Efficiency of insecticides and synergist against insect pest of okra

SYNOPSIS

Submitted to the

Lovely Professional University

In

Agriculture Entomology

By

Zore Pavan Shankar

Department of Entomology,

School of Agriculture,

Lovely Professional Unversity, Phagwara, Punjab

From: Dr.Ankush Moreshwar Raut Date: 14/05/2018

(Assistant Professor)

Certificate

This is to certify the work recorded in this thesis entitled **"Efficiency of insecticides and synergist against insect pest of okra".** Submitted by Zore Pavan Shankar (Reg. number-11715431) in partial fulfilment of the requirements for the award of Degree of Master of Science (Agriculture) in Agriculture Entomology of Lovely Professional University, Phagwara, Punjab is the faithful and bonafide research work carried out under my personal supervision and guidance.

(Signature of Students) (Signature of supervisor)

Name: Zore Pavan Shankar Dr.Ankush Moreshwar Raut

(Signature of co-advisor) (Signature of HOD)

Dr. Satish Gharde Dr.Adesh Kumar

(Signature of AO)

SYNOPSIS OF P.G. RESEARCH PROBLEM

1. Name of the student	:	Zore Pavan Shankar
2. Name of the degree	:	Msc (Agri.) Entomology
3. Registration No.	:	11715431
4. Major subject	:	Entomology
5. Minor subject	:	Plant Pathology
6. Name of the Major Guide	:	Dr. Ankush M. Raut Assistant Professor (Entomology) School of Agriculture, Lovely Professional University, Phagwara, Punjab
7. Title of the Research Problem	:	"Efficiency of insecticides and synergist against insect pest of okra,

INTRODUCTION

Okra, *Abelmoschus esculentus* (L.) Moench, commonly known as ladies finger is an important vegetable crop which belongs to Malvaceae family. It is widely grown all over the globe including India for its nutritional value in diets. It is good source of vitamin A, B, C and also rich in calcium, phosphorus, potassium, protein, carbohydrates, fats, minerals, iron and iodine (Baloch *et al*., 1990).

The young tender pods are cooked in curries stewed, soups and also canned and dried. Its ripened seeds are used as a substitute of coffee, whereas matured fruits and stems containing crude fibers are also used in paper industry. Apart from its commercial uses, it is also very useful against genitourinary disorders, spermatorrhoea and chronic dysentery (Krishnamurthy, 1994).

A major constraint in vegetable production decline due to inadequate control of pests and diseases (Tindall, 1983). Many of pests occurring on cotton are found to ravage the okra crop. Dhamdhere *et al.* (1984); Jagtab *et al*. (2007) stated that the okra crop attacked by several insect pest species which causing significant damage. Rao and Rajendran (2003) has been recorded 72 insect pest species which including major and non-insect pests occurrence in okra field (Butani and Jotwani, 1984). Various pests are damaging to different crop growth stage of okra viz. sucking pest (Aphid, *Aphis gossypii* (Glover); Whitefly, *Bemisia tabaci* (Gennadius); Leaf hopper, *Amarasca biguttula biguttula*; Mealybug, *Phenacoccus solenopsis* (Tinsley); Red spider mite, *Tetranychus urticae* (Koch); Red cotton Bug, *Dysdercus koenigii*; Dusky cotton bug, *Oxycarenus hylinipennis*), defoliators [Leaf roller, *Sylepta derogata* (Fabricius); Green semilooper. *Anomis flava* (Fab.)] and borers [(Fruit borer, Helicoverpa armigera; Shoot and fruit borer, *Earias vittella* (Fabricius)]. Among the various pests, *B. tabaci, D. koenigii, A. biguttula biguttula*, H. *armigera* and E. *vitella* recorded as major pests in okra by different scientist (Chaudhary and Dadheech,1989; Sohi, 1964; Reed, 1974; Saini and Singh, 1999;Ren *et al*., 2001; Channa Basavanna, 1971)

B. tabaci is a serious pest on vegetables and attacks on 176 different host plant species (Ren *et al*., 2001). Both nymph and adult suck cell sap and transmit yellow vein mosaic disease which affecting the quality of produce. *Earias vittella* (Fabricius) is an important pest of okra in India, South-East Asia and Africa (Sohi, 1964; Reed, 1974; Saini and Singh, 1999) attack on shoots, flowers and fruits. *Tetranychus urticae* (Koch) is a most destructive pest in the sub-tropics (Channa Basavanna, 1971). Chaudhary and Dadheech (1989) recorded 17.5 to 54.0 per cent losses in yield due to sucking and borer pest of okra (Sarkar *et al*., 1996). *E. vittella* cause damage to shoot, flowers and fruits which yield will be reduced upto 100% (Sohi, 1964; Reed,

1974; Saini and Singh, 1999) and 27.7 % considerable yield losses by *T. urticae* (Channa Basavanna, 1971).

