TRAINING NEEDS OF INPUT DEALERS ON PESTICIDE APPLICATION ON COTTON CROP IN PUNJAB

*M.K. Sarda and S.S. Gill**

Cotton *(Gossypium Sp.)* 'White Gold' is a premier textile fibre crop and also the second most important non-conventional oilseed in the world. Punjab is one of the major cotton producing states in India and produces about one fifth of the total cotton in the country. Over ninety five per cent of the area is in the cotton belt which includes districts of Bathinda, Faridkot, Ferozepur, Mansa and Sangrur.

Intensified production technologies have escalated pest problems. While the application of pesticides is necessary to improve production and productivity, the social aspects of such application cannot be ignored. Pesticides need to be used judiciously in view of high social costs such as environmental pollution. The use of pesticides is beset with conflicting interests between the farmers on the one hand and society on the other. Even though social considerations would warrant the use of target specific pesticides, which degrade expeditiously in the environment, the farmers who are more concerned with profitability would tend to use persistent, broad spectrum pesticides in a manner that is not conducive to the interests of the society.

Pesticides are used in order to save the potential yield of the crops from damage due to various insect-pests. In Punjab 44.5 per cent pesticide consumption is only on cotton crop. It is very important that the farmers use these costly and poisonous inputs judiciously with respect to dosage, time and method of application with the twin objectives of maximizing cost benefit ratio and minimizing environmental pollution. The knowledge of these important aspects must be imparted to the farmers along with the supply of these agro-chemicals. The farmer is more receptive to the technology when he has to use it and that is why he intends to know about the plant protection techniques at the time of purchase of pesticides. Punjab has a network of more than 5000 pesticide dealers. They have to maintain close functional linkages with the farmers, extension workers, whole sale distributors and sales representatives of the pesticide manufacturers. The place of pesticide dealers in the rural social system in Punjab is shown in Fig.1. The pesticide dealers, have an important role of rendering advice regarding pesticide application technique. In the absence of proper education and training about safe use of pesticides, they are likely to give inadequate and wrong advice. Hence it is necessary that these dealers have some essential technical knowledge to serve the farming community in a better way. But before organizing any regular training for these

* Agronomist (Reclamation) Ludhiana, Department of Agriculture; Director of Extension, PAU, Ludhiana Punjab.

dealers, their training needs must be identified. Thus realizing the importance of training pesticide dealers, the present study on "Training Needs of Dealers Relating to Pesticidal Application on Cotton Crop *(Gossypium Sp.)* in Punjab" was taken up with the following specific objectives:

Objectives

- To identify the subject areas/sub-areas, relating to pesticidal application on cotton crop, the knowledge of which is essential for dealers;
- To find out the existing knowledge of the dealers in the identified subject matter areas/sub-areas;
- To determine the training needs of dealers on the basis of the knowledge gap;
- To bring out the relationship, if any of major socio-personal characteristics with their training needs;
- To suggest a model curriculum and duration of training course for the dealers.

Research Methodology

The present study was conducted in the cotton growing area of Punjab state in India. The cotton belt comprises of Bathinda, Faridkot, Ferozepur, Mansa and Sangrur districts:. All the five districts were selected for the purpose of this study. Out of top three cotton growing blocks in each district, two blocks were selected randomly. Thus ten blocks were selected for this study. From the list of registered pesticide dealers, thirty dealers were selected randomly from each of the selected blocks and were invited for a group meeting on a specific date, time and venue. Of these, 206 dealers attended the group meetings and acted as respondents for this study.

From the available literature on pesticides, their sale and application, four areas, 12 sub-areas and 71 aspects, the knowledge of which was considered prima-facie essential for pesticide dealers, were identified. For further screening, a panel of experts was consulted. The panel deleted/ modified/regrouped/added some aspects. In this way three areas, four subareas and 27 aspects, the knowledge of which was considered essential for the dealers, were identified. A knowledge test consisting of 113 questions covering all the 27 aspects was prepared. The preliminary questionnaire consisting of the knowledge test was pre-administered on a non sample group. For the final test 65 questions covering 23 aspects were retained on the basis of difficulty index and item discrimination index. The research questionnaire was finalized after incorporating the suggestions, on the basis of preliminary administration of test and suggestions of advisory committee members.

