



USE OF PESTICIDES AND PRECAUTIONARY MEASURES TAKEN BY FARMERS OF HARYANA STATE

¹Singh.K, ²Chahal.KP, ³Komal and ⁴Kumari.S.

¹Principal Scientist, ²Assistant Professor, ³SRF and ⁴YP-II

Department of Resource Management & Consumer Sciences

CCSHAU Hisar

Abstract : India since earlier times has been the land of organic farming. But the green revolution in India introduced chemical fertilizer and pesticides and after the green revolution use of fertilizers and pesticides has increased several times. Pesticide covers a wide range of compounds including fungicides, insecticides, rodenticides, herbicides, nematicides, molluscicides, plant growth regulators and others. On one hand, it is helpful in increasing the yield but on other side, the consequences are such which cannot be ignored and resulted in severe health implications to human and his environment (Akter et. al. 2009). So, a study was conducted on 200 farmers of two districts of Haryana state to assess the impact of pesticides on farmers' health after using the pesticides and knowledge of farmers regarding pest controlling methods. It was found that near about fifty per cent (46%) farmers mentioned the dangerous effect of pesticides on health of Jind district. Almost equal number of farmers (41%) of the Ambala reported the dangerous and very harmful effect on their health because of pesticides usage. Headache and difficulty in breathing were found the main problems with equal mean score i.e. $\bar{x} = 2.9 \pm 1.0$ faced by farmers after use of pesticides. It was also found that 33 per cent farmers knew about organic farming and 16 per cent farmers who had knowledge of integrated pest management as an alternative method of pest control.

IndexTerms - Pesticides, knowledge, biopesticides, agriculture, farmers

I. INTRODUCTION

Agriculture is the backbone of the Indian economy and contributes 18% to the GDP. Ensuring food security for more than 1.27 bn people with decreasing productive land is a very difficult task. In the process of accomplish the target pesticides play an important role in agricultural sector (Bhardwaj T and Sharma J.P. 2013). The common formulation types of pesticide are liquids, wettable powder, emulsifiable concentrates and dusts (Rajendran S. 2003). Pesticide include all substances which are used to control insects, fungi and weeds and these substances are classified on the bases of organism which is target by these pesticides, like insecticides, herbicides, fungicides, or fumigants. Some are further sub-classified on the bases of their active agents like insecticides are classified as organophosphates (OPs), organochlorines, carbamates, and pyrethroids (Kamel F and Hoppin JA 2004). However since the green revolution (1966) has been started in India, the application of these pesticides increased several times and resulting terrific loss to human health and its environment. When they are sprayed, pesticides move through the air and eventually end up in other parts of the environment. Pesticides break into ground water, soil and surface water depending upon soil type, temperature, vapor pressure, the amount of sunlight & rain, the water solubility of the pesticides and magnitude of application. The pesticides have toxic effects like reproductive, teratogenic, mutagenic and carcinogenic as well as on ecology, including non-target plants and animals like bees. No segment of the population is completely protected against exposure to pesticides and the potentially serious health effects, though a inconsistent burden, is shouldered by the people of developing countries and by high risk groups in each country.

II. RESEARCH METHODOLOGY

The present study was conducted to assess the health hazards of pesticides and knowledge of farmers about the pest controlling method at farms in Jind and Ambala districts of Haryana state. Hundred farmers from each District were selected randomly and only those farmers were selected who were involved in pest control. Thus, total 200 farmers were taken as respondents. A well structured interview schedule was prepared to collect the data on knowledge of farmers about pest controlling methods and health hazards faced by the farmers after applying pesticides used at their farm. Data were analyzed by calculating percentage, mean and

standard deviation. For this study primary data has been collected through self structured schedule from two districts of Haryana. The data collection period is ranging from January 2020 to Dec 2021.

III. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Results and discussion:

Variable	Minimum	Maximum	Mean	Std. Deviation	Jarque-Bera test	Sig
KSE-100 Index	-0.11	0.14	0.020	0.047	5.558	0.062
Inflation	-0.01	0.02	0.007	0.008	1.345	0.510
Exchange rate	-0.07	0.04	0.003	0.013	1.517	0.467
Oil Prices	-0.24	0.11	0.041	0.060	2.474	0.290
Interest rate	-0.13	0.05	0.047	0.029	1.745	0.418

Table: 1. Health effect of pesticides

N=200

Variable	Perceived effect	Jind (n=100)		Ambala (n=100)	
		Percentage		Percentage	
Pesticides harmful to environment and health	Moderately harmful	29.0		18.0	
	Very harmful	25.0		41.0	
	Dangerous	46.0		41.0	
Health problems faced by farmers due to pesticides	Health Problems	Mean Score	Rank	Mean Score	Rank
	Dizziness	2.1±0.4	VI	1.8±0.7	VIII
	Headache	2.9±1.0	I	3.1±1.2	I
	Blurred vision	1.6±0.6	IX	1.7±.03	IX
	Excessive sweating	1.1±0.5	XI	1.2±0.5	XI
	Hand tremor	2.1±0.4	VI	2.4±0.8	V
	Eye itching	2.6±1.2	111	2.9±1.0	III
	Narrow pupils	1.3±0.6	X	1.1±0.7	XII
	Excessive salivation	1.9±1.1	VII	2.1±0.8	VI
	Nausea/vomiting	2.8±0.9	11	2.7±1.1	IV
	Sleeplessness/insomnia	1.8±0.4	VIII	1.6±0.8	X
	Difficulty breathing	2.9±1.2	1	2.1±0.5	VI
	Skin rashes	2.4±0.7	IV	3.0±0.8	II
Diarrhea	2.3±0.5	V	2.0±0.6	VII	

Data in table 1 and fig. 1 show that near about fifty per cent (46%) farmers mentioned the dangerous effect of pesticides on health followed by 29 percent who stated ‘moderately harmful’ and 25 per cent stated ‘very harmful to health and environment’ of Jind district. Same per cent (41%) farmers of the Ambala reported the dangerous and very harmful effect on their health because of pesticides usage and 18 per cent farmers stated that pesticides are ‘moderately harmful’ for their health. Regarding the health problems faced by farmers after pesticides spray, the headache and difficulty in breathing were the main problems with equal mean score i.e. $\bar{x} = 2.9 \pm 1.0$. Nausea/vomiting got 2nd rank and with mean score $\bar{x} = 2.8 \pm 0.9$, followed by itching in eyes ($\bar{x} = 2.6 \pm 1.2$, Rank III), skin rashes ($\bar{x} = 2.4 \pm 0.7$, Rank IV), diarrhea ($\bar{x} = 2.3 \pm 0.5$, Rank V), hand tremor & dizziness ($\bar{x} = 2.1 \pm 0.4$, Rank VI). Excessive salivation, sleeplessness/insomnia, blurred vision, narrow pupils and excessive sweating were also faced by the farmers of Jind district. In the Ambala district, the headache was the main problem with mean score i.e. $\bar{x} = 3.1 \pm 1.2$, skin rashes was the second most problem with the mean score $\bar{x} = 3.0 \pm 0.8$ and eye rashes got the third rank with the mean score $\bar{x} = 2.9 \pm 1.0$. Nausea/vomiting got IV rank with mean score $\bar{x} = 2.7 \pm 1.1$ followed by hand tremor ($\bar{x} = 2.4 \pm 0.8$, Rank V), excessive salivation ($\bar{x} = 2.1 \pm 0.5$, Rank VI), diarrhea ($\bar{x} = 2.0 \pm 0.6$, Rank VII), dizziness ($\bar{x} = 1.8 \pm 0.7$, Rank VIII) and blur vision ($\bar{x} = 1.7 \pm 0.3$, Rank VI). Bernardes *et. al.* 2015 also mentioned that long-term contact to pesticides can harm human life and can disturb the function of different organs in the body, including nervous, endocrine, immune, reproductive, renal, cardiovascular, respiratory systems, and chronic diseases, including cancer, Parkinson, Alzheimer, multiple sclerosis, diabetes.

