Enhancing Phytosanitary Systems for Healthy Plants, Safe & Sustainable Trade"

Sub-theme:

Theme 5: emerging innovations in phytosanitary systems

Title:

Deploying Low-cost pest exclusion agricultural nets to manage problematic horticultural pests for sustainable export market access

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Introduction

- Agriculture continues to be one of the major sector originating exports from Kenya
- Optimizing production has become very essential, to increase production per unit area
- Production focus has been both for
  - Quantity and
  - Quality
- Thus identifying factors that can improve the two aspects, and, infuse the demand driven innovations

Introduction cont’

Problem Statement

- Horticultural crops are sensitive to biological disruptions
- These crops easily convert gains per unit area when limiting farmers are managed
- Technologies that work well and are adaptable need to be responsive to
  - Easiness of use
  - Cost effectiveness
  - Reduction of losses
  - Increasing incomes
- Pests (arthropod, and diseases vectored by arthropods) are major biotic constraints
  - Direct losses
  - Aesthetic losses
  - Phytosanitary losses (no one wants to import a pest- only a commodity of interest)

Justification

- Kenyan farmers are intelligent- they choose what benefits them!
- Exceeding Pesticide residue levels has had negative effects on the farmers, some ending up counting major losses
- Pests are major contributors to residue exceedance, and farmers get overwhelmed hence over using without knowing/ or to salvage their crops
- Combined improved production and reduced pest challenge can be attractive to farmers
- Our technology offers wide range of benefits to farmers

Objectives

- To proof the concept of using physical control to manage horticultural pests

- Confirm use of physical pest control methods in enhancing crop yields through micro climate management

Methodology

- Use of nets
  - Insect proof/preventing
  - Microclimate management
- Low cover approach: plant in/ pest out
- Denier size: 0.4 & 0.9
  - Avoid polythene/glasshouse effects
  - Concentrate carbon dioxide- maximize plant growth
- Manage other critical processes
  - Natural Pollination provision
  - Disease Management
  - Possible pest management

Crops tested

- Tomato
- French beans
- Cabbages
- Watermelon

Other factors

- Insecticide –treated nets
- Un treated nets
- Colored nets
- Integration with other pest management systems
- Tunnel sizes

Methodology cont’


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Results

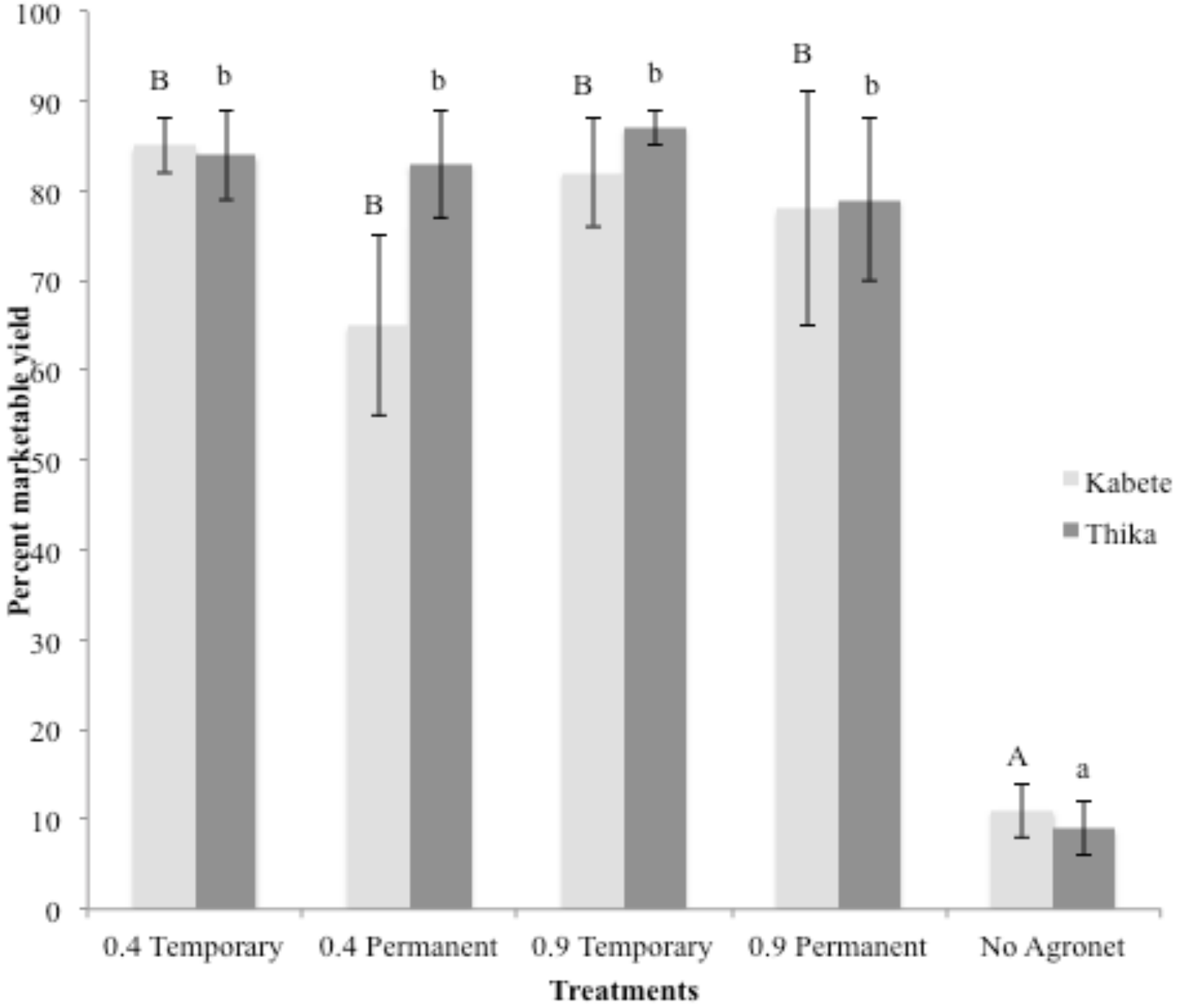
CABBAGE (Gacheri et al)

