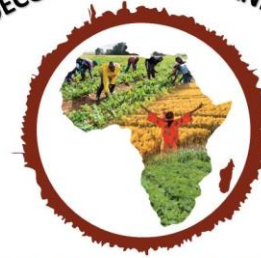


TRANSFORMING AGRICULTURE IN AFRICA
AGROECOLOGY and ORGANIC TRADE



Reducing Synthetic Pesticides and Fertilizers

Fertilizers & Pesticides in Agriculture, Environment & Health



Prof. Ratemo W. Michieka
University of Nairobi and,
Hon. Secretary, Kenya National Academy of Sciences

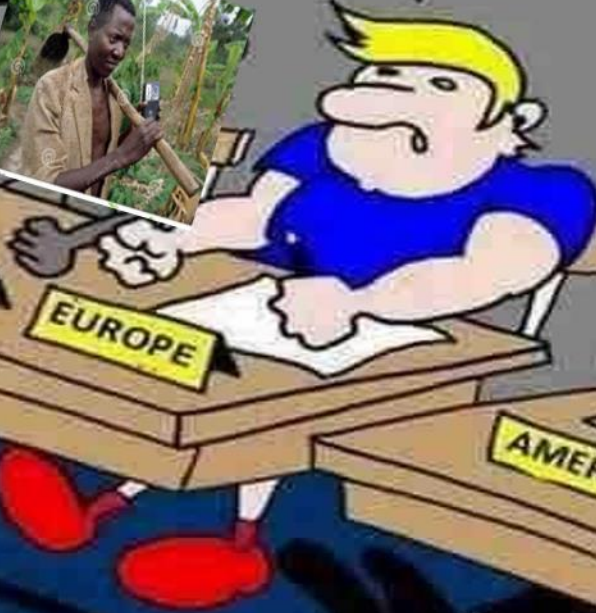
What is your opinion on the shortage of food in the rest of the world?

What is 'food'?

What is 'shortage'?

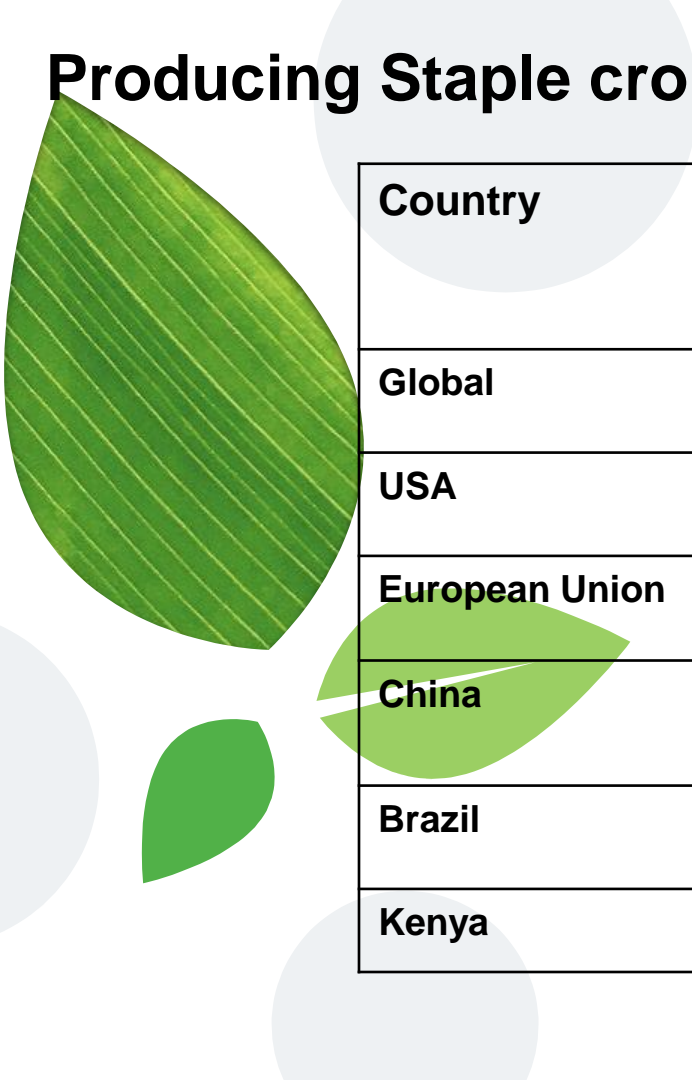
What is 'the rest of the world'?

