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Effect of Intercropping on the Infestation of *Helicoperva Armigera*

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ABSTRACT

The experiment was carried out during Rabi season in the year 2015-16. Five crops *viz.* maize, sesamum, broad bean, niger and buckwheat, were used as border crop in tomato field. It was compared with alternate spray of dimethoate (0.05%) and lambda cyhalothrin (0.005%). Dimethoate was sprayed at 80 and100 DAT and lambda cyhalothrin was sprayed at 90 and 110 DAT. Lowest incidence in tomato was recorded in alternate spray of chemical pesticides. Amongst the different crop used as border crop, maize as border crop recorded significantly lower incidence of Helicoverpa armigera than the other border crops. Farmers can adopt the practice of intercropping in tamato with maize to reduce the population of fruit borer.

1. Introduction

Tomato is globally cultivated for its fleshy fruits and known as protective food because of its special nutritive value and wide spread production. It is the world's largest vegetable crop after potato and it tops the list of canned vegetables. Tomatoes are eaten directly as raw vegetable or consumed in a variety of processed products like ketch up, sauce, chutney, juice, sliced, soup, paste, puree *etc.* It is a rich source of vitamin A and C, and also contains minerals like iron, phosphorus (Kalloo, 1991). Furthermore; tomato is the richest source of nutrients, dietary fibres, antioxidant like lycopene and beta-carotene, the compounds that protect cells from cancer. Tomato has a short generation time of about three to four months. It is well fitted in different cropping systems of cereals grains, pulses and oilseeds. Hence, it is the most widely grown solanaceous vegetable crops grown worldwide under outdoor and indoor conditions. A wide range of insects attack tomato and are a major limiting factor in its successful cultivation and yield (Ashok Kumar *et al.,* 2009). Tomato is more susceptible to the pests' attack than other vegetable crops, mainly because of its tenderness and softness.

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It is devastated by an array of pests; however, the major damage is caused by the tomato fruit borer, Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae) (Sajjad *et al.,* 2011). This insect is a highly polyphagous and serious pest that infests more than 100 plant species, including vastly planted, economically important crops such as cotton, maize, tobacco, pigeonpea, and chickpea (Talekar *et al.,* 2006). Damage starts from flowering. Eggs are laid on young leaves which are damaged by young larvae and later they migrate to developing fruits, they roll over the leaves and enter the fruits where they cut holes. Tomatoes ripen early but are not usually marketable leaving scars on the fruit. One larva feeds on many fruits, causing 5-50% losses. It causes widespread economic damage to tomato farms in Asia (Srinivasan 1959; Singh and Singh 1975; Vattanatungum and Ruchtapakornchai 1978; Talekar *et al.,* 1984). Controlling the insect pests with insecticides causes serious side effects, including development of insecticide resistance in the insects, pest resurgence, environmental pollution, and health hazards. Therefore, the present study was carried out to identify alternative methods to chemical control. Farmers currently use pesticides heavily, and borer is vulnerable to sprays for a few hours before it bores into the plant, forcing farmers to spray insecticides as often as every 2-3 days intervals (AVRDC, 2001). Heavy use of synthetic pesticides leads to environmental pollution and poses problem for human health.

Effect of intercropping on pest problems have been reviewed by many authors (Vandermeer, 1989; Ogenga-Latigo *et al.,* 1993). Intercropping practice is of economic benefit and one of the best cultural practices that have potential of reducing insect pest infestation by increasing crop diversity (Willey, 1985; Trenbath, 1993). To study the influence of intercropping; an experiment was carried out during rabi, 2015-16. Five crops *viz.* maize, sesamum, broad bean, niger and buck wheat, were used as border crop in tomato field in reducing the incidence and damage of fruit and shoot borer of tamato.

2. Material and Methods

The experiment was conducted at College Farm, College of Post Graduate Studies, Barapani under Central Agricultural University, Imphal, Manipur in the year 2015-16. The main aim of the study was to assess the influence of trap cropping /mixed cropping /intercropping of different crops on tomato on the level of incidence and damage of fruit borer (Helicoverpa armigera). Observations were recorded on twenty randomly tagged plants in each treatment of tomato in which maize, sesamum, broad bean, niger and buck wheat were used as border crops. The crop was transplanted on 30 days after sowing at 60 x 60 cm spacing with each plot measuring 4 m2. The intercrops--maize, sesamum, broad bean, niger and buck wheat were sown twenty days prior to transplantation of tomato in the field. It was compared with alternate spray of dimethoate (0.05%) and lambda cyhalothrin (0.005%). Dimethoate was sprayed at 80 and100 DAT and lambda cyhalothrin was sprayed at 90 and 110 DAT. The incidence of Helicoverpa armigera was recorded from twenty randomly selected plants in each treatment and fruit damages were recorded as number of infested fruit in twenty randomly selected fruit in each plot. Both the observations were converted into percent infestation. The incidence of Helicoverpa armigera in fruit was recorded from twenty randomly selected plants in each plot and fruit damages were recorded as number of infested fruit in twenty randomly selected fruit in each plot. Observations were converted into percent infestation. The data collected on the number of fruit borer larvae, damaged and undamaged fruits and fruit yield were subjected to analysis of variance (ANOVA). Least significant difference (LSD) was used to separate the treatment mean at 0.05 % level of probability as described by Gomez & Gomez (1984).