Treatment	KARI-Kabete			PTC-Thika		
	Aphids	Thrips	Diamondback moth larvae	Aphids	Thrips	Diamondback moth larvae
0.4 mm Temporary	12.0±2.2*	253.6 ab**	22.0±10.1 ab	6.2±1.1	1.8±0.9	14.8±3.4 a
0.4 mm Permanent	16.0±3.6	157.8 a	11.6±3.6 a	7.8±0.5	0.4±0.4	19.5±6.6 a
0.9 mm Temporary	11.2±2.0	281.8 b	34.6±6.1 b	6.4±0.4	1.8±1.2	13.0±2.5 a
0.9 mm Permanent	13.6±4.4	167.6 a	6.8±3.8 a	5.8±0.2	1.0±0.6	16.6±5.3 a
No net	9.6±1.3	273.6 ab	142.8±12.7 c	5.8±0.8	0.8±0.7	88.8±10.2 b
p-value	0.587	0.026	0.002	0.193	0.598	0.015

Tomato (Achieng'a et al)

Treatments	Kari-Kabete		PTC-Thika	
	Aphids	Whiteflies (Bemisia tabaci)	Aphids	Whiteflies (bemisia tabaci)
0.4 Net	134.3 ±141.4* b**	22.2 ±4.6 a	2.7 ±2.5 a	13.7 ±5.0 a
0.4 Open	5.3 ±3.4 a	22.0 ±3.5 a	3.7 ±3.5 ab	30.3 ±12.5 ab
0.9 Net	4.4 ±7.3 a	18.8 ± 7.2a	0.7 ±0.8 a	12.3 ±5.5 a
0.9 Open	5.0 ±6.5 a	24.0 ±11.2 a	1.0 ±1.1 a	32.7 ±10.9 ab
No net	17.4 ±18.1 ab	68.1 ±22.2 b	4.7 ±3.3 b	69 ±13.8 b
P Value	0,045	0,001	0,048	0,049

Tomato (Achieng’a et al)