What is 'opinion'?



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Producing Staple crops: The Difference Between Nations



| 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 |

Crop health faces many threats!

Crop health is important for food security and the environment!

Swiss Agency for Development
and Cooperation SDC

Acute, immediate threats ↔ Chronic, longer-term threats

- Severe Weather disruptions
- Natural calamities
- Pest & Disease outbreaks
- Sudden Policy changes e.g. trade
- Lower holdings of cereal stocks
- Economic factors
- Price hikes
- Food safety/contamination
- **Rural – urban migration and ageing farmers with few youth**

- 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
- Unfriendly policies towards farmers
- ????

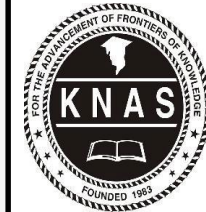


Bundesministerium für
wirtschaftliche Zusammenarbeit
und Entwicklung

Deutsche Botschaft
Luzern



Hivos
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RESERVATION

Biovision
Africa
Trust

Pests, Weeds and Empty Plates



- Crop pests and weeds are serious challenges to food production globally
- Pests destroy crops, hampering yields
- Weeds compete with crops for resources:
 - Sunlight
 - Water
 - Nutrients
- Weeds are economically more harmful than most crop pests
- Total global potential loss due to pests/weeds range from **50% – 80%**



Increase in crop losses to insect pests in a warming climate

- Crop yields will decrease as growing-season temperatures increase. This effect may be exacerbated by insect pests which already consume *5 to 20%* of major grain crops.
- For the three most important grain crops—wheat, rice, and maize—yield lost to insects will increase by *10 to 25%* per degree Celsius of warming.
- Projected 2C rise will destroy almost *50% more wheat* than they do today, *30% more maize*.
- Insects will destroy *20% more rice*.



Chemical Crop Protection

- Chemical crop protection products, or “pesticides”, help control insects, diseases, weeds, fungi and other undesirable pests.
- Pesticides comprise a wide range of products for both professional and home applications including insecticides, fungicides, herbicides, sanitizers, growth regulators, rodenticides, and soil fumigants.
- The regulatory framework of pesticides encompasses national, regional, and international legislation and conventions that help assure safety for users, consumers and the environment.

Pesticides in Agriculture

- Alternative pest control
- Reduced crop production cost (labor, time)
- Protecting farmers yield, health
- Increased return on farm investment



Role of Pesticides in Agricultural Production in Kenya and & the World



i. Protecting plants or plant products against all harmful organisms (e.g. fungicides, insecticides, molluscicides, nematicides, rodenticides).

ii. Influencing the life processes of plants (e.g. PGRs).

iii. Preserving plant products (e.g. fumigants).

