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EVALUATION OF AGRI-FLEX 185 SC (*ABAMEETIN THIAMETHOXAM*) AGAINST SPIDER MITES (*TETRANCHUS URTICAE*) ON TOMATO

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Introduction

Tomato is among the vegetable crops grown in Ethiopia and important cash crops for small scale growers with a potential for increasing incomes in rural areas, improving the living standards and creating employment opportunities for women and youth. This crop can be grown all year round. Potato, onion, tomato, garlic, shallot, pepper, are among the leading vegetable crops grown in Amhara region (CSA, 2006). According to the (CSA, 2007) 501599.14ha was under fruit (47990.34 ha) and vegetable (453608.8 ha) crops production in Ethiopia. Among the vegetables, tomato covered 5341.58 ha. The total area under some crops in Ethiopia like tomato production has been reduced by about 22% and productivity by about 15% in 2005 as compared to that in 2004. This is mainly due to the prevalence of severe viral and viral like disease accompanied by absence of effective control measures so far (Anonymous 2005).

Vegetables in tropical countries are the crops, which are often attacked most seriously by arthropod pests (Emana 2005).Among the major insect pests, white flies, one of a serious leaf-sucking pest, cause direct damage to plants by sucking plant sap and removing plant nutrients, thereby weakening the plants. Damage may be more severe when plants are under water stress. In addition, they often produce large quantity of honeydew that leads to the growth of sooty mould on the lower leaves, blocking or reducing the photosynthetic capacity of the plants.

In Ethiopia, the most serious and commonly reported arthropod pests that limit potato production were spider mites (Tetranchus urticae), cutworm (Agrotis ipsilon, A. segetum), white grub (Brahmina coriacea), potato tuber moth (Phthorimaea operculella) alone caused yield loss up to 42% in the field, respectively (Tekalign *et al*., 2015).

Spider mites are the most common pests found in potato growing areas of eastern Hararghe, Ethiopia (Muluken *et al*., 2016). The adults, nymphs and larvae of TSSM feed mostly on green parts of potato leaves leading to its complete destruction and yield during its heavy infestations, as well as potato tuber sprouts and shoots. As the result, farmers continue to bear huge losses due to these pests.

Production constraints, particularly arthropod pests and farmers 'methods of managing TSSM, could be useful in designing an effective integrated pest management (IPM) strategy in a sustainable manner. Smit and Matengo (1995), Soleri *et al*. (2000) and Obopile *et*

al. (2008) reported that assessing of farmers' perceptions of crop production constraints has been used as a tool for documenting pest status and designing suitable pest management options for a particular community.

Thus, this hindered the development of effective pest management approaches for smallholder farmers. In addition, there is an also insufficient insecticide in Ethiopia. Therefore, this research was initiated with the objective of evaluating insecticide efficacy against spider mites on Tomato. East Shewa, Ethiopia

I. Materials and Methods

The experiment was conducted at Adami Tulu Agricultural Research Center during off season (may, 2021), to test the efficacy of an insecticide known as Agri-Flex 185 SC (*Abameetin Thiamethoxam*) for controlling spider mites (*Tetranchus urticae*). Treatments were: the test chemical. Agri-Flex 185 SC (*Abameetin Thiamethoxam*) at the rate of 0.5 liter/ha, standard check (Awash) at the rate of 0.5 liter/ha and untreated check. Tomato (variety Galila) was planted on 10 m x10 m, with row and plant spacing of 1 m x 0.5 m, respectively. This experiment was designed as randomized complete block design in three replications.

Both were foliar sprayed with knapsack sprayer in seven days interval from onset of the disease until the crop reached physiological maturity.

Data Collected

All plants and plant parts were examined for leaf damage by spider mites, before treatment application and at weekly interval thereafter. spider mites leaf damage score on each leaf of a plant was taken based on a scale of 0 to 5 (0= no leaf damage; 1= up to 20 % of the total leaf area damaged; 2= 21-40% of the total leaf area damaged; 3= 41-60% of the total leaf area damaged; 4= 61-80 % of the total leaf area damaged; and 5= more than 80 % leaf area damaged) (Iman *et al*., 1990).

Yield record per plot

Statistical Analysis

The analysis of variance for all treatments were carried out using SAS version 9.0 (2008) statistical computer packages to examine the presence of statistically significant differences among treatments. Least Significant Differences (LSD) was employed to identify treatments that are significantly different each other. The analysis of variance was made using model for randomized complete block design [15].

