

## Identification of Constraints in Herbicide Application Technology of Punjab Farmers

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### ABSTRACT

Herbicides are the chemicals that are used to kill unwanted, undesirable, troublesome, noxious plants, called weeds. Ecological and environmental risks associated with their application in agriculture have been attracting the attention from the public as well as the scientific community. In order to reduce it, efforts have been made to identify the constraints prevalent in current herbicide application technology. The study on herbicide use and application technology was conducted in Amritsar and Jalandhar districts of Punjab and revealed that farmers generally depend upon local dealers for technical guidance. These dealers misguide the farmers for their own monetary benefits. Only 8 % of the farmers were generally aware of the meaning of chemical names of herbicides, rest depend more on popular names. About 5.3 % could differentiate between the classes of chemicals. The gaps in knowledge were identified and it was found that lack of awareness was with regard to spraying techniques, types of herbicides, time and method of application and dumping of empty containers. Poor communication was reported between farmers and extension persons. The study emphasized that with increasing brands in agriculture inputs and decreasing profitability, it becomes important that farmers should be trained specifically on spraying techniques and more knowledge regarding class and judicious use of herbicides be provided to them in farmer participatory mode.

**Key words:** Herbicide, application technology, gaps, Extension persons

### INTRODUCTION

Agriculture is an age old practice and being carried on over several decades amidst increase in population in geometric progression many kinds of chemicals are used in agriculture *viz.*, insecticides, herbicides, fungicides, pesticides (Ayoola, 1990). Herbicides have now emerged as an important part of technical inputs required for modern agricultural production and are accepted as a standard tool of the trade by farmers throughout the world (Lever, 1990). For several years humans have utilized herbicides to protect their crops. The FAO has estimated pre-harvest crops losses (due to weeds, plant diseases; arthropods) to be around 30 to 35 per cent, and post-harvest losses amounted to an additional 10 – 20 per cent (FAO, 1993). Overall, weeds produced the highest potential loss (34 %), with animal pests and pathogens being less important (losses of 18 and 16 per cent) (Oerke, 2006). In order to control pre-harvest losses due to weeds, chemical weed control has become an increasingly necessary operation in the consistent and economic production of crops. In addition to agricultural diversification and yield optimization, chemical weed

control has formed an integral part of the policies of many governments world over. Besides the benefits of herbicides in Agriculture, it has negative effects on the environment and human health which is generated mainly due to lack of knowledge regarding safety parameters (Miller, 2002). The chemical control of weeds has become very popular still unsatisfactory level of weed control is attained. Also, farmers lack technical knowledge regarding risks associated with herbicide use and do not take preventive measures. Thus, a survey was planned and conducted by Krishi Vigyan Kendra (KVKs) and Farm Advisory Service Center (FASC) of Punjab Agricultural University, Ludhiana in Amritsar and Jalandhar districts of Punjab to assess knowledge level of farmers with respect to herbicide usage and application technology and to identify the prevailing knowledge gaps so as to found suitable measures to rectify it.

### METHODOLOGY

The present study was conducted during 2012-13 in Amritsar and Jalandhar districts of Punjab to study herbicide use and application patterns among farmers of

Punjab. A list of farmers was prepared with the help of cooperative society and Sarpanch of the villages. Five villages from each district and 15 farmers from each village were randomly selected with age group 20 to 65 years. In this way, 75 farmers of farming community from each district were randomly selected to assess knowledge level of farmer's with regard to use of herbicides with the objective to identify the constraints prevailing in herbicide application technology. Data was collected through survey. The survey was done by using structured questionnaire developed regarding herbicide usage and application practices and administered on 75 farmers of both the districts. Data was analyzed based on means and percentages.

## RESULTS AND DISCUSSION

### Socio-personal characteristics

The socio-personal characteristics based on survey of seventy five farmers from each district were presented in Table 1. A considerable number i.e. about 28 per cent had finished middle school, 25.3 per cent high school, 14.7 per cent college and 13.3 per cent had done no schooling (Table 1). Most of those with no or lesser education levels was due to lack of funds to continue their studies, while for others it was due to lack of jobs and the need to earn money to sustain themselves. About 45.3 per cent farmers are marginal i.e. having less than one hectare of land, 34.7 per cent were small (1.0 to 2.0 ha of land) and 20 per cent were large farmers with land holdings of more than 2.0 hectares of land. About 77 per cent farmers were not a member of even a single organization. Only 23 per cent had membership of any organization. As far as family size is concerned, about 67.5 per cent farmers had small family size while 32.7 per cent had large i.e. more than five members.

**Table 1: Socio-personal characteristic of farmers**

**n=150**

Variables		Number	Percentage (%)
Age	Young aged	22	14.7
	Middle aged	62	41.3
	Old aged	66	44.0
Education	Illiterate	20	13.3
	Able to read and write	28	18.7
	Middle school	42	28.0
	High School	38	25.3
	More than above	22	14.7
Land holding	Marginal (> 1.0 ha)	68	45.3
	Small(1.0 ha -2.0 ha)	52	34.7
	Large (> 2.0 ha)	30	20.0
Social Participation	No membership	115	76.9
	Membership of some organization	35	23.1
Family Size	Small (Upto 5)	101	67.5
	Large (More than 5)	49	32.7

### Advisory dependency order

The data presented in Table 2 revealed that, the advisory dependency order had seven orders with input dealer at first order and radio at last while it placed extension expert at fourth order. Farmers generally rely on local dealers in their community for agri-inputs like seeds, fertilizers, insecticides, pesticides and other chemicals and thus for technical guidance. These dealers misguide the farmers for their own monetary benefits, resulting in downplaying the negative impact of herbicides. Farmers also in the absence of technical expertise easily adopt these misleading practices which lead to deterioration of natural ecosystem along with increased cost of cultivation and decreased profitability. At farmer's level, involvement of extension experts is secondary i.e. after local dealers, personal past experiences and from the experiences of local fellow farmers. However, there is great scope for extensional functionaries to provide technical expertise to farmers so that they will not fall into system of faulty practices and ruin the resources. It was also revealed that farmers were not in a habit of reading khetai magazines/newspapers for technical knowledge. Only about 6.7 per cent farmers were in a habit of reading magazines/newspapers for technical expertise and 6 per cent rely on radios, while 68 per cent depends on local dealers, past experiences and fellow farmers.