Objectives:

1) To study insect fauna in different crop growth stage

2) Population dynamics of major pest on okra cv. Supriya

3) Bioefficacy of insecticides with oils against major pest of okra

MATERIALS AND METHODS

3.1 Experimental site:-

The present study entailed "Efficacy on insecticides against major pest of okra" was conduct at Agricultural Research Farm, School of Agriculture, Lovely Professional University, Phagwara , Punjab during 2017-18. The research field is located at 31^0 15' North latitude, 75^0 32' East and at 228 meter above mean sea level.

Plan of experiments:

Experimental Crop	**:**	Okra (*Abelmoschus esculentus*)
Name of variety	**:**	Supriya
Source of variety	**:**	PAU, Ludhiana, Punjab
Test insects	**:**	Aphid,Meal bug,Red mite,white fly,Fruit borer,leaf roller,Red cotton bug,Dusky bug,Leaf roller
Design	**:**	Randomized Block Design (RBD)
Treatments	**:**	7 (including control)
Replications	**:**	3
Total area	**:**	$378m^2$
Date of sowing	**:**	15-02-2018

Experimental layout:-

A okra variety Supriya was grown in field at 2nd week of February. The foliar application of Spinosad 45 EC in combination with sesamum and karanj oil in different doses will used against major pest of okra. Plot size was kept 3.5 x 3.5 m^2 area per treatments and 60 x 30 cm spacing was maintained between plant to plant and row to row. The randomization of treatments were showed in layout (Fig 1)

