THESIS ABSTRACTS
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Agricultural Entomology

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VASANTRAO NAIK MARATHWADA KRISHI VIDYAPEETH, PARBHANI

Title	-	**Population dynamics and bio-efficacacy of new insecticides against insect pests of chilli**
Researcher	-	Baral, ShubhangiBhagwan
Research Guide	-	Zanwar, P.R.
Department	-	Agricultural Entomology
Subject	-	Agricultural Entomology
Degree	-	M.Sc
Thesis No.	-	1754
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033460
Abstract	-	

The experiment was conducted at Experimental Research Farm, Department of Agricultural Entomology, VasantraoNaikMarathwadaKrishiVidyapeeth, Parbhani, during the *Kharif* season of the year 2016-17 to study population dynamics and bio-efficacy of new insecticides against insect pests of chilli. The experiment was laid out in a randomized block design with 9 treatments replicated three times. The treatments comprised of fipronil 5 SC @ 1000 ml/ha, hexythiaziox 5.45EC @ 500 ml/ha, spinosad 45 SC @ 187.5 ml/ha, acetamiprid 20 SP @ 250 g/ha, fenpyroximate 5 EC @ 600 ml/ha, emamectin benzoate 5 SG @ 250 g/ha, spiromesifen 22.9 SC @ 250 ml/ha, diafenthiuron 50 WP @ 625 g/ha and untreated control. The observations on the effect of these insecticidal treatments on thrips, mites, white fly and fruit borer were recorded. The observations on population dynamics of thrips, mites, white fly and fruit borer also recorded.

The infestation of thrips, *Scirtothripsdorsalis* Hood was initiated in the third week of August (33rd meteorological week) and remained continue up to fourth week of December (51st meteorological week) during 2016-17. The data on correlation between meteorological factors and thrips population revealed that the population exhibited a significant positive correlation with maximum temperature while the correlation was negatively non significant with evening relative RH and average rainfall.

The whitefly,*Bemisiatabaci*Genn.appeared in the third week of August (33rd meteorological week) and continue up to fourth week of December (51st meteorological week). The population increased gradually and touched its peak in third week of October (42nd

meteorological week). The population exhibited significant positive correlation with maximum temperature and evaporation whereas negative and non significant correlation with rainfall, morning and evening RH and minimum temperature. The mite population persist throughout the crop season from fourth week of August (34th meteorological week) and was continue up to fourth week of December (51st meteorological week). The population increased gradually and touched its peak in the third week of October (42nd meteorological week). The fruit borer population touched its peak in the fourth week of November and showed the negatively non significant correlation with rainfall, morning RH, evening RH and minimum temperature.

The insecticides application at 25 & 45 days after transplanting showed that all the treatments were found effective against controlling pest complex of chilli as compared to untreated control. The treatment with spinosad 45 SC @ 187.5 ml/ha was found most effective against thrips, *Scirtothripsdorsalis* Hood followed by fipronil 5 SC @ 1000 ml/ha. Whereas the treatment with spinosad 45 SC @ 187.5 ml/ha was found effective against fruit borer, *Helicoverpaarmigera*Hub. followed by emamectin benzoate 5 SG @ 250 g/ha which were found at par with each other and recorded 100 per cent control after second application. The treatment with diafenthiuron 50 WP @ 625 g/ha was recorded superior control of whitefly, *Bemisiatabaci*Genn. Followed by spinosad 45 SC @ 187.5 ml/ha. The treatment with fenpyroximate 5 EC @ 600 ml/ha, recorded superior control of mites followed by spiromesifen 22.9 SC @ 250 ml/ha and hexythiaziox 5.45 EC @ 500 ml/ha which were found at par with each other.

The treatment with spinosad 45 SC @ 187.5 ml/ha recorded highest yield of greenchilli fruits followed by emamectin benzoate 5 SG @ 250 g/ha.

The overall results indicated that the treatment with spinosad 45 SC @ 187.5 ml/ha was found superior in controlling chillithrips& fruit borer, whereas the treatment with diafenthiuron 50 WP @ 625 g/ha was found superior in controlling chilli whitefly, Fenpyroximate 5 EC @ 600 ml/ha was found superior in controlling chilli mites.

Title	-	**Evaluation of sequential application of insecticides against pod borer complex of pigeonpea**
Researcher	-	Wagh, Sudam Ganesh
Research Guide	-	Bantewad, S.D.
Department	-	Agricultural Entomology
Subject	-	Agricultural Entomology
Degree	-	M.Sc
Thesis No.	-	1788
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033670

Abstract -

An investigation on "Evaluation of sequential application of insecticides against pod borer complex of pigeonpea" effect of insecticides on natural enemies, yield, and ICBR The field experiment was conducted at research farm, Department of Agricultural Entomology, Agriculture Research Station Badnapur. during*kharif* season of the year 2016-2017. The experiment was conducted under the Randomized Block Design (RBD) with eight treatments and three replications.

The treatments comprised of three sequential application of insecticides of acephate 75SP @ 2gm/lit, acetamiprid 20SP @ 0.2gm/lit,chlorantraniliprole 18.5%SC @ 0.3ml/lit >acephate 75SP @ 2gm/lit, chlorantraniliprole 18.5%SC @ 0.3ml/lit>acetamiprid 20SP @ 0.2gm/lit, chlorantraniliprole 18.5%SC @ 0.3ml/lit>indoxacarb 15.8 EC@ 0.7ml/lit>acetamiprid 20SP @ 0.2gm/lit, chlorantraniliprole 18.5%SC @ 0.3ml/lit > flubendiamide20WG@ 0.5 gm/lit >dimethoate 30 EC 1ml/lit,dimethoate 30 EC 1ml/lit and untreated control.

All the insecticides were found to be significantly superior in recording minimum population of pod borer complex i.e. (*H. armigera, M. obtusa, E. atomosa and M. vitrata*) over untreated control. Among different insecticides,chlorantraniliprolefollowed by flubendiamide and Diamthoate recorded the least population of pod borer, spotted pod borer, plume moth, and pod fly at 3,7 and 14 days after spray and which was stastistically with the sequential application of insecticides as chlorantraniliprole followed by indoxacarb and acetamiprid in respect of reducing the pod damage and higher grain yield.

