REVIEW OF LITERATURE

A thorough review of literature is essential to any research endeavour. The main functions of the review of literature are:

- To determine what work, both theoretical and empirical has been done before.
- To assist in the delineation of the problem of the areas.
- To provide a basis for the theoretical frame work.
- To provide insight into methods and procedures of the study.
- To suggest operational definitions of major concepts.
- To provide a basis for interpretation of the findings.

The studies on IPM are very limited in our country. Hence, some studies carried out abroad are also cited in this review. As far as possible, the studies attempted on farmers perception about IPM in irrigated areas in the recent past are presented in order to have meaningful relevance to this research.

The available literature related to the present study has been reviewed and presented under the following sub-heads.

1. Awareness and knowledge level of the farmers as regards to IPM technologies for major crops.
2. Adoption level and technological gaps of IPM technologies in the cultivation of major crops.
3. Attitude of farmers towards IPM technologies.
4. Constraints affecting the adoption of IPM technologies.
2.1 Awareness and knowledge level of the farmers as regards to IPM technologies for major crops

Singh (1979) has emphasized a number of constraints in the use of pesticides by farmers, such as, the farmers lack of knowledge and skill about plant protection measures, inadequate and desired level of pesticides promotion work, sophisticated nature of plant protection technology, high cost and non-availability of pesticides and lack of emphasis by extension workers on the need and importance of pest control.

Sagar (1984) observed high cost, lack of knowledge, credit, skilled labour, contact with extension personnel, low produce of farm products, adulteration and non-availability of equipments and chemicals are restricting the use of pesticides.

Yadav et al. (1989) revealed that growing of chickpea along with popular intercrops such as mustard, wheat, barley and linseed etc. helps to reduce H. armigera damage significantly in comparison to chickpea sole.

Joseph (1990) found that use of chemical pesticides in combination with non-chemical component of IPM, not only suppresses the pests but also the cost of plant protection.

Pimbert (1993) suggested for a more open partnership with the farmers, involving them in the conception, implementation and evaluation of IPM tools, which should help stimulate the acquisition and use of technological information by farmers. He observed it as critical because the success of IPM depends on proper management, timing and thoughtful observation.

Rathore and Nwanze (1993) suggested that crop mixtures were more effective than row plantings. They further suggested removal of the weeds at the
time, when maximum eggs are laid substantially, reduces the incidence of pod borer.

Dhaliwal and Arora (1998) found that IPM system increased the abundance of native natural enemies by three fold, reduced the cost of insecticide and environmental pollution by 50.3 per cent and 53.4 per cent, respectively.

Gyawali and Salokhe (1997) observed that the farmers who have attended the farmer’s field schools in Nepal were highly motivated for vegetable IPM.

Rao and Mishra (1997) found the variables like age, education, size of farm holding, farm power machinery, average annual income, source of credit and source of agricultural information exert their influence on the use of pesticides.

Katole et al. (1998) revealed that majority of respondents (80.65 %) expressed that lack of knowledge about biological control for controlling pests of cotton was a major constraint for them.

Vasantha and Pochaiah (1998) observed that the majority of vegetable growers of Andhra Pradesh were using pesticides at higher doses than the recommended level.

Govindasamy et al. (1999) resulted that those who had higher levels of education, had visited a farmer’s market within previous five years, had no children, grew fruits and vegetables at home, were female or had regularly used media reports about food safety were more likely to claim awareness of IPM.

Naut and Kennedy (1999) stated that the beetle populations reduced if potatoes were harvested before the first generation of adults emerged: To accomplish this while minimizing the potential for yield loss by harvesting too
early, crops of the early maturing varieties could be harvested as early as 83-92 days after planting.

Srivastava and Singh (1999) found that poor knowledge regarding the importance of seed treatment and chemical use. Majority of the farmers under different categories feel that there is no substantial effect of seed treatment and chemical use on crop yield. Also a substantial number of farmers across the different size groups felt that these chemicals are costly and are available at shops in poor quality and without proper specification. Quite a few farmers felt that they had no knowledge about the appropriate chemical to be used against the control of different insects—pests and diseases.

2.2 Adoption level and technological gaps of IPM technologies in the cultivation of major crops

Singh and Ranjana (1982) suggested that the availability of plant protection may give an additional one-quintal per hectare yield of oilseed crops.

Jaiswal (1985) found that technological gaps in respect to important and complex practices such as rhizobium treatment, plant protection measures and fertilizers application were more than simple practices which involve low cost or no cost on input.

Jiril and Gangadharappa (1997) suggested that 43 per cent of farmers were medium adopters, 27 per cent high and 20 per cent low adopter of integrated pest management (IPM) practices on vegetable crops. Land holding, extension participation and innovation proneness were significantly related to the over all adoption level of IPM practices.

Bora et al. (1998) observed the extent of adoption of IPM rice practices by the farmers. It is seen that the practices like use of clean seed, proper ploughing and leveling of field, destruction of stubbles and crop residues.
clipping of leaf tips of seedlings and proper sun drying of grains were adopted by more than 80 per cent farmers. These were traditional practices which the farmers adopted with renewed vigour, such as, proper water management, removal of weeds and fixing perch were adopted by 50-70 per cent farmers. The percentage would have gone higher had it not been rainfed agriculture. A total of 51 per cent farmers followed the practices of identification and estimation of bio-control agents and pests.