The data for the present study was collected from the pesticide dealers by organizing block level group meetings. The responses were quantified by assigning arbitrary score of one for correct and zero for an incorrect response. The total score for each respondent was worked out by summating the scores for all the questions. The levels of knowledge score were categorized as low, medium and high:

Levels	Score range
Low	20-40
Medium	41-60
High	61-80

In order to maintain uniformity and clarity, the knowledge score was observed out of a maximum of 100.

$$\text{Knowledge score for each respondent} = \frac{\text{Total score obtained}}{\text{Maximum obtainable score}} \times 100$$

Mean knowledge scores were calculated as under:

$$\text{Mean knowledge score} = \frac{\sum \text{ of knowledge score of all the respondents}}{\text{Number of respondents}}$$

Training need score = 100 - knowledge score

Suitable categories were developed for the various socio-personal characteristics of the respondents viz, age, family background, other occupation, education, experience in sale of pesticides and exposure to agricultural components of mass media. The data was analysed using statistical techniques such as mean, standard deviation, frequencies, percentage and Pearson's coefficient of correlation.

Salient Findings

Profile of the Respondents

Majority of the respondents were young with urban family background and business as their occupation. A majority of the respondents had an educational level of matriculation or above and business experience of four years or more,

with medium exposure to agricultural components of mass media as enclosed in Table 1..

Table 1. Profile of the respondents.

Sl. No.	Socio-personal Characteristics	Category	Frequency (f)	Percentage (%age)
1.	Age (Years)	a) < 35	126	61.17
		b) 35-50	70	33.98
		c) > 50	10	4.85
2.	Family background	a) Urban	151	73.30
		b) Rural	55	26.70
3.	Other occupation	a) Other than pesticide dealership	151	73.30
		b) Farming	39	18.93
		c) Service	16	7.77
4.	Education	a) Under-matric	8	3.88
		b) Matric.'	83	40.29
		c) Above matric (undergraduate)	36	17.48
		d) Graduate	68	33.01
		e) Agri- graduate	2	0.97
		f) Post- graduate	9	4.37
5.	Pesticide sale Experience (Years)	a) <4	44	21.36
		b) 4-10	99	48.06
		c) >10	63	30.58
6.	Mass Media exposure (scores)	a) Below (<15) average	96	46.60
		b) Average (15-21)	105	50.97
		c) Above Average	5	2.43

Identification of Essential Subject Matter

An exhaustive list of 71 aspects was collected and rearranged under four areas and twelve sub areas. After scrutiny, the panel of experts deleted/ modified/ regrouped/added the various aspects, sub-areas and areas. Finally three areas, four sub areas and 27 aspects were identified, the knowledge of which is considered essential for pesticide dealers as given in Table 2.

Table 2. List of subject matter areas/sub-areas/aspects suggested by a panel of experts

Areas	Sub-areas	Aspects
I. Technical Know How	**1)Knowledge of pesticides**	i) Classification/ groups of chemicals
		ii) Formulation/ active ingredient
		jji) Mode of action
		iv) Effect of over/ under dose
		v) Phytotoxicity
		vi) Preparation of spray material/dust
		vii) Waiting period
		viii) Safe use of pesticides
		ix) Compatibility
	2) Damage by Pest	x) Nature of damage
		xi) Symptoms of damage
	3) Plant Protection Equipments	xii) Availability and Selection
		xiii) Use and maintenance
		xiv) Calibration
	4) Application Technique	xv) Name of chemicals
		xvi) Dosage

	xvii) Time
	xviii) Method
	xix) IPM & ETL
II. Marketing	xx) Source of pesticide availability
	xxi) Selection of pesticides
	xxii) Inspection of packing & labels
	xxiii) Dispensation of pesticides
	xxiv) Importance of original pack till last application
	xxv) Collection of results of earlier application
III. Legal Aspects	xxvi) Knowledge of pesticide dealers' liabilities
	xxvii) Names of banned insecticides

Existing level of Knowledge

The overall level of knowledge of the majority of pesticide dealers was medium as shown in Table 3.

Area wise Knowledge level

Mean knowledge score was medium in all the three areas and it was highest in case of 'Technical Know-How' followed by 'Legal Aspects' and 'Marketing' as shown in Table 4.

Sub area wise Knowledge level

High level of knowledge was found in case of 'Plant Protection Equipments' and 'Pesticides'. There was medium level of knowledge about 'Damage by Pest' as shown in Table 5. No sub area under Legal Aspects and Marketing could be identified.

