International Journal of Food Science and Nutrition
ISSN: 2455-4898
Impact Factor: RJIF 5.14
www.foodsciencejournal.com
Volume 3; Issue 1; January 2018; Page No. 88-94

Review article on integrated pest management versus profile characteristics of the farmers

[1] Santhi Sri KV, [2] Sivannarayana G, [3] Sravanim Simhadri

[1] Assistant Professor, Department of Foods and Nutritional Sciences, Acharya Nagarjuna University, Guntur, Andhra Pradesh, India
[2] Professor, Department of Extension, Agricultural College, Lam, Guntur, Andhra Pradesh, India
[3] B.Tech (CSE), Malineni Lakshmiah Engineering College, Guntur, Andhra Pradesh, India

Abstract
This study was conducted in Prakasam District of Andhra Pradesh to assess integrated pest management practices in relation with profile characteristics of the farmers. In our country, a large number of insects have been recorded feeding on red gram crop. Among various pests, pod borers which attack during reproductive phase are highly destructive causing huge losses to a tune of 52.4 % in yield in Southern states of India. Among the pod borers the gram pod borer, *Helicoverpa armigera*, the spotted pod borer, *Maruca testulalis Geyer* and the pod fly, *Melanagromyza obtuse* cause serious damage in South India. To reduce the incidence of insect pests in pulse crops and improve their productivity, adoption of integrated pest management (IPM) is more relevant in these crops. Integrated pest management is a boon to the farmers as well as society by reducing environmental pollution and giving financial benefit. This integrated Pest management practices are influenced by profile characteristics of the farmers. When this association was tested, the results revealed that there was significant difference between IPM and non IPM villages according to Education, social participation, mass media exposure, extension contact, scientific orientation, economic orientation at 5% Level of significance. With regard to farm size, achievement motivation and innovativeness, farmers of IPM and non-IPM villages were not differ significantly.

Keywords: integrated, management, farmers, characteristics

Introduction
A pest is an organism causing harm to man or his property. Pests include insects, nematodes, rodents, weeds, fungi, bacteria and viruses. Management implies the direction of the pest situation by a judicious use of various methods of control to decrease the harm caused by the pest to an economically acceptable level. Integrated means bringing together of individual control methods into a whole operation that takes due care of a sound environment. Integrated also implies that combined control operation should be compatible, with complex farm production units and its social, physical, and economic conditions. Therefore, "integrated pest management" considers any and all combinations of various techniques for the management of pest problems such as those caused by plant vigor, mechanical injuries, weeds, insects, diseases, rodents, and animals within the context of the farming system (Oudejans, 1982) [28].

Integrated pest management is defined as the optimization of pest control in an economically and ecologically sound manner. It is a judicious combination of feasible pest management components to keep pests below economic injury level. Integrated pest management also defined as the combination and integration of approaches to pest management, which maximizes real profitability and genuine sustainability for the users and farming system and gives due regard to the environment. Integrated Pest Management (IPM) is a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks.

Benefits
- Provides long term results.
- Environmentally friendly.
- Reduces unnecessary chemical use and its liability.
- Reduces risk of pesticide resistance.
- Proactive, not reactive Detects a potential pest problem before it's a major problem.
- Provides a written record of pest activities and control actions.
- Site-specific.

Review of literature
The efforts were made to review the related literature, which was found to be meaningful and having direct and indirect bearing on this study and furnished under the following heads.

Profile characteristics of practicing IPM and non-IPM farmers.
1. Education
Education is nothing but formal education completed by the respondents. The most usage of term denotes bringing up intellectual and moral training. Systemic instruction develops mental power and characteristics of the individual. It can be viewed as including all communicating of knowledge and sharing of values (Sills, 1968) [50]. Shinde *et al.,* (1998) [49] revealed that 46.7 per cent of the dairy farmers were illiterates, 25.00 per cent were primary, 15.8 per cent were middle and 12.50 per cent were high school and above education.

The San Francisco IPM Ordinance passed in 1966 to minimize the city's use of pesticides and their negative impact on people and the environment. Since then the most toxic pesticides have been banned. And the role of education in IPM implementation in an urban environment is emphasized indicating that there is need to gain knowledge to know the ill effects of pesticides over health and environment. (Hom, 1999) [12].

The focus of knowledge transfer and generation is indirectly to achieve food security, but first and foremost importance is to improve smallholder producers' livelihoods. Impact assessments of participatory training programmes show more stable production with improved product quality and increase in farmers' incomes through education. (Vos, 2003) [62].

