TRANSFORMING AGRICULTURE IN AFRICA
AGROECOLOGY and ORGANIC TRADE

Reducing Synthetic Pesticides and Fertilizers

DETERMINATION OF PESTICIDE RESIDUES IN SELECTED EXOTIC VEGETABLES

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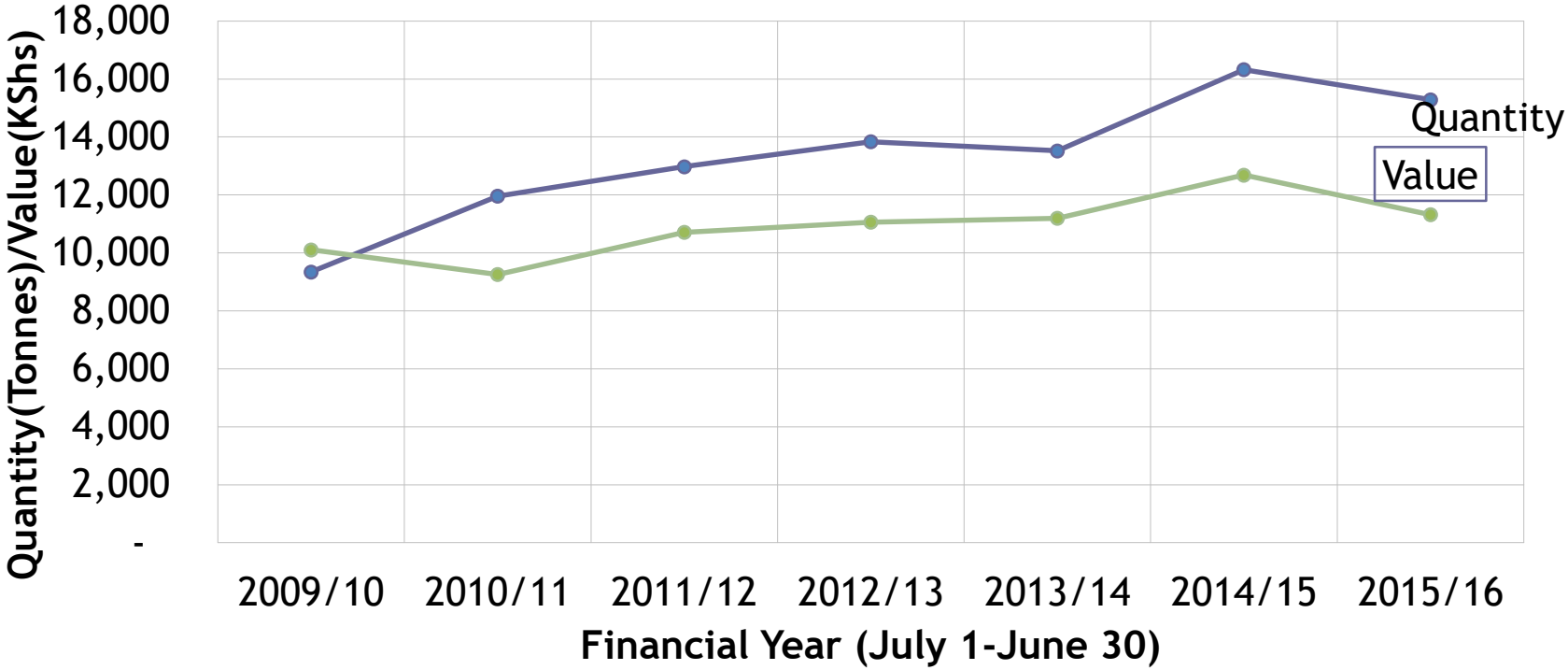
INTRODUCTION

- Vegetables have nutrients such as Vitamins and minerals e.g. folic acid among others which are beneficial to human health
- Pests and diseases are the leading causes of food losses.
- Pest resistance to pesticides result to a treadmill in pesticides use.
- Pesticide residues exposure to humans is linked to diseases like cancers, interference with the functioning of endocrine system, respiratory system, nervous system and interfere with the function of cell membrane of target and non-target organisms Inadequate data on pesticide residue levels in locally consumed agricultural products.
- This data from this study to inform Government policy and regulations

WHY PESTICIDE USE IS RAMPANT

- Emergence of new crop pests and diseases due to climate change, pest resistance to pesticides and increase consumer demand for blemish free products.
- Farmers' need higher yields and need make more profit – these lead to farmers not to adhere to good practice in pesticide use
- Lack of regulations by the Kenyan market – no Minimum Residue Levels (MRL)
- Exotic vegetables are less resistant and more prone to pest and disease attack.