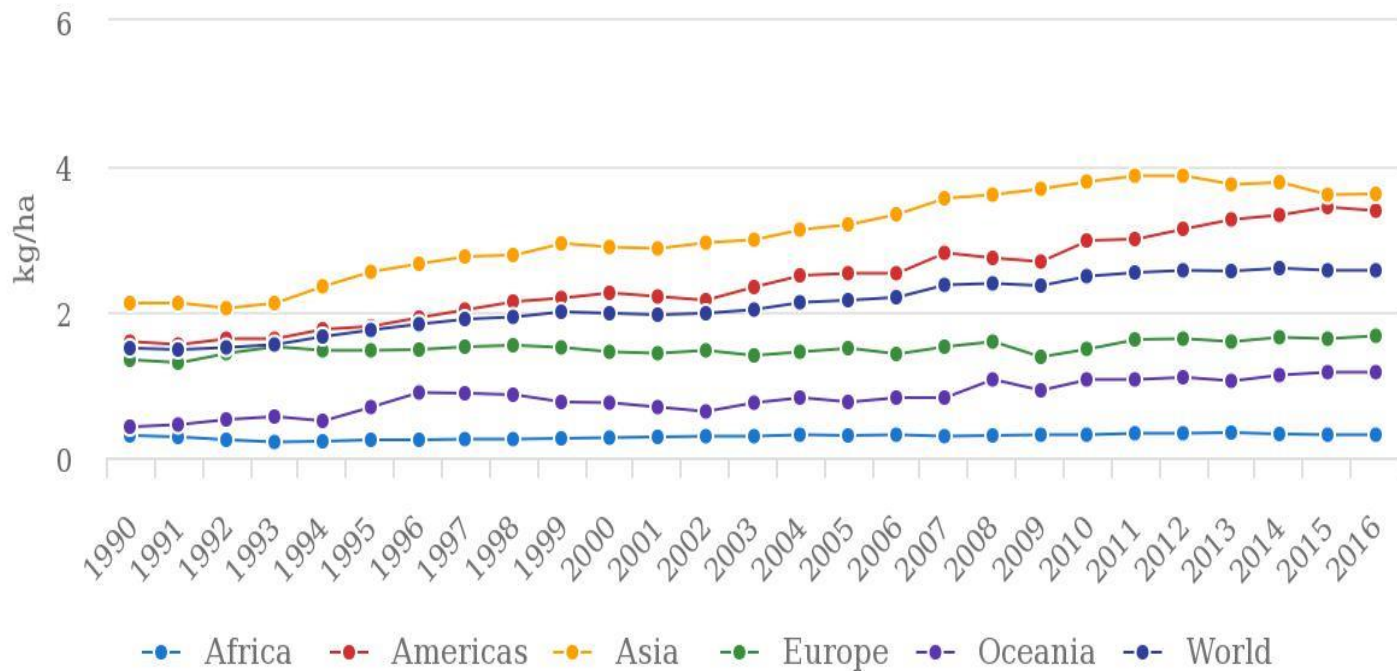
iv. Destroying undesired plants or parts of plants (e.g. defoliants).

v. Checking or preventing undesired growth of plants (e.g.