Nirmala and Hiremath (2005) [25] indicated that majority of the respondents of watershed programme were having primary school education in watershed group and non- water shed group (53.34%), (55.00%) followed by illiterates (35.00%), (33.34%) and 11.66per cent of the respondents were having secondary education in each group.

Gangaiah *et al.,* (2006) [11] indicated that 64.40 per cent of the women in SHGs were literates and 35.60 per cent of the women in SHGs were illiterates. A study conducted in Thanjavur District, Tamil Nadu, India, revealed that 48% of IPM farmers possessed high knowledge, while only 22% of non-IPM farmers possessed high knowledge on IPM practices. The results of't' test showed a significant difference in the extent of knowledge level among IPM and non-IPM farmers ('t' value=9.14). Further, the findings on practice-wise knowledge level on IPM showed that IPM farmers possessed higher knowledge on all the practices than non-IPM farmers. (Santha Govind, 2006) [45].

Venkata shiva reddy (2006) [59] revealed that majority of vegetable growers had medium level of knowledge in both tomato (66.67%) and cabbage crop (61.66%). In case of adoption of IPM practices cent percent of respondents were found to practice summer deep ploughing, the destruction of damaged fruits at each harvest in tomato crop, followed by practice of crop rotation with pulses (88.33%) and destruction of damaged at each harvest of cabbage crop (86.87%). Sarada *et al.,* (2007) [46, 47] indicated the majority (26.70%) of the rural women in Self Help Groups were functionally literates followed by high school education(21.00%), illiterate (17.50%), middle school education (16.50%) and college education(10.00%) and remaining (8.30%) had primary schooling. Manoz *et al*., (2009) [22] reported that there was a non significant difference between farmers of adopted and non-adopted villages regarding educational status.

2. Farm Size

It was operationalized as the number of standard acres possessed by the respondents at the time of interview. The dry land and wet land was taken into account. As per the Andhra Pradesh land reforms act -1973 "one hectare of wet land shall be deemed to be equal to 2.5 hectares of dry land." Thus the total land holding (farm size) of the respondents were converted into standard acres using the above conversion formula to arrive at the farm size of the respondents.

Bhosle *et al.,* (2000) [4] stated that 43.33% of the listeners of farm broadcast had larze size land holdings, while 34.00% of them had medium land holdings and 22.67% of them had small land holdings, respectively. Raja Ratnam (2000) [34] indicated that all most all the (92.11%) respondents of sunflower On Farm Extension Demonstrations belonged to small farm size category followed by meager number (7.89%) of farmers fall under marginal category.

Ravi Shankar (2000) [41] stated that 92.86 per cent of the K.V.K beneficiaries were small, farmers and remaining 7.14 per cent were marginal farmers, whereas, 56.36 per cent of non-beneficiaries were small farmers followed by big 39.28 per cent and marginal 5.36 per cent farmers. Ramesh Babu (2002) [37] revealed that majority (56.47%) of the Operational Research Project beneficiaries were big farmers followed by small24.71 per cent and marginal (18.82%) farmers.

Prasanth Kumar (2007) [32] indicated that majority 50.00 per cent of the Agricultural Marketing Committee level trained farmers possessed small sized farms followed by medium 30.00 per cent and big 20.00 per cent sized farms. Whereas majority 51.67 per cent of the un-trained farmers possessed small sized farms followed by medium 30.00 per cent and big 18.33 per cent sized farms, respectively. Sarada *et al.,* (2007) [46, 47] stated that majority 56.70 per cent of the women in Self Help Groups belonged to small land holding category followed by 29.20 per cent to large land holding category and 14.10 per cent to medium land holding category.

Manoz *et al*., (2009) [22] reported that there was a non significant difference between farmers of adopted and non-adopted villages regarding land holding size.

3. Social Participation

This was operationalized as the degree of involvement of the respondents in social organizations either as a member or as an office bearer.

Gaikwad and Gunjal, (2000) [10] indicated that majority of the K.V.K beneficiaries (60.00 %) had more social participation followed by medium (26.66%) and low(13.34%) social participation. Swaroopa Rani (2000) indicated that 98.33 per cent of the non- beneficiaries of JRY had no participation in any organization, whereas, only 1.67 per cent had participation in one Organization.

