DEPARTMENT OF AGRICULTURAL ENTOMOLOGY
COLLEGE OF AGRICULTURE,
NAVSARI AGRICULTURAL UNIVERSITY,
BHARUCH CAMPUS, BHARUCH-392 012

1. INTRODUCTION:

Department of Entomology is one of the components of College of Agriculture. The discipline has major share with the problems regarding pests particularly in Pigeonpea, cotton and pulse crops. The credit load at U. G. level is started from 3rd semester. Departmental activities are going on with following objectives:

- To upgrade the knowledge, skill and different principles regarding the current pest problems of the farmers in entomological field.
- To impart the education at under graduate and polytechnic level.
- To conduct the various research experiments of state government and other agencies.
- To develop the pest management technologies for farmers and scientific communities.
- To transfer the recommended technologies to farmers through literature distribution, popular articles in news paper and training etc.

This department is also associated with research activities wherein several field experiments on various mandate crops (Pigeonpea, cotton, pulses, ber, mango and sapota etc.) are being conducted year round under this department.

2. OBJECTIVES:

1. To upgrade the knowledge, skill and different principles regarding the current pest problems of the farmers in entomological field.
2. To impart the education at U.G. level.
3. To conduct the various research experiments approved by Plant Protection Sub Committee in AGRESCO and other agencies.
4. To develop the pest management technologies for farmers and scientific communities.
5. To transfer the recommended technologies to farmers through literature distribution, popular articles in news paper and training etc.

3. MAJOR ACTIVITIES:

1. Teaching:

(a) Polytechnic in Agriculture:

Total 4 courses with 8 (4+4) credits are being taught from first to six semesters Polytechnic in Agriculture

(b) Under graduate:

Total 11 courses with 30 (13+17) credits are being taught from first to eight semesters B.Sc. (Hons.) in Agriculture.

(c) Post graduate teaching: NIL

(d) Other academic activities:

1.The staff members involved as P.G. In-charge in post graduate studies.
2. The staff members also acted as Advisor of U.G. students.

2. Research:

This department is also associated with research activities wherein several field experiments are being conducted year round under various research projects working under this department.

3. Extension:

- Department is imparting training to the extension workers / officers of department of agriculture Gujarat state, Sugar factories officers / field staff; Gujarat Land Development Corporation officers / field staff and farmers brings by various NGOs to develop their skill for improving crop production.
- Department staff is also actively participating in Krushi mela, Khedut Din, Khedut Shibir, Seminar, Radio and Television programme time to time.
- Department is also imparting training to the students of various rural academic institutes.
- This department is also guiding farmers through publishing popular articles in different agriculture related magazines.

4. MAJOR ACHIVEMENTS

1. Teaching:

(a) Polytechnic in Agriculture

Following subjects are taught to the students of Polytechnic in Agriculture from first to sixth semester.

Polytechnic courses offered during odd semester:

Sr. No.	Semester	Course Number	Title of course	Credits
1	3rd	Ag. Ento. 3.2	Principles of insect control	1+1
2	5th	Ag. Ento. 5.4	Pests of fruit and vegetable crops and their management	1+1

Polytechnic courses offered during even semester:

Sr. No.	Semester	Course Number	Title of course	Credits
1	2nd	Ag. Ento. 2.1	Fundamentals of Entomology	1+1
2	4th	Ag. Ento. 4.3	Pests of field crops and their management	1+1

(b) Under graduate

Following subjects are taught to the U.G. students from first to eight semesters B.Sc. (Hons.) in Agriculture.

Undergraduate courses offered during odd semester:

Sr. No.	Semester	Course Number	Title of course	Credits
1	3rd	Ag. Ento. 3.1	Insect Morphology and Systematics	2+1
2	5th	Ag. Ento. 5.3	Pests of Field Crops and Stored Grain and their Management	2+1
3	7th	Ag. Ento. 7.4	RAWEP	0+1

Undergraduate courses offered during even semester:

Sr. No.	Semester	Course Number	Title of course	Credits
1	4th	Ag. Ento. 4.2	Insect Ecology and Integrated Pest Management including Beneficial Insects	2+1
2	6th	Ag. Ento. 6.4	Pests of Horticultural Crops and their Management	1+1
Experiential Learning Programme (ELP)				
1	8th	Cr. Prot. 8.1	IPM and IDM (Pest Disease Scouting)	2+2
2	8th	Cr. Prot. 8.2	Management of Post Harvest Insects-Pest and Diseases	1+2
3	8th	Cr. Prot. 8.3	Bio-Control Agencies and Bio-Pesticides (Mass Multiplication and Uses)	1+2
4	8th	Ag. Ento. 8.6	Non-Insects Pest and their Management	1+2
5	8th	Ag. Ento. 8.7	Apiculture	0+2
6	8th	Ag. Ento. 8.8	Pesticides and Plant Protection Equipment	1+2

List of students who have completed/continued their Ph. D. (Agri. Entomology) degree:

Sr. No.	Name of student	Title of Thesis	Name of Major Advisor	Year of Award of Degree
Within NAU:				
1	Chavan Sachin Mahadev (04-0741-2010)	Characterization of rice genotypes for resistance against yellow stem borer, *Scircophaga incertulus* Walker (Lepidoptera: Pyrilidae)	Dr. K. G. Patel	2013
2	Kakade Amol Madhukar (04-0978-2011)	Succession of rice pest complex and testing of different management modules against rice pest complex under South Gujarat condition	Dr. K. G. Patel	2014
3	Patel Sachinkumar Rameshchandra	Characterization of gram genotypes and management of gram pod borer, *Helicoverpa* armigera (Hubner) Hardwick infesting chickpea in South Gujarat condition	Dr. K. G. Patel	2015
4	Desai S. R. (Reg. No. 1010114005)	Bionomics of spider mites (*Tetranychus urticae* Koch) infesting rose under polyhouse condition	Dr. K. G. Patel	3rd Sem

List of students who have completed/continued their M.Sc. (Agri. Entomology) degree:

Sr. No.	Name of student	Title of Thesis	Name of Major Advisor	Year of Award of Degree
Within NAU:				
1	Patel Maheshkumar Lalubhai	Spider as biocontrol agent for management of insect-pests of rice	Dr. K. G. Patel	2003
2	Ghule Sanjay Dashrath	Seasonal incidence and management of rice earhead bug, *Leptocorisa acuta* Thunberg (Coridae:Hemiptera) throughvarieties and botanical insecticides in South Gujarat	Dr. K. G. Patel	2006
3	Patel Hiteshkumar Nathabhai	Seasonal incidence, varietal screening and botanical control of rice leaf folders, *Cnaphalocrosis*	Dr. K. G. Patel	2006

		medinalis Guene and *Pelopidas muthias* Fb. in South Gujarat		
4	Kharat Sandeep Ramprasad	Influence of nutrients on incidence of insect pests of paddy and their management	Dr. K. G. Patel	2006
5	Patel Kapilkumar Mohanlal	Studies on seasonal incidence, varietal screening and chemical control of rice blue beetle (*Leptispa pygmaea* Baly.) under South Gujarat condition	Dr. K. G. Patel	2008
6	Patel Hiren Vallabhbhai	Population dynamics of insect-pests complex of Jathropa (*Jatropa curcs* L.), biology and chemical control of thrips infesting jathropa	Dr. K. G. Patel	2008
7	Desai Chintan Prafulbhai	Studies on seasonal incidence, varietal screening and chemical control of rice brown plant hopper (*Nilaparvata lugens* Stal.) under South Gujarat condition	Dr. K. G. Patel	2008
8	Arve Swapnil Subhash	Population dynamics, varietal screening, biology and chemical control of mealybug, *Phenacoccus solenopsis* Tinsley on *Hibiscus rosa sinensis* L.	Dr. K. G. Patel	2009
9	Mandape Sanchit Shreekant	Studies on host plant resistace against rice earhead bug *Leptocorisa acuta* Thunberg	Dr. K. G. Patel	2013
10.	Mahesh B. Kavad .	Population dynamics and management of mite (Tetranychus urticae Koch) in brinjal [*Solanum melongena* Linnaeus]	Dr. J. J. Patel	2015
11.	Prabhatkumar S. Patel	Incidence of thrips in organic onion and its management	Dr. J. J. Patel	3rd sem.
12.	Rajesh M. Makvana	----------	Dr. J. J. Patel	1st sem.
13.	Priyanka J. Patel	----------	Dr. J. J. Patel	1st sem.
Other than NAU:				
1.	Miss Nilam Raghunath Bangar	Management of shoot and fruit borer, *Earias vittella (*Fabricius) and residue status of some insecticides in/on okra, *Abelmoschus esculentus* (Linnaeus) Moench in summer	Dr. J. J. Patel	2011
2.	Mr. Himansu Chandrakant Patel	Population dynamics, varietal susceptibility and management of thrips [*Thrips tabaci* Lindeman] in Onion (*Allium cepa* Linnaeus)	Dr. J. J. Patel	2011
3.	Mr. Parth Bharatbhai Patel	Population dynamics, varietal susceptibility and management of thrips (*Thrips tabaci* Lindeman) in garlic (*Allium sativum* Linnaeus)	Dr. J. J. Patel	2011
4.	Mr. Mayur V. Variya	Varietal Susceptibility and management of leaf miner (*Liriomyza trifolii* Burgess) in tomato	Dr. J. J. Patel	2012
5.	Mr. Bhavik V. Barot	Eco-friendly management of thrips, *Scirtothrips dorsalis* (Hood) in chilli, *Capsicum annum* L.	Dr. J. J. Patel	2012