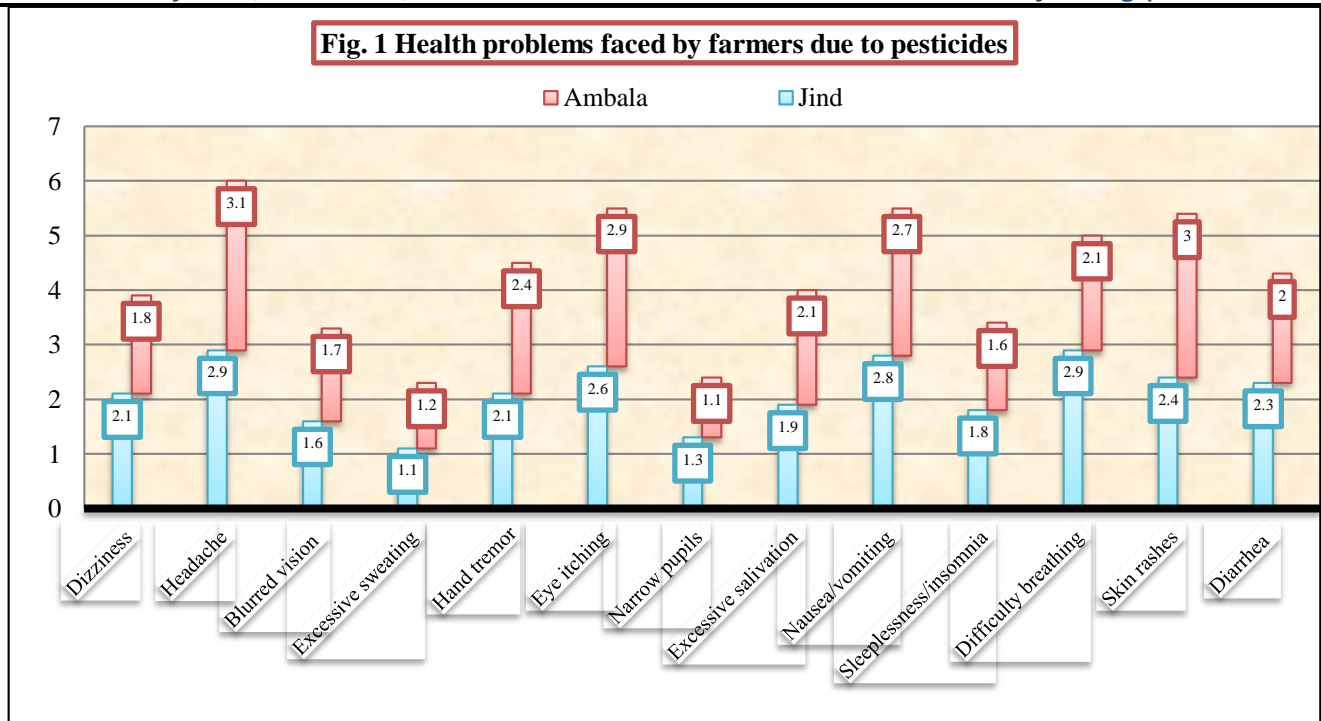


Table 2. Most affected body parts due to high exposure

N=200

Variables	Jind (n=100)	Ambala(n=100)
	Percentage	Percentage
Frequency of highest exposure		
Yes	43.0	40.0
No	77.0	60.0
Most affected parts of body		
Skin	17.0	13.0
Eyes	13.0	11.0
Suffocation/lungs	9.0	6.0
Breathing/ Asthma	4.0	10.0
Cost of loss suffered (in Rs)		
Rs. 5000-10,000	13.0	7.0
Rs.10,001-15,000	16.0	16.0
Rs. 15,001-20,000	14.0	17.0

Data in Table 2 show that almost equal percent (40% &43%) farmers mentioned that they suffered from the high exposure of pesticides in Ambala and Jind respectively. Data reveal that out of 43 per cent farmers, 17 per cent were found to be suffering from skin problems followed by eyes (13%), suffocation problems (9%) and asthmatic issues (4%). Because of these problems near about fifty percent (16%) farmers suffered the loss of Rs. 10,001-15,000, followed by 14 percent had loss of Rs 15,001-20,000 and 13 per cent had paid Rs. 5,000-10,000 as medical care, reported by farmers of Jind district. The table further shows the problems faced by the farmers of the Ambala district due to the use of pesticides. Few farmers i.e. 13 per cent were facing the skin problems, flowed by 11 per cent who faced the irritation in eyes, difficulty in breathing/asthma (10%) and suffocation (6%). Due to these problems, 17 percent of farmers had spent Rs 15,001-20,000, 16 per cent had spent Rs. 10,001-15,000 and seven per cent had spent Rs. 5000-10,000 as medical care.