Islam *et al.,* (2001) [13] indicated that 48.33 % of FFS farmers had a highly favourable attitude towards IPM, while only 6.67% of non-FFS farmers had a highly favourable attitude towards it. Education, social participation, extension contact, and agricultural knowledge had a significant relationship to FFS' farmers attitude towards IPM. Only education and agricultural knowledge were correlated to the attitude of non-FFS farmers.

Manjunatha (2002) [19, 20] indicated that majority (43.40%) of the Hemavathi irrigation project area beneficiaries were having high level of social participation followed by equal number (28.30%) of the beneficiaries having medium and low levels of social participation. While, majority (40.00%) of the non beneficiaries were having low level of social participation followed by high (33.30%) and medium(26.70%) levels of social participation. Mahalakshmi (2003) [17] indicated that majority (41.67%) of the pulse growers had medium level of social participation followed by low (32.50%) and high(25.83%) levels of social participation.

Sarada *et al.,* (2007) [46, 47] stated that majority (57.00%) of the

women in Self Help Groups had low level of social participation followed by high (30.50%) and medium (12.50%) levels of social participation. Manoz *et al*., (2009) [22] reported that there was a significant difference between farmers of adopted and non-adopted villages regarding social participation at 0.01 level of probability.

4. Mass media exposure

Mass Media Exposure was operationalized as the extent of exposure of respondents to the mass media such as radio, television, news paper, agricultural books, information material and farm magazines etc.

Tharajabin and Manoharan (2001) [57] depicted the majority (47.50%) of the kitchen garden maintaining urban women had medium level of mass media exposure followed by high (32.50%) and low (20.00%) levels of mass media exposure. Mahalakshmi (2003) [17] reported that majority (41.67%) of the pulse growers had medium level of mass media exposure followed by high (33.33%) and low (25.00%) levels of mass media exposure.

Ramya (2005) [38] revealed that majority (54.44%) of the Curry leaf growers had medium level of mass media exposure followed by low (33.33%) and high (12.23%) levels of mass media exposure. Manoz *et al.,* (2009) [22] reported that there was a significant difference between farmers of adopted and non-adopted villages regarding mass media exposure at 0.01 level of probability.

5. Extension Contact

It refers to the extent of contact that the respondent had maintained with extension agencies or personnel for getting information on agriculture or non- agriculture or both.

Manjunatha (2002) [19, 20] indicated that majority (45.00%) of the Hemavathi irrigation project area beneficiaries were having high extension contact followed by medium (35.00%) and low (20.00%) levels of extension contact. While, majority of the non beneficiaries were having low (50.00%) level of extension contact followed by high (33.30%) and medium (16.70%) levels of extension contact.

Maraty and Srinivas (2003) [23] inferred that 36.37% of the Multipurpose irrigation project beneficiaries had high extension contact followed by medium (35.00%) and low(28.33%) levels of extension contact. Ramya (2005) [38] stated that majority (47.78%) of the Curry leaf growers had medium level of extension contact followed by high (35.55%) and low (16.67%) levels of extension contact.

Prasanth Kumar (2007) [32] revealed that majority 71.67 per cent of the Agricultural Marketing Committee level (AMC) trained farmers had medium level of extension contact followed by high 15.00 per cent and low 13.33 per cent levels of extension contact. Whereas majority 56.67 per cent of the un-trained farmers had low level of extension contact followed by medium (30.00%) and high (13.33%) levels of extension contact categories, respectively. Manoz *et al.,* 2009) [22] reported that there was a significant difference between farmers of adopted and non-adopted villages regarding Extension contact at 0.01 level of probability.

6. Risk Orientation

Risk Orientation was operationalzed as the degree to which the farmer was oriented towards encountering the risk and uncertainty in adopting any new ideas or innovations in Agriculture.

Manjunatha (2002) [19, 20] stated that majority (36.70%) of the Hemavathi irrigation project area beneficiaries were having high level of risk orientation followed by medium(35.00%) and low (28.30%) levels of risk orientation. While, majority (40.00%) of the non beneficiaries were having low level of risk orientation followed by high (33.30%) and medium (26.70%) levels of risk orientation.

Subrahmanyam (2002) [54] stated that majority (75.00%) of the Agricultural Market Committee level trained farmers had medium level of risk preference followed by low (13.34%) and high (11.66%) levels of risk preference. Sridevi (2003) [53] stated that nearly three-fourth (73.34%) of farmers of adopted village had medium risk taking ability followed by high (16.66%) and low (10.00%) levels of risk taking ability.

