



Science

PRELIMINARY SURVEY ON OCCURRENCE OF APHIDS, THRIPS LEAF MINER IN TOMATO GROWING AREAS IN MOROGORO REGION TANZANIA

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Abstract

Tomato (*Lycopersicon esculentum L.*) is one of the important crop in East Africa as a source of food, income and export. Occurrence of different pest including indigenous and alien in tomato fields are considered as a major threat pests to tomato growers. Worldwide pest problems in horticultural investment need to be considered carefully as their presence increase cost of production. Despite of this information in Tanzania there has been little research to update pest list infesting our tomatoes. The study was conducted in Morogoro region in Kauzeni and Bigwa wards whereby farmers grow different varieties of tomatoes. Farmers spray different fungicides and pesticides twice per week to manage different pests. The selected fields were located at S 04°47'41.7", E 038°13'11.8" and S 06°53'38.3", E 037°36'07.4" Random sampling using "W" Pattern was used to get representation of the fields. Occurrence of pest population was estimated from ten plants during 2018/19, searching from young, middle and older leaves. Insect specimens were collected using fine forceps, aspirators, and preserved in ethanol 70% for laboratory identification.

The results showed no aphids were detected from frequent sprayed tomato fields, other pests observed include the white flies with mean (57) individuals per plant, followed by leaf miner (70) and the highest number was thrips representing (107) Mean population comparison showed a significant differences $P < 0.005$. Understanding occurrence of different pests in tomato growing areas could assist in planning sustainable Integrated Pest Management programme in tomato growing areas.

Keywords: Tomato; Aphids; Thrips; Leaf Miner.

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1. Introduction

Preliminary survey on occurrence of aphid, white flies, tomato leaf miner and thrips on tomato crop was carried in Morogoro Urban in Tanzania during cropping season 2019. The selected sites

are suitable for horticultural crop production in the region. Tomato (*Lycopersicon esculentum L.*) is one of the important crop for smallholder farmers in East Africa as a source of domestic food and export markets (Grandillo *et al.* 1999). In Africa agricultural sector tomato is one of the most locally marketable vegetable (Anang *et al.* 2013). Apart from its nutritional value tomato production has a good employment opportunity both for youth and women.

Despite of its socio-economic importance tomato production in Tanzania is constrained by various factors including climatic factors, pests and diseases, post –harvesting and marketing. Pests are considered as a major constraint *ie* indigenous and alien species (Gray *et al* 2013; Painsi *et al.*, 2016). Pests including aphids, thrips and leaf miner are among of threat pests globally as they have ability to infest a wide range of cultivated and non-cultivated crops. Most of the damage is done by adult and nymphs through piercing plant tissues with their mouth parts. For example tomato leaf miner infest various plant parts including seedlings, flowers, tomato fruits and unsold fresh tomato fruits (Desneux *et al.*, 2011), also infested fruits are small with low market value. Furthermore, aphids and tomato flower thrips are able to transmit destructive plant viruses in tomato and other family members of Solanaceae. Currently no studies has been carried out to determine economic losses caused by aphids flower thrips and tomato leaf miner in tomato production areas in Tanzania.

The intended study was carried out to document presence or absence of the threat pests and their associated natural enemies, from frequent pesticide applied tomato fields in Tanzania. Understanding occurrence of different threat pest species in tomato gardens could assist in developing sustainable pest management programs.

2. Methodology

Morogoro region is located along the coast belt 500m above sea level, and have a humid tropical climate with mean monthly temperatures between 25–27°C. These districts receive a bimodal type of rainfall with growing seasons commence in March-June and short rain season September-December. One of the selected survey areas was Kauzeni village located at S 06°53'38.3" and E 037°36'07.4" and the second one was Bigwa village located at S 06°47' 56.4" and E 037°44'57.1" A total of twenty tomato fields were selected for the preliminary studies on common tomato pests. On each selected farm, ten plants were randomly selected from each tomato field. Data collection on aphids, white flies, tomato leaf miner and thrips occurrence, from each selected plant, was done by visual counting and collection of pest found feeding on the plant *ie* young premature leaves, middle age and old leaves. Sampling was carried out during morning hours from 9.00am to 11 am when the insect were still inactive to migrate when disturbed. White flies, tomato leaf miner and aphids were collected using aspirators. Thrips samples were collected shaking the plants by doing so the pests were dislodged from the plant leaves or flowers to white plastic trays placed under each plant. Furthermore, samples were collected by using camel hair brush, all specimens were preserved into insect vials containing 70% ethanol well labeled for further laboratory work (Palmer *et al.* 1989; 1990). Sampled specimens were mounted and identified under a compound light microscope using the procedure described by Palmer (1990), at a magnification of 40. The Lucid key developed by Moritz et al. (2001) and the dichotomous keys adapted from Palmer et al. (1989; 1990).

Pest management practices under small holder farmers were considered as the main factor that affect occurrence of different pest species in tomato production areas. Data from tomato fields were analysed using the GraphPad Instat computer programme version 3 to generate analysis of variance (ANOVA) and means.