In respect of predator population, all the treatments were found statististicallynon significant as there was uniform population on plant i.e. lady bird beetle and spider per plant. The results indicated that among all insecticideschlorantraniliprolefollowed by flubendiamide and diamthoate were found less effective onlady bird beetle and chlorantraniliprole followed by indoxacarb and acetamiprid found less effective spider population after all spray of insecticides.

Significantly higher grain yield were recorded in treatment chlorantraniliprole followed by flubendiamide and diamthoate (2506 kg/ha). and An experimental result on Incremental Cost Benefit Ratio shows that highest benefit cost ratio was obtained in chlorantraniliprolefollowed acetamiprid(1:12.52).

Title	-	**Seasonal incidence and management of thrips (Thripstabaci.L) in kharif onion**
Researcher	-	Sumalatha, B.V.
Research Guide	-	Kadam, D.R.
Department	-	Agricultural Entomology
Subject	-	Agricultural Entomology
Degree	-	M.Sc
Thesis No.	-	1732
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033315
Abstract	-	

The experiment was conducted at Experimental Research Farm Department of Agricultural Entomology, VNMKV, Parbhani, during the year 2016-2017 to study seasonal incidence and management of thrips (*Thripstabaci.* L) in*Kharif* onion.

The seasonal incidence of onion thrips was recorded during 27^{th} to 50^{th} meteorological weeks of 2016. The data indicated that the thrips population was high from second week of October to fourth week of November (38^{th} to 44^{th} SMW), whereas the peak incidence (16.4 thrips/plant) was recorded during 44^{th} SMW. However considerable incidence of thrips was observed during 33^{rd} to 46^{th} SMW. The natural enemies population was maximum from second week of October to fourth week of November (38^{th} to 44^{th} SMW) indicating positive interaction between thrips and coccinelids on onion.

Eight insecticides including acetamiprid 20 SP @ 20 g. a.i. ha^{-1}, emamectin benzoate 5 SG @ 10 g. a.i. ha^{-1}, fipronil 5 SC @ 50 g. a.i. ha^{1}, flonicamid 50 SG @ 75 g. a.i. ha^{-1}, imidacloprid 17.8 SL @ 25 g. a.i. ha^{-1}, lamdacyhalothrin 5 EC @ 15 g. a.i. ha^{-1}, spinosad 45 SC @ 73 g. a.i. ha^{-1} and thiamethoxam 25 WG @ 25 g. a.i. ha^{-1} were tested to study their comparative efficacy against thrips infesting of onion. The pooled data on number of thrips (No./plant) influenced by the insecticidal treatments revealed that the surviving population of nymphs and adults of thrips in all the insecticidal treatments were comparatively low indicating that these insecticides were significantly effective on onion.

Minimum thrips population at 14 DAS was noticed from the plants treated with spinosad 45 SC @ 73 g a.i. ha^{-1} which was the most effective treatment (4.95 thrips/plant) and on par with

fipronil @ 25 g a.i. ha^{-1} (5.36 thrips/plant) followed by lamdacyhalothrin (6.76 thrips/plant) and thiamethoxam (6.83 thrips/plant). Maximum thrips count was recorded from plants sprayed with flonicamid 50 SG @ 75 g. a.i. ha^{-1} (9.63 thrips/plant).

The overall data effects on ladybird beetle indicated that flonicamid 50 SG @ 75 g. a.i. ha^{-1} (3.17 beetles/plant) followed by spinosad 45 SC @ 75 g a.i ha^{-1} (2.98 beetles/plant) were found comparatively safer to predators as compared to all other treatments.

The highest bulb yield was recorded in spinosad 45 SC @ 73 g a.i/ha t/ha (18.03 t/ha) treated plots followed by fipronil (16.78 t/ha).

Title	-	**Bioefficacy of newer insecticides against onion thrips (Thripstabaci L.)**
Researcher	-	Thakare, YogitaChatur
Research Guide	-	Kadam, D.R.
Department	-	Agricultural Entomology
Subject	-	Agricultural Entomology
Degree	-	M.Sc
Thesis No.	-	1735
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033318
Abstract	-	

The experiment was conducted at Research Farm Department of Agricultural Entomology, VNMKV, Parbhani during *Rabi* 2016-17 to study bioefficacy of newer insecticides against onion thrips (*Thripstabaci*L.)

The observations on seasonal incidence of onion thrips were recorded during 47th to 11th meteorological weeks of 2016-17. The data indicated that the thrips population was ranged from 1.46 (47 SMW) to 20.86 (08 SMW) thrips/plant. During first five weeks of observations thrips population was very less but from 1st SMW to 11th SMW the thrips population was continuously rising showing maximum incidence during 8th SMW (20.86 thrips/plant). During present course of study the thrips population was very high during summer (February to March) as compared to winter (December to January).

Seven insecticides including fipronil 5 SC @ 50 g a.i. ha^{-1},imidacloprid 17.8 SL @ 25 g a.i. ha^{-1},emamectin benzoate 5 SG @ 10 g a.i. ha^{-1},cypermethrin 25 EC @ 30 g a.i. ha^{-1}, thiamethoxam 25 WG @ 25 g a.i. ha^{-1}, clothianidin 50 WDG @ 100 g. a.i. ha^{-1} and flonicamid 50 WG @ 75 g. a.i. ha^{-1} were tested to study their comparative bioefficacy against onion thrips. The pooled data on incidence of thrips (No./plant) influenced by the insecticidal treatments revealed that the surviving population of nymphs and adults of thrips in all the insecticidal treatments were comparatively low indicating that these insecticides were significantly effective against onion thrips.

