

CHAPTER V

SUMMARY AND CONCLUSIONS

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Increasing farm production per unit area and stabilizing it at higher level, are the twin challenges in agricultural development. Insect-pests, diseases, weeds, etc. pose serious hindrance in the way of achieving the two. This is for the fact that the pests either eat away or destroy a major part of the production- 18 to 35 per cent in total, just when the crops are in the field. India is reported to be losing food production worth Rs.5,000/- crores every year owing to the ravages of these pests (Barroah, 1975).

In order to reduce the losses by pests, a variety of chemicals, besides other methods, are presently in use. Pesticides, however, are our most powerful tool in pest control despite intensive research into alternative methods. Naturally, the use of pesticides in the country has registered impressive growth. Though the national figures look big, adoption of plant protection practices by individual farmers is still at a very low level. Even the chemicals used do not give full results because many of the associated recommendations are not followed. It is only the use of right chemicals in right dose, in right concentration and at right time that effectively controls the pests menace. It is in this context that a study of technological gap in the adoption of plant protection practices becomes important. The specific objectives

of the study were:

1. To assess the extent of adoption of important components of plant protection technology.
2. To determine the technological gaps (Idealised maximum possible adoption minus the extent of adoption already taken place) with regard to various components of the technology.
3. To determine the contributions of different factors to the technological gap.

The study proposed to probe into the technological gaps and constraints in adoption of Plant Protection practices in five major crops of Haryana namely, bajra, cotton, gram, rape seed and mustard and wheat. A multistage sampling technique was used in selection of area and respondents for this investigation.

In the first instance, Hissar district was purposely selected because all the five crops selected for study were the major crops there. Secondly, the district was of medium type in the state in respect of available irrigation facilities and thus could be a better representative than any other (district). At the second stage, two Community Development Blocks out of the total of ten, with the same major crops as of the district, were selected. To exercise this selection, three blocks, Hansi II, Narnaund and Tohana were dropped from the population as the five major

crops in these blocks were not same as in the district. From the remaining deck of seven blocks, two blocks were selected by simple random sample technique.

Selection of blocks was followed by sampling of the ten villages, five from each of the two blocks. This was carried out by the technique of probability proportional to the size of the villages. At the final stage of selection a sample of approximately 5 per cent farm families was drawn from each of the village making a total of 200 families. The functional heads of these families served as respondents in this study.

As many as 9 independent variables thought to be exerting considerable influence on adoption of plant protection practices by the farmers were selected after extensive study of the relevant literature. These independent variables were, i) Respondent's education, ii) Adult Family Education, iii) Extension Contact, iv) Mass Media Exposure, v) Risk orientation, vi) Scientism, vii) Infrastructure, viii) Attitude, and ix) Knowledge of respondents.

Measurement tests to study respondents' education, adult family education, risk orientation and scientism were adopted. The scales to study other independent variables and the dependent variable were developed for this purpose by the researcher. All these tests comprised the schedule which was pre-tested before final introduction.

The data from 200 respondents were collected by personal interview. Then, informations so gathered were tabulated and analysed and inferences were drawn accordingly.

The crop-wise specific findings of the study are as under:

Bajra

1. Out of the total 196 farmers, only 73 (37.24 per cent) sowed seeds treated with the fungicides. Of them too, only three had have purchased the chemicals from the market. All others either obtained already treated seeds or were lucky to have fetched the packets of chemicals from the seed bags procured. This seed was supplied by NSDC.

Also not even a single farmer carried out the almost inexpensive salt solution treatment of the seed. These practices were recommended as prophylactic measures against ergot and smut diseases of bajra.
2. The spraying of recommended chemical to control ergot and smut diseases of bajra was not followed by any farmer.
3. The occurrence of downy mildew disease in bajra was reported by only 12 farmers (6.12 per cent). This means the disease was localized and non-serious in the year under report.

- 4.4. Only one farmer executed rouging of downy mildew infected plants of baajra. However, also only 12 farmers (6.12 per cent) reported its occurrence. The reasons of non-adoption of an inexpensive control measure of downy mildew disease probably was that, a) the farmers were not fully convinced about the effectiveness of this measure, b) they failed to recognise the diseased plants at different growth stages, c) the disease was localized and non-serious in the year of the study.
5. There was almost no insect-pest problem in baajra crop. The only farmer who reported the grasshopper infestation, sprayed the crop by an insecticide. However, only another farmer who found termite attack on his crop did not make any effort to control the pest.

COTTON

1. Among the insect-pests, jassids and pink boll worm mostly attacked cotton. Incidence of these pests was reported by 175 (88.83 per cent) and 142 (72.08 per cent) farmers, respectively. The third important group of pests was spotted boll worms, but their incidence was reported by only 21 farmers (10.66 per cent).

