMC) FAO Phasing Out Highly Hazardous Pesticides (HHPs) With Agroecology

The model agricultural production that predominates today's food system is not suitable for the new food security challenges of the 21st century. Since food production is not a sufficient condition for food security, it means that the way we are producing is no longer acceptable. Highly Hazardous Pesticides are pesticides that are acknowledged to present particularly high levels of acute or chronic hazards to health or environment according to internationally accepted classification systems such as WHO or the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) or their listing in relevant binding international agreements or conventions. In addition, pesticides that appear to cause severe or irreversible harm to health or the environment under conditions of use in a country may be considered to be and treated as highly hazardous. HHPs can present high acute human toxicity, chronic human toxicity and environmental contamination. The reason HHPs need attention is because they have a direct impact on food safety and pose barriers to international trade. Highly hazardous pesticides are development and human rights issue and hence they call for global action by all people. This is because their impacts are felt much beyond the field and can affect human health, biodiversity and natural resources. With the ongoing discussions on agroecology, it is clear that the current use of HHPs in agriculture is largely unnecessary as there are effective alternatives available for use.

Key Recommendations

- There is need to ban the production, distribution and utilization of HHPs.
- The responsible regulatory agencies should take bold actions like cancellation of registration of HHPs with or without phasing out.
- Severe restriction should be put in place where precautionary application is allowed and should be applied to licensed applicators.
- There is need for revision of registration with (further) limitations in permitted cases.
- If HHPs have to be used, then they should be administered on prescription.
- There is need for concerted effort to promote alternatives with emphasis on IPM approaches.
- There is need for training on product management measures to enhance proper use and risk reduction.

Gerard Lawry: Case Study of Eaglerise Farm – Visioning Agroecology on a Diversified Small-Scale Australian Farm

The farm has planted over 20,000 native trees. The farm's vision is to establish a reflective, aesthetically productive ecosystem that includes and captivates all that interact in its perpetual narrative and a system that leads best practice for food security and nutrition. The farm believes that welfare profit is of greater value than economic profit. The Eaglerise farm understands and appreciates climate change and

considers its impacts on every decision they make. Eagle rise farm appreciates and respects local knowledge and celebrates the seasonality of regions.

Eaglerise farm believes development of value chains in a natural way.

"May you; eat so you can taste, smell so you can savour, look so you can see, listen so you can hear, touch so you can feel and think so you can understand. May you find your own words to develop your own truth." Gerard Lawry 2005

1.8.4 Breakout Session 4: Breakout - Impact of Genetic Engineering and GMOs

Session Moderator: Dr. Nicholas Ozor, Executive Director, African Technology Policy Studies Network
Main Speaker: Dr. Judy Carman
Presenter: Irena Zdziarski

Main Speaker: Dr Judy Carman, Director Institute of Health and Environmental Research South Australia: Impact of Genetic Engineering and GMOs-Are GMOs Safe to Eat?

GMOs are genetically engineered products and industry sources studies, are not done long enough to establish their pathological implication. Further, these studies are conducted on animals that are not comparable to humans hence their safety conclusions are drawn from wrong comparisons. Studies have been conducted on chickens, dairy animals and pigs and from analysis and findings GMOs caused inflammation in the stomach/ small intestines leading to thin intestinal wall that sometimes rapture. In studies conducted in pigs there were incidences of inflammation of the digestive and reproductive systems. Autopsy done by blinded veterinarians (who were not aware of the study interest) to avoid bias revealed severe stomach inflammation observed in GMO fed pigs compared to non-GMO-fed pigs. There were more severe in males (boars) than female (sows) (almost double). The Bt proteins present in GMO maize, that were fed to the pigs were essentially insecticides that ended up rapturing the guts of grubs. This can only be evident in tissues and not blood samples as done by industry players who rarely go beyond blood investigation.

What is currently happening?

Not every country has approved use of GMO without confirmed trials. South Africa approved some crops, in Kenya there is a ban on some crops such as maize and as for cotton the approval process is currently underway. In Burkina Faso, Monsanto has done many trials and GMs have been approved.

Recommendations

1. The industry uses short cuts in conducting GMOs pathological and toxicity assessment, therefore the government should enhance its capacity to conduct thorough investigations and approval on GMOs before they are released.
2. Third party diagnostic laboratory tests should form the standard norm of investigating effects of GMOs. This will help eliminate biases in the findings.
3. There is need to separate politics from the GMOs debate as GMOs have safety and health implication on humans, animals and environment.

Irena Zdziarski: The Importance of Histopathological Analyses Containing Qualitative Methods in the Assessment of Novel Food Safety

Histopathological refers to the analysis conducted to ascertain diseases in the tissues of animals (Pathology – study of disease, Histo-tissue). The studies being shared were conducted on rat tissues and digestive system and the focus was to look at genetic code in the nucleus of DNA. The studies wanted to go beyond the blood analysis (done by industry) and check for effects of GMOs on body tissues. After two years of exposing rats to GMOs, the rats showed cancer/tumours in the nuclei of the cell and the digestive system had mucous and inflammation.

Key Issues/Emerging Concerns

1. In-depth studies and assessment of GMOs must be done to make logical conclusion and these assessments should go beyond blood analysis as the manifestations are seen in the tissues more than what blood would pick.
2. Governments should embrace toxicological studies that adhere to protocols.
3. The analysis and assessments should be conducted long enough to ascertain the impacts of GMOs as some effects take long to manifest.
4. Industry players should not lead the investigation and publication of GMOs findings as they may be biased owing to the fact they are driven by profits and not as much by safety and health standards.
5. As much as the world embrace new technologies and innovations, there is need to deliberately collect and preserve nature.

1.8.5 Breakout Session 5: Impact of Synthetic Inputs

Session Moderator: Daniel Maingi

Main Speaker: Dr. Don Huber, Professor Emeritus of Plant Pathology at Purdue University - Impact of glyphosate and its Remediation

Presentation: Kenyanya Teresa Mogoi, Determination of pesticide residues in organic and conventional exotic vegetables

Main Speaker Dr. Don Huber, Professor Emeritus of Plant Pathology at Purdue University - Impact of Glyphosate and its Remediation

Glyphosates are chemicals that accumulate in shoots, roots and reproductive tissues of plants. They are translocated to roots and about 15- 20% are released into soil where they accumulate due to slow degradation. Glyphosates are very toxic to beneficial N- fixing microbes and Mycorrhizae and other living organisms in the soils. Long-term use of glyphosate has effect on the environment, crop yield and on human beings. Glyphosates lower the crop yields especially in the soils where they have accumulated for a long time. Other negative impacts of long-term use of glyphosates include: lowering of mineral availability in plant products, endocrine disruption, neurotoxicity and increased disease susceptibility to both plants and animals. Based on this revelation, there is need to continuously engage in research to generate empirical evidence on the negative impacts of glyphosates in the foods we eat and stop relying on the research done by the industry players. The way to go is organic food production to redeem the current generation and save the generations to come.

Kenyanya Teresa Mogoi, Determination of Pesticide Residues in Organic and Conventional Exotic Vegetables

Background

There is a growing concern for food safety in the world. Pesticide residues exposure to humans is linked to diseases like cancers, interference with the functioning of endocrine system, respiratory system, nervous system and the functioning of the cell membrane of target and non-target organisms. There is also inadequate data on pesticide residue levels in locally consumed agricultural products. One of the main objectives of this conference is to reduce synthetic fertilizers and pesticides use in agriculture and food systems. A study was conducted in Kenya where 184 selected consumers of mostly consumed vegetables were interviewed and samples collected, 75 farmers (producers) and 2 synthetic pesticides were studied. This was done in order to establish the level of synthetic pesticides and fertilizers contamination in the Kenyan markets. The study tested for pesticide residue from organic vegetables and vegetables grown conventionally. The samples were taken from Nakuru County (Soko Mjinga and Ponda Mali municipal markets) and since there are no organic markets in Nakuru, the organic samples were sampled from Nairobi County (Carrefour Supermarket, Kalimoni Green market, Karen Organics).

The vegetables from Nakuru County showed pesticide residue above the allowable limit whereas from organic markets there were no detectable residues. Most farmers indicated they never sprayed the Swiss chard, but Swiss chard had the highest % of pesticide residue. This was attributed to the fact that Swiss chards are intercropped with collard greens. The collard greens grow taller compared to the Swiss chard and after irrigation the run off settles on the Swiss chard leaves. It was noted that consumer demands are playing a part to the treadmill in pesticide use where the farmers feel the need to increase dosage or use a concoction of pesticides to deliver almost perfect vegetables.

Emerging Issues

1. The participants noted that the farmers are demanding pesticides from agrovets for instance in some areas, Kenyan farmers were demanding for power tab that is used to treat the mosquito nets and used the same on their farms as pesticides.
2. Kenya lacks regulation on max pesticides at the local market.

3. Extension services in Kenya are no longer supported therefore the stakeholders feel there is a huge gap in skills and knowledge. There is need to engage the county governments in strengthening the extension services.
4. It was noted the universities have limited capacity and new technology to carry out supportive research and therefore the universities can consider working jointly through cost sharing.
5. During the study it was noted that the organic vegetables were more expensive compared to the conventionally grown vegetables. For example, Collard greens bought in Kalimoni Greens market cost KShs. 35 per Kg whereas vegetables at the municipal council market cost KShs. 10. This somehow limits the purchasing power by the people with limited income. The organic markets were also found to be situated in the affluent parts of the country.

1.8.6 Breakout Session 6: Alternative Technologies and Methodologies to Reduce Synthetic Input Use and Contamination

Session Moderator: Ms. Anne Maina – National Coordinator, Biodiversity and Biosafety Association, (BIBA) of Kenya the session

Main Speaker: Ms. Christine Zimmerman - Founder of the Asia Network Information Centre on Taking Urban Agriculture to New Heights around the World. The impact of Vertical Farming

Presentations

1. Aggrey Atuhaire: *Best practices to reduce consumer dietary exposure to synthetic pesticides: Insights from Uganda on Consumer Safety: Reducing Dietary Exposure to Dithiocarbamates in Tomatoes.*
2. David Bautze: *Impact of organic and conventional farming systems on agriculture sustainability-Results from the Long-term Farming Systems Comparisons Trials.*

Ms. Christine Zimmerman - Founder of the Asia Network Information Centre on Taking Urban Agriculture to New Heights around the World. The impact of Vertical Farming

It's clear that agriculture if done right will be the best means the world has today to simultaneously tackle food security, poverty and environmental degradation. The current global and local challenge is the continuing population growth and urbanization that will see an additional estimated 2.5 billion people by 2050. This growth will mostly take place in Asia and Africa which translates into the need to increase global food production by 70 per cent by 2050 in order to meet the food demand for this population. This translates loosely into an additional quantity of nearly 1 billion tons of cereals and 200 million tons of meat. How then can the world sustainably produce enough food in the future?

Agroecology is the way to go, other solutions have led to human health issues and degradation of the environment. Vertical farming is the practice of producing food and medicine in vertically stacked layers, vertically inclined surfaces and/or integrated in other structures (such as in a skyscraper, used warehouse, or shipping container). The modern ideas of vertical farming use indoor farming techniques and controlled-environment agriculture (CEA) technology, where many environmental factors can be controlled. These facilities utilize artificial control of light, environmental control (humidity, temperature, gases...) and fertigation. Some vertical farms use techniques like greenhouses, where natural sunlight can be augmented with artificial lighting and metal reflectors. The benefits of vertical farming will assist

tackle climate change, urbanization, population growth, resource finiteness, ecological destruction by agriculture and unsustainable agriculture as is evident in the current systems. The benefits of vertical farming include: soilless initiative as there is no need for arable land, pesticide free and weather independent. Vertical farming uses less water and fewer nutrients and it promotes safety health production.

Aggrey Atuhaire: Best Practices to Reduce Consumer Dietary Exposure to Synthetic Pesticides: Insights from Uganda on Consumer Safety: Reducing Dietary Exposure to Dithiocarbamates in Tomatoes

Pesticide importation and use in Uganda has been increasing over the years; from an estimated import value of USD 3.3 million in 1990 to USD 61.5 million in 2015 (FAOSTAT, 2018). Exposure to pesticides is either indirectly background exposure and or directly through occupational exposure. Although Dithiocarbamates are considered to have low acute mammalian toxicity, their association with several chronic effects such as endocrine disruption, alteration of immune system response, developmental defects in children, antithyroid and carcinogenic effects have been reported (EXTOXNET, 1993; Rath, 2011; Watts, 2014). The Dithiocarbamates chemical is the most used for tomatoes in Uganda. The project from which lessons are being shared was implemented to promote less use of synthetic pesticides in Uganda among communities engaged in the tomato value chain. This project monitored farmers to ascertain adherence to recommended mixing rates for Dithiocarbamate fungicides, monitor and assess levels of Dithiocarbamate residues in tomatoes grown and sold in the four different regions of Uganda and to determine the effect of pre-treatment conditions of cold washing, warm washing and peeling on Dithiocarbamate residue concentrations in tomatoes.

