

## Farmer's Perception Knowledge and Practices on Management of *Tuta absoluta* Meyerick (Lepidoptera Gelechiidae) in Tomato Growing Areas in Tanzania

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### ABSTRACT

Farmer's perception and knowledge is an important component for sustainable action plan of the invasive tomato leafminer *Tuta absoluta* Meyerick (Lepidoptera Gelechiidae). *Tuta absoluta* is an endemic pest in South America where it causes a significant crop loss in tomato growing areas. A survey was carried out in August 2015 whereby a total of 100 tomato growers were interviewed randomly to assess their knowledge, perceptions and practices regarding *Tuta absoluta*. Semi-structured questionnaire open and close ended was used to assess knowledge perceptions and practices about the invasive insect pest. The results revealed that (80%) of the farmers were aware of the *Tuta absoluta* as a major problem in tomato growing areas. Furthermore, of the total respondents showed (90%) of the growers demonstrated poor knowledge on the taxonomy of the pest and its economic impact in tomato production. A total of (70%) of the growers completed standard seven, own cell-phone for exchange various information related to market and control of various field pest in their tomato fields including leaf miner. Direct loss occurs when *Tuta absoluta* lay eggs on tomato leaves, stems, fruit results into poor crop development. Indirect loss from infested tomato fruits is restrictions imposed by tomato fruits importers. Infested fruits are unsuitable for human consumption or sale. Farmers were more conversant with the economic impact of *Tuta absoluta* and their direct damage symptoms on tomato fruits.

Recommended *Tuta absoluta* control strategies such as pheromone trapping for monitoring as well as suppression, chemical and biological control were not available or known to growers. A total of (80%) of the respondents applied chemicals that were not recommended for the control of *Tuta absoluta* and without considering their environmental and health risks. This calls for an urgent to train tomato growers to use Integrated Pest Management (IPM) aim to improve their knowledge on *Tuta absoluta* management through use of Farmers' Field Schools.

**Keywords:** Tomato growers, Knowledge, Perceptions, *Tuta absoluta*

### INTRODUCTION

In Tanzania tomato (*Lycopersicon esculentum* Mill. or *Solanum lycopersicum* L) is one of the most important edible and nutritious vegetable crops and source of income (FAO 2012). Tomato is produced by small and medium growers for home consumption and as a source of income. Tomato yield production in Tanzania is estimated at 17.5 Mt/ha (SIDO, 2009). Currently yield production has dropped to 50% of the total production due to various constraints including pests and diseases. Tomato leaf miner *Tuta absoluta* (Meyrick) is one of the serious pest and invasive species originating from South America. The pest has been introduced in the country accidentally through exchange of tomato fresh fruits and planting materials (Gray *et al.*, 2013). In sub Saharan Africa it has been mentioned that the pest has ability to infest not only cultivated species of the genus *Solanum* but also wild species (EPPO, 2007).

Tomato leaf miner infest various plant parts including seedlings, flowers, tomato fruits and unsold fresh tomato fruits (Desneux *et al.*, 2011). Farmer uses various pesticides as a quick and adopted control measure of the pest (Ngowi *et al.*, 2007). Lack of knowledge on pest population monitoring in

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tomato production has resulted into inappropriate pesticide use which lead into an increase of cost of production as well as build up of resistant, killing of non target organisms and pollute water sources (Biondi *et al* 2012.) The results from this survey will be used by policy makers and researchers to establish sustainable control measures of *Tuta absoluta* in tomato growing areas.

## MATERIALS & METHODS

Farmer’s Knowledge and Practices assessment was carried out using semi structured open and close ended questionnaires were conducted with fruit farmers, extension, exporters and other key fruit stakeholders. The objective of the study was to assess farmer’s knowledge and perception on *Tuta absoluta* taxonomy, own cell-phone for information exchange and to identify existing control measures. One hundred respondents (100), both males and females of different farming age groups were interviewed from selected village (Usa River). Socio-economic status was assessed in the selected area whereby random sampling of respondents was selected from the population. Respondents were required to avail information on tomato farming practices, key pests and diseases, farm level control strategies for the pests and diseases.