6.	Mr. Arif A. Shaikh	Management of sucking pests in brinjal [*Solanum melongena* Linnaeus]	Dr. J. J. Patel	2012

5. FACILITIES:

Well equipped laboratory facility for under graduate students is available for practical work.

6. RESEARCH ACTIVITY:

Ongoing experiments

S.No.	Title of experiment	AGRESCO No. &Year
1	Evaluation of insecticides against pod sucking bug *Clavigralla gibbosa* Spinola in pigeon pea cv. Vaishali	9th (2013)
2	Survey and surveillance of major insect pests and diseases of urdbean, mungbean and soybean at College Farm and surrounding area of Bharuch and Narmada districts	9th (2013)
3	Study the population dynamics of major insect pests of sapota	9th (2013)
4	Monitoring of fruit fly in mango orchard	9th (2013)
5	Monitoring of fruit fly and fruit borer in *Ber* orchard	9th (2013)
6	Evaluation of insecticides against chiku moth, *Nephopteryx eugraphella*	9th (2013)
7	Survey and surveillance of major insect pests of pigeonpea growing area of Bharuch and Narmada district	9th (2013)
8	Evaluation of acaricides against pigeon pea eriophyid mite *Aceria cajani*	10th (2014)

7. RESEARCH RECOMMENDATION:

S.No.	Title and Recommendation	AGRESCO No. & Year
1.	**Surveillance of *Helicoverpa armigera* in pigeonpea through sex pheromones.** The peak activity of moths and larvae of *Helicoverpa armigera* in pigeonpea were showed during mid of November to March and end of October to December, respectively. Seasonal & yearly moth and seasonal larval activities of *H. armigera* were significantly negatively correlated with minimum temperature, morning & evening relative humidity, rainfall and rainy days, while it was significantly positive correlated with sun shine hours. *H. armigera* moths were significantly negatively correlated with maximum temperature and wind speed during crop season and year, respectively. Seasonal larval incidence and moth catches of *H. armigera* were showed significantly positive correlation.	10th (2014)

8. PUBLICATION

(i) Research Paper Published in International Journal:

1. Jhala,R.C., **K.G.Patel**, C.B.Patel and A.H.Shah (1990). Field efficacy of different insecticides for the control of Mango leaf gall midge, *Procontarinia mattenia*: Kieffer and cecconi. *International pest control*, **32(**2): 40-41.
2. Jhala, R.C., Z. P. Patel, **K. G. Patel**, M. B. Patel and C. B. Patel (1991). Chemical control of bud boring insects, *Anarsia achrasella* Bradley and *Nephopteryx eugraphella* Ragonot on Sapota . *International pest control*, **35** (3): 75-77.
3. **Patel, K.G**. and S. Raman (2000). Use of colored plastic traps to attract aphid, *Aphis gossypii* Glov. and white fly, *Bemisia tabaci* Genn. in cotton. *J. Appl. Zool. Res.*, **11** (1): 11-13.
4. Patel, K.A., M.S. Purohit and **K. G. Patel** (2010). Screening of rice varieties for resistance to rice Sheath mite, *Steneotarsonemus spinki* smilly in South Gujarat. Int.

