Tomato Production Practices in Kirinyaga District and Assessment of Pest Management Options at KARI - Thika

Onyango Irene Awino

A thesis submitted in partial fulfillment for the award of Master of Science in Zoology in the Jomo Kenyatta University of Agriculture and Technology

2008

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

Signature …… Date …….

Irene Awino Onyango

This thesis has been submitted for examination with our approval as university supervisors:

Signature …… Date……..

Prof. Linus M. Gitonga

JKUAT, Kenya.

Signature …….. Date……

Dr. Monicah M. Waiganjo

NHRC-KARI, Kenya

Signature …….. Date ……

Prof. Rosebella O. Maranga

JKUAT, Kenya.

DEDICATION

I dedicate this MSc. thesis to my late Dad, family and my friend Josephat

ACKNOWLEDGEMENTS

First, I thank the Almighty God for giving me courage and strength during the course of my study, for opening ways for the project, for His sustenance and good health and for His grace and abounding love.

I am indebted to Prof. Gitonga for personally introducing me to Dr. Waiganjo who took me aboard the IPM-CRSP project on development of tomato IPM in the region. Her moral, intellectual as well as financial support throughout the study is greatly appreciated. My sincere gratitude is expressed to Prof. Gitonga and Prof. Maranga for accepting to supervise me, more so, for their advice, suggestions and critical comments that have greatly contributed to the completion of this study. I acknowledge Jomo Kenyatta University of Agriculture and Technology, Zoology department for accepting to register me for the course.

My gratitude is also expressed to the Centre Director, KARI-Thika, Dr. C.N. Waturu for providing me with research field and laboratory facilities. Much appreciation to the support staff at KARI-Thika, Crop Protection section; Joyce, Munene, Kamau, Mwangi and Muhia for their technical assistance, Mr. Wepukhulu for data analysis, Faith Nga'ng'a for printing services, J.J. Anyango and J. Kibaki for professional advice and moral support.

I acknowledge my late dad Moses Nyaoke for encouraging me to take up the course and for giving me a shoulder to lean on when things were tough. I also extend my gratitude to my mum and my siblings for their moral support. My

appreciation goes to all the friends who came out to support me when I needed them especially Josephat and Samwel.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AVRDC	Asian Vegetable Research and Development Centre
TSWV	Tomato Spotted Wilt Virus
TCSV	Tomato Chlorotic Spot Virus
ATTRA	Appropriate Technology Transfer for Rural Areas
TYLCV	Tomato Yellow Leaf Curl Virus
Bt	*Bacillus thurigiensis*
IPM	Integrated Pest Management

ABSTRACT

A study was carried out on tomato production practices in Kirinyaga District and assessment of pest management options at KARI - Thika. The study endeavored to establish farmers' knowledge on tomato pests and their pest management practices, and to evaluate pest management options. The aim of the study was to come up with an integrated pest management strategy for tomato. The tomato production practices were studied through a survey which entailed interviewing tomato farmers in Kirinyaga District. While assessment of pest management options were done through tomato trials conducted at KARI-Thika. A structured questionnaire was used in the survey and only farmers who had been involved in tomato production for at least the past six months were each randomly administered with a questionnaire. Tomato field trial experiments were laid on randomized complete block design with five pest control treatments replicated four times. The pest control treatments were; mulch with no pest control option; untreated control; mulch with need-based pest control using biopesticides; farmers' practice with regular pest control and staking with need-based pest control using biopesticides. Disease control and other agronomic practices were conducted regularly on all the treatments. Pest incidence was recorded once in a week throughout the crop season. Harvested tomatoes were weighed and converted into yield/ha for all the treatments. The trials were conducted during the long and the short rains. One hundred and twenty farmers were interviewed during the survey. It emerged that pests and diseases were a constraint in tomato

production. Some of the pests mentioned included spider mites, African bollworm, thrips, aphids and whiteflies while the diseases included late and early blight, bacterial wilt, tomato spotted wilt virus, leaf curl virus, powdery mildew, blossom end rot and nematodes. Farmers used pesticides in pest management and they had little or no knowledge on alternative pest management and IPM. The pests observed in the field trial experiments were whiteflies, aphids, thrips, spider mites, leaf miners and African bollworms, while the beneficial insects observed were the ladybird beetles and spiders. Pest incidence varied within pest control treatments in both crop seasons at $p<0.0001$. The mean marketable yield in the long and short rains differed significantly within treatments in both seasons at $p<0.0001$. Farmers' practice which involved routine pesticide use had the lowest mean pest incidence and highest mean marketable yield in both seasons. The short rains had higher pest incidence and lower yields compared to the long rains. Treatments with mulch and where biopesticide application was used had low whiteflies population. Routine pesticides applications as well as poor weather conditions increased pest management costs. Farmers needed training on alternative pest management and IPM to reduce reliance on pesticides, reduce costs of pest management and to ensure correct choice and use of fertilizers and pesticides. Mulching reduced the cost of labor on weeding and provided an environment conducive for beneficial insects. Farmers incurred losses due to price fluctuations therefore there was need to put in place appropriate marketing

policies to stabilize prices. Early planting was an important factor to take advantage of good weather and evade pests.