Aspect wise Knowledge level

Out of twenty seven aspects, high level of knowledge was found in case of fourteen aspects and these were: 'Inspection of packing and labels, 'Collection of results, 'Calibration of plant protection equipments', 'Use and maintenance', 'Effect of over/under dose', 'Liabilities under the Act', 'Classification/groups', 'Compatibility', 'Nature of damage', 'Phototoxicity', Method of application', 'Waiting period', 'Availability and selection of plant protection equipments', 'Safe use of pesticides'. Medium level of knowledge was found in the aspects of 'formulation active' ingredients, 'symptoms of damage' 'IPM & ETL' and time of pesticidal application.

Table 3. Distribution of respondents according to their overall knowledge level

Level of knowledge	Range of knowledge scores	f	%age
Low	20-40	8	3.88
Medium	41-60	104	50.49
High	61-80	94	45.63

Table 4. Distribution of respondents according to their knowledge level in different subject matter areas

Subject matter	Number of respondents under various knowledge levels						Mean knowledge score
	Low		Medium		High		
	f	%age	f	%age	f	%age	
Technical know-how	69	33.49	38	18.45	99	48.06	60.86
Marketing	83	40.29	16	7.77	107	51.94	45.05
Legal aspects	60	29.13	0	0.00	146	70.87	55.18

Table 5. Distribution of respondents according to their knowledge level in the different sub-areas of 'Technical know-how'

Subject areas	Number of respondents under various knowledge levels						Mean knowledge score
	Low		Medium		High		
	f	%age	f	%age	f	%age	
Technical	69	33.49	38	18.45	99	48.06	60.86
Pesticides	73	35.44	29	14.08	104	50.48	62.53
Damage by pests	63	30.58	77	37.38	66	32.04	59.90
Plant protection equipments	32	15.53	17	8.25	157	76.22	74.15
Application techniques	109	52.91	30	14.56	67	32.52	46.91

In the remaining nine aspects, the knowledge of the majority of the respondents was low and these aspects were: 'source of pesticide availability'; 'selection of pesticides', 'dispensation of pesticides', 'mode of action', preparation of spray material', 'name of chemicals/weeds/insects/ disease, 'dosages', 'importance of keeping original packing' and banned insecticides.

Training Needs

The training needs intensity in the area of 'Marketing' was the highest followed by 'Legal Aspects' and technical know-how. Sub- area wise the training need was found highest in the case of 'Application Techniques' followed by 'Damage by pest', 'Knowledge of Pesticides' and 'Plant Protection Equipments' under Technical Know-How' area. High training need intensity was found in the aspects of, 'Source of pesticide availability', 'Selection of pesticides', 'Dispensation of pesticides', 'Mode of action', 'Preparation of spray material', 'Name of chemicals/weeds/insects/diseases', 'Dosages', 'Importance of keeping original pack' and 'Banned insecticides'. Training need intensity for 'Time of pesticide application', 'IPM & ETL' 'Symptoms of damage' and 'Formulation/active ingredients' were found to be medium.

Relationship of selected socio-personal characteristics with the training needs

It was found that the selected socio-personal characteristics like age, education, experience in pesticide sale and exposure to agricultural components of mass media were positively and significantly related with the knowledge score of

the respondents. Thus it is concluded that age, education, experience in pesticide sale and exposure to agricultural components of mass media had inverse relationship with training need of the respondents.

Opinion of the Respondents about Training

Majority of the respondents expressed that minimum education for pesticide sale business should be matriculation. The duration of training course should not be more than one month. Punjab Agricultural University, Ludhiana should organise such training in the month of March/April/May and time devoted to practicals should be fifty to seventy five per cent. Only one fifth of the respondents felt that training should be imparted by officials of Department of Agriculture, Punjab.

Suggested Model of Curriculum

On the basis of expressed opinions of the respondents and training needs of the pesticide dealers it is suggested that the duration of the training course should be at least of one month for the existing dealers. On an average in a month there are 140 working hours. Training need intensity was found to be high in nine aspects, medium in four and low in 14 aspects as shown in Table 6. It is suggested to allot four, five and six hours for each aspect of low, medium and high training need intensity respectively. This accounts for a total of 130 working hours. The remaining ten hours may be utilized for field visits and visits to manufacturing units of pesticides and plant protection equipments. The time devoted to practicals should be at least fifty per cent

Table 6. Training need intensity for various aspects

Training Need Intensity	Aspects
High	Source of pesticide availability, Selection of Pesticides, Dispensation of Pesticides, Mode of action, Preparation of spray material, name of pesticides, Dosage, Importance of original packing, Banned insecticides.
Medium	Time of spray, IPM & ETL, Symptoms of damage, Formulation/ active ingredients.
Low	Safe use, Availability and selection of equipments, waiting period, Method of application, Phyto toxicity, Nature of damage, compatibility, Classification/Groups, Liabilities under the Act, Effect of over/underdose, use and maintenance of equipments, calibration, collection of results, inspection of packing and labels.