2. Majority of the farmers (84.26 per cent) sprayed the recommended chemicals to control cotton jassids. Nevertheless, proportion of users of insecticides to control pink boll worm fell down sharply (19.29 per cent). None sprayed specifically against spotted boll worms. However, insecticides applied to contain pink boll worm effectively controlled the latter also.
3. Among the farmers who went for chemical control of cotton jassid, 42.17 per cent gave only one spray against the requirement of two. Secondly, out of rest of the 57.83 per cent farmers who sprayed twice or thrice, as much as 20.48 per cent did (the sprayings) repeatedly by one chemical only, which was not desirable due to its possible adverse ecological effects.
4. Similar to the case of jassids, to control pink boll worm also the majority of the farmers (68.42 per cent) resorted to only one spraying against the desirability of at least two (minimum desirable considered in this study). Another 7.89 per cent farmers, although sprayed twice, did both by one chemical only which is but strongly forbidden for its anti-ecological reasons.

5. Only a handful number of farmers reported the infection of diseases in their cotton crop. The diseases which are otherwise considered important in cotton are root-rot, boll-rot and angular leaf spot. The prevalence of these diseases in cotton in the year of study was reported by as many as 2(3.02 per cent), 1(0.51 per cent) and 1(0.51 per cent) farmers, respectively.
6. Out of the total 197 farmers cultivating cotton, only 27 (13.71 per cent), showed seed treated with the recommended fungicides. However, none needed to purchase chemicals. All the twenty seven persons found either the packets of the chemicals with the seed in the bag or the seed procured by them were already treated with the chemicals.
7. The farmers, in general, were highly confused in respect of identification of the cotton diseases. They misunderstood the overt symptoms of root-rot, boll-rot and angular leaf spot with that of termite damage, effect of boll worms and nitrogen deficiency, respectively.
8. Rogor and Dimecron were the two most popular insecticides with the farmers. These were applied by 155 (91.38 per cent) and 59(32.35

per cent) farmers, respectively. The other common insecticides were Metasystox, Sevin and Monocrotophos used by 18(10.59 per cent), 16(9.49 per cent) and 9(5.29 per cent) farmers, respectively. All other chemicals were in use with only a few farmers.

9. The most commonly used insecticides were also used in optimum doses by most of the farmers while less common or uncommon ones were applied in low doses by most or all of the farmers.
10. The majority of the farmers used between 31-60 litres of water just one-fourth of the recommendation or even less in the spray solution. The percent of farmers using water only up to 90 litres swelled to about 96.00 per cent.

GRAM

1. The incidence of pod borer-an insect-pest, overwhelmed all other pests attacking gram crop. As many as 104 farmers (55.91 per cent) reported the occurrence (0.54 per cent), however, only one sprayed the crop against this pest.
2. The second most important plant protection problem in gram was that of termite control. Out of 53 farmers (28.49 per cent) reporting the infestation of the pest, only 5 farmers

(2.69 per cent) adopted the preventive measure - 3 (1.61 per cent) did soil treatment and 2 seed treatment.

3. Among diseases of gram, blight was the most prevalent. However, the farmers could hardly differentiate between the symptoms of blight and effect of frost which occurred almost at the same time.
4. The farmers did not adopt the control measures recommended to check the spread of blight and diseases in gram. Similar treatment of neglect was given to the wilt and root-rot diseases of the crop. The incidence of these were however, reported by only a small number of farmers, 2 farmers mentioning each of the two diseases.

Nevertheless, farmers were also ignorant about the availability of any control measure of these diseases. They had lot of frustration to show about the blight disease, locally called as Chandni Rog.

RAPSE SEED AND MUSTARD

1. Aphid was the greatest devil of rapeseed and mustard crops. Its incidence, in the year, 1980-81, was reported by 56 farmers (50.91 per cent). Other insect-pests and diseases were almost non-existent. Among other insect-

- pests, leaf minor and painted bug were reported by as many as 5(4.55 per cent) and 1(0.91 per cent) farmers, respectively.
2. The extent of adoption in respect of number of farmers spraying against aphids was low (30.36 per cent). This was so despite the knowledge of the chemicals being in possession of the majority of the farmers as they used the same chemicals, Rogor Dimecron and Matasystox, recommended against cotton jassids.
 3. All the farmers gave only one spraying against aphids while recommendation was for 2-3 sprayings. Thus, effectiveness of one spray made by the farmers was very much doubtful. This 'one spraying' by a farmer could be a sheer wastage if the pest reoccured after, say, 15 days with the effect of the spraying having been ended.
 4. Against leaf minor and painted bug, extremely high proportion of farmers used spraying, 60 per cent and 100 per cent, respectively.
 5. The diseases in rape seed and mustard by and large, were not perceived as a plant protection problem by the farmers. The prevalence of white rust, Alternaria and phyllody diseases was reported by only 6(5.45 per cent), 4(3.64 per cent) and 3(2.73 per cent) farmers, respectively. However, a large number of

farmers lacked the skill to identify these diseases.