Results

- There was tendency to exceed recommended mixing rates by 3-7 times by some farmers and this was attributed to pursuit of extending the tomato shelf life and making tomatoes attractive to customers and as demanded by market vendors in the local markets. This was contrary to a study undertaken in Tanzania, Mtui et al., (2014) that demonstrated that the use of an agroecologically friendly agronomic practice of mulching with dry grasses resulted in fruits with a consistently longer shelf life for four weeks in storage compared to farmer spraying regime of 14 times per crop cycle.
- Weak regulation of Uganda's pesticide industry (distributors and retailers) has resulted into a thriving trade in counterfeit pesticides, as well as unqualified pesticide sellers who offer poor/no guidance to minimally educated farmers thus contributing to the growing pesticide abuse trend in the country (Atuhaire, 2017).
- Knowledge gaps: Uganda's current extension worker to farmer ratio is 1:1,800 (MAAIF, 2019) which has been a key factor contributing to the knowledge gap amongst farmers, hence translating into inappropriate practices such as dosage abuse as reported in this study.

Conclusion

Conventionally grown tomatoes in Uganda contain relatively high residues of the synthetic fungicide, Mancozeb, which unsuspecting consumers are exposed to, though washing with warm water and peeling off the outer skin of the tomato can largely reduce the residue levels.

Recommendations:

- Develop capacity building programs for farmers on the management of the synthetic fungicide.
- The study recommends research institutions (breeding programs) to develop tomato varieties with a relatively long shelf life (in addition to other consumer desirable attributes).
- There is a need for more research into and popularization of sustainable (ecological/organic) tomato production mechanisms that will guarantee safe products for consumption.
- A functional national pesticide residue surveillance program for Uganda is recommended as a means towards the safety of consumers in the country and beyond.

David Bautze: Impact of Organic and Conventional Farming Systems on Agriculture Sustainability -Results from the Long-term Farming Systems Comparisons Trials

Global challenges leading to climate change which in turn impact on agricultural production are resulting in soil degradation, small scale structures and contributing to climatic changes. Most of these challenges in Africa affect the small-scale farmers who depend on agriculture for sustainability. The farming system comparison project is being conducted in Kenya, Bolivia and India. In Kenya the trials are being conducted in Chuka and Thika. The objectives of these studies include to draw comparison between organic versus conventional farming in relation to: quality and quantity of crop products, resource use efficiencies, establishing sustainability of the agro-ecological system, provision of solid data that can be used to influence policy and for creation of knowledge for dissemination and learning.

1.8.7 Breakout Session 7: Linking Organic Farmers and Aggregators to Retail Markets in Kenya

Session Moderator: Dr. David Amudavi, Dr. Frank Eyhorn
Main Speaker: Bert-Jan Ottens – *Experiences from Profound*
Presentations

1. Lillian Kamathi, Project Director, Biioto@TuskysLtd**,** Presentation
2. Caroline Mbugua, Bridges Organic Restaurant, Presentation
3. Dr. Pietro Campus - Organic farming and the role of certification systems: A success story in Italy and Presentation
4. 4: Dr. Upendra Nath Roy - Development and Organization of Organic Farmers Market at Chandigarh, India

Main Speaker Bert-Jan Ottens: Experiences of ProFound and Green Rhino Kenya

The world is facing problems of quality due to increased incidences of food fraud, residues in products, pollution of soils and water, lack or inadequate knowledge and education for farmers, poor field hygiene, poor handling and transportation, lack of marketing structures, no reliable value chains and waste in production and supply chains.

Green Rhino creates quality image of African organic suppliers and their products and connects them to high-end markets. To achieve compliance with international standards Kenya needs to engage in a "safe chain" marketing systems. Traceability is key and to support these Kenya organic farmers must put in place robust controls systems. Green Rhino also supports farmers through offering trainings on certification process and access to markets. The company also supports co-creation of new business models through public-private partnerships and engages in joint programmes for food safety, traceability and sustainable production.

Mrs. Lillian Kamathi: Biioto Concept: Tuskys Ltd Pure Natural Freshness

Due to limited knowledge, organic crops are not appealing to customers as they have never taken time to internalize the benefits that come with it. There is also limitation on the varieties of crops produced which face a twin challenge of competing with conventional products. Because of limited supply of organic products, Tuskys has not been able to scale it out to other branches across the country. There is need to train and educate farmers on certification and traceability requirements for organic foods and also where possible provide advisory and extension services through mobile-based application platforms. With PGS in place farmers can now be integrated into the mainstream marketing and trading systems.

Pietro Campus: Italy's Institute for Ethical and Environmental Certification, Organic Farming and the Role of Certification Systems: A Success Story in Italy

Pietro in his presentation noted that, certification is often slow especially among smallholder farmers. There exist knowledge and yield gaps in the available data and hence this poses challenges on planning for the supply chain for organic products. Research is key in providing scientific evidence on the positive or negative effects of organic farming on human health, animal welfare, food security and on the environment. Research will help in providing information on yields and associated distribution data. Once research generates information, dissemination of research results has to be done to support technology transfer. Italy institute supports in the process of integrating research on food waste and losses and proposes transformational change that global agriculture should be done to food and fibres. Certification is key in strengthening of the control system that helps in building consumer confidence in the EU organics system. The EU is setting new rules for producers which will make it easier for smaller farmers to convert to organic production. The new rules on imported organics will ensure that all organic products sold in the European Union are of the same standard for ease of trade and exchange.

> ***"Organic farming is not a journey where we are backing into the caves. It's a journey of high technology, good health, of better democracy and huge, multiple benefits that go well beyond saving global agriculture and the planet."***

Dr. Upendra Nath Roy: Development and Organization of Organic Farmers Market at Chandigarh, India

Can we solve farmers' problems by convening workshops and conferences? The answer to this question is yes and that farmers require action research that will engage them, experiment with them to co-generate workable solutions that are context-based. The main challenges facing India's organic agriculture is certification, testing and inadequate replication of success stories in other cities and towns. However with the advent of PGSs, farmers have been supported to get certification for organic farming but there is still room for improvement particularly with the establishment of laboratories to supplement the analysis with test on residues in the organic products. Through the platform organized by the

National Institute of Technical Teacher Training and the Chandigarh Organic Farmers Market, India is able to convene meetings for dissemination of good practices to organic farmers including sharing of latest research findings. These organizations also promote and encourage pioneer farmers and grass root Leaders.

"There is enough resource on the earth to feed everyone's need but not everyone's greed" ~ Mahatma Gandhi

"Making a U turn towards Sustainable Agriculture System is the path to save the Mother Earth and Humanity"

Jane Albert: Tanzania Organic Agriculture Movement (TOAM): Market Linkage in Tanzania (0TEA project)

There are low-level awareness and misconceptions about organic farming and produce in Tanzania. For instance, organic produce is perceived by some as being food for the wealthy. This is attributed partly by the weak coordination mechanisms between different policy level initiatives hence high incidence of duplication of efforts and in some cases policies contradict each other making it difficult to implement. There is also over regulation of the business environment in Tanzania causing disincentives to new players in the market. Organic farming stakeholders in Tanzania are urging the government to follow up on commitments made in the national agriculture policy and national strategies. The same government should regulate and control uncertified farm produce and inputs that are being advertised as being 'organic' and insist on compliance with the East Africa Organic Product Standard (the Kilimohai Mark). With the recognition of PGS, TOAM has managed to engage PGS Groups from 5 groups to 52 over the past four (4) years. The PGS also could easily grow into ICS as it has received recognition of the EAOPS in India, New Zealand, through better relations with the governments and business partners. TOAM has also supported capacity building of farmers on organic agriculture and marketing.

Carol Mbugua: Bridges Organic Restaurant: Organics Experiences

The major challenges facing organic farming are lack of enough resources like water and finances. There are also challenges with logistics and supply chain due to insufficient quantities. On the economic front, the pricing structure has been unstable hence making it difficult to plan and forecast. These are challenges that are generic and are felt by smallholder farmers across the region. There is need therefore to provide innovative financing solutions to fund farmers to drill boreholes and irrigation structures to tackle water shortages. Awareness campaigns to grow market demand for organic products is a must and once this happens, farmers can then be linked to supply to the customers. Continuous farmer education on East African Organic Standards will facilitate its adoption and this will open greater opportunities for farmers within the larger East Africa Community.

General Recommendations from Plenary

1. There is need to promote significance of organic research and development through linkages between farmers, universities and research institutes.
2. Stakeholders should explore and exploit possibility of establishing Organic Farming Research Basket Fund, publications and dissemination of research findings. Develop strategic partnerships between research institutions and policy makers at local, ministerial and parliamentary levels.

3. Explore and exploit avenues that promote high level dialogue between stakeholders and policy makers, Parliamentary Committees, ministerial level dialogue or broader consultations within EAC framework. This should not exclude efforts of local government to undertake lobbying and advocacy work. Further, stakeholders should sustain constructive and empirical lobbying and advocacy initiatives for organic agriculture.
4. More resources should be allocated to support organic farming research, farming systems, extension services, market infrastructure, among others. CSOs and companies that facilitate access to fair organic markets should also be supported with resources.
5. Explore possibility of mobilizing stakeholders towards development of a joint organic database.
6. Develop a good communication strategy to inform, educate and influence policy stakeholders about organic farming and its significance to poverty alleviation goals.
7. Develop innovative system for rewarding individuals, institutions and public or private sector networks that facilitate organic farming and trade. Among other possibilities is to establish Organic Farming Challenge Fund and Presidential Award on organic farming in a bid to support organic farming research, development and market development initiatives.

1.8.8 Breakout Session 8: Organic Guarantee Systems and Policy Frameworks

Session Moderator: Prof. Charles Ssekyewa
Keynote Speaker: Louise Luttikholt
Presenters

1. Jack Juma
2. Andrien Sibomana
3. Samuel Ndung'u
4. Lise Chantal

Panellists: Jack Juma, Andrien Sibomana, Samuel, Ndung'u and Lise Chantal

Opening Remarks by Moderator

1. Organic agriculture works through value chains and therefore we need to consider value chain opportunities and challenges and how to move forward.
2. Regulations are key in achieving quality and the organic principles.
3. Participatory guarantee systems and enabling policy environment will support and facilitate integration of smallholder farmers into the mainstream markets.
4. Certification is key in the performance of organic agriculture and without certification we are locking so many people out of the markets.

Louise Luttikholt, Executive Director IFOAM Organics International Organic: Guarantee Systems and Policy Frameworks Environment in East Africa

Why do we need the guarantee system?

Guarantee systems are important because consumers want to be assured of safety and adherence to safety standards by food vendors. Consumers pay a premium price, or make extra efforts to seek organic products, because they believe that such products correspond to particular efforts at the production level. Producers should produce according to expectations and commit to follow a set of organic practices. Organic practices are often laid down in an organic standard. An organic standard often gives producers access to an organic label which helps the consumers to recognize and trust. There exists three forms of organic guarantee systems namely, first party self-claim done by producer herself/himself,

second party done by the buyer and third party done by a person/body that is independent from both the producer and the buyer (has nothing to do with the value chain). Third party guarantee systems are currently dominant particularly for players who want to access export markets. The services are done by professionals who are trained and certified.

Benefits of Certification

- Certification facilitates access to better markets and premium prices
- Certification improves the image of the organic sector by giving it credibility
- Encourages consistency and trust in organic production
- Encourages production and market planning
- Identification and transparency. Facilitates contacts between market operators
- Certification facilitates data collection on the organic sector

Organic standards and regulations: A global overview

There are four types of organic standards: Private standards, National/governmental standards, Regional standards and International standards such as IFOAM and Codex Alimentarius. It should however be noted that there exist variations in standards as a result of cultural differences, climatic differences, agricultural practices, economy and status of organic agriculture, natural resources and local values.

Figure 33: Types of organic standards

Jack Juma, Organic Standards and Certification Expert on Alternative Accreditation of Local Certification Bodies

Background

Development of local organic certification services in East Africa has been going on for almost 20 years. Some Certification Bodies (CBs) received support in their earlier phase of establishment from development partners and offered inspection services for established international CBs. Each of the CBs have developed their own organic mark and in some cases they work with national standards.

Harmonization of East African Organic Products Standards (EAOPS) and the East African Organic Mark (EAOM)

Harmonization of an organic regional standard for East Africa was achieved in 2007 that culminated in the launch of East Africa Organic Mark. The EAOM was deemed necessary to facilitate and promote local and regional trade. The EAOM is also critical in trade as it provides a comparison and equivalency with other regulations including international regulations. The procedure for using the MARK includes sublicensing agreement that has been developed.

Figure 34: East Africa Organic Mark

The regional organic mark is accredited based on the ISO 17065 a process that opens up organic agriculture and products to match internationally required standards. The monitoring of the implementation and compliance with organic standards is achieved through institutional structures that run from the local, national, regional to international levels. These structures are also responsible for joint review and modification of standards to facilitate trade in safe and healthy products, provision of advice on accreditation framework and policies, supporting and executing market surveillance and take action against false claims and fraudulent operators.

Andrien Sibomana, Burundi Organic Agriculture Movement: Use of Local Organic Fertilizers and Bios Pesticides the Winning Alternatives to Chemicals

The degradation of the environment is closely linked to the culture that shapes the human community: Pope Benedict XIV

Agriculture must literally return to its roots by rediscovering the importance of healthy soils, drawing on natural resources of plant nutrition and using mineral fertilizers wisely: FAO Save and Grow

"Let's save our common house: We all have a stake in saving our planet and ensuring that agriculture is able to grow and meet the challenges ahead ".Jacques Diouf, D.G. FAO in "Save and Grow".