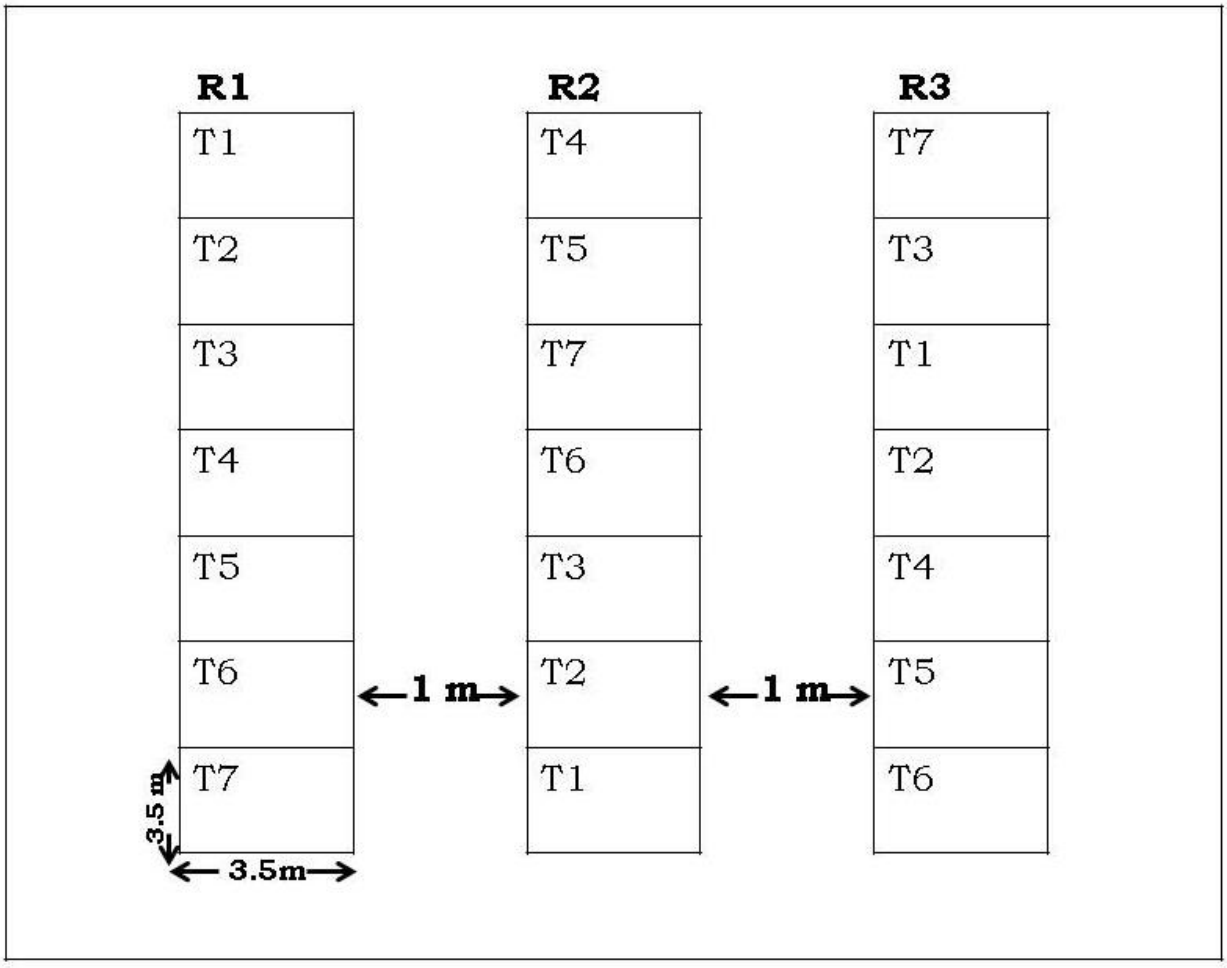

Fig 1: Field layout for experiments including seven treatments and three replications.

Treatments details:

In present research work contains seven treatments including three replications. Spinosad 45% SC, sesamum and karanj oil was applied in different doses against major pest. Oils were purchased from local pesticide dealer from Jalandhar Cant market. Treatment details are mention in following table.

Sl.No.	Treatments details	Doses
T_1	Spinosad 45% SC	0.005%
T_2	Spinosad45%SC+ Sesanum oil	0.005% + 3%+
T_3	Spinosad 45% SC+Karanja oil	0.005%+3%
T_4	Spinosad 45% SC	0.004%
T_5	Spinosad45%SC+ Sesanum oil	0.004% + 3%
T_6	Spinosad 45% SC+Karanja oil	0.004%+3%
T_7	Control	-

Calendar of Operations

The crop grown in the open field conditions has following cultural practices

Land preparation and sowing:-

The plot was prepared by using harrow followed by rotavator till the soil became friable and exposed to sunlight for make the field frees from the weeds, pathogen and other. The field was divided into 21 plots and each plot size maintained 3.5 x 3.5 m^2.Two to three seed were directly sowed in field and one plant maintained for further studies. The field was irrigated to provide enough moisture to germinate and after that healthy seeds were sowing into the field.

Fertilizer application, weed management

The recommended dose of fertilizer were applied at 20 tonnes of FYM, 100 kg nitrogen, 60 kg phosphorus and 50kg potash per hectare. Half of nitrogen, full phosphate and potash were applied as basal dose and remaining nitrogen applied after one month after sowing. Necessary hand weeding was done time to time during the experiments.

Irrigation:-

The first irrigation was applied at the time of sowing after 7-10 days interval as well as whenever needy time irrigation was provided according to field condition.

Preparation of spray concentration

Observations:-

Data collection

Incidence of the different sucking pests like aphid, whitefly, mite and hopper were recorded before spray and after 1, 3, 5, 7 and 15 days of each spray on randomly selected 5 plants from each plot at different growth stage for bio-efficacy study .

The insect population is observing before treatment in the selected plot. In each sample plants, number of nymph and adult of test insect are recording on leaves from three canopy levels i.e. from one upper, middle and lower leaves. Population of natural enemies encounter during the study period recorded before & 7 days after each spray.

3.8.8 Statistics Analysis:

Analysis of variance of the data was done for each experiment under completely randomized block design (RBD). The incidence of insect pest data where subjected to logarithm transformation prior to analysis as treated eariler counting of insect for each plot. Necessary analysis like ANOVA, DMRT where done by SPSS of statistical packages (22.0 version)

REVIEW OF LITERATURE

Shoot and fruit borer, *Earias vittella* (Fabricius)

Dabhi (2007) observed that the maximum fruit damage was observed from 7^{th} to 13^{th} week after sowing during summer season. However, *E. vittella* showed significant positive correlation with temperature, sunshine hours while negative relation with relative humidity.