Minimum thrips population at 14 DAS was noticed from the plants treated with fipronil 5 SC @ 50 g a.i. ha^{-1} (4.80 thrips/plant) followed by cypermethrin 25 EC @ 30 g a.i. ha^{-1} (5.69 thrips/plant), emamectin benzoate 5 SG @ 10 g a.i. ha^{-1} (5.79 thrips/plant) and

thiamethoxam 25 WG @ 25 g a.i. ha^{-1} (6.16 thrips/plant). These treatments were at par with each other. Maximum thrips count was recorded from plot sprayed with imidacloprid 17.8 SL @ 25 g a.i. ha^{-1} (8.73 thrips/plant).

The newer insecticides tested for their safety to honey bees revealed that maximum bee visits were observed at 1 DAS during peak intensity (12 to 14 hrs) period in plots sprayed with flonicamid (2.80 bees/ 5 umbels /min) followed by thiamethoxam (2.33 bees/ 5 umbels /min). Plots sprayed with fipronil showed less honey bee visits (0.80 bees/ 5 umbels /min).

Seven different concentrations of commercial and conventional bee attractants *viz*, Bee-Q @ 1%, 1.25 % and 1.50 %, sugar solution 10 % and 20 %, jaggery solution 10 % and 20% were tested as bee attractants in onion seed production. Commercial bee attractants Bee-Q @ 1.50 % , Bee-Q @ 1.25 % and Bee-Q @ 1.50 % found most superior in attracting bees at 14 DAS (4.66, 4.36 and 4.03 bees/ 5 umbels/ min), during peak intensity period (12 to 14 hrs) followed by conventional bee attractants 20% jaggery solution (3.86 bees/ 5 umbels/ min) and 20% sugar solution (3.66 bees/ 5 umbels/ min).

Title	-	**Effect of different spraying dates on management of pod borer complex of pigeonpea**
Researcher	-	Shinde, SachinVitthalrao
Research Guide	-	Kadam, B.S.
Department	-	Agricultural Entomology
Subject	-	Agricultural Entomology
Degree	-	M.Sc
Thesis No.	-	1738
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033323
Abstract	-	

The experiment was conducted at Experimental Research Farm Department of Agril. Entomology, VasantraoNaikMarathwadaKrishiVidyapeeth, Parbhani, during the *Kharif*2016.The studies on seasonal incidence of major pests of pigeonpea revealed that the incidence of *Helicoverpaarmigera* commenced from the 43^{th} to 1^{st} meteorological weeks of 2016-2017. The data revealed that population ranged from 0.60 to 4.08/plant. The incidence of *E. atomosa* was observed in 47^{th} to 2^{nd} MW and population ranged from 0.19 to 3.87 larvae/ plant. The incidence of *M. obtusa*was observed during 49^{th} to 2^{nd} MW and ranged from 1.84 to 3.20/plant.

To study effect of different spraying dates on management of pod borer complex of pigeonpea in three different cultivars in split plot design. Two consecutive sprays of emamectin benzoate 5% SG @ 4.4 gm/10 lit. water followed by flubendiamide 39.3% SC @ 3.9 ml/10 lit. water at 15 days interval were taken at various crop growth stages. Three cultivars of pigeon pea *viz.*, BDN-711 (early), BSMR-716 (mid late), BSMR-736 (late) were observed under field condition. The results revealed that in BDN-711 spraying at 50% bud initiation stage was superior treatment where as in BSMR-716 crop sprayed at 10% flowering stage recorded minimum pest incidence and produced higher yield. In the cultivar BSMR-736, crop sprayed at flower initiation stage recorded minimum incidence of *H. armigera*and maximum yield. In above three cultivars, the incidence of *E. atomosa*was minimum, when the crop was sprayed at pod formation stage.

Subsequently the observations on natural enemies of pod borers were recorded. It was observed that lady bird beetle count was maximum at 50% flowering stage in BSMR-736, BSMR-716 and BDN-711 followed by pod formation stage.

Title	-	**Seasonal incidence of onion thrips (Thripstabaci L.) in onion seed production ecosystem**
Researcher	-	Pawar, SonaliNandu
Research Guide	-	Kadam, D.R.
Department	-	Agricultural Entomology
Subject	-	Agricultural Entomology
Degree	-	M.Sc
Thesis No.	-	1741
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033336
Abstract	-	

The experiment was conducted at Research Farm Department of Agricultural Entomology, VNMKV, Parbhani during *Rabi* 2016-17 to study bioefficacy of newer insecticides against onion thrips (*Thripstabaci*L.)

The observations on seasonal incidence of onion thrips were recorded during 47th to 11th meteorological weeks of 2016-17. The data indicated that the thrips population was ranged from 1.46 (47 SMW) to 20.86 (08 SMW) thrips/plant. During first five weeks of observations thrips population was very less but from 1st SMW to 11th SMW the thrips population was continuously rising showing maximum incidence during 8th SMW (20.86 thrips/plant). During present course of study the thrips population was very high during summer (February to March) as compared to winter (December to January).

Seven insecticides including fipronil 5 SC @ 50 g a.i. ha^{-1},imidacloprid 17.8 SL @ 25 g a.i. ha^{-1},emamectin benzoate 5 SG @ 10 g a.i. ha^{-1},cypermethrin 25 EC @ 30 g a.i. ha^{-1}, thiamethoxam 25 WG @ 25 g a.i. ha^{-1}, clothianidin 50 WDG @ 100 g. a.i. ha^{-1} and flonicamid 50 WG @ 75 g. a.i. ha^{-1} were tested to study their comparative bioefficacy against onion thrips. The pooled data on incidence of thrips (No./plant) influenced by the insecticidal treatments revealed that the surviving population of nymphs and adults of thrips in all the insecticidal treatments were comparatively low indicating that these insecticides were significantly effective against onion thrips.

Minimum thrips population at 14 DAS was noticed from the plants treated with fipronil 5 SC @ 50 g a.i. ha^{-1} (4.80 thrips/plant) followed by cypermethrin 25 EC @ 30 g a.i. ha^{-1} (5.69 thrips/plant), emamectin benzoate 5 SG @ 10 g a.i. ha^{-1} (5.79 thrips/plant) and

thiamethoxam 25 WG @ 25 g a.i. ha^{-1} (6.16 thrips/plant). These treatments were at par with each other. Maximum thrips count was recorded from plot sprayed with imidacloprid 17.8 SL @ 25 g a.i. ha^{-1} (8.73 thrips/plant).

