

Evaluating Horticultural Practices for Sustainable Tomato Production in Kamuli, Uganda

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Introduction

Tomatoes (*Lycopersicon esculentum* Mill.) are the most widely grown vegetable crop in Uganda and are popular in the diet. Tomato production among small-landholder farmers is affected by many challenges in rural Uganda. Inadequate information about appropriate sustainable horticultural practices, lack of improved cultivars, and pest problems cause low yields and quality of tomatoes in the Kamuli District (Akemn, 2000).

Objective: To determine horticultural practices for sustainable tomato production in Kamuli District of Uganda.

Hypothesis: The use of tolerant/resistant cultivars, pesticides, staking and using a soil mulch will increase yield and gross margin of tomato production

Materials and Methods

Field plot experiments were completed in two growing seasons: April-August (transplant production in April) and August-December (transplant production in August), 2013.

A Randomized Complete Block Design with a factorial and split plot arrangement of treatments was used. Treatments included: cultivar, staking, pesticide application, and mulching as the split plot.

Table 1. Total and marketable fruit number, marketable fruit weight, and gross margin of three tomato cultivars grown with or without pesticide application and soil mulch in the Kamuli District, Uganda, 2013

Treatment	Total Fruit Number (No./sub-plot ^z)		Marketable Fruit Number (No./sub-plot)		Marketable Fruit Weight (Kg/sub-plot)		Gross Margin (USD/sub-plot ^y)	
	Growing season ^x		Growing season		Growing season		Growing season	
	1	2	1	2	1	2	1	2
'Heinz'								
Pesticide and Mulch	60 a ^{w,v}	30 a	24 a	16 a	1.70 a	1.18 a	-2.42 b	-2.62 b
Pesticide and No mulch	65 a	20 a	17 a	10 a	1.43 a	0.86 a	-1.46 ab	-0.82 ab
No Pesticide and Mulch	50 a	20 a	19 a	8 a	1.36 a	0.67 a	-0.61 ab	-1.88 b
No pesticide and No mulch	25 a	15 a	5 a	5 a	0.33 a	0.37 a	-0.26 a	-0.07 a
'Nuru F1'								
Pesticide and Mulch	104 a	136 a	57 a	72 a	2.71 a	4.25 a	-2.44 a	-0.99 ab
Pesticide and No mulch	74 a	91 b	35 a	41 b	1.41 a	2.20 b	-2.30 a	-0.58 ab
No Pesticide and Mulch	87 a	44 c	37 a	24 bc	1.60 a	1.16 b	-1.26 a	-2.32 b
No pesticide and No mulch	57 a	43 c	26 a	15 c	1.01 a	0.80 b	-0.54 a	-0.56 a
'MT 56'								
Pesticide and Mulch	151 a	41 a	92 a	24 a	6.21 a	3.13 a	1.13 a	-1.11 b
Pesticide and No mulch	118 a	37 a	63 a	24 a	3.46 b	2.46 a	0.11 a	0.40 ab
No Pesticide and Mulch	136 a	55 a	60 ab	26 a	3.46 b	2.89 a	1.01 a	-0.16 b
No pesticide and No mulch	88 a	43 a	24 b	21 a	1.28 b	2.54 a	0.45 a	1.61 a