The suitable months for training are March to May. The training on technical know how should be imparted by PAU Scientists but for marketing and legal aspects the assistance from the enforcement staff of the Department of Agriculture, Punjab may be sought. Course weightage for essential subject matter areas/sub areas is shown in Fig.2.

Conclusions and Suggestions

The overall knowledge level of the respondents was medium in essential subject areas. It was found that there is a need to give training priority in order of 'Marketing', 'Legal Aspects' and 'Technical Know-How' areas. Training priority on sub areas should be given to the 'Application Technique' followed by 'Damage by Pests', 'Knowledge of Pesticide' and 'Plant Protection Equipment'. High training need intensity was found in the aspects of 'Source of pesticide availability', 'Selection of pesticides', 'Dispensation of pesticides', 'Mode of action', 'Preparation of spray material', 'Name of chemicals/weeds/insects/diseases', 'Dosages', 'Importance of keeping original packaging' and 'Banned insecticides'. The knowledge of these nine aspects must be possessed by the dealers. In the aspects of 'Time of pesticidal application', 'IPM & ETL', 'Symptoms of damage' and 'Formulation/active ingredients' the training need intensity was medium, thus second training priority should be given to these aspects. So the knowledge of these four aspects should also be possessed by the dealers. It would be helpful for the dealers to possess the knowledge of remaining 14 essential aspects. However, for the future, an amendment should be made in the Insecticide Act, 1968, so as to make minimum training essential for registration as pesticide dealers. Minimum educational qualification for the registration should be 10+2 with science followed by a Certificate Course in Agriculture/Pesticides. Preference should be given to those possessing higher qualifications like diploma/degree in agriculture. For the dealers already in the business a training course of one month should be made compulsory for the renewal of Insecticide license. Refresher courses of 2-3 days should also be started so that the dealers can voluntarily join such courses. It is suggested that the provisions of the Insecticide Act, 1968 should also be amended such that if any dealer possesses lower qualifications, then he should employ a person with the suggested minimum qualifications.