The newer insecticides tested for their safety to honey bees revealed that maximum bee visits were observed at 1 DAS during peak intensity (12 to 14 hrs) period in plots sprayed with flonicamid (2.80 bees/ 5 umbels /min) followed by thiamethoxam (2.33 bees/ 5 umbels /min). Plots sprayed with fipronil showed less honey bee visits (0.80 bees/ 5 umbels /min).

Seven different concentrations of commercial and conventional bee attractants *viz*, Bee-Q @ 1%, 1.25 % and 1.50 %, sugar solution 10 % and 20 %, jaggery solution 10 % and 20% were tested as bee attractants in onion seed production. Commercial bee attractants Bee-Q @ 1.50 % , Bee-Q @ 1.25 % and Bee-Q @ 1.50 % found most superior in attracting bees at 14 DAS (4.66, 4.36 and 4.03 bees/ 5 umbels/ min), during peak intensity period (12 to 14 hrs) followed by conventional bee attractants 20% jaggery solution (3.86 bees/ 5 umbels/ min) and 20% sugar solution (3.66 bees/ 5 umbels/ min).

Title	-	**Effect of neonicotinoids on foraging behavior of honey bees on safflower**
Researcher	-	Matre, YogeshBabasaheb
Research Guide	-	Latpate, C.B.
Department	-	Agricultural Entomology
Subject	-	Agricultural Entomology
Degree	-	M.Sc
Thesis No.	-	1744
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033340
Abstract	-	

The present investigation was carried out for the Effect of Neonicotinoids on foraging behaviour of honey bees on safflower at Department of Agriculture Entomology, College of Agriculture, Parbhani during *rabi*2016-17. The results obtained are summarized below.

The Effect of imidacloprid 17.8 % SL insecticides spraying at full dose and visit of honey bees initially low on 1st day after spraying (was in the range of 1.66 to 1.00 bees/m^2) followed by 5th day after spraying (was in the range of 1.66 to 2.00 bees/m^2). The visit of honey was initially high on 14th day after spraying and found at par (in the range of 3.33 to 4.00 bees/m^2) with honey bees observed before spraying of imidacloprid 17.8 SL followed by 10th day after spraying (in the range of 2.00 to 3.00 bees/m^2).

The Effect of imidacloprid 17.8 % SL spraying insecticides at half dose and visit of honey bees was initially high in before spraying of insecticides (5.66 to 7.33 bees/m^2) and initially low on 1st day after spraying (was in the range of 2.00 to 3.33 bees/m^2) followed by 5th day after spraying (was in the range of 2.33 to 3.00 bees/m^2). The visit of honey was initially high on 14th day after spraying and found at par (in the range of 5.00 to 5.33 bees/m^2) with honey bees observed before spraying of imidacloprid 17.8 SL followed by 10th day after spraying (in the range of 2.33 to 4.00 bees/m^2).

However results revealed that the comparison of full dose and half dose of imidacloprid among which at half dose of imidacloprid has found to more visits of honey bees than the full dose of imidacloprid spraying on safflower.

The Effect of acetamiprid 20% SP spraying insecticides at full dose visits of honey bees was initially low on 1st day after spraying (was in the range of 2.66 to 3.66 bees/m^2) followed by 5th day after spraying (was in the range of 3.00 to 4.66 bees/m^2). The visit of honey was initially high in 14th day after spraying and found at par (in the range of 6.00 to 6.66 bees/m^2) with honey bees observed before spraying of acetamiprid 20% SP followed by 10th day after spraying (in the range of 5.00 to 6.77 bees/m^2) honey bees population.

However results revealed that the comparison of full dose and half dose of acetamiprid among which at that half dose of acetamiprid has found more visits of honey bees than the full dose of acetamiprid spraying on safflower.

However results revealed that comparison between Imidacloprid and Acetamiprid were found that Acetamiprid was safest to honey bees as compared to Imidacloprid insecticide.

The intensity of *Apisindica, Apisflorea, Apismellifera, Apisdorsata, Trigona*spp. and other pollinators were reached at its peak 10.00 - 12.00 hrs. The intensity of all the bees was found to be highest at 7th day after 10 per cent flowering.

The maximum time spent for pollen foraging (8.70 hrs) was recorded by *A. indica*and minimum (6.45 hrs) by *Trigona*spp. The number of flowers visited per minute and time of pollen and nectar foraging were minimum in case of *A. mellifera*.

As many as 19 species of pollinators were recorded on safflower out of these, 8 species belong to order Hymenoptera, 5 species from Lepidoptera, 4 species from Diptera and 2 species from ColeopteraAmong the total pollinators *A. florae* was predominant pollinator and constituted 34.40 per cent followed by *Trigona*spp. which constituted 62 per cent and *Apismellifera*constituted 23.55 per cent.

Title	-	**Evaluation of newer insecticides against bollworm complex in cotton**
Researcher	-	Dahe, ManishaManikrao
Research Guide	-	Zanwar, P.R.
Department	-	Agricultural Entomology
Subject	-	Agricultural Entomology
Degree	-	M.Sc
Thesis No.	-	1784
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033663
Abstract	-	

The investigations on Evaluation of newer insecticides against bollworm complex in cotton were carried out to study population dynamics of major insect pests and their natural enemies, at Department of Agricultural Entomology, VNMKV, Parbhani during *Kharif* 2016-17. The NH-615 cotton variety was used for the study. Experiment of evaluation of insecticides against bollworm complex was conducted in RBD with three replications and 9 treatments. The silent findings of these aspects are summarized below. Studies on population dynamics of major insect pests clearly indicated that bollworms were the predominant pests than sucking pests and their incidence recorded throughout the season.On the basis of population dynamics of larval population, fruiting bodies damage, rosette flowers due to pink bollworm and boll damage during *Kharif* 2016-17 revealed that incidence was more to variation in weather parameters. Population dynamics of larval population of bollworm indicate that the population of *Eariasspp* was negligible. The correlation studies indicated that the correlation exists between pest population and different weather parameters. Also there was a combined effect of weather parameters on pest population and cotton. It showed per cent variation in pest population and their incidence along with their direct and indirect effects.Mostly, the correlation between larval population *viz.,E. vittella, H. armigera* with weather parameters obtained was significant and definite as the incidence of bollworms on cotton was due to the variation in weather parameters like temperature, rainfall and humidity. However, there were no confirmed reports as to how the abiotic factors like temperature, rainfall and humidity influence the abundance of the pink bollworm populations on cotton.