Shukla *et al.* (1997) recorded maximum infestation (41.3%) caused by E. vittella in first fortnight of June and infestation start from fruiting stage which progressively increased upto harvesting stage. Zala et al (1999) stated that the *E. vittella* remained active throughout the crop period and bright sunshine hours and maximum temperature showed significant positive effect whereas vapour presser and relative humidity had significant negative influence on larval activity.

Mandal *et al*. (2002) observed that *E. vittella* activities started from 13^{th} SW and constantly higher damage maintained in rest of the growing season. Infestation was reached at peak in 22^{nd} standard week. The pest infestation had significant positive relationship with

minimum temperature and the relative humidity. Mandal *et al.* (2006) revealed that the late sowing crop increased attack of *E. vittella* and reduced 31% yield of okra.

Hosamani *et al.* (2011) the application of Rynaxypyr 20 SC at 30 g/ha noticed the minimum larval population (0.60 larva per plant) of okra shoot and fruit borer as well as exhibited highest fruit yield of 87.72 q/ha.

Bangar *et al.* (2012) evaluated various synthetic insecticides (Flubendiamide, indoxacarb, emamectin benzoate and cypermethrin + chlorpyriphos) against *Earias vittella* and resulted that Flubendiamide 480 SC @ 0.0144% had significantly lower infestation and higher fruit yield (76.73 q/ha) .

Bio-efficacy of newer insecticides

Parmar *et al*. (2013) revealed that the profenophos @ 0.1% exhibited minimum shoot (1.62 %) and fruit (1.82%) damage followed by deltamethrin @ 0.036% (1.70 % and 2.01 %)) and alphamethrin @ 0.01% (1.89 % and 2.15 %) respectively.

Shimoge and Vemuri (2014) studied the bio-efficacy of newer molecules against pests and resulted that the flubendiamide at 60 g a.i./ha lowest 14.4 % fruit borer infestation and superior over all other treatments and control. Beta-cyfluthrin at 18.75 g a.i./ha and profenophos at 400 g a.i./ha recorded 23.40 and 24.20 per cent of fruit borer infestation respectively and at par with quinalphos at 350 g a.i./ha.

Mite

Adilakshmi *et al.* (2008b) studied efficacy of botanicals against mites on okra and resulted that endosulphan found promising chemical over the botanicals. Among the botanicals Neemazal and NSKE recorded minimum population of mite on okra. Patil and Nandihali (2009) also found that NSKE 5 % was effective against mite in brinjal.

Whitefly, *Bemisia tabaci* (Gennadius)

Norman and Sparks (1997) reported that hairy leaf cultivar more susceptible as comapired smooth leaf cultivars to whitefly colonization and hair density, length and leaf area had positive relation with whitefly population (Raghuraman *et al*. (2004).

Kannake (2014) tested different insecticides against B. tabaci on summer okra and result revealed that acetamiprid 20 SP @ 0.3g was most effective against whitefly followed by triazophos 40 EC@2ml and diafenthiuran 50 WP@1gm.

Dhar (2015) tested different insecticides (Profenophos 50% EC; Imidacloprid 17.8% SL + Spinosad 45% SC; Chlorpyriphos 20% EC; T4= Deltamethrin 2.8% EC +Quinaphos 25% EC; Lambda Cyhalothrin 5 % EC; Cypermethrin 10 % EC; Triazophos 40% EC against pest complex of okra and tomato. Among insecticides single application of imidacloprid 17.8% SL@20gm/ha gave minimum infestation caused by fruit borer and whitefly fallowed by Spinosad 45% SC@75gm/ha

Mohanasundaram (2011) revealed that the application of thiamethoxam 20 g a.i/ha, fipronil 50 g a.i/ha and endosulfan @ 700 g a.i/ha was effectively reduced the leafhopper, whitefly and red spider mite population. insect predatory population (coccinellids and spiders) in treatment schedules T1 and T3 comprising of Neemazal/ Econeem @ 2ml/L, emamectin benzoate @ 10 g a.i/ha and endosulfan @ 700 g a.i/ha were found to be at par with untreated check indicating non-hazardous to these predominant natural enemies in okra ecosystem.

Jassid, *Amrasca biguttula biguttula*.

Sinha *et al.* (1981) evaluated insecticidal against important insect pest of okra for seed production and result was found that endosulphan @ 0.21 kg per ha combined with dimetoate @ 0.25 kg per ha applied four time at 15 day intervals gave the suitable for jassid control.