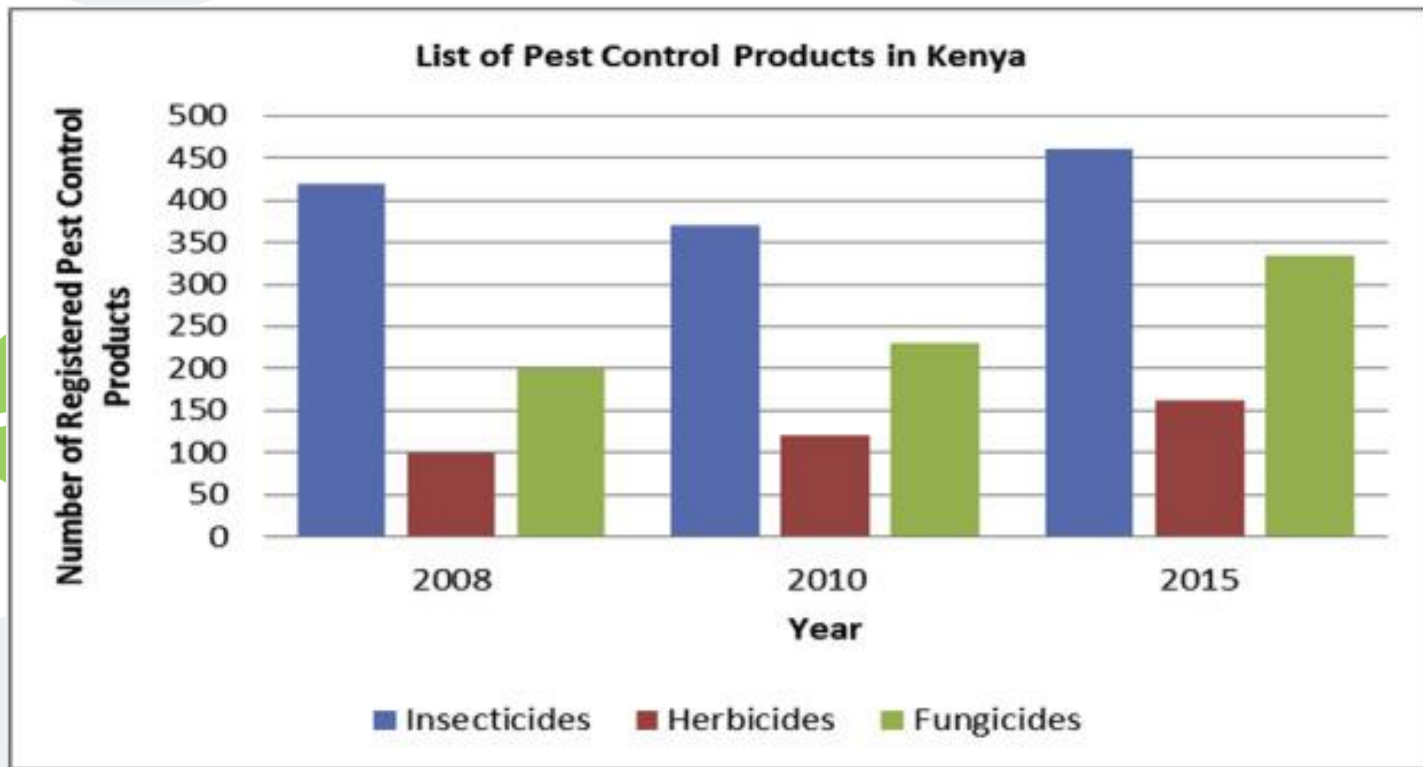
Status of Global Pesticide Use

Pesticides - Average use per area of cropland

1990 - 2016




Pesticide Use in Kenya



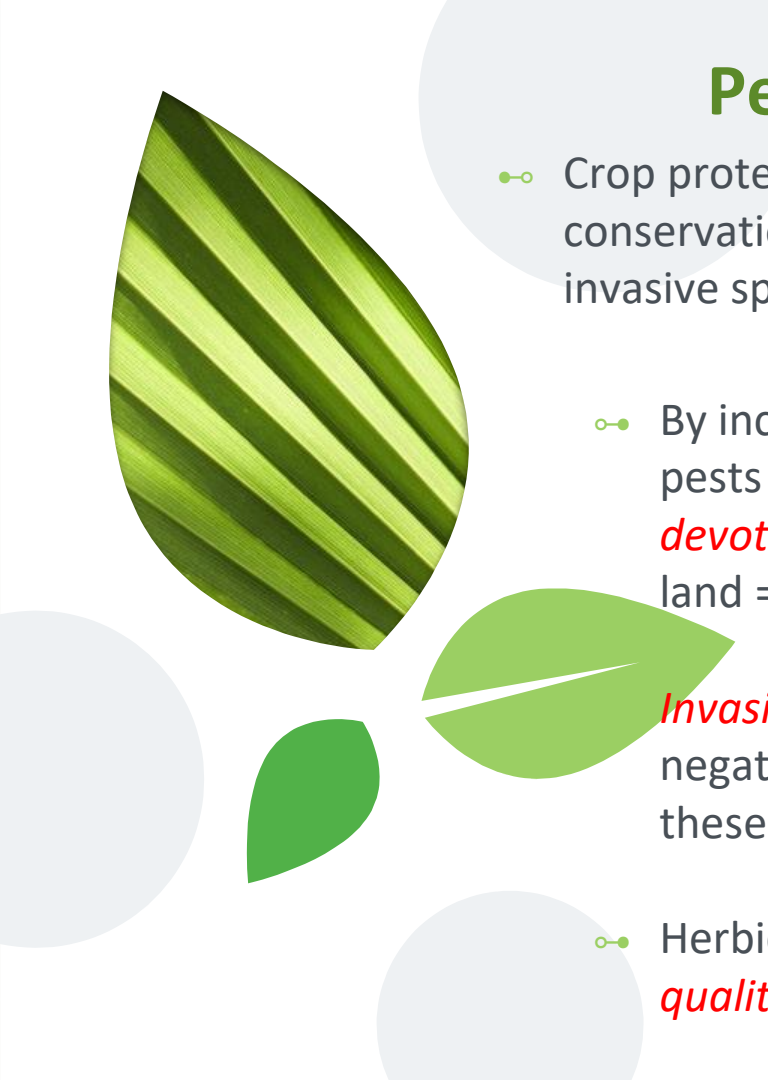
Regulations in Pesticide Use

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

Integrated Pest Management

- 
- IPM 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:
 - **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
 - **Intervention** where control measures are *needed*