Sajit Kumar (2004) [44] inferred that 53.33% of farmers of the coconut farmers had medium level of risk orientation followed by high (30.67%) and low (16.00%) levels of risk orientation, respectively. Prasanth Kumar (2007) [32] indicated that majority 88.33 per cent of the Agricultural Marketing Committee level trained farmers had medium level of risk orientation, followed by high (6.67%) and low (5.00%) levels of risk orientation. Whereas, majority 63.34 per cent of the un-trained farmers had low level of risk orientation followed by medium (33.33%) and high (3.33%) levels of risk orientation, respectively. Manoz *et al*., (2009) [22] reported that there was a significant difference between farmers of adopted and non-adopted villages regarding risk orientation at 0.01 level of probability.

7. Scientific Orientation

It was operationalized as the degree to which a person was oriented towards scientific methods of farming.

Bhosle *et al.,* (2000) [4] indicated that maximum number (60.67%) of the radio listeners had medium level of scientific orientation followed by low (25.33%) and high (14.00%) levels of scientific orientation, respectively. Patel (2002) [30] indicated that because of scientific orientation farmers used GAU IPM module (M3) and could effectively manage the population of Helicoverpa armigera and Melanagromyza obtusa on pigeon pea. The effectiveness of GAU IPM module (M3) was also reflected on grain yield which was significantly higher in comparison to bio-intensive IPM module (M1) and module consisting of recommended package of practices (M4).

Mahalakshmi (2003) [17] observed that majority (48.33%) of the pulse growers had medium level of scientific orientation followed by low (26.67%) and high (25.00%) levels of scientific orientation, respectively. Ramya (2005) [38] revealed that majority (53.33%) of the Curry leaf growers had medium level of scientific orientation followed by high (27.78%) and low (18.89%) levels of scientific orientation, respectively.

Chaudhari (2006) [8] stated that majority (62.50%) of the trained dairy farmers belonged to medium level of scientific orientation followed by high (22.50%) and low (15.00%) levels of scientific orientation, respectively. Whereas, in case of the un-trained dairy farmers majority (61.00%) of the respondents belonged to low level of scientific orientation

followed by medium (34.00%) and high (5.00%) levels of scientific orientation, respectively. Manoz *et al*., (2009) [22] reported that there was a significant difference between farmers of adopted and non-adopted villages regarding scientific orientation at 0.01 level of probability.

8. Economic Orientation

Economic Orientation was operationalized in terms of profit maximization and relative value by the farmer on economic needs.

According to the production efficiency analyzed by the nonparametric efficiency analysis model, the efficiency scores of IPM plots were higher, respectively, than those of the farmers' practice plots: 0.5824 vs. 0.4192 in 1996, 0.5558 vs. 0.5195 in 1997, and 0.6961 vs. 0.6281 in 1998. IPM implementation by the field-oriented approach by keeping economy as a concern, it was very effective in improving plant protection practices and production efficiency. (Lee, 2003)

Mahalakshmi (2003) [17] reported that majority (44.17%) of the pulse growers had medium level of economic orientation followed by high (30.83%) and low (25.00%) levels of economic orientation. Ramya (2005) [38] revealed that majority (40.00%) of the Curry leaf growers had high level of economic orientation followed by medium (33.33%) and low (26.67%) levels of economic orientation.

Mahalakshmi (2007) indicated that majority (65.84%) of the bakery and confectionary training beneficiaries had medium level of economic orientation followed by high (20.00%) and low (14.16%) levels of economic orientation. Manoz *et al.*, (2009) [22] reported that there was a significant difference between farmers of adopted and non-adopted villages regarding economic orientation at 0.05 level of probability.

9. Achievement Motivation

Achievement Motivation was operationalized as a social value that implants a desire for excellence in order for an individual to attain a sense of personal accomplishment.

The diversity of competing interests in North America provides a remarkable series of divergent messages to growers. One of the most successful approaches has been an economic comparison of grower standard and IPM programs using partial budgets through achievement motivation. Increased net profits provide powerful incentives for program adoption (Trumble, 1998) [58].

Ravichandra Prasad (2002) [39, 40] revealed that majority 62.50 per cent of the On Farm Extension Demonstration beneficiaries had medium level of achievement motivation followed by high 25.00 per cent and low 12.50 per cent levels of achievement motivation. Whereas, in case of non-beneficiaries, 46.44 per cent of them had low level of achievement motivation followed by medium (39.28%) and high (14.28%) levels of achievement motivation, respectively.