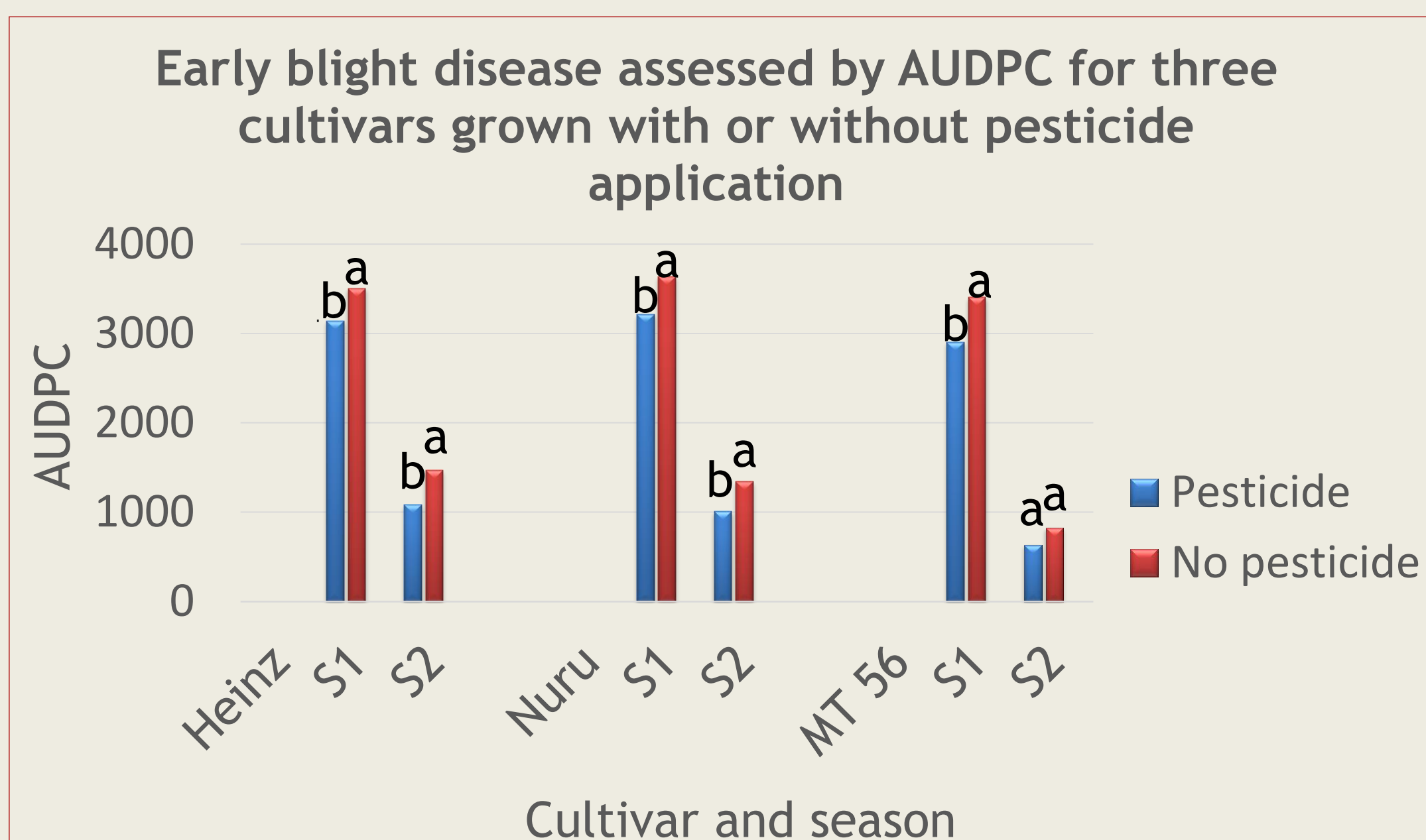
^z Sub-plots included 8 plants and a row length of 4.9 m.

^y The gross margin was calculated by subtracting the costs of applying pesticides and mulch from the revenue. Data obtained in Uganda Shillings and converted to US dollars (1 USD = 2500 UGX, Uganda Shillings).

^x Growing season 1 = May to Aug. and 2 = Sept. to Dec.

^w Mean separation within a column and cultivar by Tukey-Kramer ($P \leq 0.05$); Means followed by the same letter within columns are not different from one another.

^v Total fruit number represents the quantity of fruits harvested per plot.



Tomato seedlings in transplant boxes

Results

Disease-resistant cultivar, MT 56, in combination with pesticide application and soil mulch provided the highest marketable fruit number and marketable fruit weight with a positive gross margin in season one.

A combination of MT 56, no pesticide application and no mulch resulted in the only positive gross margin in season two.

Application of pesticides reduced disease severity of (early blight, *Alternaria solani*) for all cultivars in season one, and in season two for Heinz 1370 and Nuru F1, but did not affect disease severity for MT 56 in the second season

Using soil mulch reduced the severity of early blight disease (data not presented), but decreased the gross margin when purchased

Staking did not affect yield variables or disease severity of plants and decreased the gross margin (data not presented).

Conclusions

Small-landholder farmers should consider producing 'MT 56' without the expense of staking.

When producing MT 56 tomato:

In season one: farmers should consider applying pesticides and soil mulch, to increase marketable fruit number. However, the yield increase may not translate to increased gross margin.

In season two: farmers should consider applying pesticides and no soil mulch to increase gross margin. If mulch is purchased during the off season (season two), farmers may expect a lower gross margin.

References

Akemn, M.C., S. Kyamanywa, G. Luther, C. Ssekya, J.M. Erbaugh, and H. Warren. 2000. Developing IPM systems for tomato in central and eastern Uganda. IPMCRSP sixth Annu. Rpt. 6:117-121.