Burundi supports the use of local fertilizers and bio pesticides as a winning strategy because organic fertilizers increase organic matter in the soil which retains water in the soil. Bio pesticides preserve microorganisms which improve soil fertility and do not have negative impacts on other life forms like bees, bumblebees and other friendly insects. Use of bio pesticides contributes to saving money that would have been used on chemical pesticides which then can be transferred to other development initiatives that will contribute in reducing issues like poverty, hunger and climate change impacts.

Other alternatives to synthetic fertilizers beside bio pesticides include: composting; use of soil covering crops; use of authorized industrial fertilizers for organic agriculture and Agro forestry. Examples of biopesticides in use include: the use of integrated pest control methods (parasitoids and predators),

adoption of push-pull technology, use of plants: herbs (such as tephrosia, tithonia, capsicum, pyrethrium, ricinius in agricultural system) and use of trees such as neem-Azadiracta Indica as biopestides.

The conclusion to this discussion is that alternatives to chemical fertilizers and pesticides are available and hence there is need for a little effort by all stakeholders to discover them and promote them through appropriate information and communication channels.

Lise Chantal: Chief Executive Officer Rwanda Organic Agriculture Movement (ROAM): The Case of Pigs in Rwanda

Rwanda Organic Agriculture Movement is an organic lobby and advocacy group whose motto is together we are strong. Its current membership is 100 organic stakeholders who are engaged in sustainable development. One of the interventions for ROAM is linking smallholder farmers to markets and provision of sustainable solutions for enhanced livelihoods. ROAM are members of the Joint management committee on organic standards and they oversee the objectives of PGS and Kilimohai Mark in Rwanda. The driving force behind ROAM vision is promotion of the production and consumption of healthy foods. ROAM's advocacy is aimed at contributing towards change of mindset and helping boost local production. ROAM promotes PGS as it continues to increase incomes to smallholder farmers. The PGS elements are based on shared vision, promotion of trust building between consumers and producers, transparency, participation and the learning process. ROAM also advocates for linking farmers to existing guarantee funds that are being used for business development. Lastly, ROAM oversees the knowledge and experience sharing within East Africa.

Samuel Ndungu, Programme Manager, KOAN - Case Study of Consumer Attitudes and Preferences on Organic Foods in East Africa

Background Introduction

The consumer survey is one of the outputs that was achieved under OTEA project (2014-2018) supported by Sida. The 2018 survey was based on the earlier surveys conducted in the region with the same objective and methodology. The report provided a comparison of the findings of 2006, 2013 and 2017 in order to better illustrate the dynamics of the organic sector and its growth challenges. The survey was conducted in order to achieve the following objectives: 1) Identify the consumers' attitude towards organic agriculture, 2) Analyze the impact of promotional materials from each NOAM that carried out most effective and influential messages, and 3) Provide recommendations for consumer awareness future strategies.

Research Methodology

Data was collected between January and February 2018 using both quantitative and qualitative methodologies. The data was disaggregated on quantitative quotas based on age and sex to enable comparison of results for 2006 and 2013. The following are the results of the consumer survey that was conducted.

Awareness of Organic foods

Most consumers referred organic foods as natural foods and the results indicated that awareness increased by 4% from 35% in 2013 to 39% in 2017 (Uganda - 58%, Burundi - 48%, Rwanda - 45%, Kenya - 29% and Tanzania-20%)

Table 2: Source of Information on Organic Foods

	Natural Foods	Foods Without Chemicals	Foods Not Sprayed With Pesticides	Traditional/ Indigenous Foods	Foods Grown With Manure	Herbal Foods	Healthy / Nutritious Foods
BASE (n =)	352	237	87	134	127	129	132
Percent	100%	100%	100%	100%	100%	100%	100%
Word of mouth	26%	32%	26%	51%	19%	24%	25%
Taught in school / college	30%	35%	38%	19%	41%	23%	38%
Television programmes /adverts	25%	15%	25%	16%	20%	26%	31%
Radio programmes / adverts	16%	17%	20%	13%	14%	30%	23%
Books	11%	15%	17%	7%	13%	12%	15%
Don't know / not sure	7%	3%	2%	3%	4%	5%	3%
Newspaper	13%	8%	14%	7%	12%	12%	14%
Magazines	8%	8%	14%	6%	6%	7%	15%
At a promotional / educational event	5%	6%	11%	7%	2%	5%	9%
Internet / Social Media	12%	10%	9%	4%	3%	5%	11%

Knowledge of Facts about Organic Foods

On the level of knowledge on selected description of organic products by consumers, the survey indicated there was still limited information by consumers on most of the items as shown in the figure below.

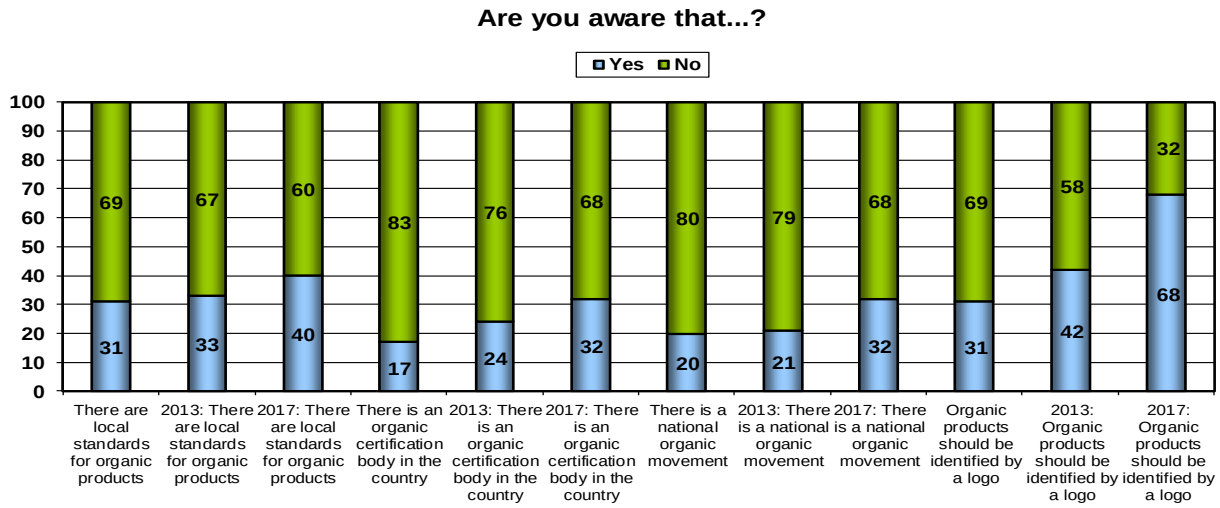


Figure 35: Level of knowledge on selected items on organic products

Motivation for Consuming Organic Foods

On the factors that motivate consumers to choose organic products, the survey establish that consumers chose organic products because they are healthy and nutritious, they are tasty, and are safe without contamination from chemicals. The table below presents the findings.

Table 3: Motivation for Consuming Organic Foods

	Fruits & vegetables	Cereals	Dairy products	Meat	Bread and pasta
BASE	571	293	213	115	80
	100%	100%	100%	100%	100%
They are healthy / nutritious	76%	71%	72%	60%	75%
They are tasty	46%	40%	47%	38%	41%
They are safe to consume / not contaminated	32%	32%	36%	25%	43%
They are readily available	14%	18%	15%	14%	21%
Good for management of illnesses	25%	25%	29%	23%	30%
They are affordable	17%	18%	16%	17%	20%
They are environmental friendly	8%	11%	9%	7%	14%
Makes me feel in touch with my indigenous roots	5%	10%	7%	3%	8%
No specific reason / indifferent	2%	4%	1%	5%	3%

Reasons for Need for Verification

On the need for verification, 92% of the respondents confirmed there is need for a verification method by the government verification system (67%) and 27% of the respondents confirmed that certification bodies should provide a verification system.

Perception and Attitudes

Respondents perceived organic foods as being a "good thing" because it excludes the use of synthetic fertilizers. As such consumers are willing to purchase organic if priced slightly lower, at par or slightly higher than conventional foods.

Related Qualitative Findings

1. Organic products are good for health and are safe and more nutritious.
2. Population that demands organic foods is the middle and upper income segment who have a growing purchasing power.
3. Organic products are very expensive and are not easily available making people shy away from stocking them.
4. Most respondents confirmed that they sell both organic and nonorganic but more of non-organic. Reason for giving low priority to selling organic products was because the produce and products are very limited and in unreliable supply.

1.8.9 Breakout Session 9: Impact of Synthetic Inputs

Session Moderator: Barbara Zilly
Main Speaker: Dr. Million Belay, Coordinator AFSA
Presentations:

1. Prof. Ratemo Michieka - The Compromise: Pesticides Use, Food Security or Environmental Pollution, and Presentation
2. Dr. Bollmohr, S. - Banned pesticide use in Kenya- an urgent need to move towards sustainable agriculture

Main Speaker: Dr. Million Belay, Coordinator Alliance for Food Sovereignty in Africa (AFSA): Adapting Agriculture to Changes in Africa – The Path to Agroecology

About AFSA

Refers to a continental coalition made up of representatives drawn from food producers (farmers, fisher folks and pastoralists), women, youth, faith-based organizations, consumer groups, indigenous peoples and indigenous CSOs. AFSA champions small scale family farming/production systems based on agroecological and indigenous approaches that sustain food sovereignty and the livelihoods of communities. Advocates for African driven solutions to problems and it aims to be a strong voice that shapes policy on the continent in the area of community rights, family farming, promotion of traditional knowledge and knowledge systems, the environment and natural resource management. Its mandate revolves around agroecology work in Africa and it advocates for culturally produced food. It takes a systemic approach to farming where farmers should own their markets and seed systems in order to have a sustainable agriculture and food systems. AFSA delivers its interventions through working categorized as: Resilient seed systems, Land rights, Climate change and Citizen action.

AFSA also conducts research to produce evidence for policy, mobilization and education of stakeholders on agroecology. Besides, it documents best practice case studies for sharing and learning. AFSA is convinced that if consumers define market dynamics, then the other value chain actors will have no other option but to meet consumer demands. Agroecology can therefore, be driven through consumer awareness and structured social movements.

Critical questions for Food Sovereignty in Africa

- How can we produce more food?
- How can we produce more, nutritious and healthy food?
- How can we produce more food which is nutritious and healthy without affecting the biosphere?
- How can we produce culturally appropriate food which is nutritious and healthy and without affecting the biosphere and in a just way?

These questions should be discussed in the context of the following challenges facing the African continent

- Population explosion
- Land and forest degradation
- Decrease in biodiversity
- Cultural erosion
- Unplanned urbanization
- Climate change

Prof. Ratemo Michieka, University of Nairobi: The Compromise: Pesticides Use, Food Security or Environmental Pollution

Africa as a continent is still grappling with the questions of: Is food equitably distributed? How do you balance the use of pesticides and still address food security? The role of pesticides in the current equation of food security cannot be ignored especially when we do not have adequate alternatives for replacement. If pesticides are used responsibly, there will be food and the environment will be protected. We need an integrated system of tools to progressively transition to sustainable agriculture and food systems. It is high time Africa awoke to the reality that land is not increasing and therefore there is need to adopt appropriate technologies that are cost effective and sustainable. Farming is business and businesses always looks for ways to make profits while reducing cost of production and one of the ways is the use of synthetic fertilizers and chemicals. As practitioners we need to advocate for judicious use of chemicals and fertilizers in systems where they are being used. Currently, the African Development Bank is working on supporting interventions for Africa's transformation through innovations and technologies. As this is happening we need to ask ourselves: Are these technologies appropriate and beneficial? Best practices (cases) have been documented, can we learn from these cases through platforms to promote building of networks for knowledge exchange and co-generation. The cardinal rule is that Africa needs to come up with recommendations on how to balance productivity, safety and environmental conservation.

Dr. Bollmohr, S.: Banned Pesticide use in Kenya- An urgent need to move towards sustainable Agriculture

We can't solve problems by using the same kind of thinking we used when we created them A.Einstein

Pesticide use in Kenya

The world's soils, plants, animals are contaminated and they can no longer sustain agricultural production. There is an urgent need for regeneration. Regarding Kenya's use of pesticides, there exist 718 different pesticides products that are registered in Kenya by 170 companies which are mostly chinese companies, Bayer and Syngenta. Further, there are 220 active ingredients that are registred in Kenya. All chemicals registered in Kenya undergo risk assessment procedures where assessments are done on exposure and then effect. The registration of a chemical is a 4 tier process that considers data availability, complexity, relevance and cost. Before registering pesticides in Kenya one has to guarantee the effects on human and environment and provide mitigation measures.

Why are some Pesticides banned in Europe?

They are banned because of precautionary principle, adopted in EC1109/2009 that states, if there is no enough data to prove pesticides are not harmful to the environment or human health then it will be banned from use until more data is collected, analyzed, verified and the process given approval. Pesticides are also banned in Europe if there are proven unacceptable effects that is: If new studies conducted have shown that the chemicals are harmful to the environment and or human health then the chemical will be banned. It should be noted that, out of the 220 active ingredients registered in Kenya, more than 25% are already banned in Europe because they are a threat to human rights, food security and food safety.