The overall effect of insecticides in cotton against major pests indicates that chlorantraniliprole 18.5 SC @ 0.005 per cent proved as major factor for recording highest yield of cotton, with effectiveness for the control of bollworms infesting cotton. Chlorantraniliprole 0.005 per cent and were found to be relatively safer to natural enemies.

Title	-	**Management of sucking pests of *Bt*cotton underhigh density planting system**
Researcher	-	Nikam, T.A.
Research Guide	-	Latpate, C.B.
Department	-	Agricultural Entomology
Subject	-	Entomology
Degree	-	Ph.D.
Thesis No.	-	17183
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034081
Abstract	-	

An investigation on "M**anagement of sucking pests of *Bt*cotton underhigh density planting system**" was carried out at Department of Agricultural Entomology, VNMKV, Parbhani during *Kharif* 2015 and 2016. The present investigation were studied with the objectives such as, to study population dynamics of major insect pests and their natural enemies, efficacy of conventional and newer insecticides sucking pests, persistence toxicity of conventional and newer insecticides against leafhopper (*A. biguttullabiguttula)*andestimation of yield losses due to sucking pests of *Bt* cottonunderhigh density planting system. The Balwan cotton variety was used for the study. The experiment of efficacy of conventional and newer insecticides sucking pests was conducted in RBD with three replications and nine treatments,the laboratory experiment of residual toxicity of conventional and newer insecticides was tested against leafhopper *A. biguttulabiguttula*at 1, 3, 7, 10, 14 and 19 days after first, second and third application of insecticides, for estimation of yield losses, the experiment was carried out in paired plot design with fourteen replications and two treatments.

The salient findings of these aspects are summarized below. Studies on population dynamics of sucking pests clearly indicated that, sucking pests incidence was varied throughout the season. On the basis of population dynamics of sucking pest *viz.*, aphid, leafhopper, thrips and whitefly population during *Kharif* 2015 and 2016 revealed that, the incidence was more in *Kharif* 2015 than *Kharif* 2016 due to seasonal variation in weather parameters. Further, with regard to population dynamics of predators like coccinellids, chrysopids, syrphidsand spiders in high density planting system of *Bt*cotton showed more population of predators in *Kharif* 2015 than *Kharif* 2016. The predators were present throughout the cropping period when there were

more incidences of sucking pests. The correlation studies indicated that, the correlation exists between pest population and different weather parameters. Also there was a combined effect of weather parameters on pest population and their incidence on high density planting system of *Bt* cotton. It also showed that, the per cent variation in pest population and their incidence along with their direct and indirect effects. Mostly, the significant correlation between sucking pests population *viz.*, aphid, leafhopper, thrips and whitefly with weather parameters was obtained under high density planting system of *Bt* cotton and it was due to variation in weather parameters like temperature, rainfall, rainy days, humidity, bright sunshine.

The efficacy results indicated that among all insecticides flonicamid 50% WG was found most effective against aphid, leafhopper, whitefly and fipronil 5% SC against thrips in reducing sucking pest population. The overall effect of insecticides in high density planting system of *Bt*cotton against sucking pests indicated that flonicamid 50% WG proved as major factor for recording highest yield. Further, these insecticide interventions found to be safe to the natural enemy activity as there was no significant variation among the treatments with respect to the natural enemies population (Lady bird beetle *Chrysopa*, Spidersand syrphid maggots). Hence, these insecticides can safely be included in IPM of cotton for sucking pests, which are increasing in trend.

The order of persistence toxicity of conventional and newer insecticides *viz.*, imidaclopride, acetamiprid, chlothinidin, flonicamid, diafenthiuron , fipronil, acephate was tested against *Bt* cotton leafhopper *A. biguttulabiguttula*, the order of relative residual toxicity of conventional and newer insecticides based on PT and LT_{50} values were flonicamid>dinotefuron>chlothinidin>imidaclopride>fipronil>diafenthiuron>acephate. The highest PT and LT_{50} value were obtained due to flonicamid 50% WG followed by dinotofuron 20 SG against cotton leafhopper after three spraying.

The studies on estimation of yield losses due to sucking pests *viz.*, leafhoppers, aphids, thrips and whiteflies, observed that on an average significantly more yield (18.67 q/ha) was obtained under protected condition as compared to unprotected condition (12.47 q/ha) with avoidable loss of 33.02 % per cent by unprotected condition over protected condition ones.

Title	-	**Management of major pests of *kharif* sorghum**
Researcher	-	Sonawane, ChetanKalidas
Research Guide	-	Mohammad, Ilyas
Department	-	Agricultural Entomology
Subject	-	Entomology
Degree	-	M.Sc
Thesis No.	-	17185
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034086
Abstract	-	

A field experiment was conducted with the title Management of major pests of *kharif* sorghum. In *Kharif* season 2016 at Sorghum Research Station, VNMKV Parbhani (MS) India. The experiment was laid out in Randomized Block Design with Eight treatments and three replications. The seed of sorghum hybrid SPH-1641 was sown on 01st July 2016 by dibbling. The gross plot size was 5.4m X 4m and spacing was 45 X 15 cm.