### Data Collection Procedure

A semi-structured opened and close ended questionnaire was developed to address intended objectives of this study. The questionnaire enabled to collect information on general background to the vegetable growers and their perceptions knowledge on pesticide use for management of different pest species, knowledge on the taxonomy of the pest and existing control measures. The questionnaire was first developed and pretested aim to improve the questionnaire and there after translated to local language to simplify communication. Pilot-testing of the questionnaire was useful as unwanted and long preliminary information collected from pre tested information was not included in the main data used for the statistical analysis.

### Data Analysis

Data analysis was conducted with SPSS software version 11 for windows. Frequency distribution and percentages were also used to describe the findings according to each specific research question.

## RESULTS

The result revealed that (70%) were male and (24%) were female and (6%) young children or students. Furthermore at age of 40 more men’s are active people engaged in tomato production compared to women’s (Figure 1). Similarly 95% percent of the respondents showed they completed ordinary primary education showing that majority of the respondents they can read and follow instructions from various input suppliers.

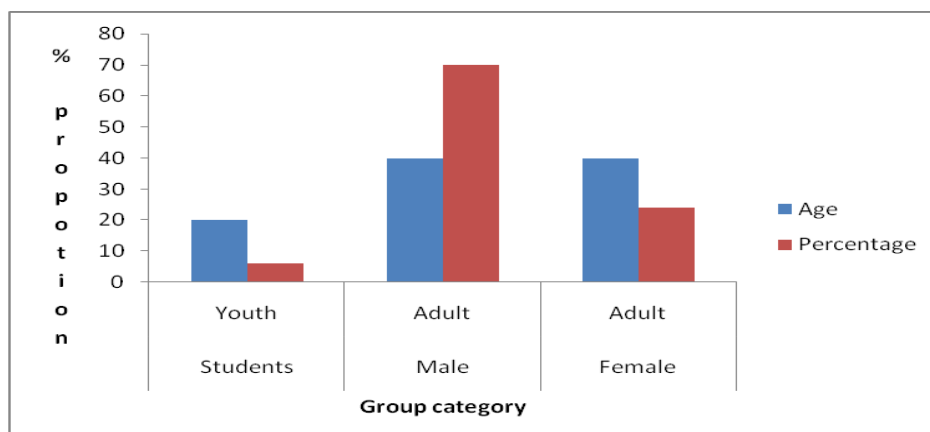
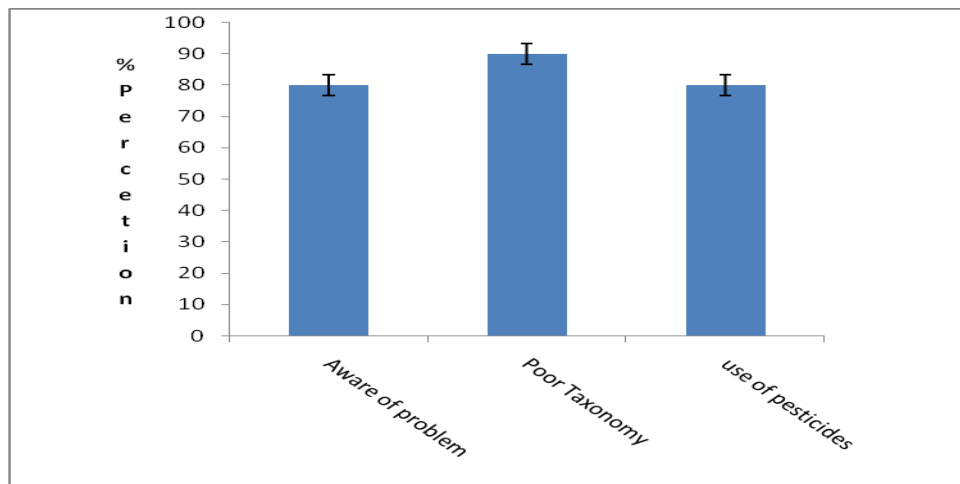


Figure1. Farmers groups and their proportion in the community

### Farmer’s awareness on moth problem and its impact

During the study period showed that more than 80% respondents were poor on taxonomic information related to the pest and use of appropriate pesticide to control the pest (Figure 2).