Selected Examples

Carbendazim: Used in eight different products that are sprayed onto tomatoes, French beans, and fruits for various fungal infection. This product is carcinogenic, neurotoxic, mutagenic, has toxic effects on the development of frogs, birds and aquatic species

Diazinon: Used in six products to manage various insect pests on various vegetables. Its effects include being: neurogenic, EDC and highly toxic to bees, birds, aquatic species and wildlife.

Acephate: Used in four different products to control insect pests on vegetables. Effects: EDC, neurotoxic and toxic to birds and aquatic species.

Paraquat: Used in seven different products to control weeds in maize, coffee and tea. Effects: highly mutagenic, highly acute toxicity to operators and bystanders, very toxic to aquatic species and has been associated with Parkinson's Disease.

Imidacloprid: Used in 17 products in Kenya for control of various insect pests in vegetables. Effects: EDC (Thyroid disease), Neurotoxic, highly toxic to birds, aquatic species, earthworms and many other beneficial insects and bees.

Why is the use of banned pesticides happening despite knowing the dangers?

- The industry players are justifying their production and use by claiming they provide training on safe use of these pesticides.

- There exists weak international legislation and those responsible for enforcement apply double standards.
- There are weak or non existent national legislations due to limited capacity on risk assessmet and management.
- Lack of sufficient resources to conduct thorough trials and simulations.
- There is no data on pesticide use hence very limited information for lobby and advocay for or against.
- There are no or inadequate monitoring programs for food, water and soils to determine contamination levels.
- There exist very weak consumer protection frameworks.

Solution: There is need for Africa to produce own foods using safer approaches and agroecology is one of the potential solutions that can deliver large scale impact.

1.8.10 Breakout Session 10: Alternative Technologies and Methodologies to Reduce Synthetic Input Use and Contamination

Session Moderator: Prof. Rhoda Birech

Presentation

1. Jane W. Wangu: *Effect of organic and inorganic amendments on the population of nematode destroying fungi*
2. Dr. Victor Dania: *Biocontrol efficacy of Trichoderma species against rot-inducing post-harvest fungal pathogens of white-fleshed sweet potato (Ipomoea batatas L)*
3. Toyin Abolade*: Perception of the Effect of Climate Variability on Maize yield among Organic Crop Farmers in Anambra State, Nigeria*

Keynote address by Prof. Julius Mwine: Technologies/ methodologies to reduce synthetic inputs and contamination

There is growing belief that production is not possible without synthetic Agro-inputs, that Africa uses minimum quantities of synthetic chemicals and that many pesticides are not harmful. To counter this misconception by farmers on the synthetic pesticides some strategies are proposed, and these are: awareness creation to change the mind-sets among the farmers, development and review of training curriculum to include agroecology, conducting of research and publication of findings for learning and improvement.

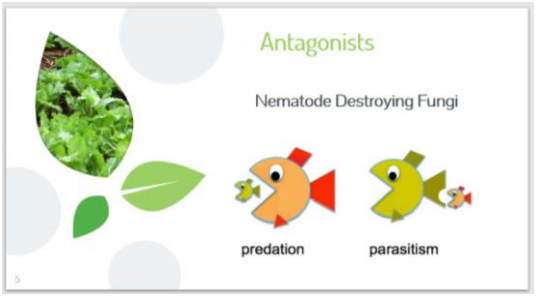
Some of the working Agroecological technologies in Uganda include:

- Recycling of materials on farms by farmers
- Practicing of Agroforestry in Nindye village, Uganda
- Use of farm yard manure as soil amendment in Banana plantations in Bushenyi, Uganda
- Intercropping of maize and beans in Northern Uganda to control pests
- Practising seed/ planting material selection and hygiene to reduce disease spread such as banana bacterial wilt caused by *Xanthomonas campestris*
- Promotion of use of biochar fertilizers that are acceptable agro-inputs in organic agriculture

- Application of ICT in different applications to support dissemination of information and making of transactions

N/B: All these technologies need constant research and review for continuous improvements.

Jane W. Wangu: Study on: Effect of Organic and Inorganic Amendments on the Population of Nematode Destroying Fungi



A study was conducted in Embu on nematodes (Microscopic worms) in banana value chains to establish the effects of organic and inorganic amendments on their population. Nematodes are parasitic worms that attack the banana roots causing stunting growth. Typically, nematodes are managed using nematicides which they have since developed resistance towards and the chemical is contributing to environmental contamination. The study was conducted on manure products made from locally available resources such as the goats, chicken and cow manure, inorganic fertilizers and a control experiment. Soils were sampled before amendments and 3 and 6 months after amendments to establish population of nematodes. The fungi used for the study include: Monacrosporium cionopagum, Arthrobotrys longispora, Oligospora, Dactyloides, Superba, Harposporium anguillulae and Dactylella phymatophaga.

Findings

The table below summarizes the findings of the study. The organic soil amendments products contributed more in trapping the nematodes as compared to trials where inorganic fertilizers and control experiments were set. This means that, the population of nematodes in bananas can progressively reduce with appropriate use of organic materials.

Table 4: Population of Nematodes Destroying Fungi in Banana

Manure/ Months	0	3	6	Total NDF isolates	Means
Chicken	24	31	19	74	2.8148 a
Cow	19	30	22	71	2.5556 ab
Goat	19	30	20	69	2.5556 ab
Control	14	20	20	54	2.0000 bc
Fertilizer	13	11	15	39	1.4444 c

Dr. Victor Dania - Biocontrol efficacy of Trichoderma species against rot-inducing post-harvest fungal pathogens of white-fleshed sweet potato (Ipomoea batatas L)

Synthetic pesticides have become an albatross to man, constituting weapons of ecosystem destruction, including the eradication of beneficial soil micro and macro organisms without sparing even man himself. Why go biological control? This is because it is harmless to humans and livestock and acts against a wide range of pathogenic fungi. Biological control is self-perpetuating and promotes nutrient uptake thus

enhancing plant growth and provides long term resistance to disease and pest attack. The study involved introduction of the *Trichoderma species* on the white-fleshed sweet potato to reduce rot occurring after post-harvest.

Trichoderma asperellum strain NGT158 applications for the experiment were administered as outlined below:

1. Seed treatment: 5 – 10g of *Trichoderma* powder per 100 kg of seeds were applied
2. Nursery treatment: 10-25 kg powder per 100 m^2
3. Cuttings and seedlings root deep: Mixed 10 g of *Trichoderma* powder per litre of water and dipped cuttings for 10 minutes before planting
4. Soil treatment: Applied 5 kg of *Trichoderma* per ha
5. Plant treatment: Drenched the soil near stem region with 10 g *Trichoderma* powder per litre of water

Results

Table 5: Effect of rot-inducing fungi on percent rot severity and weight loss of inoculated tubers in storage

	2 MAS		3 MAS		4 MAS	
Pathogen	**Rot severity**	**Weight loss**	**Rot severity**	**Weight loss**	**Rot severity**	**Weight loss**
Lasiodiplodia theobromae	15.20±0.05^{ab}	60.70±1.5^{ab}	22.11±0.05^{b}	15.20±0.05^{ab}	60.70±1.5^{ab}	22.11±0.05^{b}
Rhizoctonia solani	18.01±1.5^{a}	62.18±1.2^{ab}	26.95±0.2^{ab}	18.01±1.5^{a}	62.18±1.2^{ab}	26.95±0.2^{ab}
Fusarium oxysporum	13.37±0.9^{b}	43.30±0.8^{bc}	17.33±0.1^{bc}	13.37±0.9^{b}	43.30±0.8^{bc}	17.33±0.1^{bc}
Macrophomina phaseolina	12.12±0.4^{b}	50.08±0.7^{b}	19.08±1.1^{b}	12.12±0.4^{b}	50.08±0.7^{b}	19.08±1.1^{b}
Rhizopus nigricans	18.42±1.3a	66.33±1.8^{a}	30.05±1.5^{a}	18.42±1.3a	66.33±1.8^{a}	30.05±1.5^{a}
Verticillium sp.	10.75±1.1^{b}	30.61±0.3^{c}	17.08±0.1^{bc}	10.75±1.1^{b}	30.61±0.3^{c}	17.08±0.1^{bc}
Sclerotium rolfsii	15.88±0.7^{ab}	51.88±1.5^{b}	20.55±0.3^{b}	15.88±0.7^{ab}	51.88±1.5^{b}	20.55±0.3^{b}
Control	6.66±0.1^{bc}	6.4±0.0^{cd}	11.80±0.7c	6.66±0.1^{bc}	6.4±0.0^{cd}	11.80±0.7c

MAS = Months after storage. Means followed by same letter along a column are not significantly different at p<0.05 using Duncan's Multiple Range Test (DMRT)

Conclusion

- The use of Trichoderma species has gained importance in the management of most plant diseases.
- The method of mass production and use of these BCAs have been commercialized for the purpose of producers and farmers.
- However, there is still considerable interest in finding a solution to the problem for phyllosphere establishment associated with Trichoderma species.

1.8.11 Breakout Session 11: Drivers of Adoption of Agroecological Systems

Session Moderator: Mr. Samuel Ndungu
Main Presenter: Anne Majani, Hivos, Contributing Towards Transforming Food Systems
Presenters:

1. Dr. Ann Muriuki
2. Dr. Charles Odhong

Anne Majani, Hivos: Contributing Towards Transforming Food Systems

The world is currently dealing with a broken food system where natural resources are under pressure, biodiversity loss is increasing, food is less diverse where 75% of the food we eat comes from 12 crops and 5 animals, 30% of produced food is lost or wasted, hunger persists (820 million hungry), double burden persists (obesity and under nutrition), 24% - 33% GHG emissions are caused by agriculture and 1.4 billion of the extremely poor depend on Agriculture.

Hivos contribution towards transforming food systems can be seen through its interventions.

Sustainable Diets for All (SD4All)

It is a program being implemented jointly by Hivos and International Institute for Environment and Development (IIED) in 4 regions and in 5 Countries- Bolivia, Uganda, Zambia, Indonesia and Kenya. Hivos works with partners and allies with funding from Ministry of Foreign Affairs, Netherlands. This is Largely a Lobbying/Advocacy programme with components on capacity building, research, advocacy and multi-stakeholder coalitions. The goal of the program is to contribute to sustainable, healthy and affordable food that will be available for all, in particular for low-income rural and urban consumers that respects the planetary boundaries, now and in the future.

Open Source Seed System

This programme is implemented jointly by Hivos, Bioversity International, Sustainable Agriculture and Natural Resource Management (SANREM), Genetic Plant Resource Centres in Kenya, Uganda and Tanzania with partners and allies. It is funded by the Open Society Foundation, FAO Benefit Sharing Fund through Bioversity International, Christensen Fund and Hivos Donation Fund. The goal of the program is to improve adaptation to climate change and enhance food and nutrition security of resource- poor farmers in Kenya, Uganda and Tanzania through sustainable management and promotion of use of a wider range of quality plant agricultural biodiversity. The program supports research on climate resilience, building of platforms for multi-stakeholder engagements, advocacy, knowledge and information sharing and development of viable business cases.

***"To a hungry man a piece of bread is the face of God"* (Mahatma Gandhi)**

Dr. Ann Muriuki, KALRO: Motivation for Organic Agriculture Practice and Input Use in Selected Counties in Kenya (Murang'a, Kirinyaga and Machakos)

Organic agriculture continues to gain recognition for its contribution to sustainable agriculture, ecosystems improvement and food, nutrition and income security in sub-Saharan Africa. There is however limited credible contextual empirical data on practices and performance of organic agriculture. The ProEcoAfrica project being conducted by multi-institutions and researchers in Ghana, Kenya and Uganda (www.proecoafrica.net) seeks to contribute to improved rural livelihoods, including food, nutrition and income security, in sub-Saharan Africa (SSA) through climate-smart intensification of agricultural systems. ProEcoAfrica will generate scientific evidence and knowledge on the productivity, profitability and sustainability of EOA in comparison to conventional systems in Ghana, Kenya and Uganda. Sound conclusions and recommendations will be drawn on the potential of EOA to help farmers, especially women, to be more economically successful and resilient to the adverse impacts of climate change and socio-economic challenges. This will result into increased availability of scientific and sound evidence on the potential of intensified organic agriculture to improve and sustain the incomes and food and nutrition security of smallholder farming households, have increased capacity and knowledge of organic practitioners for effective promotion of innovative organic agriculture practices through use of research information and conducive policies towards ecological organic agriculture supported at national, sub-regional and regional levels. The ongoing research by KALRO(one of the institutions engaged in the ProEcoAfrica project) in Murang'a, Kirinyaga and Machakos indicates increasing recognition of organic agriculture.

The preliminary results indicate that health, market access/profitability and nurturing of environment among other factors are the motivations behind adoption of organic agriculture. The study also showed about 40% of conventional farms in Kirinyaga reported herbicide use while herbicide use was reported on 80% (permitted under organic Ref EU regulations) of the organic farms as opposed to 90% of conventional farms. Up to 40% of organic farms used permissible insecticides compared to more than 90% of the conventional farms that were using insecticides prohibited in organic farming. Farmers in Muranga and Kirinyaga applied some fertilizers about 95% of organic and close to 80% of conventional farms use d organic fertilizers. In Machakos 30% of organic farms reported to have used organic fertilizers and a similar proportion used mineral fertilizers in conventional farms.