3. Results and Discussion

The incidence of Helicoverpa armigera in tomato was recorded from twenty randomly selected plants in each plot and fruit damages were recorded as number of infested fruit in twenty randomly selected fruit in each plot. Lowest incidence of pest was recorded in alternate spray of chemical pesticides at 3.33 percent infestation. Among the different crop used as border crop, maize as border crop recorded significantly lower incidence of Helicoverpa armigera at 8.61 per percent than the other crops. Incidence of Helicoverpa armigera in the plots with sesamum, niger, broad bean and buck wheat were also closely comparable with untreated control recorded from twenty randomly selected plants in each plot and fruit damages were recorded as number of infested fruit in twenty randomly selected fruit in each plot. The observations were converted into percent infestation.

Conclusion

The results indicate that intercropping of tomato with maize has significant influence on tomato in reducing the incidence and damage of fruit and shoot borer. Damage in the intercrop was significantly lower from that of the plant in the sole crop. There was also significant yield advantage of intercropping in tomato with maize. Incidence of pest where intercropped with sesamum, niger, broad bean and buck wheat were also comparable with untreated control. It is therefore recommended that farmers in this agro ecological region can adopt the practice of intercropping in tomato with maize to minimize borer infestation and increase its production.

Effect of trap cropping /mixed cropping /intercropping on level of incidence of Helicoverpa armigera in Tomato fruits in Meghalaya during 2015-16

	% damage by *Helicoverpa armigera*						
Treatment	90 DAT	100 DAT	110 DAT	120 DAT	130 DAT	140 DAT	Mean
Maize	3.33(0.47)	6 .67(15)	6.67(15)	10(18.44)	13.33(21.39)	11.67(20)	8.61(18.05)
Sesamum	10(18.44)	10(118.44)	15(22.79)	16.67(24.12)	15(22.79)	18.33(25.33)	14.17(22.14)
Niger	11.67 (20)90	13.33(21.39)	11.67(20)	16.67(24.12)	20(26.56)	18.33(25.33)	15(22.79)
Buck Wheat	8.33(16.74)	6.67(15)	11.67(20)	10(18.44)	15(22.79)	18.33(25.33)	11.67(20)
Broad bean	11.67(20)	8.33(16.74)	8.33(16.74)	11.67(20)	15(22.79)	18.33(25.33)	12.22(20.44)
Chemical	3.33(10.47)	3.33(10.47)	3.33(10.47)	3.33(10.47)	3.33(10.47)	3.33(10.47)	3.33(10.47)
Control	11.67(20)	6.67 (15)	16.67 24.12)	10 (18.44)	11.67 (20)	15 (22.79)	(20.18)
SEd(±)	4.44	3.01	3.32	2.45	2.93	3.12	5.65
$CD_{0.05}$	9.67	6.56	7.23	5.33	6.39	6.79	11.07

References

Ashok Kumar C. T. Shivaraju C (2009). Bioefficacy of newer insecticide molecules against tomato fruit borer, Helicoverpa armigera (Hübner) *The Journal of Agricultural Science 22*: 288–289

AVRDC (2001). The World Vegetable Center, http:// www.avrdc.orgiLCIeggplantiborer.html)

Degri MM (2014). The effect of spacing of Egg Plant (Solanum melongena L.) (Solanaceae) on Shoot and Fruitborer (Leucinodes orbonalis Guen.) Lepidoptera: Pyralidae) Infestation in the Dry Savanna zone of Nigeria. Agriculture and *Biology Journal of North America,* 5: 10-14 doi. 10. 5251 / abjna. 2014.5.1.10.14

Degri MM, Sharah HA, and Z Dauda (2013). Effects of intercropping pattern and planting date on the performance of two cowpea varieties in Dalwa, Maiduguri, Nigeria. *Global Journal of Bioscience and Biotechnology* 2: 480-484.

Gomez AK, and AA Gomez (1984). Statistical procedures for agricultural Research. 2nd ed. John Wiley and sons publication, New York.

Grubben GJH, and DA Denton (2004). Plant resources of tropical Africa, vegetables. PROTA Foundation, Wageningen.

Srinivasan P. M (1959). Control of fruitborer, H. armigera (Hb) on tomato. *Ind. J.I-Tort* 16: 187– 188.

Talekar N. S. Chang Y. F. and S Lee T (1984). Tomato insect pests: major management strategies, pp. 53–171.In Proceedings of the Symposium on the Insect Control of Vegetables in Taiwan. Department of Agriculture and Forestry, Taiwan Provincial Government, Chung Hsing Village, Taiwan.

Talekar N. S. Opena R.T. and P Hanson P (2006). Helicoverpa armigera management: A review of AVRDC's research on host plant resistance in tomato. *Crop Protection*. 25: 461–467. Google Scholar Cross Ref

Vattanatungum A Ruchtapakornchai W (1978). Principal insects which attack tomato in the tropics and their control, pp. 132–135. In First International Symposium on Tropical Tomato. Asian Vegetable Research and Development Center, Shanhua, Taiwan. Netherlands. Blacklings Publishers Leiden, Netherlands. CTA, pp.668.

Vandermeer J (19891). Ecology of intercropping. Cambridge University Press, Cambridge 273 pp.

Willey RW (1985). Evaluation and Presentation of Intercropping Advantages. Experimental Agriculture 21:119-133 doi: 10.1017/S0014479700012400.