Subrahmanyam (2002) [54] stated that majority (78.34%) of the Agricultural Market Committee level trained farmers had medium level of achievement motivation followed by high(18.33%) and low (3.33%) levels of achievement motivation, respectively. Significant achievements in farmer participatory IPM through the field and problem discovery-based agro ecological approach provided sound evidence of the successful exploration of IPM based on new concepts through achievement motivation. (Piao-Yong Fan and Chen-ZhiQun, 2003) [31].

Prasanth Kumar (2007) [32] reported that majority 71.67 per cent of the Agricultural Marketing Committee level trained farmers had medium level of achievement motivation followed by low (15.00%) and high (13.33%) levels of achievement motivation. Whereas, majority 70.00 per cent of the un-trained farmers had low level of achievement motivation followed by medium (26.67%) and high (3.33%) levels of achievement motivation, respectively. Manoz (2009) [22] reported that there was a significant difference between farmers of adopted and non-adopted villages regarding achievement motivation at 0.01 level of probability.

10. Innovativeness

Innovativeness was operationalized as the degree to which an individual adopted new ideas relatively earlier than others in his social system.

Parthasarathi (1997) [29] inferred that majority (66.67%) of the trained farmers of Farmers Field School had high level of innovativeness followed by medium (24.33%) and low (9.00%) levels of innovativeness. Whereas, in case of un-trained farmers, 41.67 per cent of them had medium level of innovativeness followed by low(35.33%) and high (23.00%) levels of innovativeness, respectively. Reddy (1998) [42] found that that majority (67.50%) of the Agricultural Market Committee level trained farmers fell under medium level of innovativeness followed by high (17.50%) and low (15.00%) levels of innovativeness.

The relevance of biotechnology and integrated pest management (IPM) to small scale farmers in South and Southeast Asia is due to innovativeness through advances in biotechnology including biological pesticides, transgenic plants and animals, and information science. The place of biotechnology in rice IPM and vegetable IPM in South and Southeast Asia has shown good impact. (Whitten, 1999)

Mahitha Kiran (2000) [18] reported that 67.50% of the farm women in Agriculture and allied activities had medium level of innovativeness followed by high (16.67%) and low (15.83%) levels of innovativeness. Ravichandra Prasad (2002) [39, 40] revealed that majority 67.86 per cent of the On Farm Extension Demonstration beneficiaries had medium level of innovativeness followed by high 17.86 per cent and low 14.28 per cent levels of innovativeness. Whereas, in case of non-beneficiaries, 51.78 per cent of them had low level of innovativeness followed by medium (35.50%) and high (10.72%) levels of innovativeness,, respectively.

Subrahmanyam (2002) [54] stated that majority (71.66%) of the Agricultural Market Committee level trained farmers had medium level of innovativeness followed by high(15.00%) and low(13.34%) levels of innovativeness, respectively. Karpagan (2005) [16] indicated that majority (50.00%) of the grape growers had high level of innovativeness followed by medium (32.50%) and low (17.50%) levels of innovativeness.

Prasanth Kumar (2007) [32] reported that majority (70.00%) of the Agricultural Market Committee level trained farmers fell under medium level of innovativeness followed by high (20.00%) and low (10.00%) levels of innovativeness, Whereas, in case of un-trained farmers, majority 70.00 per

cent of them had low level of innovativeness followed by medium (20.00%) and high(10.00%) levels of innovativeness, respectively. Manoz *et al*. (2009) [22] reported that there was a significant difference between farmers of adopted and non-adopted villages regarding innovativeness at 0.01 level of probability.

Damodaran (2007) [9] reported that innovativeness of the Cauvery old delta farmers exhibited positively significant relationship with knowledge about irrigation management practices towards rice cultivation. Manoz (2008) reported that there was a positive and significant correlation between innovativeness and adoption level of farmers of adopted and non-adopted villages.

Conclusion

From this review it is concluded that there was significant difference between IPM and non IPM villages according to Education, Social participation, Mass Media Exposure, Extension Contact, Scientific Orientation, Economic Orientation at 5% Level of significance. With regard to Farm Size, Achievement Motivation and Innovativeness, farmers of IPM and non-IPM villages were not differ significantly.