**Table 2: Advisory dependency order**

**n=150**

Advisory services	Number	Percentage	Ranking
Local Dealer	72	48.0	I
Fellow farmers	15	10.0	III
Past experience	18	12.0	II
Radio	9	6.0	VII
Advertisements	12	8.0	V
Magazine/newspaper	10	6.7	VI
Extension expert	14	9.3	IV

### Herbicide use and application patterns of farmers

The study presented in Table 3 revealed that only 8 per cent of the farmers were aware about the meaning of chemical names of herbicides and rest depend more on popular names. About 9 per cent had knowledge of herbicide brands, 5.3 per cent could differentiate between the classes of chemicals and 4 per cent type of herbicides.

The study emphasized that with increasing brands in agriculture inputs and decreasing profitability, it becomes important that farmers should be trained specifically on spraying techniques and more knowledge regarding class and judicious use of herbicides should be provided to them. Majority of the farmers had lack of awareness with regard to spraying techniques. They changed the dosage of herbicides applied per unit of land. Only 63 per cent

farmers used the recommended dosages while 37 per cent used the higher dose because they thought that the recommended dose did not work in their fields. About 76 per cent farmers have no knowledge about time of application of herbicides. They do not know at what weed stage and at what time, herbicides should be applied in various crops.

The best time to apply herbicides is in the morning. To ensure proper utilization of herbicide it is better applied in the morning or evening when the temperature is low. The application of the herbicides in the morning make it to be absorbed easily by the plants better than when it is applied at any other time of the day. No or very little awareness was found with regard to mode of action of herbicides, residual effect and effect of overdose on crop. About 33 per cent farmers have no knowledge regarding type of nozzle to be chosen for spraying herbicides. It was also observed that 44 per cent farmers generally go for mixing of different brands of herbicides.

The main reason was to counter the different resistant weeds affecting farm produce. Direction of wind when applying herbicides is also very important. Whenever, herbicides or agrochemicals are to be applied, the direction of wind has to be considered. But gap was observed in this case as 46 per cent farmers apply herbicides keeping direction of wind under consideration, rest not. The majority of farmers in this survey sold empty containers to buyers who picked up the waste from the community. It is unclear what the buyers do with such containers. Damalasb et al. (2008), strongly against such practices. It is recommended to puncture empty containers to prevent their reuse.

**Table 3: Herbicide use and application patterns of farmers  
n=150**

Variables			Number		Percentage		Ranking
			Y	N	Y	N	Y
Lack of awareness							
Knowledge of herbicide	Knowledge of brand		14	136	9.3	90.7	I
	Chemical name		12	138	8.0	92.0	II
	Class of herbicide		8	142	5.3	94.7	III
	Type of herbicide		6	144	4.0	96.0	IV
Spray technology							
Dose	Recommended	Higher	94	56	62.7	37.3	I
Time of application	Recommended time	Late	36	114	24.0	76.0	VIII
Amount of water used	Recommended	Less	54	96	36.0	64.0	VI
Knowledge of Nozzle	Y	N	50	100	33.3	66.7	VII
Use of alternate herbicide	Y	N	90	60	60.0	40.0	II
Mixing of brands	Y	N	66	84	44.0	56.0	IV
Direction of wind	Y	N	69	81	46.0	54.0	III
Dumping of empty containers	Y	N	57	93	38.0	62.0	V

### Constraints for adoption of herbicide application technology

The major constraints perceived by farmers for adoption of herbicide application technology (Table 4) were cheating by dealers, high cost of inputs, high cost of labour, lack of awareness of technologies, non availability of trained labour, lack of proper communication with extension functionaries and lack of timely supply of recommended herbicides. Among these constraints cheating by dealers was observed as most serious constraint and this was ranked at first followed by lack of awareness of technologies, lack of proper communication with extension functionaries and high cost of labour. Eighty four percent farmers observed that lack of proper communication with extension functionaries as a major constraint that is ranked third and that must be addressed to educate farmers regarding new advanced existing technologies so that constraint ranked one (cheating by dealers) and ranked two (lack of awareness of technologies) can be over ruled.

**Table 4: Constrains faced by farmers for adoption of recommended herbicide application technology  
n=150**

Constraints	Number	Percentage	Ranking
Cheating by dealers	134	89.3	I
High cost of inputs	102	68.0	VI
High cost of labour	120	80.0	IV
Lack of awareness of technologies	128	85.3	II
Non availability of trained labour	118	78.6	V
Lack of proper communication with Extension functionaries	126	84.0	III
Lack of timely supply of recommended herbicides	98	65.3	VII

### CONCLUSION

The gaps in knowledge were identified and it was found that full gap was reported in case of lack of awareness with regard to spraying technique, types of herbicide, time and method of herbicide application. No or very little awareness was found with regard to class and type of herbicides and effect of overdose on crop. Poor communication was reported between farmers and extension persons. Farmers totally rely on dealers for technical knowledge. There is great need to make farmers aware regarding the herbicide spraying technology. Transfer of technology should be strengthened in farmer participatory mode along with involvement of extension persons. Farmers training camps, demonstrations and field days can really help in creating awareness among the farmers and mitigating this gap.

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