For the management of major pest, T_2 (Seed treatment with Thiamethoxam 350 FS @7ml/kg of seed + Spray of Quinolphos 25 EC @ 20 ml/ 10 lit. of water at milk stage) found most effective against shoot fly followed by T_1 (Seed treatment with Imidacloprid 48 per cent FS @14ml/kg of seed + spray of Cypermethrin 25 EC @ 5 ml/10 lit. of water at milk stage). T_2 (Seed treatment with Thiamethoxam 350 FS @ 7 ml/kg of seed + Spray of Quinolphos 25 EC @ 20 ml/ 10 lit. of water at milk stage) recorded lowest stem borer dead hearts followed by T_1 (Seed treatment with Imidacloprid 48 per cent FS @ 14 ml/kg of seed + spray of Cypermethrin 25 EC @ 5 ml/10 lit. of water at milk stage) and T_4 (Soil application of Carbofuran 3% G @ 20 kg/ha at the time of sowing + Emamectin benzoate 5 SG @ 3.5 g/10lit. of water at milk stage). T_4 (Soil application of Carbofuran 3% G @ 20 kg/ha at the time of sowing + Emamectin benzoate 5 SG @ 3.5 g/10lit. of water at milk stage) found most effective against ear head worm population followed by T_3 (Soil application of Phorate 10% G @ 25 kg/ha at the time of sowing + spray of Novaluron 10 EC @ 10 ml/10lit. of water at milk stage) and T_2 (Seed treatment with Thiamethoxam 350 FS @ 7 ml/kg of seed + Spray of Quinolphos 25 EC @ 20 ml/ 10 lit. of water at milk stage). T_3 (Soil application of Phorate 10 % G @ 25 kg/ha at the time of sowing + spray of Novaluron 10 EC @ 10 ml/10 lit. of water at milk stage) found most effective against

ear head bug populationfollowed by T_2 (Seed treatment with Thiamethoxam 350 FS @ 7 ml/kg of seed + Spray of Quinolphos 25 EC @ 20 ml/ 10 lit. of water at milk stage) and T_6 (Spraying of Oxydemeton-methyl 25 EC @ 20 ml/10 lit. of water at 14 DAE followed by Spray of Quinolphos 25 EC @ 20 ml/ 10 lit. of water at milk stage). Among the different treatments used against major pest of sorghum the maximum grain yield was obtained in T_4 (Soil application of Carbofuran 3% G @ 20 kg/ha at the time of sowing + Emamectin benzoate 5 SG @ 3.5 g/10 lit. of water at milk stage) which was at par with T_3 (Soil application of Phorate 10% G @ 25 kg/ha at the time of sowing + spray of Novaluron 10 EC @ 10 ml/10lit. of water at milk stage) and T_6 (Spraying of Oxydemeton-methyl 25 EC @ 20 ml/10 lit. of water at 14 DAE followed by Spray of Quinolphos 25 EC @ 20 ml/ 10 lit. of water at milk stage) while maximum fodder yield was obtained in T_1 (Seed treatment with Imidacloprid 48 % FS @ 14 ml/kg of seed + spray of Cypermethrin 25 EC @ 5 ml/10 lit. of water at milk stage) which was at par with T_2 (Seed treatment with Thiamethoxam 350 FS @ 7 ml/kg of seed + Spray of Quinolphos 25 EC @ 20 ml/ 10 lit. of water at milk stage), T_4 (Soil application of Carbofuran 3% G @ 20 kg/ha at the time of sowing + Emamectin benzoate 5 SG @ 3.5 g/10lit. of water at milk stage) and T_3 (Soil application of Phorate 10% G @ 25 kg/ha at the time of sowing + spray of Novaluron 10 EC @ 10 ml/10 lit. of water at milk stage). As far as the economics were concern the T_1 (Seed treatment with Imidacloprid 48 % FS @ 14 ml/kg of seed + spray of Cypermethrin 25 EC @ 5 ml/10 lit. of water at milk stage) proved to be the most economic insecticidal treatment against major pest of sorghum which was followed by T_2 (Seed treatment with Thiamethoxam 350 FS @ 7 ml/kg of seed + Spray of Quinolphos 25 EC @ 20 ml/ 10 lit. of water at milk stage) (1:16.15), T_6 (Spraying of Oxydemeton-methyl 25 EC @ 20 ml/10 lit. of water at 14 DAE followed by Spray of Quinolphos 25 EC @ 20 ml/ 10 lit. of water at milk stage).

The population dynamics of major pests and their natural enemies in sorghum in years showed the incidence and peak time of the pests and natural enemies. The initiation of shoot fly eggs, dead heart due to shoot fly, stem borer dead hearts, ear head worm, lady bird beetle and chrysopa eggs was during 27^{th}, 28^{th}, 31^{th}, 38^{th}, 35^{th}, and 38^{th} MW, respectively during 2016.The peak incidence of shoot fly eggs, dead heart due to shoot fly, stem borer dead hearts, ear head worm, lady bird beetle and chrysopa eggs was observed during 28^{th}, 31^{th}, 43^{th}, 39^{th} , 35^{th}, and 41^{st} MW, respectively.

Title	-	**Pest management in cauliflower (*Brassica oleracea* var. *botrytis*)**
Researcher	-	Bhede, BaswarajVishwanath
Research Guide	-	Bhosle, B.B
Department	-	Agricultural Entomology
Subject	-	Entomology
Degree	-	Ph.D.
Thesis No.	-	17190
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034108

Abstract -

The investigations on 'Pest management in cauliflower (*Brassica oleracea* var. *botrytis*)' were carried out to study seasonal incidence and management of major insect pests of cauliflower and to monitor insecticide resistance in aphids on cauliflower at Department of Agricultural Entomology, VasantraoNaikMarathwadaKrishiVidyapeeth, Parbhani during *rabi* 2015-16 and 2016-17. To study seasonal incidence, the seedlings of cauliflower were transplanted in 100 m^2 area and weekly observations were conducted. To study management of insect pests, the experiment was laid out in randomized block design with ten treatments and three replications. To monitor insecticide resistance, bioassay was carried out.