References

1. Adiseshaiah M. Comparison of knowledge, attitude and level of adoption of agricultural graduate farmers and other farmers towards research recommendations of APAU on Paddy. M. Sc (Ag) Thesis, Acharya N.G. Ranga Agricultural University Hyderabad, 1995.
2. Ajaykuamr P. A study on adoption behaviour and in former consultancy pattern of grape growers in Rangareddy district of Andhra Pradesh. M. Sc. (Agri) Thesis, University of Agricultural Sciences, Dharwad, 1989.
3. Anantharaman, Ramanathan. Extending new cassava technology – The lab to land programme in southern India. Cassava in Asia, its potential and research development needs. Proceedings of a Regional Workshop Held in Bangkok, Thailand. 1986; 5(8):365-372.
4. Bhosle PB, Jondhale S, Gand CB, Patil. effectiveness of farm broadcast as perceived by listener. Maharastra journal of extension education. 2000; 19:28-32.
5. Borkar MM, Chothe GD, Lanjewar AD. Characteristics of farmer influencing their knowledge about use of bio-fertilizers. Maharashtra journal of extension education. 2000; 19:130-131.
6. Chandrasekhar S. A study on the effectiveness of selected agricultural programmes of ITDA on tribal farmers in Adilabad district of Andhra Pradesh. M.Sc (Ag) Thesis, Achrya N.G. Ranga Agricultural university, Hyderabad, 1995.
7. Chatterjee RK. A study on the impact of national watershed development project for rainfed area (AWDPRA) in Burdwan district of west Bengal. M.Sc (Ag) Thesis, Achrya N.G. Ranga Agricultural University Hyderabad, 2000.
8. Chaudhari RR. A study on entrepreneurial behavior of dairy farmers, Ph.D. thesis, University of agricultural sciences, Dharwad, 2006.
9. Damodaran GCM. Irrigation management and socio-economic changes among cauvery old delta farmers. M.Sc.(Ag) thesis. Tamilndu Agricultural University, Coimbatore, 2007.
10. Gaikwad BH, Gunjal SS. information seeking behaviour of K.V.K beneficiaries. Maharashtra journal of extension education. 2000; 11:2672-2676.
11. Gangaiah C, Nagaraja B, Vasudevulu Naidu C. impact of self help groups on income and employment. Kurekshetra, 2006, 18-23
12. Hom A. The urban IPM challenge: San Francisco and beyond. IPM-Practitioner. 1999; 21(3):1-8-36.
13. Islam MN, Nurzaman M, Islam MR. Attitude towards integrated pest management of FFS and non-FFS farmers. Bangladesh Journal of Training and Development. 2001; 14:1-2-9-16
14. Jagadal LH. A study on knowledge and adoption of recommended cultivation practices of cabbage growing farmers of Belgaum district, Karnataka state. M.Sc. (Agri) Thesis, University of Agricultural Sciences, Dharwad, 1989.
15. Jondhale SD, Ingale LA, Fakak UN. Impact of krishi vigyan kendra on adoption of improved practices of summer groundnuts. Maharastra Journal of Extension Education. 2000; 19:109-111.
16. Karapagan C. Farmer interest groups in grape production sector- An impact analysis, M.sc (Ag) Thesis, Tamilnadu Agricultural University, Comibatore, 2005.
17. Mahalakshmi B. socio-economic impact on pluse growers M.sc. (Ag) Thesis, Tamilnadu Agricultural University, Coimbatore, 2003.
18. Mahitha kiran P. A study on the participation of fram women in agriculture and allied activities in chittoor district of Andhra Pradesh M.Sc (Ag) Thesis, Acharya N.G. Ranga Agricultural University, Hyderabad, 2000.
19. Manjunatha M. Impact of irrigation on annual income and employment generation in hemavathi irrigation project aera; A comparative analysis M.sc. (Ag) Thesis, University of Agricultural Sciences, Dharwada, 2002.
20. Manjunatha M. Impact of irrigation on annual income and employment generation in hemavathi irrigation project aera; A comparative analysis M.sc. (Ag) Thesis, University of Agricultural Sciences, Dharwada, 2002.
21. Manoj A. Impact of Krishi Vigyan Kendra on farmers in Srikakulam district of Andhra Pradesh. M.Sc (Ag) Thesis, Achrya N.G. Ranga Agricultural University, Hyderabad, 2008.
22. Manoj A, Sivannarayana G, Ramesh Babu Ch, Srinivasa Rao V. Profile characteristics of farmers in the adopted and non-adopted villages of Krishi Vigyan Kendra, Amudalavalasa in Srikakulam. The Andhra Agricultural Journal. 2009; 56(3):382-386.
23. Maraty P, Srinivas E. Impact of multipurpose irrigation project on socio-economic status of submerged village in Andhra Pradesh. Journal of Extension Education. 2003; 14:3517-3520.
24. More MR, Jadhav SV, Pendke MS. impact training of krishi vigyan kendre on knowledge and adoption of cotton production practice by trained farmers. Journel of Extension Education. 2000; 10:20-243.
25. Nirmala B, Hiremath GK. impact of training of krishi

