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SURVEY ON DISTRIBUTION AND DAMAGE ON TOMATOES BY RED SPIDER MITE IN SUBUKIA AND RONGAI SUB COUNTY, KENYA

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ABSTRACT
A survey was carried out in March 2013 in Subukia and Rongai Sub County to obtain information on key pest of tomato and strategies adopted by farmers for their management. A total of 60 farmers (30 open field and 30 greenhouse) interviewed were randomly selected from the two sub county. The selection of farmer was done in conjunction with the Ministry of Agriculture staff in the respective sub county. Both primary and secondary data were collected in this study. Primary data was obtained from direct interview of the farmers whereas secondary data was obtained from the various Ward Agricultural Extension offices. A structured questionnaire was administered to each respondent through one farm visit using the most appropriate language or interpreter where necessary. In addition field observations were carried out to verify information provided where the tomato crop was available. The survey showed that most farmers (96.7%) perceived or recorded Red spider mite as the most important pest of tomatoes. The farmers indicated that they experience a crop loss of more than 50% in both short rain and dry seasons if proper control measures were not applied.
Key words: Agriculture, Farmer, Green house, Tomatoes, Red spider mite, Survey

INTRODUCTION
Subukia and Rongai divisions are among the divisions in Subukia and Rongai district respectively in Rift Valley Province of Kenya. These divisions are high potential area with annual average rainfall ranging from 800 to 2200 mm. In most of the areas, the soils are deep and moderately to highly fertile. The average annual temperatures range is 9.7 to 21.6 ^{o} C (Ralph et al 1983). Subukia and Rongai divisions cover an area of about 424.2 km^2 and 254 km2 respectively. The agricultural land per house hold is about 2.5 acre in both Subuka in Rongai districts. Both divisions receive bimodal rainfall (Ralph et al 1983). The first rains start at the end of March and the second rains start at the end the end of October. Tomatoes are grown throughout the year in the green house and during long and short rains in the open field. In dry months of December to March, tomatoes are grown under irrigation in the open field.

Study Objective
The objectives of the present study were to collect information on distribution and damage on tomatoes by Red spider mite *Tetranychus evansi* and the farmers' management practices.

MATERIALS AND METHODS
A survey was carried out in March 2010 in Subukia and Rongai division to obtain information on key pest of tomato and strategies adopted by farmers for their management. A total of 60 farmers (30 open field and 30 Greenhouse) interviewed were randomly selected from the two divisions. The selection of farmer was done in conjunction with the Ministry of Agriculture staff in the respective divisions. Both primary and secondary data were collected in this study. Primary data was obtained from direct interview of the farmers whereas secondary data was obtained from the various Divisional Agricultural Extension offices. A structured questionnaire was administered to each respondent through one farm visit using the most appropriate language or interpreter where necessary. In addition field observations were carried out to verify information provided where the tomato crop was available. The information collected from the farmers include the following: Total farm size, tomato varieties grown, effect of planting time on Red spider mite, major pests and diseases of tomato in order of priority, chemicals used by tomato farmers to control red spider mite and other pests of tomato, type of protective measures during pesticide application and yield loss due to red spider mite infestation. Data collected was recorded in worksheet and descriptive and statistical analysis carried out. Statistical analysis was carried out using the statistical package for socio-scientist (SPSS ver.11.5)

RESULTS AND DISCUSIONS
Tomato varieties grown
Majority of the open field tomato farmers (93.3%) grow the tomato variety Riogrande. This is followed by Onyx (56.7%), Cal J at 36.7%. Only 3.3% of the farmers grow other varieties (Figure 1). These results

are different from what was reported by Waiganjo et al 2006 where majority of the farmers in Kirinyaga were reported to grow Onyx (81%) and Riogande (42%).The difference in the results may be attributed to difference in farmers' preference and targeted market in these tomato growing regions. Majority of green house tomato famers grow Anna F1 (96.7%) with only 6.7% grow other varieties namely Nomenetta and money maker in the green house. Among other reasons, Nomenetta was perceived to weigh more per unit tomato fruit compared to Anna F1. Farmers who grow Money maker grow it because the seeds are cheaper compared to Anna F1. However, although the seeds are expensive, farmers reported that Anna F1 yield more and have a long harvesting period compared to other tomato varieties.

Important pests of tomato as listed by farmers

Most of farmers 96.7% perceived the Red spider mite (*Tetranychus evansi*) as the most important pets of tomato followed by African boll worm (*Helicorverpa armigera)* (71.7%) White flies (*Bemesia tabaci*) (68.3%), Thrips (*Megalurothrips sjostedti*) (46.7%), Aphids (18.3%), and Leaf miner (*Liriomyza trifoli*) (11.7%) (Figure 2). The results are similar to a survey report of tomato farmers in Kirinyaga district by Waiganjo et al 2006 where 91.7% of the respondents perceived Red spider mite as an important pest of tomato. In the present study, 68.3% and 46.7% perceived White flies and Thrips respectively as an important pest of tomato. In Eastern and Central Africa regional priotization of tomato pests, Red spider mite was considered the most dangerous pest of tomato (Varela et al., 2003). However, Waiganjo et al 2006 reported that 58.7% and 68.6% of famers in Kirinyaga felt that Whiteflies and Thrips respectively were important pests of tomato. In the present study, although 71.7% of the respondents perceived African bollworm as an important pest of tomato, a report of tomato production in Mvomero district in Tanzania by Amon et al 2006 reported that African bollworm was the most important pest of tomato. In the same report, Whiteflies and Thrips were reported to be of less importance. The difference in the results may be attributed to difference in climatic conditions of the study areas.