Aphid *B. brassicae* initiated during 48th MW (26 Nov.-2 Dec.) and 50th MW (10-16 Dec.) and reached its peak activity during 52nd MW (24-31Dec.) and 1st MW (1-7 Jan.) in 2015-16 and 2016-17, respectively. The incidence of diamondback moth *P. xylostella* was started in 52nd MW (24-31 Dec.) during both years. The peak activity was noticed during 4th MW (22-28 Jan.) in 2015-16 and during 3rd MW (15-21 Jan.) in 2016-17. The larva of leaf webber*C. binotalis* was first spotted during 49th MW (3-9 Dec.) and attained peak during 2nd MW (8-14 Jan.) in 2015-16, while in 2016-17, it was first noticed during 51st MW (17-23 Dec.) and peak was observed in 3rd MW (15-21 Jan.). The initiation and peak activity of tobacco leaf eating caterpillar *S. litura* was observed during 51st MW (17-23 Dec.) and 2nd MW (8-14 Jan.) in 2015-16 and during 49th MW (3-9 Dec.) and 1st MW (1-7 Jan.) in 2016-17, respectively. The larva of green semilooper*T. ni* was first observed during 51st MW (15-23 Dec.) in 2015-16 and 1st MW (1-7 Jan.) in 2016-17. The peak was attained in 3rd MW (15-21 Dec.) in both years. The activity of tussock moth larva was initiated during 52nd MW (24-31 Dec.) in 2015-16 and during 50th MW (10-16 Dec.) in

2016-17. The peak activity was noticed in 3rd MW (15-21 Jan.) in both years. The incidence of head borer was very less during both years. It was initiated in 50th MW and 52nd MW in 2015-16 and 2016-17, respectively. The syrphid fly eggs were first noticed in 49th MW (3-9 Dec.) and 50th MW (10-16 Dec.) during 2015-16 and 2016-17, respectively, while peak was observed in 52nd (24-31 Dec.) in both years. The maggots of syrphid fly was first spotted in 50th MW (10-16 Dec.) in 2015-16 and in 51st MW (17-23 Dec.) in 2016-17. The peak activity was observed during 1st MW (1-7 Jan.) and 52nd MW (24-31 Dec.) in 2015-16 and 2016-17, respectively. The ladybird beetle population was first noticed in 50th MW and attained peak in 1st MW during both years. The mummified aphids were first noticed in 50th MW during both years. The peak was noticed in 52nd MW in 2015-16 and in 1st MW in 2016-17. The parasitization of lepidopterous larva was ranged from 5.00 to 35.00 per cent during 2015-16, whereas 5.00 to 30.00 per cent in 2016-17. The highest parasitization was noticed in the larvae collected during 3rd MW during both years. Cyantraniliprole 10.16 % OD, buprofezin 25 % SC and flonicamid 50 % WG were proved to be most effective insecticides against aphid on cauliflower. For management of lepidopteran insect pests on cauliflower such as diamondback moth, leaf webber, tobacco leaf eating caterpillar, semilooper, tussock moth and head borer, the most effective insecticides were cyantraniliprole 10.16 % OD, emamectin benzoate 5 % SG, chlorantraniliprole 18.5 % SC and flubendiamide 20 % WG. Aphid on cauliflower had developed resistance to imidacloprid.

Title	-	**Studies on bioecology and management of major insect pests of brinjal**
Researcher	-	Masal, Mahadev Shankar
Research Guide	-	Kadam, D.R.
Department	-	Agricultural Entomology
Subject	-	Entomology
Degree	-	Ph.D.
Thesis No.	-	17223
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034230
Abstract	-	

The investigations on bioecology and management of major insect pests of brinjal were conducted in laboratory as well as on research farm of Department of Agricultural Entomology VNMKV, Parbhani during *Kharif* 2015-16 and 2016-17.

The studies on biology of *L. orbonalis* on different hosts carried out under laboratory condition revealed that the total developmental period was completed within 25.65±2.75, 20.20±1.27, and 26.50±2.42 days, respectively through five instars on brinjal, tomato and potato.In the present study, the average longevity of female moth was 6.4±1.35, 3.6±0.70 and 6.4±1.07 days, while the average longevity of male moth was 4.1±1.20, 2.3±0.48, and 3.9±0.99 days reared on brinjal, tomato and potato, respectively. The mean number of eggs laid by female moth of shoot and fruit borer developed from larva fed on the fruits of brinjal, tomato and potato were 93.40±6.50, 46.90±6.97 and 88.20±6.80 eggs per female. The sex ratio (F/M) of emerged adults of *L. orbonalis* after feeding on different hosts *i.e.*brinjal, tomato and potato was found 1.94:1, 1.56:1 and 1.81:1 while the mean duration of mating *i.e.* coitus was 20.08 ± 2.94, 8.2 ± 2.39 and 18.9 ± 2.51 minutes.

During *Kharif* 2015-16 maximum incidence of aphids, jassids, whiteflies, red spider mites, per cent infestation by shoot borer, fruit borer, stem borer and leaf roller were 28.75 aphids/3 leaves in 35th SMW, 20.30 jassids/3 leaves in 43rd SMW, 79.25 whiteflies/3 leaves in 42nd SMW, 44.25 mites/4cm^2/3 leaves in 52nd SMW,20.75 per cent shoot infestation at 36th SMW, 53.85 per cent fruit infestation at 52nd SMW, 40 per cent stem borer infestation at 52nd

SMW, and 29.23 per cent leaf roller infestation in 39th SMW, respectively. However, During *Kharif* 2016-17 maximum incidence of aphids (24.55 aphids/3 leaves 50th SMW), jassids (16.30jassids/3 leaves in 42nd SMW), whiteflies (52.00 whiteflies/ 3 leaves at 44th SMW), red spider mites (40.25 mites/4 cm^2 leaf area/3 leaves at 52nd MW), per cent infestation by shoot borer (18.75 per cent shoot infestation in 36th SMW), fruit borer (45.45 per cent fruit infestation in 47th SMW), stem borer (20 per cent stem infestation in 52nd SMW) and leaf roller (22.16 per cent leaf infestation in 41st SMW) was observed.