II. Result and Discussion

Leaf damage visual scores across weeks

Leaf damage scores over three weeks period is given in table (1). In the first week there were non significant differences ($P<0.05$) among all treatments, because it was before the application of any treatments. The extent of damage caused by spider mites (*Tetranchus urticae*), on Tomato was almost similar, though there were leaf damage scale variations among treatments. In the 2nd week, however, there were significant differences ($P<0.05$) among treatments in leaf damaged score. The highest leaf damage was recorded on control plot. In all the cases the control Tomato the highest leaf damage score whereas tomato treated with Agri-Flex 185 SC and Awash had the lowest leaf damage due to spider mite. The present

observation is in line with finding of Nakagome and Kato (1981) who stated that all crop growth stages are subjected to severe spider mite infestation, so insecticide applications are required to control Tomato, especially during the peak population period. When Tomato is not managed the scale of leaf damage increased in untreated cabbage, but decreased generally in treated cabbages throughout the growing season. In studies made by Freddy (2011) the leaf damage was significantly lower in fields treated with insecticides than in fields not treated with insecticides. Sakai (1984) shows all crucifers suffer depredation by this pest practically throughout the growing season. Asare *et al* (2010) reported the mean leaf damage for unprotected plants were higher than those which were treated in various ways.

Table 1. Mean leaf damage due to spider mites (*Tetranchus urticae*) on Tomato

Treatments	On station			On farm 1			On farm 2		
	Week 1	Week 2	Week 3	Week 1	Week 2	Week 3	Week 1	Week 2	Week 3
Agri-Flex 185 SC	3a	2.3b	2.22bc	3a	2.44b	1.22b	2ab	2.10b	1.88b
Awash	3a	2.55b	1.99c	2.8a	2.33b	1.33b	2.8a	2.33b	1.55a
Control	3a	3.4a	4a	3a	3.22a	4.33a	3.1a	3.40a	4.22a
CV	13	23	22	14	16	24	17	23	25

Total fruit yield

The results indicated in Table 2 show significant difference both in total fruit number and yield. The higher total yield was recorded on tomato treated with Agri-Flex 185 SC (443qu/ha), while lower fruit number (354qu/ha) recorded on untreated check.

Marketable yield

Effect on Marketable Yield

There were significant differences (P< 0.05) among treatments in terms of marketable yield (Table 2). Marketable yield of tomato crop (Galila variety) ranged from 443 to 309qu/ha. The highest level of marketable yield was obtained from plots sprayed with insecticide Agri-Flex 185 SC, followed by Awash treated tomato Galila variety. The untreated plot (control) had the lowest marketable yields. This indicates that controlling populations with synthetic chemicals can double the yield of tomato crops production.

Spider mites (*Tetranchus urticae*), adult sucks on the leaf portions of the crop, therefore, synthetic insecticides will remain essential for the management of this pest (Hill & Foster, 2000).The plant extracts compared favorably with the synthetic insecticide in the control of spider mites *(Tetranchus urticae),*. This could be due to the pungent smell given out by the soaked plant extract which deter animals from

eating the plant Sivapragasam and Aziz (1990).

Table 2 the effects of frequency of synthetic chemicals on total fruit, marketable fruit yield (qu/ha)

Treatments	On station			On farm		
	Marketable qu/ha	Unmarketable qu/ha	Total fruit yield	Marketable qu/ha	Unmarketable qu/ha	Total fruit yield
Agri-Flex 185 SC	423a	22b	443a	418a	16b	434a
Awash	362b	15b	375ab	384ab	14b	398b
Control	279c	30a	309c	334c	20a	354c
CV	12	17	14	13	10.56	21

Conclusion and Recommendation

Results indicated that across all the weeks, there were significant differences (P< 0.05) among treatments in affecting population of spider mites *(Tetranchus urticae)* following foliar applications. The highest number of spider mites *(Tetranchus urticae)* recorded from control (untreated) plots. The lowest number of spider mites *(Tetranchus urticae)* was recorded from plots treated with Agri-Flex 185 SC insecticides. This shows both Agri-Flex 185 SC can significantly reduce the number of spider mites *(Tetranchus urticae)* the subsequent damage to the crop, including quantity and quality of fruit yield.

On the yield data significant differences (P< 0.05) among treatments was observed in marketable yield of the tomato crops. The highest levels of tomato marketable yield per plot were obtained from plots sprayed with foliar application of insecticide Agri-Flex 185 SC which was followed by plot treated with foliar application of insecticide Awash. Untreated plot (control) had the lowest marketable yield. This indicates that controlling spider mites *(Tetranchus urticae)* populations with insecticides, Agri-Flex 185 SC and Awash can significantly increase the yield of the tomato crop.

The result of this study indicated that the newly tested insecticide, Agri-Flex 185 SC (*Abameetin Thiamethoxam*), sprayed at the rate of 0.5L ha^{-1} can effectively control spider mites *(Tetranchus urticae)* as the comparison to standard and untreated check clearly indicated with respect to key parameters.

Therefore, based on the results of this study, Agri-Flex 185 SC (*Abameetin Thiamethoxam*) can be recommended for management of spider mites *(Tetranchus urticae)*on tomato sprayed at the rate of 0.5 litters ha^{-1} and at weekly (14 days) spray intervals.

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