Result

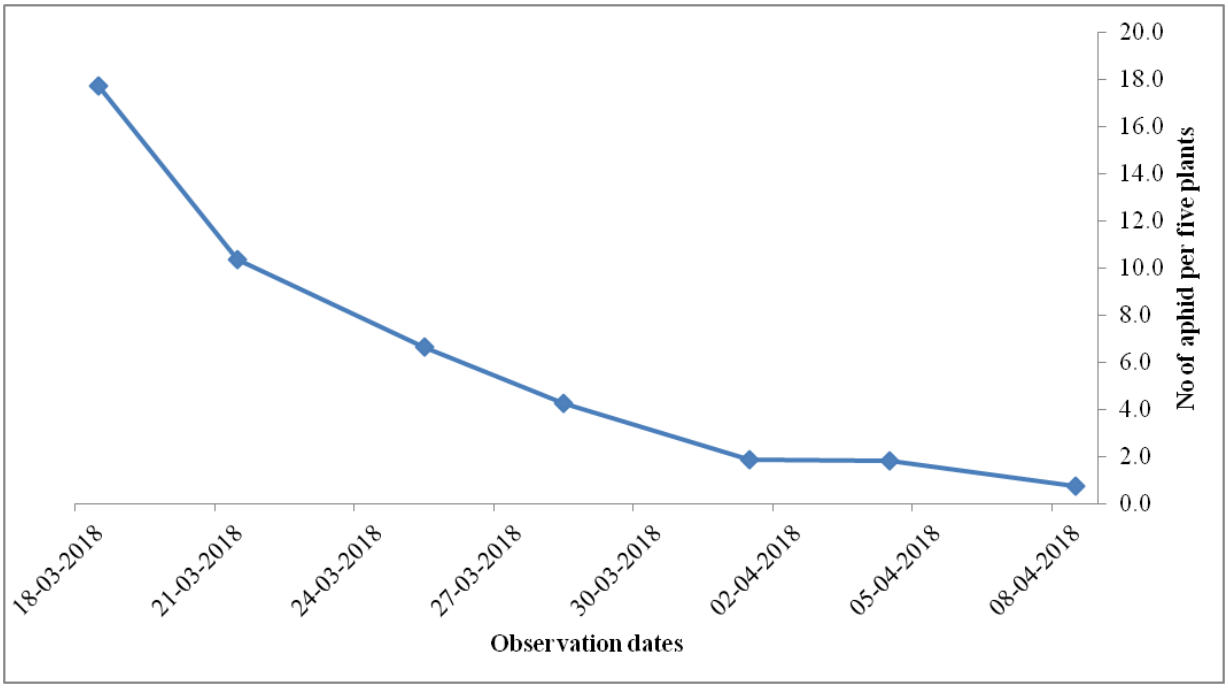

Fig: Population dynamics of aphid on okra cv. Supriya during Feb-May, 2018.