**Figure2.** Proportion of the respondents aware of the problem lack of taxonomic information and use of pesticides

### Assets ownership

The number of household assets owned by fruit farmers was used as an indicator of socio-economic status in the selected areas. The majority (94%) of farmers owned poultry, (54%) owned bicycles and 51% owned cell-phones and radios. The smallest proportion owned corrugated iron sheet roofed houses and goats (3%) (Table 1). The high numbers of bicycle and cell-phones owners is a good indicator of the possibility for devising an extension system for pests control advisory that can be delivered to farmers by cell phones. Besides, farmers can easily reach markets, extension offices, and input stores to buy inputs or seek pest control expertise. The relatively large number of farmers owning radios can be taken advantage of to remit improved IPM technologies for *Tuta absoluta* through radio programs.

**Table1.** Household assets ownership by tomato growers from selected area in Arusha region

Asset	Percentage
Radios	51
Bicycles	54
Cell phones	51
Block and corrugated iron sheet houses	3
Goats	3
Poultry	94

## DISCUSSIONS

### Division of labor

Division of labor across genders showed there is a greater likelihood that men was more engaged in the physically demanding activities and that women was engaged more in home production. Students or young generation were less involved in the field activities but were able to read instructions on pesticide use and other necessary input used in tomato production and advice where assistance was needed. Educated farmers were more innovative to new technologies and they promote adoption of new introduced technologies. It is therefore important to encourage women involvement in fruit and vegetable production to promote food security and poverty alleviation in their household level.

### Farmer’s awareness on moth problems and its impact

Tomato growers from the selected surveyed area demonstrated fair knowledge of the damage and economic impact of *Tuta absoluta* on tomato crop production. Farmers were aware on damage symptoms as well impact resulted after infestation. Furthermore, farmers showed that *Tuta absoluta* is one of the important invasive pests that cause serious damage to their tomato crop and cause low income from the crop. The pest can attack tomato crop at any stage of the plant growth and cause severe damage in an open field (Desneux *et al.*, 2011). Furthermore, farmers were observed to spray various pesticides as an adopted control method but with less effective results due to larvae feeding behavior inside fruits and plant parts. Probably chances for building resistance to pesticide use is high

in all tomato growing areas (Lietti *et al.*, 2005). Though frequent pesticide application was observed to be of unnecessary (Adipala *et al.*, 2000; Isubikalu *et al.*, 1999). Furthermore, frequent pesticide use results into hazardous products, poor sustainability concern as well as serious human health and increasing their production costs.

### **Assets ownership**

Of the total respondents only 3% own good houses this was considered as an indicator of wealth. Farmers with higher income were able to buy pesticides for the control of *Tuta absoluta*. 250ml of Emamectin was sold at 500 USD the price was observed to be too expensive. Small scale farming systems are viewed as low input (Ebenebe *et al.*, 2001). Extensive use of pesticides dosage to target pest and poor serving of application equipment has resulted into less effectiveness (Pretty and Hine 2005). Loss of biological diversity due to pesticide use results in the loss of some ecosystem services such as pest and disease control (Gallagher *et al.*, 2005).

### **CONCLUSION**

There should be focus on the community awareness to tomato growers for proper *Tuta absoluta* management, use of appropriate safety precautions with pesticide use and its side effects on public health and environment. There is therefore the need to carefully study how existing control practices can be improved upon, where necessary to enhance their effectiveness in *Tuta absoluta* suppression in tomato growing areas (Ekesi and Billah, 2006). It is believed that more educated farmers are better off positioned to acquire new skills and knowledge from others sources to complement the existing practices and apply them to the farming situation. There is therefore an urgent need to train farmers and extension workers using appropriate pesticide on management of *Tuta absoluta* using farmers field schools (FFS).

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