vigyan kendra on knowledge and adoption of cotton production practices by trained farmers. Journal of Extension Education. 2005; 10:240-243.
26. Nurzaman M, Islam MN, Ahmed S. Practice of integrated pest management by FFS and non-FFS farmers Bangladesh Journal of Training and Development. 2000; 13:219-227
27. Ortiz O. Information and knowledge as the principal inputs for the adoption of integrated pest management. Manejo Integrado de Plagas. 2001; 61:12-22.
28. Oudejans JH. Agro-Pesticides: their management and application. United Nations Economic and Social Commission for Asia and the Pacific Bangkok, Thailand, 1982, 205.
29. Parthasarathi S. A study on the impact of rice farmers field school among trained and un-trained farmers, M.sc (Ag) thesis, Annamalai University, Annamalainagar, 1997.
30. Patel MG, Bharpoda TM, Patel JJ, Chavda AJ, Patel JR. Evaluation of various modules for IPM in pigeon pea. Indian-Journal-of-Entomology. 2002; 64:39-43.
31. Piao-Yong Fan, Chen-ZhiQun. The IPM approach and lessons in China Rice science:-innovations and impact for livelihood Proceedings of the International Rice Research Conference, Beijing, China. 2002-2003; 16(19):537-547.
32. Prashanth Kumar TVRR. A study on the knowledge and adoption of AMC level trained and un-trained farmer in mahaboobnagar district of Andhra Pradesh. M.Sc (Ag) Thesis, Acharya N.G. Ranga Agricultural University Hyderabad, 2007.
33. Raghavendra MR, Natikar KV, Hirevenkanagoudar LV. Knowledge level of farmers about cultivation practices and post harvest technology in red gram. Karnataka Journal of Agricultural Sciences. 2006; 19:862-866.
34. Raja Ratnam T. impact of sunflower on-farm extension demonstration (OFEDs) in kurnool district of andhra pardesh M.Sc (Ag) Thesis, Acharya N.G. Ranga Agricultural University Hyderabad, 2000.
35. Raja P. A study on the opinion leadership and adoption of recommended practices in rice crop in adopted village-vallabharao pelam in guntur district of andhra pradesh. M.Sc (Ag) Thesis, Achrya N.G. Ranga Agricultural University Hyderabad, 2004.
36. Raji RJ, Muthaiah M, Arunachalam R. Relationship between knowledge and adoption of KVK trained and un-trained farmers with their socio-personal characteristics. Journal of Extension Education. 1996; 7(1):42-47.
37. Ramesh Babu C. effectiveness of Indo-Dutch network operational research project on drainage and water mangement for salinity control in prakasam district of Andhra pradesh: An Analysis. Ph.D. Thesis, Achrya N.G. Ranga Agricultural University, Hyderabad, 2002.
38. Ramya R. socio- economic impact and marketing behaviour of curry leaf growers. M.SC. (Ag) Tamilnadu Agricultural University, Coimbatore, 2005.
39. Ravichandraprasad C. A study on the impact of on-farm extension demonstration (OFEDs) in rice in nellore district of Andhra Pradesh. M.Sc (Ag) Thesis, Achrya N.G. Ranga Agricultural University, Hyderabad, 2002.
40. Ravichandraprasad C. A study on the impact of on-farm extension demonstration (OFEDs) in rice in Nellore district of Andhra Pradesh. M.Sc (Ag) Thesis, Achrya N.G. Ranga Agricultural University, Hyderabad, 2002.
41. Ravishankar.A comparative study of krishi vigyan kendras (KVKs) of governmental organizations and non-governmental organization in kurnool district of Andhra Pradesh. M.Sc (Ag) Thesis, Acharya N.G. Ranga Agricultural University, Hyderabad, 2000.
42. Reddy PBH. A study on impact of training programmes conducted at Agricultural Market Committee as a follow up activity of KVV in Chittoor district of Andhra Pradesh. M.Sc (Ag) Thesis, Achrya N.G. Ranga Agricultural University, Hyderabad, 1998.
43. Roja Rani B. Employment generation, income and expenditure pattern of DWACRA beneficiary families in kurnool district of Andhra Pradesh. M.Sc (Ag) Thesis, Achrya N.G. Ranga Agricultural University, Hyderabad, 2000.
44. Sajit kumar. Adopted of recommended package of practices of coconut farmer of Mahe region of union territory of pondicherry. M.Sc (Ag) Thesis, Achrya N.G. Ranga Agricultural University, Hyderabad, 2004.
45. Santha Govind. Knowledge of farmers on integrated pest management practices. SO: Journal of Ecotoxicology and Environmental Monitoring. 2006; 16(3):263-266
46. Sarda O, Shivamurty M, Suresh SV. socio-economic and psychological profiles of rural women in SHG. Mysore Journal of Agricultural Sciences. 2007; 41(3):389-394.
47. Sarda O, Shivamurty M, Suresh SV. socio-economic and psychological profiles of rural women in SHG. Mysore Journal of Agricultural Sciences. 2007; 41(3):389-394.
48. Saxena KK, Singh RL. Adoption of organic farming practices by farmers of Malwa region. Maharashtra J Extn. Edu. 2000; 19:53-58.
49. Shinde VG, Sangle GK, Dikle RM. Adoption of improved dairy practices by dairy farmers. Indian Journal of Extension Education. 1998; 17:144-151.
50. Sills DC. (Ed) international encyclopedia of social sciences, London. The Mac Millan Company and the free press, 1968.
51. Sivanarayana G, Jayaramareddy S. correlates of adoption of recommended technologies. Indian Journal of Extension Education. 1994; 30:1-4.
52. Sivanarayana G, Rama Devi M, Venkata Ramaiah P. Awareness and adoption of cotton (Gossypium hirsutum L.) Integrated Pest Management practices by the farmers of Warangal District in Andhra Pradesh. J Res. ANGRAU. 2008; 36(4)33-40.
53. Sridevi K. study on the media exposure and consumption by farmer of adopted village-machavaram in guntur district of Andhra Pradesh. M.Sc (Ag) Thesis, Acharya N.G. Ranga Agricultural university, Hyderabad, 2003.
54. Subramanyam I. A study on the impact of agricultural market committee level trained programmes in Nellore district of Andhra Pradesh. M.Sc (Ag) Thesis, Acharya N.G. Ranga Agricultural University, Hyderabad, 2002.
55. Sujatha P, Annamali R. differential adoption behaviour by different categories of farmers and their characteristics associated with adoption behaviour. Journal of Extension Eduction. 1998; 9(1):14-19.