However there exist serious challenges with organic yields which are reportedly 25% lower than conventional farming in developing countries. As such there is reverting back to conventional farming by organic farmers. To ensure we retain momentum, there is need for continued data analysis and publication of major scientific papers coupled with dissemination of the same to the end users. This process requires involvement of different players including farmers, civil society, researchers, donors at all levels.

Mr. Charles Odhong': Investment in Agricultural Research for Development: What Role for Agroecology?

Agricultural research and development investments across the African continent are currently inadequate and under-funded with growing contribution of private philanthropists. Also the dependency on external donors for Agri research agenda financing in Africa is still a great challenge. Specialized research, focusing solely on increasing production, does not tackle the root causes of present interconnected challenges such as natural resources loss, marginalization of smallholder farmers or climate change. However, there is small support to agroecological research from bilateral funders like UK Aid and USDA. Assessment of agriculture research projects should be based on the analytical framework by Gliessman that looks at: increasing efficiency of industrial practices, substituting alternatives and inputs, redesigning of the whole agro-ecosystems to re-establish connection between growers and eaters, developing alternative food networks and rebuilding the global food system that it is sustainable and equitable for all. The FAO 10 elements of agroecology should also provide a basis for conducting research and assessing sustainability systems.

The political economy analysis of priority setting and decision making in investment flows in the Agricultural Research for Development (AR4D) system should be based on a political economy framework developed by Institute of Development Studies (IDS). Finally there is need to conduct key informant interviews with various stakeholders to find out "what their position and leverages are regarding the strengthening of agroecological research" including establishing current blockages and windows for agroecological research.

1.8.12 Break Out Session 12: Creating an Enabling Policy and Legislative Environment for the Organic Sector

Session Moderator: Eustace Gacanja

Main Speaker: Mathius Wafula, Ministry of Agriculture, Livestock, Fisheries and Irrigation - Progress towards development of national organic policies: The case of Kenya

Presenters

1. Prof Wahome - Policy implications raised by the results from the ProGrOV project
2. Dr. Daniel Maingi - Beyond industrial Agriculture: Pesticide use and the legislative landscape in Eastern Africa and beyond

Main Speaker: Mathius Wafula, Ministry of Agriculture, Livestock, Fisheries and Irrigation - Progress Towards Development of National Organic Policies: The Case of Kenya

Introduction

There has been a growing interest in agroecology in recent years as an innovative and sustainable response to the challenges facing our food and agriculture systems. There is drive for sharing enough evidence of how application of knowledge and practices of agroecology are creating impact to inform policy and continued wide-scale application by farmers. This session aimed at identifying effective strategies and policy interventions whilst raising awareness of synthetic pesticides and fertilizers contamination in the African continent through data and information sharing.

Key Issues

'Modern technology owes ecology an apology '. Organic agriculture in Kenya is a small sector growing especially in fruits and vegetables. Demand for organic agriculture is high and unmet. The organic sub sector contributes to food security, environmental conservation, gender empowerment, diversification of markets and premium prices. Organic agriculture provides a cheap means of replenishing depleted soil nutrients and enhanced health due to reduced chemical residual intake. There has been policy development in Kenya and principles of EOA activities have been included in the 2019 Government's Kenya Export Market Development Programme. The Ministry is in the process of initiating development of the Organic Agriculture strategy. The mainstreaming of organic agriculture issues in the regional EAC SPS 2018 regulation and Kenya - USA TIWG is currently being undertaken by a desk officer based at the MOALF&I. There are however challenges in the legislation of the Organic Act. This is because of challenges such as presence of weak research-extension- farmer linkage, inadequate research and development, and lack of a policy framework explicit on organic agriculture coupled with low consumer awareness on organic products and their benefits.

Emerging Issues

Kenya is facing a problem on changing of the leadership which leads to inconsistency and dragging of the Organic Agriculture policy. The University of Nairobi is setting up demonstration Center for public and students to learn on organic farming which is a great milestone in promoting agroecology. It was noted that the presentations did not mention the economic value attached to organic agriculture. Problem is at the implementation level and not the policy. There is need to mainstream organic agriculture in many platforms.

Prof. Raphael Wahome - Policy Implications Raised by the Results from the ProGrOV Project.

Introduction

The objective of the project was to endow policy makers with information that can enable appreciation of the organic industry and create urge to hasten its development to show associations between ProGrOV results, possible policy direction and strategic initiatives for the development of the organic sector.

Key Issues

Where a government is convinced that conversion to organic agriculture is required they should provide associated support during the transitioning process to encourage farmers. Organic agriculture and convectional agriculture are mutually exclusive and when compared, there is very little support to organic agriculture. In the convectional agriculture systems, certification is at trade level whereas in organic certification it is at input level as such they both need research, education, extension and other services. The ProGov project was implemented in Tanzania and Uganda and it demonstrated that organic agriculture works only if markets are organised, transaction costs are lowered, practitioners receive due benefits, consumers trust that certification works and associated traceability schemes are working. Currently the policies do not address specialised or niche production systems that are founded on agroecology. The government should therefore, make a policy that enacts a law to set up organic authority, it should encourage public-private partnerships (PPP) so as organic industry is addressed

holistically. The organic industry requires support for it to grow and the Government must have a vision for healthy well-fed prosperous people living in healthy environments.

Dr. Daniel Maingi: Beyond Industrial Agriculture: Pesticide use and the Legislative Landscape in Eastern Africa and Beyond

Introduction

Currently there is increased use of highly hazardous, highly persistent pesticides. It's time to shift from our broken food systems to embrace sustainable food systems. In addition to climate change, our current food systems are negatively impacting people's health around the globe and the amount of toxic chemical linked with the development of a disease or death which is central in determining "safe" or "hazardous" levels is proportionately greater at the lowest dose or levels of exposure. These results, which are contrary to the way the United States Environmental Protection Agency (EPA) and other regulatory agencies assess the risk of chemicals, indicate that in Africa we have underestimated the impact of toxic chemicals on death and disease. Africa's agriculture is big business for seeds and pesticides, it is about opening markets deregulating (relaxing controls) and getting government out of agriculture and the food system. There are gaping holes in knowledge with limited information existing on chemical long-term effects with the approval process being flawed because the data is limited, and decisions have already been made. Knowledge and scientific research are highly controlled and or guarded by industry and flawed laws hence a lot is left unattended to and without this information the powers are snatched from the end user to the industry players.

1.8.13 Breakout Session 13 - Impact of Synthetic Inputs

Session Moderator: Ivy Saunyama

Keynote Speaker: Prof. Rhoda Birech- Pesticides residues on vegetables

Presenters/Speakers:

1. Valence Mutwedu
2. Prof. Timothy Olabiyi

Valence Mutwedu: Growth and Reproductive Parameters Impairment of Glyphosate (Herbicide) in Male Guinea Pig (Cavia Porcellus)

Background

The presentation is informed by a study that was conducted in the DRC where mining and agriculture industries have been accused of pollution. In these areas, there exists a lot of release of pesticides into the environments as a result of mining activities and indiscriminate use of glyphosate-based chemicals in agriculture. Notably the Glyphosate which is used to increase agricultural production through weeding out unwanted plants has become the most controversial pesticide because of the deleterious effect it has in causing impairment of sexual reproductive organs in the guinea Pig and this potentially has the same effect on humans through food chain. The use of herbicides should be discouraged, and more measures put in place to safeguard everybody from unintended exposure especially in commercial industries.

Prof. Timothy Olabiyi: Comparative Effects of Biological and Synthetic Nematicides in the Management of Nematode Pests of Okra

Background

- Okra is a food commonly consumed in West Africa.
- Okra is affected by parasitic nematodes which deny the plants nutrients leading to significant yield declines and eventual death of the plants.
- One of the most commonly used agrochemicals in the control of parasitic nematodes is Carbofuran, which is marketed under the name Furadan.

Key Highlights

- The study findings show that, the nematodes have devastating effect on crop yield.
- The virulence of the nematodes varies with seasons.
- Farmers prefer late planting as a strategy for pest control.
- The study findings show that Bio nematicides are equally as effective as synthetic chemicals (carbofuran) in the control of nematodes.
- Microbial based bionematicide, plant-based bionematicide, liquid fertiliser and synthetic carbofuran all ranked equally in the control of nematodes.
- Control group in the experiment showed significantly lower yields than all the intervention groups.

Key Concerns

- *What dosage of carbofuran was used?* The carbofuran doses used in the experiment were according to what the manufacturer recommended on their packaging.
- *Emerging issue-* Carbofuran is one of the most toxic pesticides with adverse side effects to non-target species. Carbofuran is listed in Annex 3 of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. Although this does not mean it is banned from use.
- *What is the formulation of the plant based nematicide?* The plant-based bio nematicides were made from teratoma plant extract.
- *What was used in the formulation of organic Nematicides?* Plant based extracts from titanium plant.

Recommendations

Since bio-pesticides work as effectively as synthetic pesticides (carbofuran), farmers should be encouraged to use them in the control of nematodes.

1.8.14 Breakout Session 14: County Government experiences in Policies and Legislations in Support of Agroecology Based Programmes

Session Moderator: Wanjiru Kamau

Main Speaker: Stella Lutalo, Pelum Uganda: Uganda experiences in Agroecology Scale up Initiatives

Presenters

1. MCA Gathuru Mburu, MCA Lari, Githunguri

Main Speaker: Stella Lutalo, Pelum Uganda: Uganda Experiences in Agroecology Scale Up Initiatives

Introduction

This session provided an opportunity for the organisations working with farmers practising agroecology to share information and best practices that can be used to upscale agroecology. The presentation focused on Uganda Experience on Agroecology. PELUM Uganda started in 1995 and is active in 102 districts with a membership of 57 NGOs and has reached 3 million farmers. PELUM pursued agroecology in Uganda since it is one of the world's fastest growing population at 3.4% growth rate. Agriculture in Uganda contributes 26% to the GDP and employs 69% of population with women smallholder farmers producing over 70% of the food. The current high rate of land degradation is costing Uganda over 10% of GDP. There is increasing climate change effects and high vulnerability of small holder farmers while at the same time the existing industrial agriculture models have failed to deliver inclusive socio-economic development and resilience. The other challenge is the desire for more aggregated land for plantations by stakeholders that has led to increased cases of land grabbing and destruction of natural ecosystems.

A long term (2005 to 2015) study by Misereor in Uganda revealed that agroecology offers more viable alternatives for smallholder farmers than conventional/ industrial farming. Farmers practicing agroecology have exhibited more resilience to market fluctuations, pest and disease outbreaks and harsh climatic conditions. To scale up these agroecology benefits in Uganda PELUM holds annual events such as national indigenous and traditional food and seed fairs, regional food and seed fairs and green action week. Other opportunities from PELUM include scaling up of the FAO led initiatives, relevant finance opportunities, strong academic and research institutions, strong CSO networks and strong farmer movements that are embracing agroecological systems.

Gathuru Mburu, Member of County Assembly Lari, Githunguri: Evidence based Policy Formulation around Agroecology in Kiambu County

Agroecology is an integrated approach that simultaneously applies ecological and social concepts and principles to the design and management of food and agricultural systems. It optimizes interactions between plants, animals, humans and the environment while taking into consideration the social aspects that need to be addressed for sustainable and fair food systems. Current situation indicates that, in Kenya there is no specific policy on Agroecology thus very little attention is given to agroecology. Counties have tried drafting motions, but they are still very weak. The government needs to recognise the role of agroecology. There are many national and international players recommending formulation of policy to support agroecology given its massive uptake and practice across the country, with five international certification bodies working in Kenya showing the strategic importance of the sector. Kiambu County has made steps towards agroecology process by passing a motion on agroecology at the County Assembly and supporting the process of setting up of a committee. Further, Kiambu County has facilitated the development and implementation of a training curriculum for the village polytechnics.

Recommendations

1. There is need to have a desk at the Ministry of Agriculture to lead in development of an organic policy.
2. Organic agriculture needs to be incorporated in the drafts of food security policy and soil fertility policy.
3. There is inadequate or weak mention of aspects of agro-ecology in County Integrated Development Plans (CIDPs) hence counties should reconsider this critical approach for sustainable agriculture and food systems.

'Participation of food insecure groups in the policies that affect them should become a crucial element of all food security policies'. Report of the UN Special Rapporteur on the Right to Food

1.8.15 Breakout Session 15: Role of Knowledge Platforms in Promoting the Organic Sector

Session Moderator: Mr. Willis Ochilo

Main Speaker: Laura Tibet, Access Agriculture

Presentations

1. Gerald Herrmann, Presentation
2. Su Kahumbu CEO Greendreams Ltd, Presentation
3. 3: Monique Hunziker and Belinda Weya

Laura Tibet, Access Agriculture: Egypt Focal Point. Scaling up Farmer Innovations

Farmers learn best from their peers, but this has physical limitations. Women and youth have limited access to new ideas and knowledge when it comes to agriculture. There is also lack of suitable content in local languages to facilitate self-paced learning. Informed by this there is need to create a platform where farmers have access to free ecological and farming information. Access Agriculture continues to train more young professions to produce and translate videos for farmers across the south. Videos have been found to be very effective dissemination channels for farming information.