Sym. Cum Work shop in Acarology. Int. Jou. Of Acarology, UK & Acarology Development Foundation, USA: **Abstract: 8-10** (4):59.

5. Patel, K. A., M. S. Purohit and **K. G.Patel** (2010). Effect of nitrogenous fertiliser to crop on the incidence of rice Sheath mite, *Steneotarsonemus spinki* smilly in South Gujarat. Int. Sym. Cum Work shop in Acarology. Int. J. Acarol., UK & Acarology Development Foundation, USA: **Abstract: 8-10** (4): 57.
6. **J. J. Patel** and R. C. Jhala (2010). Evaluation of Eco-friendly modules for the management of serpentine leaf miner, *Liriomyza trifolii* (Burgess) in cucumber, Cucumis sativus Linnaeus. *Green Farming*, **1(**1**)** 46-50.
7. Shinde, S.V., H. V. Patel., S.M. Chavan., **K.G. Patel**., M.S. Purohit and M.B.Patel (2011). In vitro mass multiplication Media and its Impact Assessment on Entomopathogenic Nematode *Steninernema carpocapsae* (weiser) (Nematoda: Steninernematidae) *Biopesticide Intl*., **7** (1): 64-67.
8. Patel, K.M. and **K.G. Patel** (2011). Influence of water level in rice field on the population build up of *Leptispa pygmea* baly. Crop Improvement, Special Issue: **ISSN 0256-0933(2) 6-8: 182.**
9. Desai, C.P. and **K. G. Patel** (2011). Seasonal incidence of rice brown plant hopper, (*Nilaparvata lugens* stal.). Crop Improvement, Special Issue: **ISSN 0256-0933(2) 6-8: 451.**
10. Desai, C.P. and **K. G. Patel** (2011). Varietal screening of rice against rice brown plant hopper, (*Nilaparvata lugens* stal.). Crop Improvement, Special Issue: **ISSN 0256-0933(2) 6-8: 453.**
11. Patel, H.V. and **K. G. Patel** (2011). Population dynamics of insect pest complex and Spider on Jatropha (*Jatropa curcas* L.) In South Gujarat. Crop Improvement, Special Issue: **ISSN 0256-0933(2) 6-8: 214.**
12. Arve, S. S., **K. G. Patel**., S.M. Chavan, S.S. Alunkhe and M.B.Patel (2011). Impact of weather parameters on population of Solenopsis Mealybug, *Phenacoccus solenopsis* on Hibiscus Rosa- Sinensis under South Gujaratconditions Crop Improvement, Special Issue: **ISSN 0256-0933(2) 6-8: 456.**
13. Arve, S. S., **K. G. Patel**., S.M. Chavan and P.K.Vidhate (2011)Investigation on population dynamics of hibiscus mealybug, *Phenacoccus solenopsis* Tinsley in relation to biotic factors under South Gujarat condition. *J. Biopesticides*, **4**(2): 211-213.
14. Sushma Deb, Borad, P. K. and **Patel, J. J.** (2012). Evaluation of synthetic insecticides against Sitophilus oryzae (L.) on maize under storage condition. *AGRES- An International e-Journal*, **1**(3): 251-255.
15. Patel, P. B. and **Patel, J. J.** (2012). Susceptibility of different garlic genotypes/cultivars to thrips (*Thrips tabaci* Lindeman). *AGRES- An International e-Journal*, **1**(3): 256-262.
16. Patel, H. C. and **Patel, J. J.** (2012). Evaluation of conventional insecticides against thrips, *Thrips tabaci* Lindeman infesting onion (*Allium cepa* L.). *AGRES- An International e-Journal*, **1**(3): 268-273.
17. Patel, P. B. and **Patel, J. J.** (2012). Impact of different nitrogen levels and irrigation intervals on incidence of thrips (*Thrips tabaci* Lindman) infesting garlic. *AGRES- An International e-Journal*, **1**(3): 287-292.
18. Shaikh, A. A. and **Patel, J. J.** (2012). Effect of different levels of potash on incidence of sucking pests in brinjal. *AGRES- An International e-Journal*, **1**(3): 298-304.
19. Bangar, Nilam R. and **Patel, J. J.** (2012). Residual status of insecticides in/on okra fruits. *AGRES- An International e-Journal*, **1**(3): 305-313.
20. Patel, R. K., Mehta, A. N., Patel D. R., **Patel, J. J.** and Patel, R. R. (2012). Impact of sowing period and varieties on incidence of pod borers and grain yield in pigeonpea. *AGRES- An International e-Journal*, **1**(3): 321-327.
21. 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.
22. Barot, B. V. and **Patel, J. J.** (2012). Evaluation of different oils against thrips, *Scirtothrips dorsalis* Hood in chilli. *AGRES- An International e-Journal*, **1**(3): 390-394.