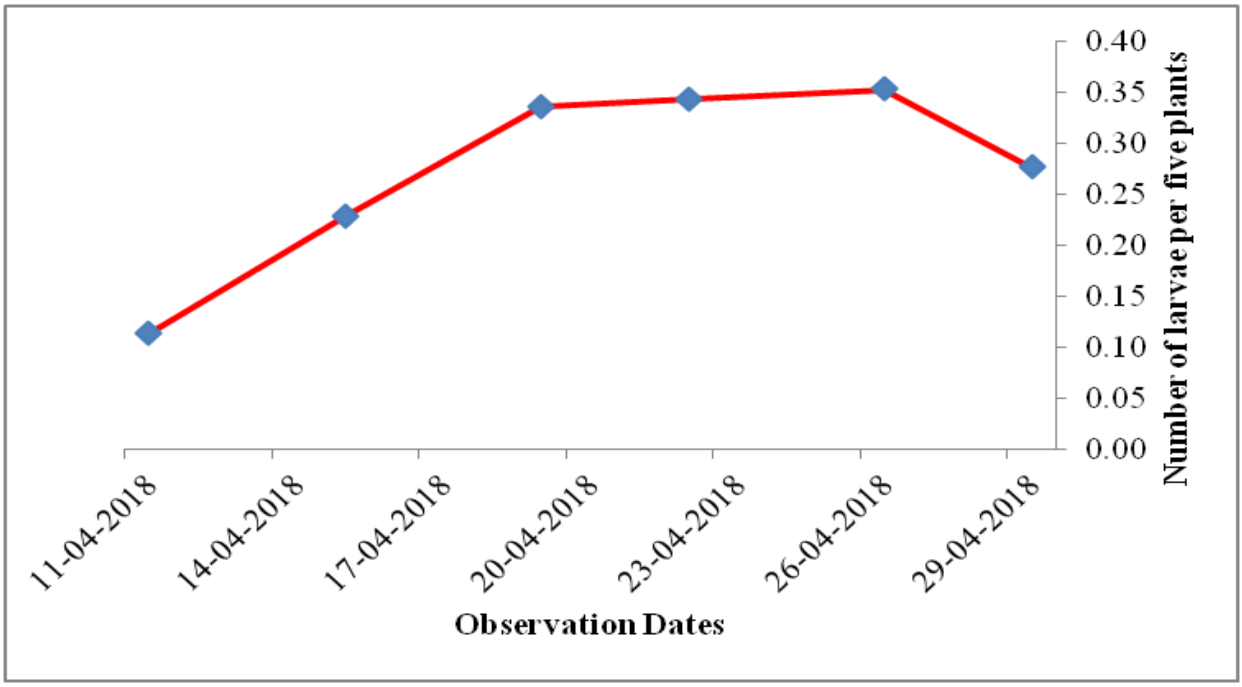

Fig: Population dynamics of *Helicoverpa armigera* on okra cv. Supriya during Feb-May, 2018.