Pesticides & Biodiversity Conservation

- 
- Crop protection products can contribute to biodiversity conservation by enhancing agricultural productivity and controlling invasive species:
 - By increasing crop yields and minimizing losses caused by pests and diseases, pesticides help *reduce the amount of land devoted to agriculture*; limit encroachment on non-agricultural land = wildlife habitats conservation
 - *Invasive plant species* such as weeds and fungi can also have a negative impact on wildlife habitats. Pesticides help control these species and protect wildlife.
 - Herbicides enable *conservation tillage* and *improves soil quality, reduce erosion*.

Fertilizer Use 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 play an important role in providing crops with the nutrients they need to grow and produce

Fertilizers help deliver enough food to feed the world's population (compare with manure...pathogens, quantity, logistics), recall earlier table...



Universal Role of Fertilizers & Pesticides in Agriculture

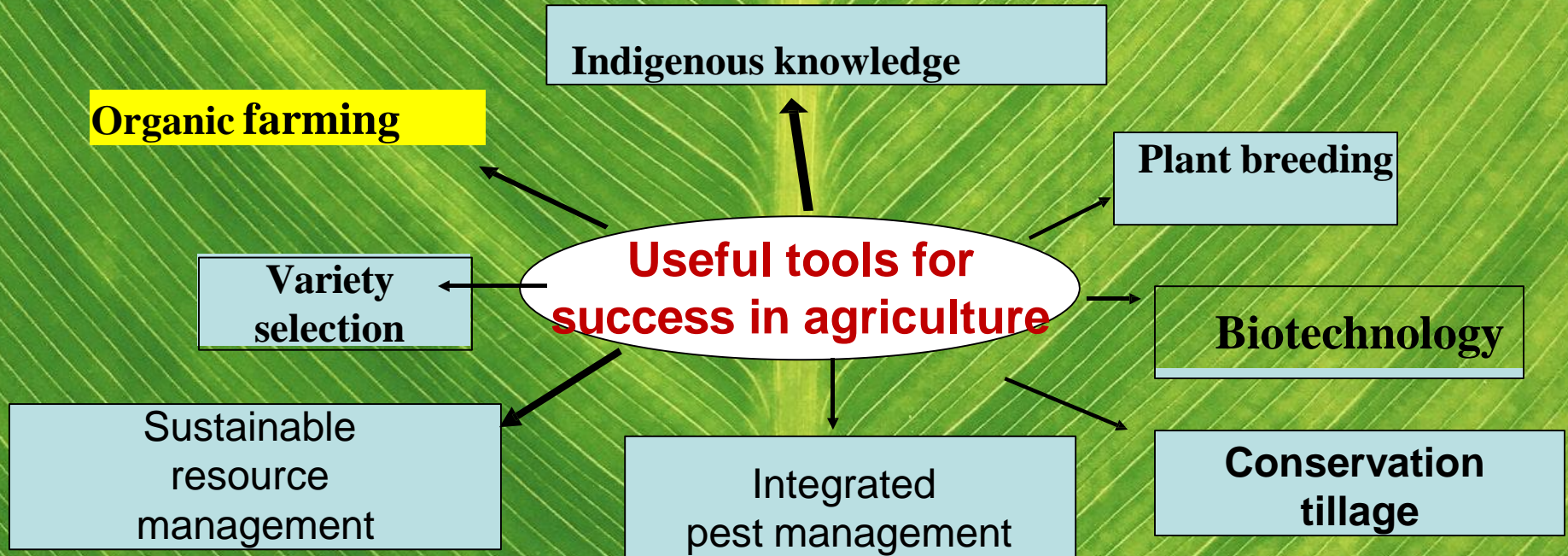
Sustainable and profitable agriculture

Food and nutrition security (Agenda 4-Kenya)

Transformative agriculture amidst climate change



Improving Field Crops Production requires... *Combined OPTIONS!*



We need more tools NOT LESS!

Thanks!

ANY QUESTIONS?

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