23. **Patel, J. J.,** Patel, P. B. and Patel, H. C. (2012). Bio-efficacy of buprofezin 70% DF against jassid infesting okra. *AGRES- An International e-Journal*, **1**(3): 395-399.
24. Shaikh, A. A. and **Patel, J. J.** (2012). Bio-efficacy of insecticides against sucking pests in brinjal. *AGRES- An International e-Journal*, **1**(4): 423-434.
25. Variya, M. V. and **Patel, J. J.** (2012). Evaluation of different insecticides against leaf miner (*Liriomyza trifolii* Burgess) in tomato. *AGRES- An International e-Journal*, **1**(4): 453-462.
26. Barot, B. V., **Patel, J. J.** and Shaikh, A. A. (2012). Population dynamics of chilli thrips, Scirtothrips dorsalis Hood in relation to weather parameters. *AGRES- An International e-Journal*, **1**(4): 480-485.
27. H. C. Patel, **J. J. Patel** and P. B. Patel (2012). Screening of onion genotypes/ cultivars for susceptibility to thrips, *Thrips tabaci* Lindeman. *AGRES- An International e-Journal*, **1**(4): 492-496.
28. Bangar, Nilam R. and **Patel, J. J.** (2012). Resistance sources of okra genotypes/cultivars to shoot and fruit borer (*Earias vittella* Fabricius). *AGRES- An International e-Journal*, **1**(4): 497-503.
29. H. C. Patel and **J. J. Patel** (2012). Impact of different nitrogen levels and irrigation intervals on incidence of thrips (*Thrips tabaci* Lindaman) infesting onion (*Allium cepa* L.). *AGRES- An International e-Journal*, **1**(4): 509-513.
30. Variya, M. V. and **Patel, J. J.** (2012). Evaluation of chrysanthemum and marigold as trap crops against leaf miner (*Liriomyza trifolii* Burgess) in tomato. *AGRES- An International e-Journal*, **1**(4): 514-521.
31. **Patel, J. J.,** Patel, H. C., Patel, P. B. and Bangar, N. R. (2012). Bio-efficacy of cyazypyr 10 OD W/V against thrips (*Scirthothrips dorsalis* Hood) and fruit borer [*Helicoverpa armigera* (Hubner) Hardwick] infesting chilli. *AGRES- An International e-Journal*, **1**(4): 534-538.
32. **Patel D.R**., Purohit, M. S. and Patel, R.K. (2012). Occurrence of army worm, *Mythimna separata* walker on *kharif* sorghum. *AGRES- An International e-Journal*,**1**(3): 334-339.
33. **Patel D.R**., Purohit, M. S. and Patel, R.K. (2012). Studies on parasites of stem borer, *Chilo partellus* on *kharif* sorghum. *AGRES- An International e-Journal*, **1**(4): 475-479.
34. **Patel D.R**.and Purohit, M. S. (2012). Population fluctuation of stem borer, *Chilo partellus* Swinhoe infesting sorghum in relation to weather parameters in *kharif* season *AGRES- An International e-Journal*, **1**(3): 350-355.
35. **Patel D.R.**and Purohit, M. S. (2012). Susceptibility of sorghum cultivars to stem borer, *Chilo partellus* Swinhoe *AGRES- An International e-Journal*, **1**(3): 376-384.
36. Shaikh, A. A., **Patel, D. R**. and **Patel, J. J.** (2013). Screening of different genotypes/cultivars against sucking pests infesting brinjal. *AGRES- An International e-Journal*, **2**(1): 51-57.
37. **Patel, D. R., Patel, J. J.,** Pathak, D. M. and Patel, R. R. (2013). Studies on incidence of earhead worm, *Helicoverpa armigera* on rain fed sorghum. *AGRES- An International e-Journal*, **2**(2): 225-231.
38. Shaikh, A. A. and **Patel, J. J.** (2013).Population dynamics of sucking pests on brinjal in relation to weather parameters. *AGRES- An International e-Journal*, **2**(3): 370-378.
39. Variya, M. V. and **Patel, J. J.** (2013). Population dynamics of leaf miner (*Liriomyza trifolii* burgess) on tomato in relation to weather parameters. *AGRES- An International e-Journal*, **2**(3): 385-391.
40. **Patel D.R**.and Purohit, M. S. (2013). Occurrence of armyworm, *Mythimna separate* on *rabi* sorghum *Internat. J. Plant Protec.*, **6**(1): 225-226.
41. Kapadiya H.J.; Pathak D.M.and **Patel.D.R**.(2013) Effect of artificial injuries and fresh neck cutting against black mould (*Aspergillus niger*) on onion bulb. *Internat. J. Plant Protec.*, **6**(2): 422-424.
42. **Patel D.R**.and Purohit, M. S. (2013). Some physical plant characters in relation to shoot fly, *Atherigona soccata* (Rondani) resistance in sorghum. *Internat. J. Plant Protec.*, **6**(2): 312-315.