Effect of tomato growing season on Red spider mite infestation and crop loss

The open field tomato farmers indicated that majority (70%) grew tomato in the dry season (December to March) (Table 1). This is because farmers believe that during the dry season there is low incidence of fungal diseases and this lowers there cost of production. However, during dry season, Red spider mite infestation is high (75-99% infestation), these if not controlled, farmers reported that may lead to serious crop damage (> 50 % crop loss). During the short rains, 53.3% of the farmers grew tomatoes. Farmers indicated that this is because of availability of land after the main crop has been harvested and also relatively low incidence of fungal diseases. However, during the short rains, there is moderate Red spider mite infestation (50-74%) which if not controlled may lead to crop loss of between 25 - 50%. During the long rains, farmers perceived they experience low incidence of Red spider mite infestation (23.3%) but only 16.7 % grow tomato in the open field.

Pesticide used by farmers in Subukia and Rongai divisions for the control of Red spider mite

All the tomato farmers interviewed used pesticides for their tomato production. The highest pesticide used for the control of Red spider mite was Polythrin (85%) and Vapcothion (81.7%) (Table 2). Surprisingly; some farmers use insecticides for the control of Red spider mites. This may be because of lack of knowledge about the pest and therefore there is a need for farmers' general capacity building on the pest and its control.

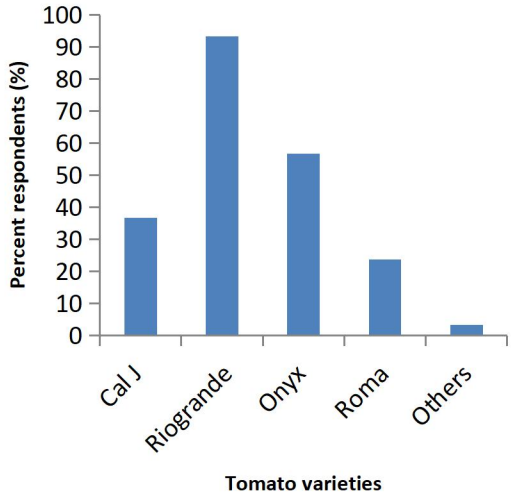

Figure 1: Tomato varieties grown by open field tomato farmers in Subukia and Rongai divisions, Kenya

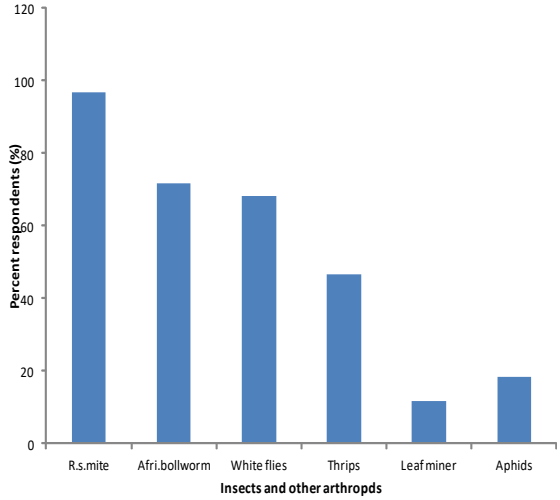

Figure: 2: Important insect pests and other arthropods as perceived by tomato farmers in Subukia and Rongai divisions, Kenya

Table 1: Effect of tomato growing season on Red spider mite infestation and crop loss

Growing season	Percent respondents (%)	Percent Red spider mite infestation (%)	Percent crop damage due to Red spider mite (%)
Long rains (March-August)	16.7	**	**
Short rains (September – December)	53.3	* * *	* * *
Dry season December-March	70	* * * *	* * * *

KEY

	Red spider mite infestation	**Crop damage**
*	Very low (0-24%)	No damage
**	Low (25-49%)	Non important damage (<25%)
***	Moderate (50-74 %)	Important damage (25-50%)
****	High (75-99)	Serious damage (> 50%)

Table 2: Pesticide used by farmers in Subukia and Rongai divisions for the Control of Red spider mite

Chemical Trade Name	**Active ingredient**	**Percent farmers using**
Polytrine	Profenofos + Cypermethrin	85
Vapcothion	Tetradifon + Dicofol	81.7
Dictator plus	Tetradifon + Propergite	71.7
Mitigan	Dicofol	45
Dynamec	Abamectin	38.3
Ortus	Fenpyroximate	13.3
Alfix	Alphacypermethrin	6.7

Dimethoate	Dimethoate	5
Karate	Lambdacyhalothrin	3.3
Actara	Thiamethoxam	1.7

CONCLUSION AND RECOMMENDATIONS

Evaluation of pesticides against Red spider mite *T.evansi* indicated that Vapcothion (Dicofol 8%, Tetradifon 25%) is more effective. However, continuous use of one type of chemical should be avoided since the mites develop resistance against prolonged use of one chemical very fast. There is also need to establish spray interval and optimum number of Chemical spray against Red spider mite per cropping season. In the present study only six pesticicides were evaluated there is therefore need for other pesticides e.g polytrine to be evaluated. Total average mean number of mites per leaf disc recorded on Chilli extract was significantly ($P<0.05$) less than in the control plants. The results suggest that crude extracts from pepper fruits can be explored for developing natural products for use as biodegradable alternatives to synthetic acaricides. There is also need to further investigate the use of chilli extracts in terms of the dosage and frequency of application. The bio-pesticides are suitable since they are relatively safe and environmentally friendly. Other plant extracts like spider plants which has been used to control *T. urticae* in flowers need to be evaluated.

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