Recommendations

1. Strengthen agroecology movement and accelerate change at scale in a cost-effective way.
2. Increase support to farmers, including the youth to learn about sustainable practices in their own language.
3. Work with research institutions to support PhD, MSc and BSc students on innovations in production, access and delivery of videos for farmers.
4. Support video-assisted learning platforms for farmers to accelerate transitioning towards agroecology and also contribute to inspiring the youth led- rural enterprise development.

Su Kahumbu, CEO Green Dreams TECH Ltd - Experiences of iCow Platform as a Knowledge Service. "A Farmer's Best Friend!"

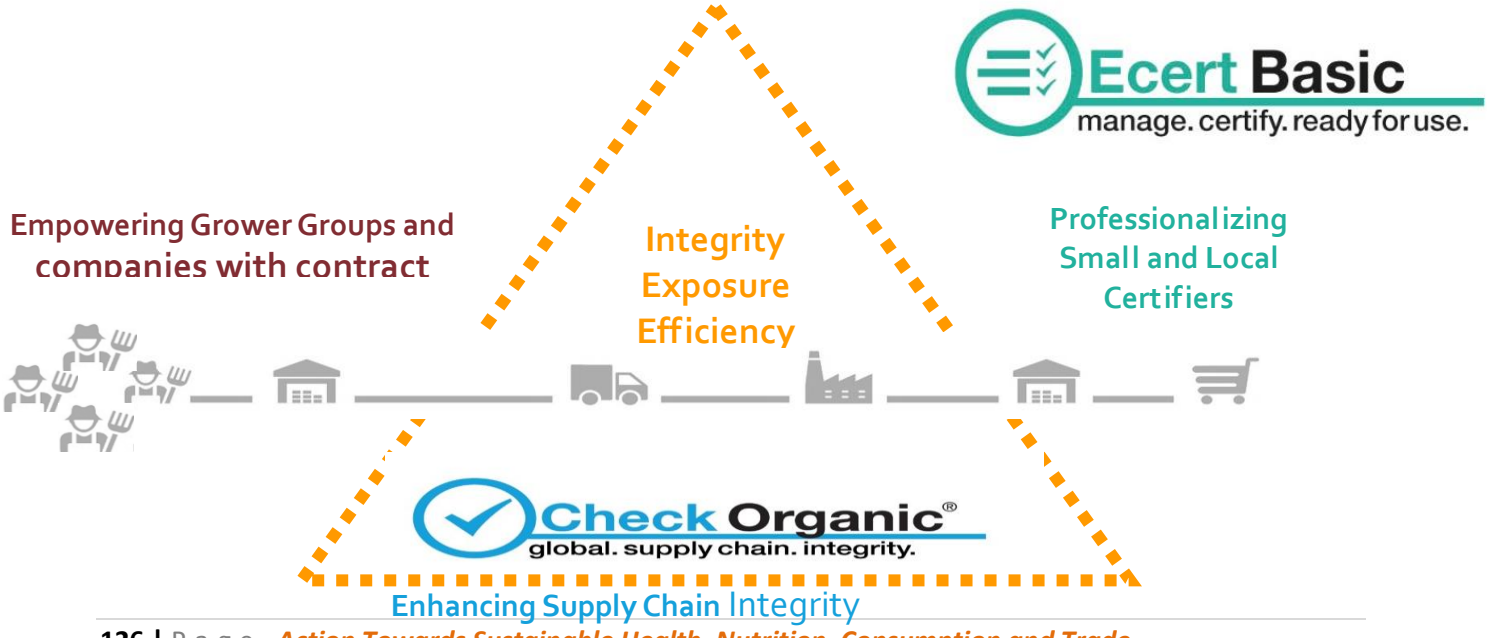
iCow is a social enterprise by Green Dreams TECH Ltd that offers comprehensive solution for farmers designed not only to support them with livestock and crop production but also to connect farmers to the vital players in their agricultural ecosystem. These include input providers, agricultural financial service providers, veterinary experts, agricultural extension service providers, NGO's, Government and other

service providers. It is designed for the most basic feature phones and is available in differ rent languages depending on the county of deployment. In Kenya and Tanzania it is available in English and Kiswahili, in Ethiopia in Oromiffa, Amharic and Tigrinyia. iCow creates an ecosystem of like-minded people, organizations, Governments and farmers across the world hell bent on solving Africa's food security problems. This is done through harnessing the positives to contribute towards even greater positives. Green Dreams TECH offers partners in the agricultural ecosystem a variety of services aimed at increasing value for the farmers on the iCow platform including bundled Services, marketing, surveys and sponsored content. The iCow application is a very effective technology for farmers and has registered very encouraging results however, the application poses difficulties because of insufficient resources to access email and website due to poor network in some areas and in some cases the cost of airtime is a limiting factor. Therefore, there is need to supplement such innovations with more open training centers in rural areas and more partnerships with institutions.

Gerald Herrmann: The Importance of Digital Transformation for Sustainable Economic Development of the Organic Sector (Presented By Ina)

If the organic sector intends to keep growing in a sustainable manner, without leaving small-scale farmers and small certifiers behind, the use of modern ICT tools is indispensable. Without comprehensive digital transformation, bureaucracy and its costs will hamper all further development whilst the organic brand will lose its integrity and value. ICT tools are ready – let's use them and change for the better. There are several challenges facing the organic supply chain and its stakeholders including: demand for audits, inspections, certification, accreditation, private standards and seals and transparency among others. All these processes take time and have a cost implication. ICT provides opportunities to leverage on to reduce these costs and time including processes. ICT offers solutions for farm management, production, certification and integrity, finance and financial management, training and marketing. The figure below demonstrates this possibility.

A correlating ICT family that creates synergy effects



Monique Hunziker and Belinda Weya – User Friendly Knowledge Platform

Monique made a presentation about Infonet which is a web based information Platform with up-to-date information for the improvement of human, animal, plant and environnemental health. It was developed in response to requests made by farmers. The content is developed continuously with structured reviews by experts and scientists. It is a unique platform because it offers open access, offline version options, content on plants, animals, humans and environmental health suitable for promoting organic agriculture. It has mobile responsiveness with suitable links to the organic farmer publication and other relevant publications. In Kenya the platform covers the whole country.

1.8.16 Breakout Session 16: Partnerships, Networking and Financing Innovations

Session Moderator: Mr. Zachary Makanya, PELUM Kenya

Keynote address: Malick KANE, UNCTAD On improving access to finance for sustainable agriculture

Presentations

1. *Dr. Nicholas Ozor - African Technology Policy Studies Network (ATPS):* Financing Research and Innovation
2. James Kimotho: Smallholder farmer access to finance through Jungle Mhela system

Keynote address: Malick KANE, UNCTAD On improving access to finance for sustainable agriculture

Agroecology can be linked to all the SDGs with a key focus on SDG 17 which looks at partnership. Financing is a major issue for the development of Agriculture in Africa for both conventional and organic farming. Persisting challenges in financing include low government expenditure allocation where agriculture orientation index for government expenses still remains below the world average (0.2 for SSA vs 0.26 for the World and 0.33 for Eastern and South Eastern Asia). The share of agriculture in total credit flow is equally low where Africa > 4%; Asia and Pacific >4% and the World 2.9%. (FAO, 2017). Agricultural contribution to GDP in Africa is almost 3 times the world average and twice the developing countries average. Rates of investment per worker in African agriculture have been declining or have stagnated for three decades (FAO). UNCTAD-AfrOnet collaboration on financing initiated after the 3rd African Organic Conference (AOC) in Lagos, Nigeria, and renewed at the 4th AOC in Senegal is committed to mobilizing a network of African researchers to bridge the data gap and create ownership.

From the joint research between UNCTAD and AfrOnet it was established that:

- Only 3% of respondents considered that organic agriculture stakeholders were completely able to meet their funding needs.
- Despite awareness of market growth, level of access to finance perceived as stable or more restrictive over the last 5 years (87% of OA stakeholders and 67% of respondents from financial institutions).
- 67% of surveyed stakeholders indicated that the funding needs of the sector were insufficiently met. More than 70% considered needs insufficiently met for research, purchase of equipment and certification.

- Certification, organization of smallholder farmers and purchase of equipment were identified as areas for which securing external funding is considered the most important.
- Organic Agriculture stakeholder's perspective: agriculture lacks or has limited credit backing mechanisms, lack of funding from commercial banks, high-interest rates and restrictive regulatory framework, inaccurate perception and risk associated with agriculture were considered as strong limiting factors by approx. 70% of the respondents.

Dr. Nicholas Ozor: Financing Research and Innovation

The role of knowledge from its generation, transfer, uptake and utilization has become a key topical issue as countries transition to the knowledge-based economy as per Africa's Agenda 2063. Research and Innovation (R&I) – the two methods of generating and utilizing knowledge can only be sustained through adequate funding and investments. In order to increase the funding/ financing opportunities for R&I under the current global financial crises and national cutbacks in R&D budgets, new approaches must be considered (Ozor, 2015). While "funding" refers to money provided by an organization or government on the basis of an agreement for the provision of goods and services and with no requirements to pay back the capital, "financing" on the other hand refers to money provided with the expectation to pay back the capital amount along with a certain percentage of interest. Unfortunately, African countries are yet to meet the AU 1% investment in R&D some 38 years later since the Lagos Plan of Action. Few countries have complied with the Malabo Declaration of 2014 requesting 10% budgetary allocation to agriculture. Expenditures continue to dwindle even when investments are made/committed.

Key Highlights

- Africa needs funding for research and innovation that is consistent, sufficient, relevant and sustainable.
- New and innovative funding approaches developed leverage to a large extent on partnerships, co-funding and multi-disciplinary arrangements.
- Innovative funding models based on new coalitions between the public, private and non-profit sectors are required to support seamlessly the different stages of the research, translation and innovation value chain.

- African countries have developed some innovative and dynamic new funding models, and more can be done to adapt and deploy other regions' innovative research and innovation funding models to mitigate decreasing traditional sources of funding for research and innovation.
- There are context-specific and context-transcending historical, technical, social, political and economic factors that stakeholders in the research and innovation ecosystem need to address if they are to optimize funding of research and innovation.

Conclusion

- Dynamic funding models have been developed, countries, organizations and individuals need to determine which model works best for them under the prevailing circumstances.
- Models encompassing partnerships, co-funding and multidisciplinary approaches seek to ensure context-driven, efficient and effective utilization of scarce resources.

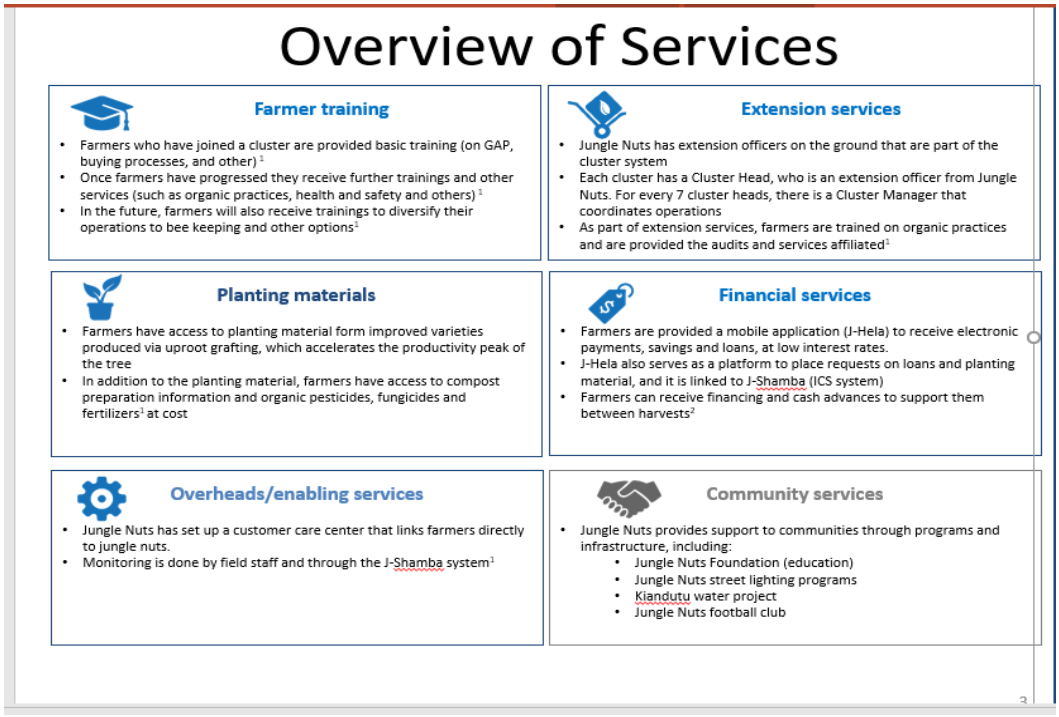
Recommendations

- Governments need to develop unifying long-range and operationable national ideologies on R&I modelled around the comparative advantages they have.
- Compliance to regional and continental treaties.
- Deployment of diverse funding models.
- Development and implementation of forward-looking policies and institutions for funding R&I.
- Challenges such as lack of political goodwill, lack of implementation plans and uncoordinated approaches hamper the harnessing of funding for R&I.