Trends of Imports (Quantity & Value) over 7 Years



Source: Pesticide Control Products Board (PCPB)

OBJECTIVE

- To determine the concentration of cypermethrin and lambda-cyhalothrin pesticide residues in Collard (*Brassica oleracea var. acephala*) Tomatoes (*Solanum lycopersicum*) and swiss chard (*Beta vulgaris subsp. cicla*).

RESEARCH DESIGN

- Laboratory study to analyze the pesticide residues - at University of Eldoret

Sampling procedure

- 1 kg of 3 most consumed vegetables were bought from six sampling sites;
  - **Conventional samples from 3 markets -** were bought from soko mjinga, ponda mali and municipal markets in Nakuru.

    Organic samples from 3 markets - were bought from Carre four, Karen organic market and kalimoni greens in Nairobi
- Samples were stored at temperature below 4 degrees celcius.

SAMPLE EXTRACTION AND ANALYSIS PROCEDURE

i. The samples were chopped and blended using a blender to ensure homogeneity.

ii. 10 g of the sample was weighed into a 50ml Teflon tube.

iii. 10ml of Acetonitrile was added and shaken vigorous for 1minute using a vortex mixer.

iv. 4g of anhydrous magnesium sulphate and 2g of sodium chloride were added and shaken vigorously

v. An internal standard solution was added and shaken vigorously then centrifuged at 5000rpm.

vi. 25mg of primary-secondary amine (PSA) and 150mg of anhydrous MgSO4 were weighed into 2ml micro-centrifuge vials.

vii. 1.5ml aliquot of the upper acetonitrile layer was added to the micro-centrifuge vials containing PSA and anhydrous magnesium sulphate. 1 ml of the extract was then transferred to 1.5ml tubes for HPLC analysis.

viii. High liquid performance chromatography-Reverse phase (HPLC-RP) was used for analysis at wavelength 205nm and sensitivity of 0.5.

ix. Temperature of the machine was at room temperature at a flow rate of 1ml/min.

RESULTS OF RECOVERY RATES

Vegetables	Cypermethrin (% Mean±SD)	Lambda-Cyhalothrin (% Mean±SD)
Collard greens	95.7±0.01	91.97±0.019
Tomatoes	87.78±0.014	90.65±0.049
Swiss chard	97.93±0.006	95.72±0.023

COLLARD GREENS

Markets	Cypermethrin (Mean±SD) mg/kg	Lambda-cyhalothrin (Mean±SD) mg/kg	MRL (FAO/WHO, 2009)
Soko-mjinga Ponda-mali Municipal Market	1.397±0.478 0.982±0.265 0.238±0.132	0.262±0.108 0.341±0.164 0.427±0.219	• Cypermethrin 1mg/kg • Lambda-Cyhalothrin is 0.3mg/kg
Kalimoni Greens Carre Four Karen Organics	Below Detectable Levels B.D.L B.D.L	B.D.L B.D.L B.D.L	•

SWISS CHARD

Markets	Cypermethrin (Mean±SD)mg/kg	Lambda-cyhalothrin (Mean±SD) mg/kg	MRL (FAO/WHO, 2009)
Soko-mjinga **Ponda-mali** **Municipal Market**	2.458±0.298 2.495±0.109 1.462±0.239	0.352±0.193 0.24±0.045 0.365±0.28	• Cypermethrin is 2mg/kg • Lambda-Cyhalothrin is 0.3mg/kg
Kalimoni Greens **Carre Four** **Karen Organics**	Below detectable levels B.D.L B.D.L	B.D.L B.D.L B.D.L	•

TOMATOES

Markets	Cypermethrin (Mean±SD) mg/kg	Lambda-cyhalothrin (Mean±SD) mg/kg	MRL (FAO/WHO, 2009)
Soko-mjinga	0.232±0.085	0.081±0.037	• Cypermethrin is 0.2mg/kg • Lambda-Cyhalothrin is 0.3mg/kg
Ponda-mali	0.296±0.076	0.049±0.046	
Municipal Market	0.401±0.052	0.119±0.052	
Kalimoni Greens	Below detectable levels	B.D.L	
Carre Four	B.D.L	B.D.L	
Karen Organics	B.D.L	B.D.L	

RECOMMENDATIONS

1. Encourage ecological organic agriculture in food production.
2. Help the conventional public sector to formulate regulations on “good agricultural practice” with reference to Minimum Residue Levels
3. Promote integrated pest management (IPM) for conventional farmers to reduce reliance on chemical pesticides
4. Do more research on agroecology - Recruit more entomologists, plant pathologists and environmentalists.

Thanks!

ANY QUESTIONS?

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