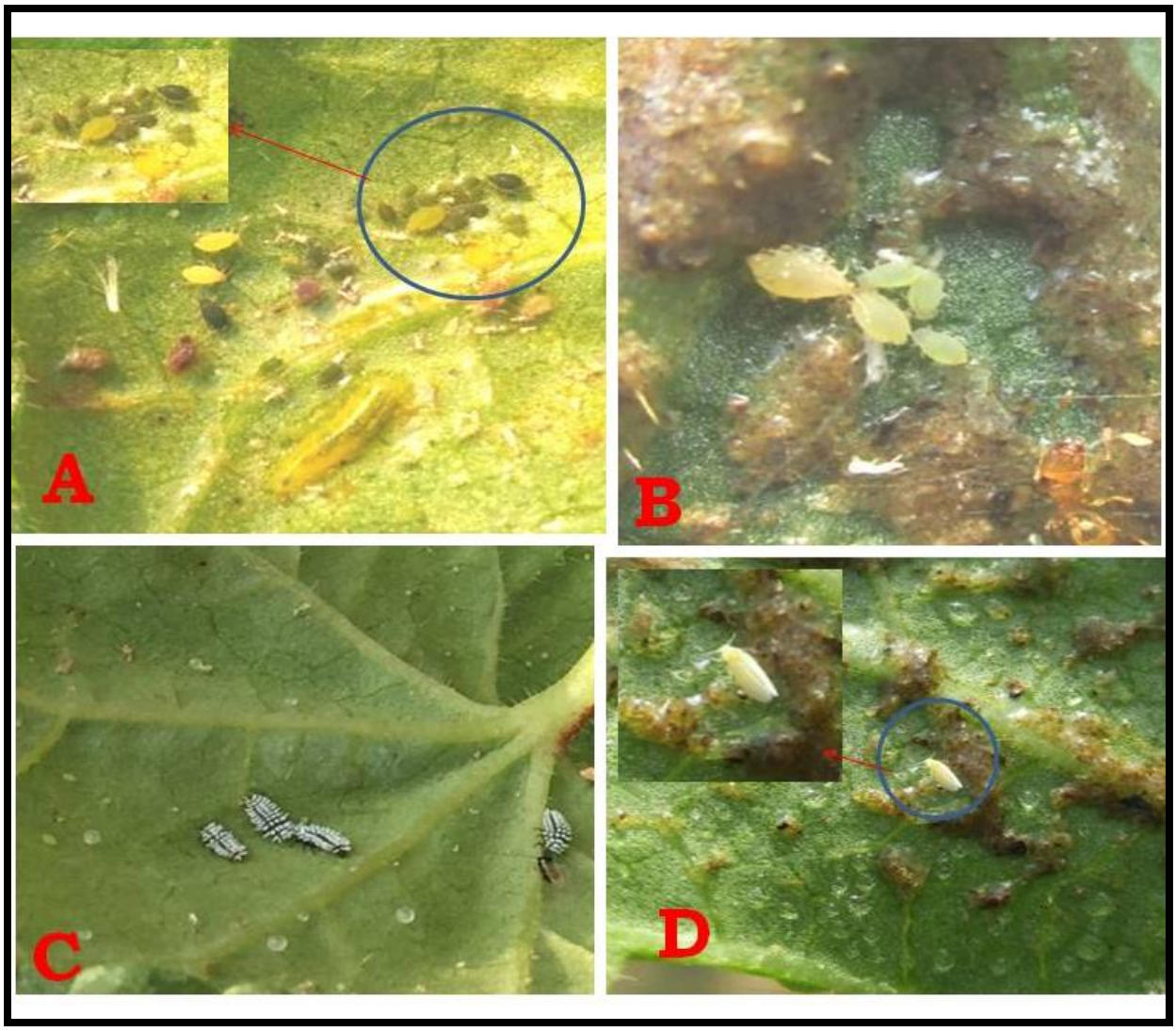

Fig3: Insect pest present at seedling stage of okra (A & B- Aphid (*Aphis gossypii*); C- Mealy bug (*Phenacoccus solenopsis*); D- White fly (*Bemesia tabaci*).

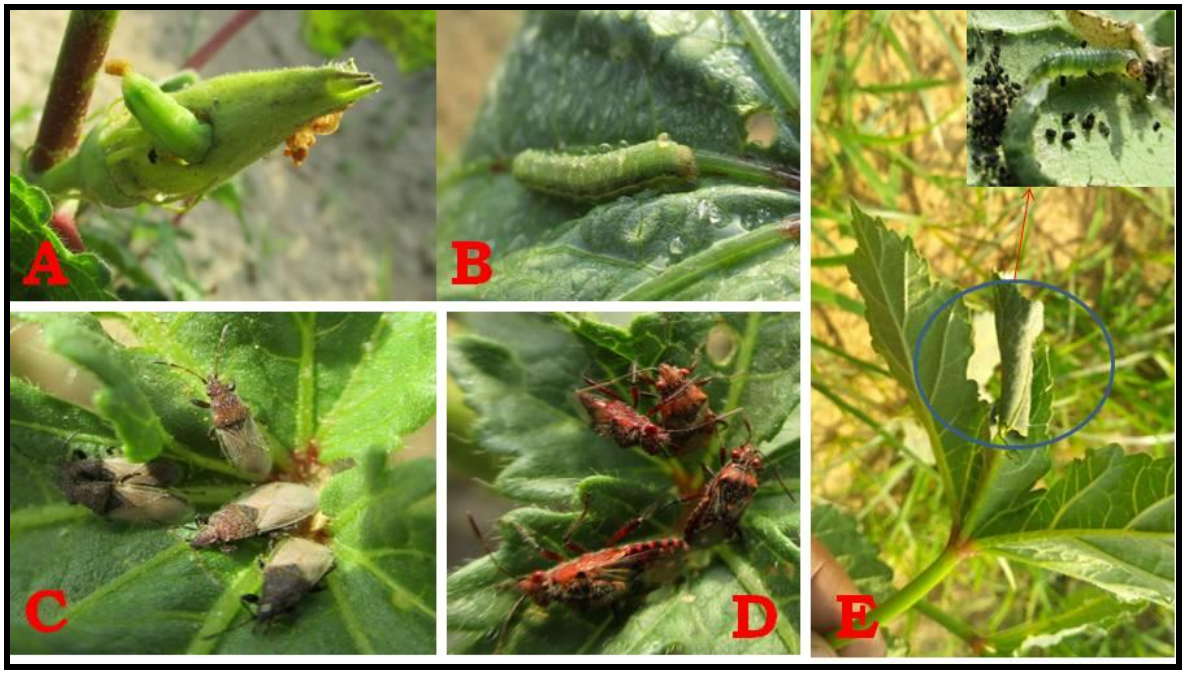

Fig3: Insect pest present at flowering and fruiting stage of okra (A & B- Pod borer (*Helicoverpa armigera*); C- Dusky bug (*Oxycarenus hyalinipennis*); D- Red cotton bug (*Dysdecus singulatus*);

E- Leaf roller (*Sylepta derogate*)

Fig4: Natural enemies present during research trials on okra cv. Supriya

Silent Finding:

- **Infestation of aphid is starting from (18-03-2018) in the field crop.**
- **Aphid, whitefly, mealy bug and red mites are observed in the flowering stage.**
- **Fruit borer infestation is occurring in the flowering stage.**
- **At the fruiting stage red cotton bug, dusky bug, leaf hopper and leaf hopper are observed.**
- **In the trail field natural enemies are also observed (ladybird beetle, syrphid fly, red ants and spiders.**

REFERENCES

Dabhi, M. V. 2007. Succession population dynamics and management of major insect pests of okra. M. Sc. (agri) thesis submitted to Anand Agricultural University, Anand.