Table: 3. Knowledge level in farmers regarding pest control methods**N=200**

S.N.	Variables		Jind (n=100)	Ambala(n=100)
			Percentage	Percentage
1	Alternative methods can be used to control pests	Crop rotation method	24.0	21.0
		Bio-pesticides	27.0	38.0
		Integrated pest management	16.0	11.0
		Organic farming	33.0	30.0
2	Availability of bio-pesticides	Yes	30.0	40.0
		No	70.0	60.0
3	Substituting the chemical pesticides with alternate method	Good	54.0	48.0
		Maybe	22.0	19.0
		No way	11.0	17.0
		Don't know	13.0	16.0
4	Information of organic farming	Yes	68.0	75.0
		No	32.0	25.0
5	If yes, explain what does organic farming mean	No chemical fertilizers	56.0	48.0
		No chemical pesticides	58.0	56.0
		Composting	34.0	27.0
		Crop rotation	-	3.0
		Intercropping	-	-
6	Types of mineral fertilizers used in farm	Nitrogen (N)	100.0	100.0
		Phosphorus (P)	100.0	100.0
		Potassium (K)	100.0	100.0

*Multiple responses

Knowledge level in farmers regarding pest control methods: Table 3 shows the knowledge level in farmers regarding pest control methods besides pesticides. It is clear from the table that in the Jind district, 33 per cent farmers knew about organic farming followed by knowledge of biopesticides (27%), crop rotation method (24%) and 16 per cent farmers who had knowledge of integrated pest management as an alternative method of pest control. In the case of the Ambala district, data reflect that nearly 40 per cent farmers (38%) mentioned that bio-pesticides as an alternative method for pest control, followed by organic farming (30%), crop rotation method (21%) and integrated pest management (11%). In Jind (30%) and Ambala (40%) farmers had knowledge of the availability of bio-pesticides. More than half (54%) of Jind and near about fifty percent (48%) farmers of Ambala mentioned that alternative methods to control pests are good and can be applied. The table further describes that 68 per cent farmers of Jind had knowledge about organic farming and mentioned that when no chemical pesticides (58%) or chemical fertilizers (56%) and compost (34%) is used in farm, it is called as organic farming. Three fourth (75%) farmers of Ambala had knowledge about organic farming mentioned when no chemical pesticides (56%) and chemical fertilizers (48%) used in the farm and compost is used in the farm, it is called organic farming. Only three per cent farmers mentioned the crop rotation as organic farming. Besides this cent percent of respondents were using mineral fertilizers (Nitrogen, Phosphorus and Potassium) in fields in both districts.

Table: 4. Knowledge of services available to farmers**n=200**

S.N.	Variable		Jind (n=100)	Ambala(n=100)
			Percentage	Percentage
1	Agricultural consultation services in district	Yes	100.0	100.0
		No	-	-
2	Service or advices by these consultation services available to you	Yes	67.0	62.0
		No	-	-
		Partly	33.0	38.0
6	Consultation to expert to control	Before cultivation	35.0	42.0

	pest	During cultivation	38.0	32.0
		When problem arise	27.0	26.0

Knowledge of services available to farmers: Table 4 presents the knowledge of services that are available to the farmers. It is appreciable that cent per cent farmers of both districts had knowledge about agricultural consultation services, the maximum number of farmers i.e. 67 per cent (Jind) and 62 per cent (Ambala) were availing services and advice from these. Remaining farmers were partially availing these services regarding pest control. Findings in table further show that only a few percent of farmers (38%) were taking expert advice during cultivation followed by before cultivation (35%) and 27 percent who were taking expert advice when the problem arises. In case of the Ambala district, more than forty per cent farmers (42%) were taking expert advice before cultivation followed by during cultivation (32%) and 26 per cent who were taking advice when the problem arises regarding pests.

CONCLUSION

It is estimated that around 800,000 people in developing countries may have died due to pesticides since the onset of the Green Revolution. Nearly 20,000 people in developing countries die each year by pesticide consumption through their food. It is also concluded that out of 43 per cent farmers, 17 per cent were found to be suffering from skin problems followed by eyes (13%), suffocation problems (9%) and asthmatic issues (4%). So application of pesticides and using extremely toxic pesticides that endanger farm workers is unacceptable. The government should provide alternatives and proactive supports to farmers so that they may shift to ecological, sustainable and eco-friendly farming. Thus use of biopesticides as a component of Integrated Pest Management (IPM) programs can greatly decrease the use of chemical pesticides.

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