43. **Patel D.R**.and Purohit, M. S. (2013). Influence of different weather parameters on aphid, *Melanaphis sacchari* infesting *Kharif* sorghum. *Internat. J. Plant Protec.,* **6**(2): 484-486.
44. **Patel D.R**.and Purohit, M. S. (2013). Some morphological plant characters in relation to army worm, *Mythimna separata* resistance in sorghum *Internat. J. agric.Sci.,* **9**(2): 667-670.
45. **Muchhadiya, D.V**., Kabaria, B.B., Patel,D.V. and Patel, K.G. (2014). Long term surveillance on population dynamics and correlation of weather factors with populations of major natural enemies of insect pests of Bt cotton on farmers field of Rajkot district. *Internat. Sci. J.,* **1**(1): 53-57.
46. H. C. Patel and **J. J. Patel** (2015). Population dynamics of thrips (Thrips tabaci Lindeman) on onion in relation to different weather parameters. *Trends in Biosci*., An Intl. Fortnightly Journal, 8 (2): 531-34.

(ii) Research Paper Published in National Journal:

1. **Patel, K.G**., R.C. Jhala, C.B. Patel and A. H. Shah (1985). Evaluation of some newer insecticides against Mango hopper, *Amritodus atkinsoni* leth. (Cicadellidae: Homoptera) In Gujarat. *Pestology*, **9**(10): 24-33.
2. **Patel, K.G**. and A. H. Shah (1990). Safety measures for plant protection in Mango orchard. *Agricultural Extension Review*, **3 - 4**: 8- 9 pp.
3. Rai, A.B., **K.G.Patel**, R.C.Jhala, and C.B.Patel (1992). Chemical control of Mealy bug *Coccidohystrix insolita* (Green) pseudococcidae: Homoptera infesting pigeon pea in South Gujarat. *GAU Res. J.,* **17**(2): 72-75**.**
4. Vyas, R.V.; **Patel**, **J. J.;** Godhani, P. H. and Yadav, D. N. (1993). Evaluation of green muscardine fungus (*Metarrhizium anisopliae* var. *anisopliae*) for control of mango hopper (*Amritodus atkinsoni*). *Indian J. Agric. Sci*., **63** (9): 602-603.
5. **Patel, K. G**., S. Raman, D.M. Korat, J.F.Dodia and A.R. Pathak (1996). Integrated pest management in paddy. *Pestology*, **20**(9): 26.
6. Patel, C. B., **K. G. Patel** and S. N. Saravaiya (1996). Dose and efficacy period of methyl eugenol to attract Mango fruit fly *Bactrocera dorsalis* Hendal. *GAU Res. J.,* **21** (2): 132-136
7. **Patel, J. J.;** Patel, N. C.; Jyani, D. B. and. Patel, J. R. (1996). Bio-efficacy of synthetic and botanical insecticides against aphid, *Lipaphis eysimi* Kalt. and diamond back moth, *Plutella xyalostella* L. infesting cabbage. *GAU Research J*., **22** (1): 67-71.
8. **Patel**, **J. J.;** Patel, N. C.; Jyani, D. B.; Patel, J. R. and Patel, B. D. (1997). Bio-efficacy of synthetic and botanical insecticides for controlling pod borer (*Helicoverpa armigera)* and podfly (*Melanagromyza obtusa*) infesting vegetable purpose pigeonpea (*Cajanus cajan*). *Indian J. Agric. Sci*., **67** (3): 117-119.
9. Patel, N. C.; **Patel**, **J. J.;** Jyani, D. B. and Patel, J. R. (1997). Evaluation of insecticide schedules for controlling thrips (*Scirtothrip dorsalis*) infesting chilli (*Capsicum frutescens*). *Indian J. Agric. Sci*., **67** (2): 75-76.
10. Patel, N. C.; **Patel**, **J. J.;** Jyani, D. B., Patel, J. R. and Patel, B. D. (1997). Bio-efficacy of conventional insecticides against pests of okra. *Indian J. Ent.,* **59** (1): 51-53.
11. **Patel, J. J.;** Patel, N. C. and Patel, J. R. (1998). Bio-efficacy of some of the newer insecticides against thrips, *Scirtothrips* corsalis Hood infesting chilli. *Proceedings of the Entomology in 21st century: Biodiversity, Sustainability, Environmental safety and Human health* held at Rajasthan College of Agriculture, Udaipur during 30 April to 2 May, 1998. pp. 57-59.
12. Patel, K. I.; Bharpoda, T. M.; **Patel, J. J.;** Chaudhri, G B. and Patel, J. R. (1998). Effect of weather on activity of cotton bollworms in middle Gujarat. *Proceedings of the Entomology in 21st century: Biodiversity, Sustainability, Environmental safety and Human health* held at Rajasthan College of Agriculture, Udaipur during 30 April to 2 May, 1998. pp. 301-304.