Shukla, A., Pathak, S. C. and Agrawal, R. K.1997.) Seasonal incidence of okra shoot and fruit borer *Earias vittella* (Fab.) and effect of temperature on its infestation level. *Advances in Plant Sciences*, **10**(1): 169-172.

Zala, S. P., Patel, J. R. and Patel, N. C. 1999. Impact of weather on magnitude of *Earias vittella* (Fab.) infecting okra. *Indian Journal of Entomology*, **61**(4): 351-355.

Mandal, S. K. 2002. Management of key insect pests in summer sown okra, *Abelmoschus esculentus* L. Moench. Ph.D. Thesis, submitted to Rajendra Agricultural University, Samastipur.

Mandal, S. K., Sattar A. and Gupta, S. C. 2006. Population dynamics of *Earias vittella* Fab. In okra as influenced by weather parameter in North Bihar. *Journal of Agrometeorology*, **8**(2): 260-265.

Hosamani, A. C., Chowdary, L. R., Bheemanna, M. and Hanchinal, S. G. 2011. Field bioefficacy of Rynaxypyr 20 SC against fruit borer complex in okra

Bangar, Nilam, R. and Patel, J. J. 2012. Evaluation of various synthetic insecticides against *Earias vittella* fabricius infesting okra. *AGRES - An International e-Journal*, **1**(3): 367-375.

Parmar, K. D., Korat, D. M., Joshi, M. N., Patel, A. R. and Shah P. G. 2013. Relative bio-efficacy of insecticides/miticides against pest complex of okra. *Karnataka Journal Agricultural Science*, **26**(3): 375-378

Shimoge, D. and Vemuri, S. B. 2014. Bio-efficacy and dissipation of newer molecules against pests of okra. *Indian Journal of Advances in Plant Research*, **1**(4): 56-63.

Adilakshmi, A.; Korat, D. M. and Vaishnav, P. R. (2008b). Bio-efficacy of some botanicals, and their combination against major insect pest of okra. *Indian Journal of Entomology*, **68**(4): 369-374.

Patil, R. S. and Nanadihalli, B. S. (2009). Efficacy of promising botanicals against red spider mite on brinjal. *Karnataka Journal of Agricultural Sciences,* **21**(3): 690-692.

Norman, J. W. Jr. and Sparks, A. N. Jr. (1997). Cotton leaf hairs and silverleaf whiteflies in the lower Rio Grande Valley of Texas. In**:** Dugger, R. and Richter, D. A. [Eds.], Proceedings of the Belt. Cotton Production Research Conference, National Cotton Council, Memphis, TN, 1063-1064 pp.

A Mohanasundaram (2011) effect of newer pesticide schedules on the population of sucking pests and predators on okra. Pesticide Research Journal . 23(1): 55-63

Dhar, T. (2015) efficacy of imidacloprid and spinosad against pest complex of okra and tomato. International Journal of Bio-Resource, Environment and Agricultural Sciences. 1(3) : 126-131.

S.G.Kannake (2014) effectiveness of different insecticides against whitefly Bemisia tabaci genn. In relation to yellow vein mosaic virus (yvmv) on okra A thesis submitted to the mahatma phule krishi vidyapeeth, rahuri - 413 722, dist. Ahmednagar, maharashtra, india Page-84

Raghuraman, M.; Gupta, G. P. and Singh, R. P. (2004). Impact of certain leaf morphological characters of cotton on population of whitefly, *Bemisia tabaci* Genn. *Journal of Cotton Research and Development*, **18**(1): 81-84.

Naik, P. R. and Shekharappa, H. (2009). Field evaluation of different entomopathogenic fungal formulations against sucking pests of okra. *Karnataka Journal of Agricultural Sciences*, **22**(3): 575-578.

Sinha, S. N.; Chakrawarti, A. K. and Peshwani, K. M. (1981). Evaluation of some insecticidal schedules against important insect pest of okra for seed production. *Seed Research*, **9**(2): 154-161.