6. Rogor was the most popular chemical with the farmers for use on rape seed and mustard against aphids. This was used by 17 (84.00 per cent) farmers in the year, 1980-81. The chemical was applied in optimum dose by the majority of the applicators (88.24 per cent).
7. Similar to cotton, majority of the farmers (71.43 per cent) used upto or less than one-fourth of the recommended water dose in the spray solution. The percent of users less than or upto one-third of the water dose swelled to just 100 per cent.
8. Not a single farmer among total 290 was aware of any control measure of the diseases of rape and mustard.

WHEAT

1. Among the five crops taken for study, wheat had the least plant protection problem. However, the diseases fully dominated over the insect-pests in this crop.
2. Seed treatment by fungicides recommended as preventive measure against loose smut was adopted by only 23 farmers (11.62 per cent) out of total 198 who cultivated wheat crop in the study year.

The infestation of the disease was reported by as many as 42 farmers (21.21 per cent).

3. The prevalence of rust diseases (Brown and Yellow rust) was almost non-mentionable. Though 32 farmers (11.12 per cent) reported their incidence, it was very light and localized. Naturally, therefore, the farmers did not perceive a need to go for the control of these diseases. However, atleast one farmer still sprayed the crop.
4. There was no insect-pest problem in wheat except of termites. The incidence of this pest was reported by as many as 28 farmers (14.14 per cent). None applied any chemical to control the termites. However, there were 10 farmers who applied insecticides as prophylactic measure against this pest.

GENERAL

1. Among the five crops taken for the study, cotton received attention of maximum number of farmers for use of pesticides. Bajra enjoyed the second position but chemicals used, which was mainly through seed treatment, were normally supplied by the government along with the seed. Rape seed and mustard were the only other crops after cotton on which a number of farmers

- carried out spraying. The number of pesticide users on gram and wheat was negligible.
2. There were very wide technological gaps in adoption of plant protection practices in all the major crops of Hisar district.
 3. Among bajra, gram and wheat in which seed/soil treatment were recommended as preventive measure against different pests, the technological gap was the widest in gram (97.31 per cent) followed by wheat (89.39 per cent) and the least in bajra (62.76 per cent). But even this 'least' gap' is very large.
 4. Between two cash crops, the overall technological gap was less in cotton (55.28 per cent) than in rape seed and mustard (64.39 per cent).
 5. The most important variables that influenced the technological gaps, were knowledge of the farmers and infrastructure of the plant protection. However, mass media exposure, respondents' education and adult family education were also the important variables significantly affecting the technological gap in cotton at 0.01 level of probability. Other independent variables, namely, risk orientation, extension contact and attitude of the farmers towards plant protection was associated with the technological gap in cotton at 0.05 level of probability.

Only knowledge was found to have significant influence on the technological gap in the adoption of plant protection in rape seed and mustard.

ACTION IMPLICATIONS OF THE STUDY

The utility of this study lies in recommending guide-lines for drawing an effective strategy for the promotion of plant protection measures among the farmers. Some of the important points in this regard are discussed below:

1. There is need to organise one day training camp of the farmers in every village to educate them about the identification of various insect-pests and the disease symptoms in the crops. The packing and formulations of the chemicals recommended to control these pests should be shown to the farmers with the help of 'dummy packs' and the procedure of their (pesticides) use be told to them (the farmers) through method demonstration.
2. The components of plant protection technology like seed treatment, volume of water to be used in spray solution and use of different chemicals for the successive sprays, are of vital importance, without any additional investment. Presently, these are almost

neglected in the farmers' pest control operations, and thus, are the major sources of inefficiency.

As also seems, firstly, these aspects are not being given adequate extension emphasis also.

Secondly, some recommendations, like, volume of water in spray solution for spraying at different growth stages of the plants and use of different chemicals for successive sprays, are not specific. This means there is research gap also with regard to these aspects of the technology. A Single Practice Result Demonstration on these components should be laid-out in every village so that the farmers may become convinced about the high economic returns of the use of their almost negligible investment on these apparently minor aspects.

2. The extent of use of water in spray solution is presently very low. As a result, the majority of the farmers are using highly concentrated solutions of the pesticides. This results in poor coverage of the plant parts and may lead to several side effects. Since this is a free input available to all the farmers, the extension workers should be specially directed to emphasise upon the use of right dose of water in spray solution at different stages of crop growth.

4. The farmers need to be guided about exact time of a spray on his crops. While this would ensure the use of required number of sprayings, this will also help stop wastage done by spraying once against the need of 2 or 3 times. If pests reoccur after the 1st spraying and 2nd spraying is not given, then there is little benefit of the first spraying, rather it would mean a loss worth atleast the investment (on the spraying done).
5. Application of a pesticide in time is of crucial importance for the pest control. Therefore, there is a strong need to strengthen the infrastructure of the plant protection, particularly with regards to the availability of spraying equipment at the peak pest attack period and chemicals on cheaper rates.
6. There is need to replicate this study in larger area. Many important implications will emerge out if this report is discussed in the Agricultural Officers' Workshop which is held twice every year, before rabi and kharif seasons in the Haryana Agricultural University, to finalize the Package of Practices for different crops of the ensuing season.