Efficacy of neonicotinoids against aphids infesting brinjal crop revealed that the treatment with dinotefuran 20 SG @ 30 g a.i./ha was most superior followed by clothianidin 50 WDG @ 20 g a.i./ha and flonicamid 50 WG @ 75 g a.i./ha. Regarding the efficacy against jassid treatments comprised of thiamethoxam 25 WG @ 50 g a.i./ha followed by dinotefuran 20 SG @ 30 g a.i./ha, clothianidin 50 WDG @ 20 g a.i./haand acetamiprid 20 SP @ g a.i./ha were the most effective treatments. Acetamiprid 20 SP @ 10 g a.i./ha was the most superior treatment in minimizing whitefly incidence on brinjal crop. The treatment comprised of dimethoate and imidacloprid were highly toxic to lady bird beetle followed by clothianidin, acetamiprid. Whereas, flonicamid, thiamethoxam and dinotefuran were found comparatively safer.

The treatment dimethoate was the most superior in controlling red spider mites infesting brinjal whereas, highest population of mites *i.e.* even more than untreated control was recorded in imidacloprid 17.8 SLacetamiprid 20 SP, flonicamid 50 WG,clothianidin 50 WDG,thiamethoxam 25 WG, anddinotefuran 20 SG justifying the concept of harmoligosis. The order of toxicity of neonicotinoids to honey bees were imidacloprid>clothianidin>dimethoate>dinotefuran>thiamethoxam>flonicamid>acetamiprid.

Overall pooled mean percentage of infested shoots and fruits (number and weight basis) from two sprays of both the years indicated that, the treatment chlorantraniliprole 18.5 SCwas found highly effective over all treatments and recorded the least per cent infested shoots (1.89%) and fruits (8.04 and 9.14%). The significantly highest yield of healthy brinjal fruits to the tune of 167.15 q ha^{-1} was recorded in those plots which were sprayed with chlorantraniliprole 18.5 SC. The treatment emamectin benzoate 5 SG recorded the highest B: C ratio (1:12.69) followed by indoxacarb 15.5 SC (1:11.81).

Title	-	**Seasonal activity of major insect pests and bioefficacy of newer insecticides against sucking pest complex of transgenic cotton**
Researcher	-	Surwase, SeemaRajabhau
Research Guide	-	Zanwar, P.R.
Department	-	Agricultural Entomology
Subject	-	Entomology
Degree	-	Ph.D.
Thesis No.	-	17225
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034256
Abstract	-	

The investigations on "Seasonal activity of major insect pests and bioefficacy of newer insecticides against sucking pest complex of transgenic cotton" were carried out the seasonal activity of major insect pests in transgenic cotton and their correlation with weather parameters was studiedat Department of Agricultural Entomology, VNMKV, Parbhani during *Kharif* 2015 and 2016. The RCH-II BGIIcotton variety was used for the study. The experiments of bio-efficacy of newer insecticides against major sucking pests was conducted in RBD with three replications and nine treatments,residual toxicity of newer insecticides against leaf hopper in laboratory was conducted in CRD with three replications and nine treatments and monitoring of pink bollworm was also conducted during course of investigations.The seasonal activityof major insect pests was recorded throughout the season.Seasonal activity of larval population, fruiting bodies damage, rosette flowers due to pink bollworm and boll damage revealed that incidence was more in 2016 than 2015 due to variation in weather parameters.Further, with regard to population dynamics of predators likecoccinellids, chrysopids, syrphidsand spiders in cotton showed more population of predators in 2015 than 2016. The correlation studies indicated that the correlation exists between pest population anddifferent weather parameters.

The results of bioefficacy of insecticides after all the sprays indicated that among all insecticidesdiafenthiuron 50% WG @ 300 g.a.i/ha and imidacloprid 17.8 SL @ 25 g.a.i/ha were found most effective in reducing aphid population. Minimum incidence of jassids was found in dinotefuron 20% SG @ 200 g.a.i/ ha treated plots followed by flonicamid 50 WG @ 75 g.a.i/ha treatment. The insecticides fipronil 5%SC @ 50 g.a.i/ha and dinotefuron 20% SG @ 200 g.a.i/ ha were found most effective against thrips. The insecticides buprofezin 25 EC @ 250

g.a.i/ha, fipronil 5%SC @ 50 g.a.i/haanddiafenthiuron 50% WG @ 300 g.a.i/ha were found effective against whiteflies.The insecticides treatmentswere found comparatively safe to the natural enemies of sucking pests of cotton.

Residual toxicity study of different insecticides against jassids showed highest PT and LT_{50} values in dinotefuron 20 SG followed by flonicamid 50% WG, diafenthuron 50% WP, Fipronil 5% SC. Residual toxicity of these insecticides was declined with lapse of time and provided long time protection up to 14 days.

The attraction of male moths of *Helicoverpa*in pheromone traps was commenced during the third week of August- September. Maximum attraction of male moth was 12 and 17 in during the second and fourth week of October during 2015 and 2016 respectively. Throughout the crop season 81 and 148 male moths / five traps were trapped in sex pheromone trapsinthe years 2015 and 2016.

The attraction of male moths of pink boll worm (*P. gossypiella*) started in the beginning of the fourth weekof September and continued till the second week of Decemberduring 2015 and 2016. The maximum trapped moths were inthe last week of November 16 / five traps/week and 22/five/traps/week. During the season, pink boll worm moths were trapped93/ five traps and 89/five traps.

The highest seed cotton yield (2227 kg/ha) kg/ha was recorded in plots treated with diafenthiuron 50 WP. The next best treatments werefipronil 25% SC (2040kg/ha)anddinotefuron 20% SG @ 200 g a.i./ha (1961 kg/ha). The lowest yield obtained from untreated plot (728 kg/ha).

The highest net profit was obtained from diafenthiuron 50 WP @ 300 g a.i./ha (Rs. 106249/ha) treatment followed by fipronil 25% SC @ 50 g a.i./ha (Rs91777/ha) anddinotefuron 20% SG @ 200 g a.i./ha(Rs. 87169/ha).

The highest ICBR was in imidacloprid 17.8% SL @ 25 g.a.i/ha (1:32.91) followed by flonicamid 50% WG @ 75 g.a.i/ha (1:19.04) and fipronil 25% SC (1:17.19) treatments.