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(iii) Practical manuals/theory manuals prepared:

Sr. No	Publications	Title	Published	Year
1	Practical Manuals	Ento.214: Crop Pests and their Management (1+1) : D. R. Patel and J. J. Patel	Polytechnic in Agriculture, NAU, Bharuch	2012
2	Theory Manuals	Ento.214: Crop Pests and their Management (1+1) : D. R. Patel and J. J. Patel	Polytechnic in Agriculture, NAU, Bharuch	2012
3	Practical Manuals	Ento.1.1: Fundamentals of Entomology (1+1): D. R. Patel and J. J. Patel	Polytechnic in Agriculture, NAU, Bharuch	2013
4	Theory Manuals	Ento.1.1: Fundamentals of Entomology (1+1): D. R. Patel and J. J. Patel	Polytechnic in Agriculture, NAU, Bharuch	2013
5	Practical Manuals	Ag. Ento.2.2: Principles of Insect Control (1+1) : D. R. Patel, D. V. Muchhadiya and J. J. Patel	Polytechnic in Agriculture, NAU, Bharuch	2013
6	Theory Manuals	Ag. Ento.2.2: Principles of Insect Control (1+1) : D. R. Patel, D. V. Muchhadiya and J. J. Patel	Polytechnic in Agriculture, NAU, Bharuch	2013
7	Practical Manuals	Ento.3.3: Pests of Field Crops and their Management (1+1): D. R. Patel, J. J. Patel and D. V. Muchhadiya	Polytechnic in Agriculture, NAU, Bharuch	2014
8	Theory Manuals	Ento.3.3: Pests of Field Crops and their Management (1+1) :D. R. Patel, J. J. Patel and D. V. Muchhadiya	Polytechnic in Agriculture, NAU, Bharuch	2014
9	Theory Manuals	Ag. Ento. 6.4 :Pests of horticultural crops and their management (1+1): Muchhadiya D.V.; Patel J.J.; Patel D. R.; and Patel, K.G.	College of Agriculture, Bharuch	2015
10	Practical Manual	Ag. Ento. 5.3 : Pests of field crops and stored grain and their management (2+1) Patel D. R.; Patel J.J.; Muchhadiya D.V. and Patel, K.G	College of Agriculture, Bharuch	2015

9. TRANSFER OF TECHNOLOGIES:

1. Department staff is also actively participating in Krushi mela, Khedut Din, Khedut Shibir, Seminar, Radio and television programme time to time.
2. This department is also guiding farmers through publishing press notes in daily news paper and weekly/monthly periodicals on the agronomic aspects of major crops as well as through Agro ITI programmes.