3. Results and Discussion

The overall population mean of common pest sampled there was significant difference ($P < 0.0001$) Furthermore population of aphids was not observed during sampling period as farmers do spray different pesticides mixed together without following any recommendations (Table 1). Multi power -plus as fungicides and cutter as pesticide twice per week to manage different pest species. The population mean of common pests infesting tomato crop was 57 for the white flies, followed by leaf miner 70 and mean of 107 for the thrips respectively (Figure 1).

Effect of Variety on Pest Occurrence on Tomato

Most of the farmers were growing Assila F1, Zara, Imara and Kilele as their tomato varieties of choice. The most commonly used fungicide was Mutli –power plus mancozeb (Dithane M45) while the most commonly used insecticide was Cutter. None of the farmers use pesticide without combination of pesticide and fungicide or pesticide + pesticide (Table 1).

Table 1: List of common pesticide for insect pest and disease control

Trade Name	Formulation	Common name	Usage
Blast 60 EC	EC	Acetamiprid 300 g/l	Control aphids on horticultural crops
Karate 5EC	EC	Lambdacyhalothrin 50g/l	Control aphids, bollworms and sucking bugs
Promectin 1.8EC	EC	Abamectin 18g/l	Control bollworm, leaf miner and red spider mite
Cutter			Insect repellent

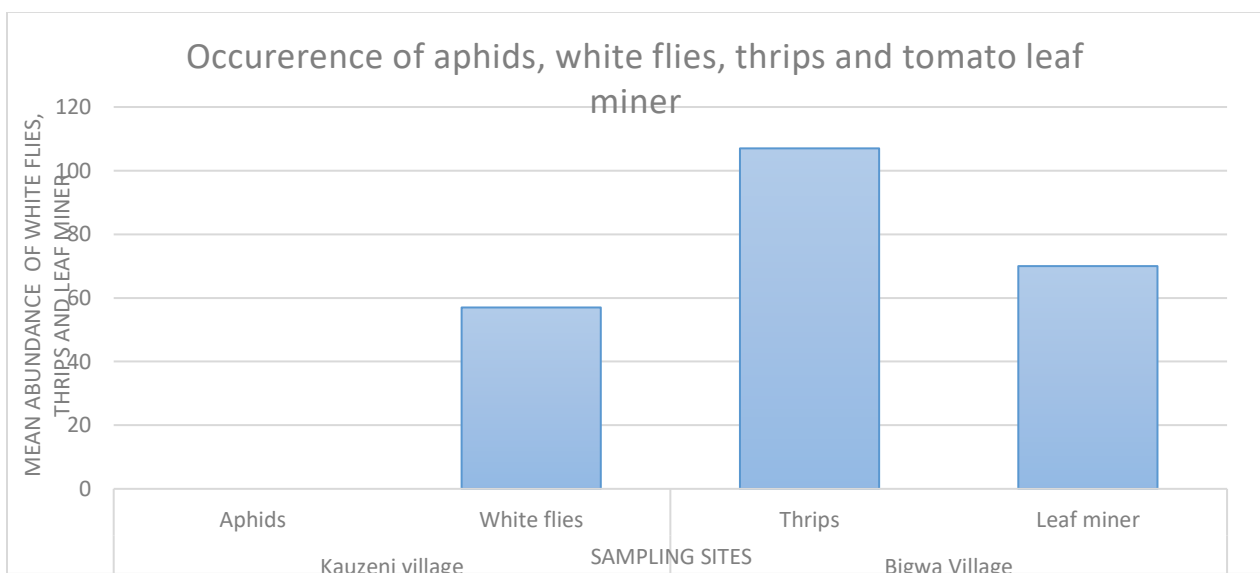


Figure 1: Occurrence of different pest species in tomato growing areas in Morogoro region

Overall tomato yield production was low from multiple infested tomato fields probably due to ineffective pesticide application. No aphids were sampled from all fields probably combination of Blast, promectin, Karate and cutter was able to reduce the population from sampled fields. Population buildup of white flies, thrips and tomato leaf miner was the cause of low yield due to multiple infestation (Bliev *et al.* 1985). Furthermore, population increase ie tomato leaf miner has reported to build resistant towards synthetic insecticides and reduced effectiveness of control (Lietti *et al.*, 2005; Silva *et al.*, 2011). Such outcome encourage tomato growers to opt for applying pesticide twice per week on their tomato fields (Reyes *et al.*, 2012). Continuity application of pesticide on tomato growing areas to manage aphids, thrips, leaf miner and white flies make the situation worse and build up resistance (Silva *et al.*, 2011; Reyes *et al.*, 2012). To alleviate the situation use of integrated pest management strategies including cultural control, crop rotation, removal alternate hosts, destruction of crop residues and production of resistant tomato varieties, (Korycinska *et al.*, 2009; De Oliveira *et al.*, 2012). Integration of these strategies under tomato growing area will reduce pest problem.

4. Conclusion

Tomato provide a wide variety of nutrients required in human body, therefore tomato fruits production should be free from pesticides residues. Use of pesticides on management of aphids, thrips and leaf miner has raised problems on environmental side effects as well as human health. In order to reduce these problems need to carry out regular monitoring to detect damage symptoms, or presence of the pest (Graham-Bryce, 1981). The information will assist to establish economic threshold and decision making for pesticide use. Suitable time for pesticide application will assist to suppress reproduction rate of common pests under tomato production areas.

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