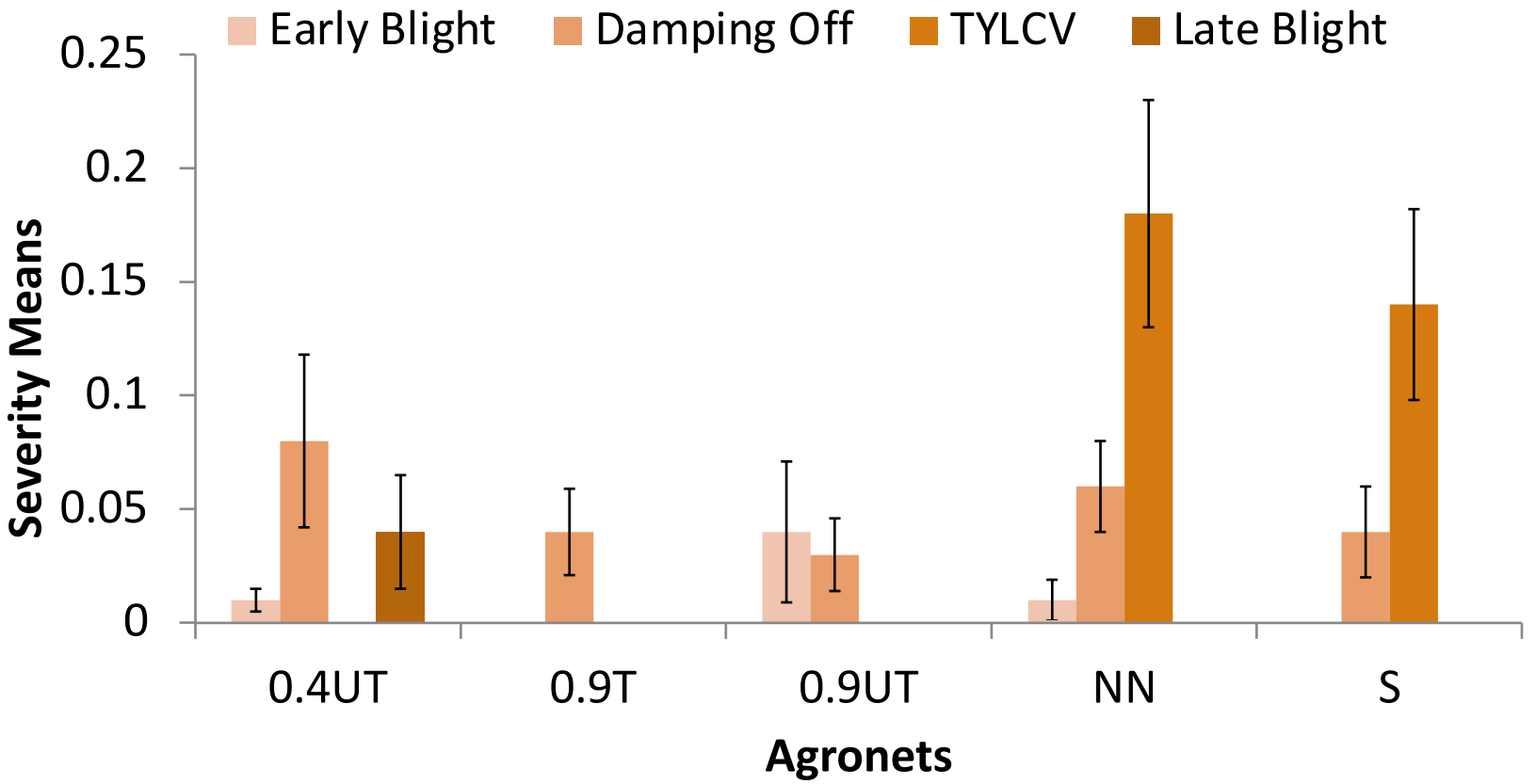


Colored nets, Tomato (Virginia et al)

Treatment	Season 1	Season 2	Total
No net	88.0 ±9.18c	93.0±29.49b	181.0±28.41c
Blue	120.4 ±15.27bc	277.8±17.10a	398.2±19.93b
Rainbow	237.2a ±25.08a	299.6±23.91a	536.8±33.43a
Silver	152.65 ±15.74b	286.2±34.85a	438.8±37.96ab
White	165.8±11.53b	236.0±40.98a	401.8±43.34b
Yellow	159.0±22.65b	272.6±66.57a	431.6±69.9ab
P value	0.001	0.006	0.001
LSD	51.95	107.1	126.6

Too et al

Tomatoes in nursery establishment



French beans (Kasina..)

	Whitefly (± sed)	Aphids (± sed)	Thrips (± sed)	Bean fly (± sed)
No Agronet	94.3 ± 57.3 b	68.0 ± 26.1 c	28.3 ± 7.1 b	6.7± 4.1 b
Un-impregnated Agronet	9.7 ± 4.3 a	4.3 ± 2.0 b	9.5 ± 1,8 a	3.7 ± 2.7 ab
Impregnated Agronet	7.8 ± 3.4 a	0.7 ± 0.4 a	9.0 ± 4.3 a	0.2 ± 0.2 a
P-value	0.011	0.005	0.020	0.006

French beans (Matere et al)

Treatment	Thrips		Aphid colonies		Whiteflies	
	Murang'a	Mwea	Murang'a	Mwea	Murang'a	Mwea
Control	23.8	21.4	77	42.8	65.50[b]	122
Bio Control	11.8	22.2	17	34.0	58.33[b]	77
Net	7.8	1.8	25	1.4	12.17[a]	18
Pesticides	14.8	17.2	23	19.8	68.83[b]	95
P value	0.690	0.656	0.285	0.353	0.001	0.101
N	24	24	24	24	24	24