James Kimotho: Smallholder farmer access to finance through Jungle Mhela system

Founded in 2004, Jungle Nuts Ltd is a Kenyan nut processing company; it is one of the 4 affiliates under Jungle Holdings, alongside Jungle Energy, Jungle Housing and Jungle Foundation. Jungle Nuts procure both organic certified and conventionally farmed nuts. Jungle Nuts sources from 7 different regions in Kenya. These regions are Nyeri, Kirinyaga, Embu, Muranga, Kiambu, Tharaka Nithi, Machakos and Taita Taveta counties. Jungle Nuts sources nuts from 33,000 smallholder farmers and produces four nut-based products: macadamia nuts and oil, cashew nuts and butter and bio-briquettes. Jungle Nuts operations are certified Organic and Fairtrade. The company has recently developed the J-Hela banking platform introducing digital transactions between supply chain partners and farmers.

Below is an illustration of the services J-Hela provides to its stakeholders in the supply chain.


Overview of Services
Farmer training
Farmers who have joined a cluster are provided basic training (on GAP, buying processes, and other) [1]
Once farmers have progressed they receive further trainings and other services (such as organic practices, health and safety and others) [1]
In the future, farmers will also receive trainings to diversify their operations to bee keeping and other options[1]
Extension services
Jungle Nuts has extension officers on the ground that are part of the cluster system
Each cluster has a Cluster Head, who is an extension officer from Jungle Nuts. For every 7 cluster heads, there is a Cluster Manager that coordinates operations
As part of extension services, farmers are trained on organic practices and are provided the audits and services affiliated[1]
Planting materials
Farmers have access to planting material form improved varieties produced via uproot grafting, which accelerates the productivity peak of the tree
In addition to the planting material, farmers have access to compost preparation information and organic pesticides, fungicides and fertilizers[1] at cost
Financial services
Farmers are provided a mobile application (J-Hela) to receive electronic payments, savings and loans, at low interest rates.
J-Hela also serves as a platform to place requests on loans and planting material, and it is linked to J-Shamba (ICS system)
Farmers can receive financing and cash advances to support them between harvests[2]
Overheads/enabling services
Jungle Nuts has set up a customer care center that links farmers directly to jungle nuts.
Monitoring is done by field staff and through the J-Shamba system[1]
Community services
Jungle Nuts provides support to communities through programs and infrastructure, including:
Jungle Nuts Foundation (education)
Jungle Nuts street lighting programs
Kiandutu water project
Jungle Nuts football club
3

CLOSING PLENARY

The following are the summary from selected leaders who crowned the event.

Zachary Makanya

A lot is happening in agroecology and the exhibitions are evidence. As stakeholders there is need to document the good practices and disseminate widely so that others can see and learn. As stakeholders and champions of agroecology, it is our responsibility to start lobbying at the grass root level where producers and consumers are. To build on synergies there is need to map out all agroecology stakeholders in every country and join forces for complementarity. Africa's Heads of States should honour and deliver on the Malabo Declaration that will go a long way to support smallholders through the 10% investment of the national budget. Likewise, the decision by Africa's Heads of State and Government to support organic agriculture in 2011 should be supported with resources for implementation. " Together we can, alone we cannot".

Dr. Darcy Ogada

The way forwards and the starting point is always scaling up of good practices. 99% of people out there in the world do not understand how toxic the synthetic fertilizers and pesticides are. We in this conference have the responsibility and opportunity to create awareness including training to bring to the fore the revelations and facts seen, heard and felt in the discussions. The world urgently needs alternatives to synthetic fertilizers and pesticides.

Dr. Louise Luttikholt

The world where it is right now does not have a plan B, the world needs to embrace agroecology. Many examples of agroecology have been shared in the conference and they offer attractive opportunities for investment and good proposals for society development. Let the networks established in this conference remain firm, productive and active to maintain and improve on the positive momentum.

Dr. Mwatima Juma

Indeed, a lot of learning has taken place during the conference and it needs to be appreciated through adoption. Indeed, knowledge is power and this conference participants should device ways on how the knowledge gained will reach the people at the grass root level. The delegates and other stakeholders should explore all available resources including social media to communicate agroecology, build networks and host the next biannual conference a 50:50 attendance of those who are pro and anti-agroecology. This will help convert the anti-agroecology proponents through demonstration of facts and evidence. Organic farming focus is just but part of agroecology, there is so much more that is yet to be exploited fully by the African continent.

Dr. Robinson Rue

Question for reflection: Should we tell people not to use pesticides or how to make compost? Win over by teaching and training and sharing on the alternatives and let the results influence change.

FAO Representative

We are not reinventing the wheel. Let stakeholders support the agroecology movements already happening in Africa. All the topics addressed in the conference were very relevant and organic trade is key as markets define supply and demand. Let health and sustainability be at the core of every agriculture and food systems discussions where policy makers and parliamentarians are also engaged. Support these discussions with institutional policies, legal and financial frameworks. Scaling of agroecology requires territorial approach, and this can be achieved if all stakeholders are engaged from the public, CSOs, academia, research, NGOs, producers, financial institutions, students, women and youth and private sector were well represented.

Dr. Hans Herren

The choice of continent for hosting the conference was timey and great. Facts and evidence about agroecology have been demonstrated. Africa has the knowledge, science and technology to transform agriculture and food systems. There is need for urgency transformation. The conference is not oblivious of the forces anti-agroecology and as such more synergies from stakeholders is needed for building stronger alliances. The world and its people need to be concerned about the planet and its resources. Africa's demand for food is increasing requiring doubling or even tripling the production. Agroecology can and will support the achievement of this need including support achievement of the 17 SDGs and associated national and regional goals. There is a difference between "what we want" and "what we do not need". This must be incorporated in policy and legal systems where citizens must demand for provision of ecosystems services. There is need for a plan of action with specific points on what Africa needs to do moving forward including voting for new leadership. Africa and the rest of the world should make life be more important than money and profits and this will help rout the ills of corruption.

Dr. David M. Amudavi

Dr. David articulated the **4Ds** of reflection as the conference was ending:

1. There is need to **Demystify** the notion that agroecology cannot feed a nation, that it is all about a narrative.
2. There is need for **Diversification** of options and opportunities so as to provide alternatives such as agroforestry, organic farming.
3. It is prudent to acknowledge that there is need for **Drivers** of transformation. These include among others, resources which need to be allocated, good leadership and governance and champions of change.
4. **Develop** and tap into indicators to measure change: Agroecology needs to demonstrate that its application makes a difference.

The conference has been rich with presentations and experiences which resulted into a call to action that appeals to all represented here to take the mantle and be part of the solution and not the problem.

Ministry of Agriculture Kenya Representative

Agroecology is not a one man show as it requires all stakeholders to play their part. Agroecology will be demystified if alternatives to current practices are provided. Currently there are new methodologies for extension and advisory service provision that utilize ICT platforms. These channels can be explored to share more information and knowledge on agroecology with the wider world. Food safety and health

should be key in policy discussions. In the Kenyan context, this should be applied at the two levels of government: County and National government.

DELEGATES EXCURSION

Field Visit: LIMBUA Group Limited

Starting as a pioneer for the cultivation of organic macadamia nuts with small-scale farmers, LIMBUA German-Kenyan company is a one of the leading organic macadamia producers worldwide today. The company produces four main products: Organic macadamia nuts, organic macadamia oil, organic macadamia seedlings and organic avocado oil. In this role, Limbua views itself as an innovative link between small-scale farmers in Africa and demanding quality customers from all over the world. Using technology to a high degree enables the direct support and supervision of the small-scale farmers and effective value addition of macadamia and other crops from their mixed farms. LIMBUA operates three modern decentralized production facilities and a nursery directly within farmer communities on the slopes of Mount Kenya. Since its creation, it follows a unique, holistic philosophy**.** Limbua has 25 qualified field officers who work with over 2500 certified small-scale farmers in Embu and Kirinyaga counties. The LIMBUA small-scale farmers grow a high variety of crops on their farms. These farms are fully converted into certified organic farming. This enables Limbua to market also other high-quality organic products beyond macadamia as main crop, which is processed and exported to Germany for the European market.

LIMBUA operates modern decentralized production facilities directly at the locations of the small-scale farmers. This helps reduce transport costs and preserve the freshness and quality of the raw materials. Even more important to the company is the fact that this enables them to involve the small-scale farmers into the value process to a higher degree. Most of the employees in the production facilities come from farming families in the surrounding regions that are able to process their own raw materials in this way.
In some processing steps the company intentionally prefers handcraft materials to further increase the product quality. Through this the company creates additional jobs in the countryside and therefore contributing to decrease of rural-urban migration particularly for the women and youth who get alternative employment. The small-scale farmers show their appreciation to LIMBUA through high motivation and loyalty in their work.
More information about the organic farm can be assessed from: http://www.limbua-group.com

Sylvias Basket

Sylvias Basket is a farm based in Limuru, Kenya committed to providing fresh organic vegetables to its customers. The farm has a variety of organic vegetables which are supplied within 24 hours of harvest. The farm applies agroecological principles in its production and certified safe, biological pesticides when is absolutely necessary. The farm has a traceable system that allows customers to track them for consultations, visits and learning. The farm over and above the organic vegetables, they also are growing exotic and indigenous trees, organic spices and are engaged in harvesting water that is used in the irrigation system on the farm. The farm provides for learning by interested parties including school going children, university students and other farmers. The farm sources seeds from the local shops and also utilizes its own grown seeds.

The following agroecological practices and processes were observed on the farm: Boundary tree planting, composting of manure, water harvesting from surface run off, crop and livestock diversification, intercropping of main crops like maize with nitrogen fixing legumes, growing of cover crops such as sweet

potatoes and Napier, mulching for water conservation, crop rotation for management of pests and diseases. Plans were underway to introduce aquaculture and soil testing and amendment for organic matter management.

About marketing of the organic vegetable, the farm engages in farm gate selling and home deliveries upon receiving orders. For wide scale publicity, awareness creation and effective marketing the farm utilizes the social media platforms.

The main challenges facing Sylvia's basket are logistics (the farm is in Limuru and most people find it too interior to be accessed), middle-man pricing challenge (due to the remoteness, middle men take advantage to buy at low prices from Sylvia's basket farm and deliver to the high end market where they receive a premium price) and difficulties in scaling up the organic practice (the surrounding farms and community are yet to embrace the organic farming concept as they do not have incentive to do it particularly with regard to pricing). For more information the farm can be reached at: http://sylviasbasket.co.ke/ and on Facebook at Sylvia's Basket.

Gilgil Organic Farm - JATFLORA FARM

Jatflora farm is a 350 acres farm located in Gigil 5km from Gilgil town. The expansive farm which has a hill on upper side and gentle slope on the lower side was founded by Mr. John Mbuu in 2007. The farm was started as a flower farm with a market linkage for cut flowers in the export market. In 2012, there was a shift in focus as a result of the realization of the negative effect of chemical pesticides on farm workers and to the environment. The director started converting the farm to an organic farm. This was done by stopping the usage of chemical fertilizers and starting to adopt agroecological methods. The farm also approached several hotels who indicated the willingness to partner in supply of organic produce. In the same year, the farm also approached Kenya Organic Agriculture Network for guidance on conversion to an organic certified farm. Since then, the farm has been employing organic farming techniques in production. The farm currently offers employment to 70 permanent workers; 40 women and 30 men.

Future Outlook: There are plans to establish a market centre for organic produce grown and processed at the farm and nearby Gilgil town. The farm also plans to expand distribution of organic produce to more hotels, supermarkets and shops. There is also the possibility of expanding to the export market for organic produce in the future.

Certification: The farm is certified under the East Africa Organic Produce by Acert LTD.