Tantrary and Dar (1996) found that the gaps in adoption of plant protection measures were 56.67 per cent for disease control, 42.3 per cent for insect and pest control and 28.67 per cent for seed treatment.

Nikhade et al. (1997) found that the majority of respondents belonged to medium technological gap in case of red gram (69.23 %), green gram (68.80 %) and Bengal gram (75.20 %) whereas, almost equal per cent of respondents were observed in high and low technological gap categories in all three pulse crops.

Mangal et al. (1998) stated that the overall adoption of IPM technologies in potato, only 18.67 per cent of the farmers showed high adoption status, while 30.66 per cent showed low adoption status and 50.67 per cent showed medium adoption status.

Sumathi and Alagasan (1998) have concluded with their observations that the majority of small and marginal farmers adopted only limited number of IPM practices as compared to large farmers.

Horne et al. (1999) analyzed that awareness of IPM ranged between 35 and 60 per cent of growers, with large differences between states and growers groups. Adoption was highest amongst crisping potato growers. The source of information on IPM appeared to influence the level of adoption.
2.3 Attitude of farmer’s towards IPM Technologies

Patil and Chauhan (1970) reported that results of crop performance was in favour of hand weeding as compared to chemical weed control.

Matteson (1992) found and put it “Few IPM programmes have made a lasting impact in farmers knowledge, attitude and practices”.

Reusink and Onstad (1994) observed that the farmer’s ability to identify pests; his assessment of likely and potential pest losses and his opinion regarding the efficacy of different control options will affect the decision process.

Khan (1996) reported that the *rabi* pulse crop is damaged by *Helicoverpa armigera* (Hub.) from vegetative to the podding stage of the crop causing enormous loss every year.

2.4 Constraints affecting the adoption of IPM Technologies

Glass et al. (1992) reveals that the lack of research, extension, education, training, institutional, regulation, policy and economic are the constraints for the implementation of integrated pest management in cotton, fruit and vegetables crops in the USA.

Rajak (1993) suggested that the shortage of multiple resistant varieties, unstandardized pest surveillance and pest monitoring methods, including forecasting and forewarning models, low level of education of Indian farmers with different socio-cultural environment, absence of emphasis on technique of mass-rearing of several potential natural enemies and sporadic demonstrations
without continuity are the constraints in introducing the Integrated Pest Management Technologies.

Gopalan (1995) identified the lack of man power to demonstrate IPM technologies, insufficient production of bio control agents, under utilization of mass media in disseminating IPM technologies, lack of exchange of information on IPM, lack of location of specific IPM and ineffective follow-up as the constraints in the adoption of IPM technologies in cotton.

Padhee (1995) emphasized that the large-scale adoption of IPM technologies were constrained by non-availability of the required inputs, lack of extension efforts and methodology directed towards small farmers problem of institutional credit and suspicion of cultivators about IPM recommendations.

Sivakumar et al. (1996) found that the awareness about IPM practices, pest control methods used, the cost of pest control and the constraints in adopting IPM. About 95 per cent of farmers regularly made observations in field to check for pests and diseases. About 75.8 per cent of farmers sought advice from officials of agricultural department. Among IPM practices, the use of insect resistant varieties, cleaning bunds and synchronized planting were known and adopted by all farmers. About 75.8 per cent of farmers expressed the lack of easy pest assessment technique as the major constraints in following need based pesticide application. Additional costs and lack of knowledge on IPM practices were major constraints. Most farmers were aware of the use of biological control agents.

Backad and Shiradkar (1997) reported that the lack of precise information on monitoring, lack of location of specific IPM packages, non availability of bio agents and low educational status of the farmers were the main constraints in the implementation of IPM.
Decari et al. (1997) made a survey in the adoption of plant protection technology and reported that considerable number of contact farmers faced the constraints like non-availability of plant protection appliances (15.91 %) and lack of finance for the purchase of pesticides/fungicides (22.97 %).

Shinde et al. (1997) studied constraints behind the non-adoptions of mechanical and biological practices of IPM programme and found that lack of scientific knowledge among the farmer’s community was the main cause of non-adoption.

Kushwaha et al. (1998) found that the problem of insect pests and effective control measures are the most severe constraints among the farmers.

Schaefer (1998) stated that IPM in Africa has limited impact in raising agricultural productivity in most sectors. Poor access to IPM information and poor interactive networking has been a constraint in effective development and implementation of IPM.

Anonymous (1999) outlined the major technical constraints in potato production as perceived by the farmers. which were, ignorant about cultivation practices (49 %), time and number of irrigations (36 %), weight and size of seed tubers and the scientific method of planting (45 %), number of ploughings employed for field preparation (43 %), method, quality and type of fertilizers used (24 %), chemicals and their doses and method of application (37 %) and scientific method of storage (88 %).

Kumar (2002) concluded in his study that the knowledge regarding cultural methods of IPM technologies was higher than other methods viz. mechanical, biological and judicious use of chemical methods.

He reported that adoption level of cultural methods of IPM technologies in paddy is higher than those in mustard and gram.
He further reported that the major socio-psychological, promotional, bio-physical and economic constraints reflected in adoption of IPM technologies were unconscious vigilance, inadequate practical demonstrations at farmer's field, non-availability of bio-agents and high cost of IPM technologies.