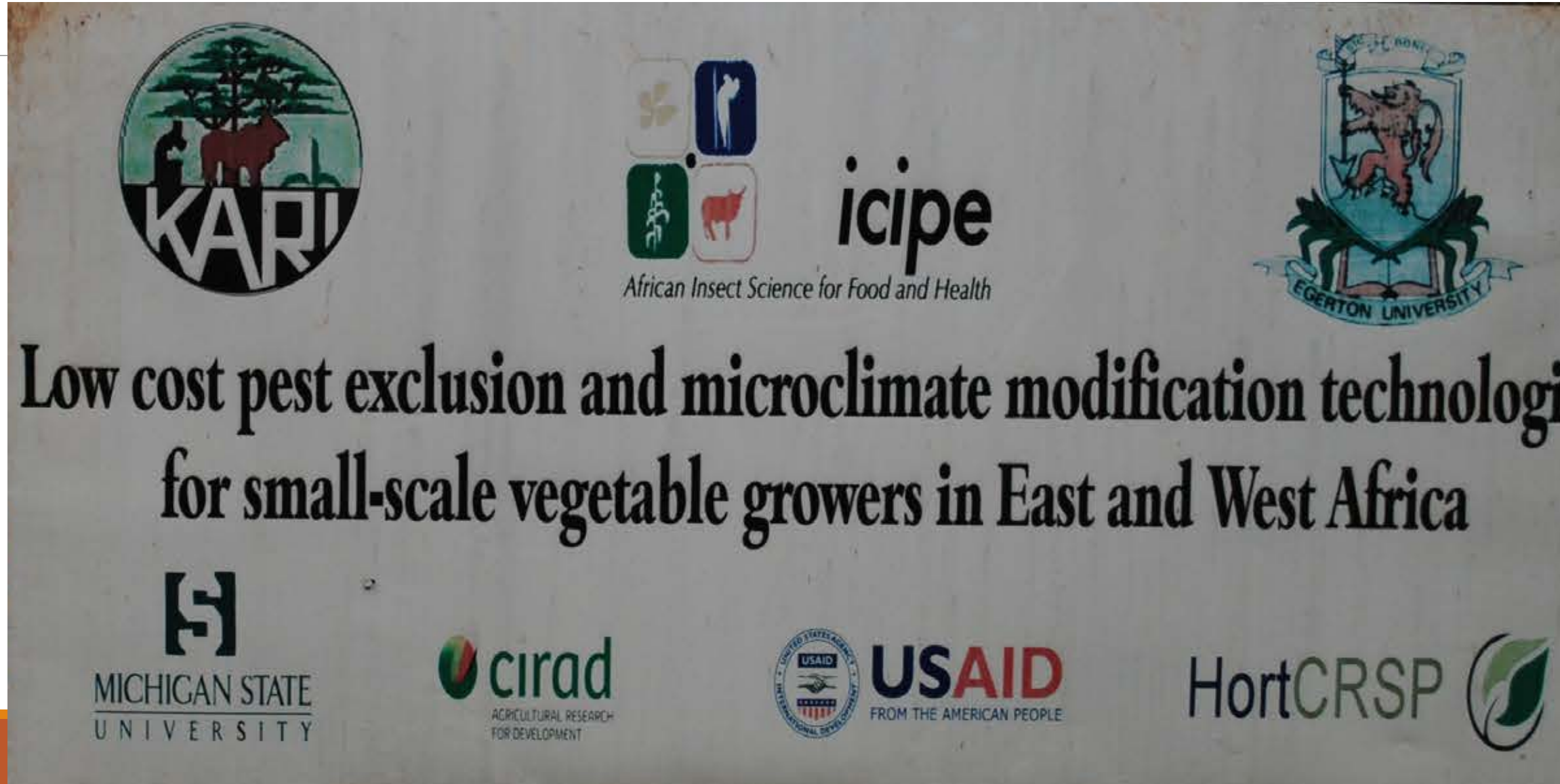
Conclusion

- Low cost insect exclusion nets are very effective against pests
- These nets optimizes crop yields through microclimate management
- Benefits
  - Pest exclusion
  - Reduced pesticides use
  - Integrate with other environmentally safe methods such as biocontrol, chemical ecology
  - Can be modified to fit needs for smallholders and large growers
  - Can be modified for specific pest targets

Recommendations

- Strongly adopt this method of pest control
- Very useful for insect pests
- Excellent for growing clean vegetable seedlings
- It is available in the market
- Notice: Impact on environment for fully used nets may need investigation

Acknowledgement



Acknowledgements

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