ANNEXES

Annex 1: List of participants

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410	Manei	Naanyu		Professional	Kenya

Annex 2: List of Exhibitors

1. AFROSEP
2. Access Agriculture
3. CCFD-Terre Solidaire
4. Bioversity International
5. Godefridus Boers
6. Ferdinand Wanyonyi Wafula
7. CHEMOQUIP LTD
8. Biovision Foundation
9. Stella Maina-Green Rhino
10. GIZ
11. PELUM Kenya
12. PELUM Kenya
13. PELUM Kenya
14. PACJA
15. Biovision Africa Trust
16. Biovision Africa Trust
17. KOAN
18. KOAN
19. UMU- Rose Nalungo
20. Biovision - Rongo Farmers

Annex 3: Local Organizing Committee

1. Dr. David M. Amudavi- Executive Director of Biovision Africa Trust. Chair of the Local Organizing Committee
2. Mr. Zachary Makanya - Country Coordinator, PELUM Kenya
3. Dr. Peter Mokaya - Managing Director, Organic Consumers Alliance (OCA)
4. Mr. Eustace Kiarii - CEO and Country Coordinator, Kenya Organic Network (KOAN)
5. Mr. Samuel Ndung'u – Programmes Manager, Kenya Organic Network (KOAN)
6. Ms. Venancia Wambua - Ecological Organic Initiative Africa Project Manager, Biovision Africa Trust

7. Mr. Alex Mutungi - Ecological Organic Initiative for Africa Secretariat Coordinator
8. Ms. Rosinah Mbenya - Programmes Manager, Pelum Kenya
9. Ms. Manei Naanyu - Ecological Organic Initiative for East Africa Secretariat Coordinator

Annex 4: Titles of Book of Abstracts

Oral Presentations

1. Prof. Michieka, R.W., Kamau, R.N. & *Ebanda, O.R.:* The Compromise: Pesticides Use, Food Security Or Environmental Pollution
2. Dania V. O. & Thomas, A.S.: Biocontrol Efficacy of *Trichoderma* Species Against Rot-Inducing Post-Harvest Fungal Pathogens of White-Fleshed Sweet Potato (*Ipomoea Batatas* L.)
3. Adeoluwa Oluwaseyi Adeleye 1., Mosudi Babatunde Sosan & John Adekunle Oyedele Oyekunle: Dietary Exposure Assessment of Organochlorine Pesticides in two Commonly Grown Leafy Vegetables In South-Western, Nigeria
4. Zdziarski, I. M: The Importance of Histopathological Analyses Containing Quantitative Methods in the Assessment of Novel Food Safety
5. Gideon Oluwasogo Odewale, Mosudi Babatunde Sosan & John Adekunle Oyedele Oyekunle: Human Health Risk Assessment of Dichlorodiphenyltrichloroethane (DDT) And Hexachlorocyclohexanes (HCHS) In Fruit Vegetables In South Western Nigeria
6. V. B. Mutwedu, R. B. B. Ayagirwe, D.K. Chiregereza, Azine P.C., NgoumtsoV.H. P & Nyongesa A. W.: Growth and Reproductive Parameters Impairment of Glyphosate (Herbicide) In Male Guinea Pig (*Cavia Porcellus*)
7. Abolade T.J., Meludu, N. T. & Chuwuanu, C.J.: Perception of the Effect of Climate Variability on Maize Yield among Organic Crop Farmers in Anambra State, Nigeria.
8. Tankou, C.M., Beyegur, Kouam D.H., Essam E.B., M. J. V. L., Etia, K.M., Mbieleu, D. J. L. & Yellegar, P.: Potentials of Low-External-Input Resources and Intercropping Systems to Sustainable Food-Crop Production in Cameroon
9. David Bautze, Martha W. Musyoka, Edward Karanja, Komi K.M. Fiaboe, Anne Muriuki, Monicah Mucheru-Muna & Noah Adamtey: Impact of Organic and Conventional Farming Systems on Agriculture Sustainability: Results from The Long-Term Farming Systems Comparisons Trials in Kenya
10. Kenyanya T. M., Moturi W. N., Nyaanga J., Macharia J. K. & Birech R. J.: Determination of Pesticide Residues in Organic and Conventional Exotic Vegetables
11. Aggrey Atuhaire, Peter Ssekkadde, Oscar Kibirango, Daniel Ssekaboja & Erik Jørs: Best Practices to Reduce Consumer Dietary Exposure to Synthetic Pesticides: Insights from Uganda
12. Olowe, V.I.O. & Adejuyigbe C.: Crop Rotation: A Major Strategy in Agroecology
13. Gerard Lawry: Visioning Agroecology on aDiversified Australian Farm
14. Jane W. Wangu, Peter M. Wachira, John W. Kimenju & William M. Maina: Effect of Organic and Inorganic Amendments on the Population of Nematode Destroying Fungi

15. Irene Kadzere, Anja Heidenreich, Anne W. Muriuki, John M. Ndungu, usta Gitonga[3], Charity Gathambiri, Paul Kiuru, Chrysantus M. Tanga, Christian Grovemann, Bernard Schlatter, Noah Adamtey, Gian Nicolay & Christian Schader: Motivation for Organic Agriculture Practice and Input Use on Selected Counties of Kenya
16. Roy Upendra Nath: Development and Organisation of Organic Farmers Market at Chandigarh, India
17. Herrmann, G.A. & Hiester, I.: The Importance of Digital Transformation for A Sustainable Economic Development Of The Organic Sector
18. Landoloyem Nathalie: Appropriation of Organic Farming by Farmers and the Consumer Attitude in Moungo - Cameroon
19. Pietro C. & Ciccarese L.: Organic Farming is a Success Story in Italy. Some Figures, Scenarios and the Role of Certification Systems
20. Daniel Maingi, Dorothy Muthini & Margaret Mburu: Beyond Industrial Agriculture: Pesticide Use and the Legislative Landscape in Eastern Africa and Beyond
21. Raphael Wahome: Policy Implications Raised by the Results from the Progrov Project
22. Muzira E. W. & Mutatu W.: Impact of Atrizine and other Herbicides on Animal Health in the Zimbabwe Sugar Industry
23. Bollmohr, S. & Liebetrau, L.: Banned Pesticide use in Kenya - An Urgent Need to Move Towards Sustainable Agriculture
24. Mohammad Khurshid Alam: Effects of Different Organic Fertilizers on the Yield of Potato and Quality of Processed Products
25. Kemoi E, Nyerere A,. & Bii C: Fungicide use in Horticulture Linked to Antifungal Resistant *Aspergillus* Species in Kajiado County
26. Okongo L. R., Alarokol S. P. & Ongeng D.: A Multi-Land Use Knowledge, Attitude and Practice Survey of Pesticides Use in Lake Victoria Basin
27. Darcy Ogada: Breaking the Silence: Africa's Wildlife Poisoning Crisis
28. John Bosco Muhumuza, Mattias Jonsson, Jeninah Karungi, John Gilbert Ntare & Herbert.A.L.Talwana: Contrasting Effects of Vegetative Heterogeneity, Pesticide Use and Plant Nutrition on Fall Armyworm (*Spodoptera Frugiperda*), Termites and Ladybird Beetles
29. John J Anyango, G K Onyambu, Komi K M Fiaboe, A W Muriuki, Sibylle Stöckli, & Bautze, D: Effects of Organic and Conventional Farming Systems 0n Physiochemical Soil Changes, Central Kenya
30. Morel Kotomale, Grâce Houndafoche, Appolinaire Adandonon, Ghislain Tepa-Yotto, Ouorou K. & Douro Kpindou: Innovating Use of Biovirus Strains in the Management of Fall Armyworm *S. Frugiperda* (J.E.SMITH) in Maize
31. Charles Odhong, Stefanie Pondini, Charlotte Pavageau & Hans Herren : Investment in Agricultural Research for Development: What Role for Agroecology?

Posters

1. Aderolu, I. A. & Bello, O. N.: Comparative efficacy of Azadirachta indica and Ampligo against Fall armyworm on Zea Mays in Nigeria
2. Mulumpwa, M. C: Reports of adulteration of formalin and pesticides in food fish on the Malawian Markets: a quest for intensified collaboration of market monitoring
3. Yousif Osman Hussein Assad, Nabil Hamid Hassan Bashir & SamiaAbouObida Hassan: Effects of selection pressure in development of resistance in cotton whitefly *Bemisiatabaci* Gennadius (Homoptera: Aleyrodidae) in Gezira State, Sudan
4. Michael Adedotun Oke: An Appraisal of the Honey Marketing Practices in Gwagwalada area council of the Federal Capital Territory, Abuja Nigeria
5. Panfilo Tabora, Sergio Quieroz, Angelo Levi, Jeronimo Binda & Teruo Higa: EM (Effective Microorganisms) Biospray to Control the *Oidium anacardii* fungus and the *Helopeltis antonii* bug attacking the cashews in Mozambique
6. W. Muthoni, R. Kahuthia-Gathu, Mwangi, M. & Waceke J.W.: Management of fusarium wilt using *Pseudomonas fluorescens* and neem extract in Kirinyaga County, Kenya.
7. Efficacy of Biochar in the Management of *Fusarium verticillioides* Sacc. Causing Ear Rot in Maize.
8. Nwogwugwu, J.O. & Anicet A. Batcho: Advancement in Agriculture: An Alternative Way to Control Plant Disease in Africa via Small RNAs
9. Otim, A., Malaala, A., Nakityo. F. & Ddamulira G: Biochar Fertilizer Improves Tomato and Cabbage Growth and Yield
10. Henry Stanley Mbowa: Using urine as a fertilizer for vegetable production in Kyambazi Cell, Wakiso City, Uganda
11. Olabayi, T.I. & Gbadamosi, A.R.: Evaluation of *Trichoderma* and *Bacillus* species in the management of pathogenic nematode and fungi on tomato
12. Patrick Sama-Lang, Uwemi Essia & Che Samuel Shu: Bio-fortifiers, trees, bananas and plantains, in reducing the use of synthetic fertilizers and pesticides in Cameroon
13. Oumar Doungous & Njuckeng Jetro Nkengafac: Potentials of cocoa pod husk-based compost on *Phytophthora* pod rot disease suppression, soil fertility and *Theobroma cacao* L. growth
14. Liambila, N. R., Wesonga, J. M., Ngamau C. N. & Waudo W.: Insight into the Management of Tomato Leaf Miner (*Tuta absoluta*) with *Lantana camara* Oil Product
15. Wilfredo Robles, Dania Rivera, Luis Almodóvar, & Enrique Rodríguez: An Integrated Web-based System as Educational Aid to Improve Consciousness of Pesticide Use
16. Yao Akoua Clémentine, Bomisso Edson Lézin, Angaman Djédoux Maxime, Ipou Ipou Joseph & Koné Mamidou Witabouna: Botanical bioherbicide, an alternative to chemical weed control

17. Mutondwa M. P. & Paramu M.: Pesticide use and handling amongst smallholder farmers in Limpopo province, South Africa
18. Abdou Karim Keita, Moustapha Gueye, Mayécor Diouf, Anicet G. B. Manga & Mamadou Ousseynou Ly : Efficacy test of a foliar biostimulant on the growth of banana seedlings in a semi-controlled environment under different water regimes
19. Dassou G. Anicet, Delphine Bodjrenou, Sylvère Tovignan & Simplice D. Vodouhè : Insect pest management and certification of organic cotton in Benin: Farmer's knowledge with their experience
20. Taiwo Joshua Agunloye & Adeola A. Ala: *Piper guineense* and *Sesamum indicum* as Insecticide Synergists for Controlling *Rhyzopertha dominica* and *Tribolium castaneum*
21. Butseya, M. Mike, Nkedi-Kizza, Peter & Niyibigira, L. Emmanuel: Soil Fertility and Nutrient Status of coffee Agro systems in Uganda, 2017
22. Ndeye Maïmouna Diene & Abou Thiam: Practices and conditions of use of pesticides in cotton cultivation in Velingara, Senegal of West Africa
23. Mulindo J. Chengole, Mwenjeri G., Macharia M., Opole R., Wayua F. & Oduori C.: Agroecology adoption and its impact on household welfare in the finger millet farming system of Kenya
24. Adama, J. Y., Usman, A. & Olukotun B.: Haematological responses of broiler chickens placed on different vaccination schedules
25. Fabian Ottiger & Johanna Jacob: Comparing pesticide use and health impacts in agroindustrial and local family farms in Kenya
26. Nganga, B.W., Nge'tich, K.O., Macharia, J.M. & Ngetich, K.F.: A spatial multi-criteria evaluation for selection of optimal locations for the use of organic resources in the Upper Tana region Kenya.
27. Mwenda Mbaka & Henry Bwisa: Efficient Student Industrial Attachment Programs for a Reduction of Contamination by Synthetics through Agroecology
28. Musango, J. K., Waceke, J. W. & Kahuthia-Gathu, R.: Antagonistic Potential of Indigenous fungi against Potato Cyst Nematodes (*Globodera rostochiensis*) in Kenya
29. Tene Tayo Paul Martial, Dzelamonyuy Aristide & Boudjeko Thaddée: Enhancement of cocoa seedling resistance to black pod disease by oyster shell nursery soil amendment
30. Djeuani A.C., Mbouobda H.D., Mejane E.C., Wadawa J., Metopa D. Niemenak N., Fotso., & Omokolo N. D.: Use of arbuscular mycorrhizal fungi in the production of minitubers, new approach to produce sanitized seeds in *Xanthosoma sagittifolium* L. Schott (white cultivar)
31. Barasa, M.W. R., Kahuthia-Gathu, Mwangi, M. & Waceke, J. W.: Efficacy of indigenous antagonistic fungi in management of *Frankliniella occidentalis* on tomato in Kenya
32. George O. Kegode, Noubia Gribi-Hussain, Ray Ott, & Mushtaq Memon: Addressing the challenge of pesticide use in africa

33. Lizzy A. Mwamburi: Host-specificity of endophytic *Beauveria bassiana* and *Metarhizium anisopliae* confers control to fall armyworm in tomato
34. Knowledge, attitudes and practices of market gardeners in Kinshasa on the use of pesticides and the impact on human and environmental health
35. Mamadou Ousseynou LY, Rachael Taylor, Mayécor Diouf, Moustapha Gueye & Mamadou Drame: Transition to Agroecology: Pathway to Sustainable Agro-Food Systems in Casamance, Senegal
36. Adumanya, Ocu & Obi-Adumanya, G. A: Proximate analysis and sensory evaluation of "okpa" prepared with fluted pumpkin and scent leaves
37. Rhoda Jerop Birech, Joseph Kinyoro Macharia, Martin Njoroge Kimani, Mark Korir & Joan Kimutai: Indigenous knowledge on crops, livestock, beekeeping among the ogiek of nakuru county, kenya
38. Rhoda Jerop Birech, Joseph Kinyoro Macharia & Martin Njoroge Kimani: Status of ethnomedicine among the Ogiek of Nakuru County, Kenya