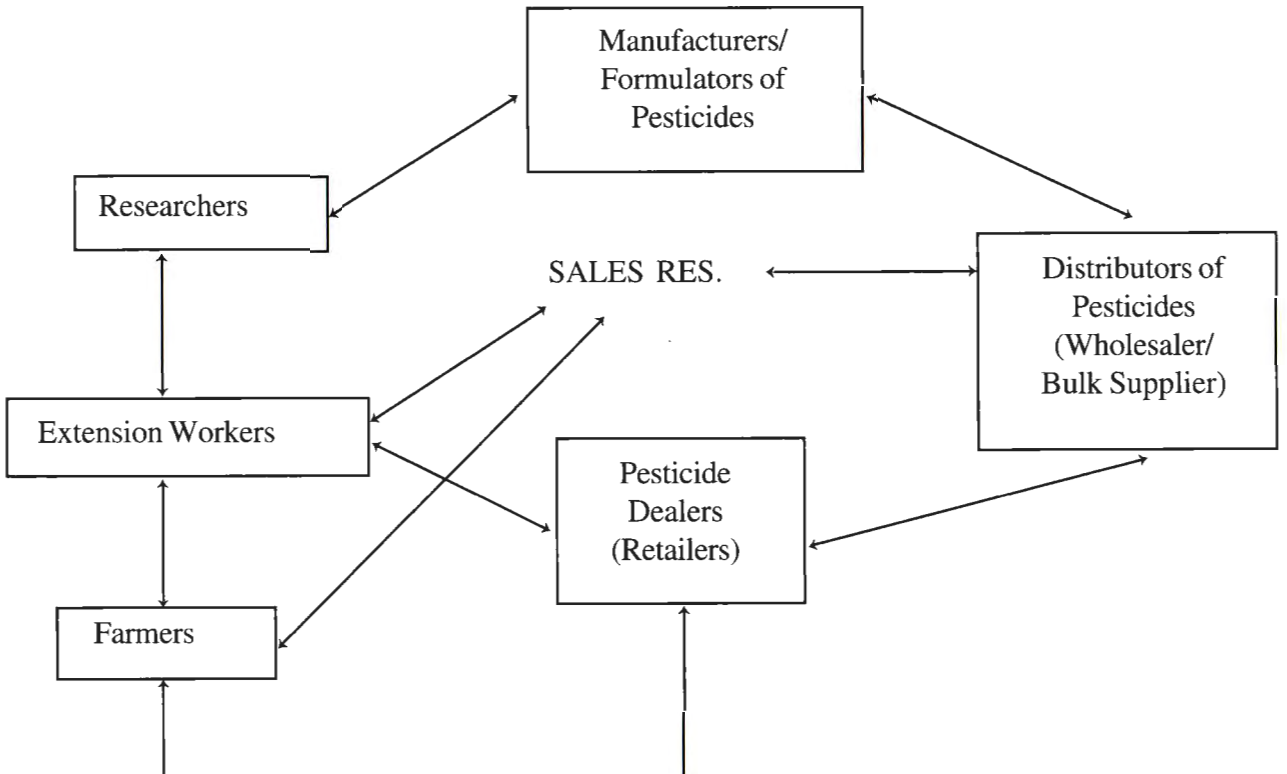

FIG. 1: OPERATIONAL MODEL SHOWING THE PLACE OF PESTICIDE DEALERS IN RURAL SOCIO SYSTEM IN PUNJAB

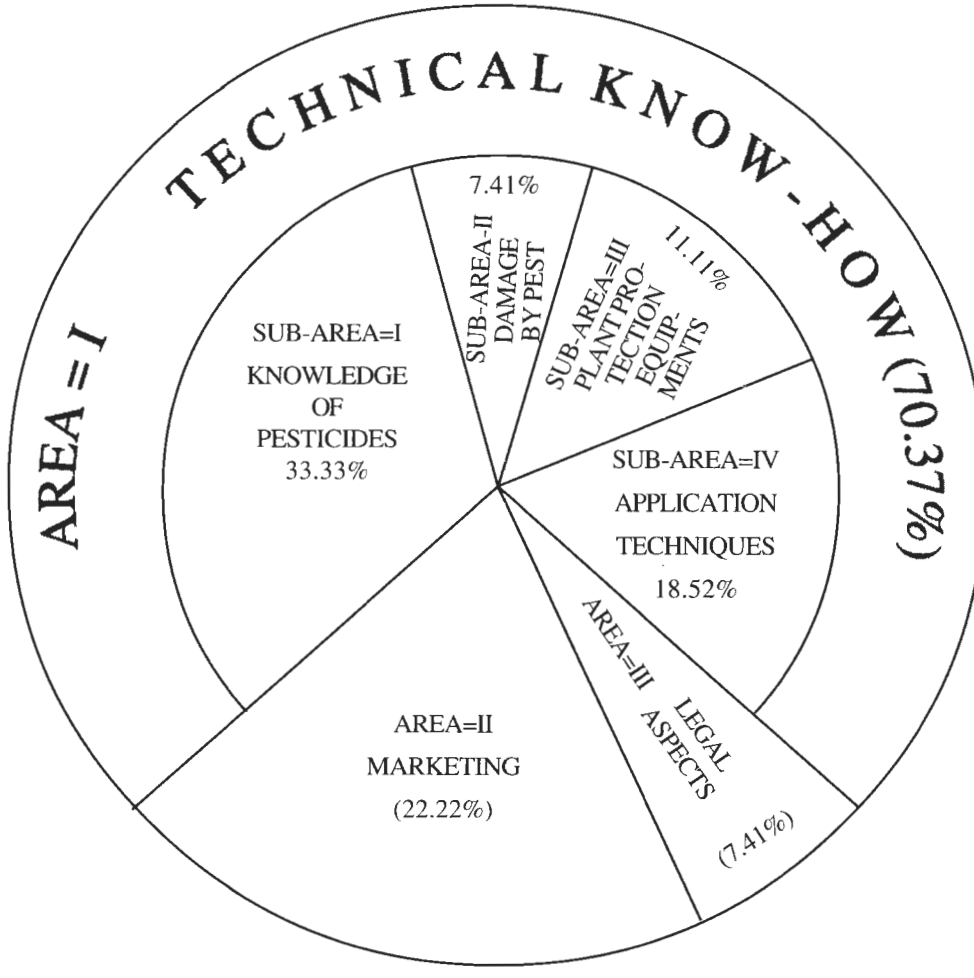

FIG. 2: COURSE WEIGHTAGE FOR ESSENTIAL SUBJECT MATTER AREAS / SUBAREAS