56. Swaroop Rani J. A Study on the impact of JRY in Nizambad district of andhra Pradesh. M.Sc (Ag) Thesis, Acharya N.G. Ranga Agricultural university Hyderabad, 2000.
57. Tharajabin M, Manoharam M. socio-personal characteristics of kitchen garden maintaining urban women. Journal of Extension Education. 2001; 12(1):3033-3036.
58. Trumble JT. IPM: overcoming conflicts in adoption. Integrated Pest Management Reviews. 1998; 3(4):195-207.
59. Venkata Shiva Reddy. A study on knowledge and adoption of integrated pest management practices among vegetable growers of Gadag district in north Karnataka. M.Sc. (Agri.) Thesis, University of Agricultural Science, Dharwad, 2006.
60. Vennila VA, Annamalai R, gomathy M. awareness knowledge on millets technology of farmer. Journal of Extension Education. 2001; 12:3042-3047.
61. Vijalakshmi V. A study on knowledge and adoption of development women and children in rural areas (DWACRA) beneficiaries in vegetables cultivation in guntur district of Andhra Pradesh. M.Sc (Ag) Thesis, Achrya N.G. Ranga Agricultural University, Hyderabad, 1998.
62. Vos, J. IPM knowledge transfer - current developments and needs in farmer training for IPM implementation. Arab-Journal-of-Plant-Protection. 2003; 21(2):194-196
63. Wassberg A, Wanblad K. Alternative agriculture in Cuba - pest management and biological control. Minor-Field-Studies-International-Office,-Swedish-University-of Agricultural Sciences. 2002; 219:130.