Knowledge of vegetable growers on the effects of agricultural chemicals

Abstract

The present study was conducted in Kolar district of Karnataka state during 2018-19 to understand the knowledge level of vegetable growers on the effects of agricultural chemicals. The data was collected from 120 vegetable growing farmers in Kolar and Malur talukas by applying simple random sampling technique and pretested interview schedule. Results revealed that more than forty per cent of the vegetable growers (42.50 %) possessed medium level of knowledge on the effects of agricultural chemicals, more than three fourth of the vegetable growers (77.50 %) knew that taking bath using soap immediately after application of agricultural chemicals was a must, only 53.33 per cent of the vegetable growers knew that red colour on the agricultural chemical container indicated extremely toxic level, sixty per cent of the vegetable growers knew that usage of same fertilizer for a long time reduces soil fertility, nearly seventy per cent of the vegetable growers (69.17 %) knew about importance of puncturing the pesticide bottle to prevent its reuse and burying it in the waste land as a safe method of disposal. The results of the study implies that still majority of the farmers were largely unaware of ill-effects of agro-chemicals on various entities like soil, underground water, water bodies, soil micro-organisms, natural predators as well as their personal health. This necessitates the extension agencies to sensitize farmers on optimum use of agro-chemicals for a sustainable farming and livelihood. Other variables like age, family size, annual income, size of land holding hardly associated with their knowledge on the effects of agricultural chemicals.

Key words: Agricultural chemicals, Effects, Knowledge, Vegetable growers,

Introduction

India is the second largest producer of vegetables in the world with an annual production of 204.84 million metric tonnes of vegetables in 2021-22 (APEDA, 2021-22). Vegetables are a rich source of minerals and high in nutrition value and are being grown in almost all the states in the country under varied agro-climatic and soil conditions in plains as well as hilly regions. Every year in India 5-13 per cent of fruits and vegetables is lost due to inadequate post-harvest storage facilities and 20-30 per cent is lost due to pests and diseases (Gaganpreet *et al.* 2018). Further, the rising population and decreasing arable land stressing greater demand for increasing food production. These conditions necessitate ensuring higher production by applying all available technological options including use of agricultural chemicals.

In the recent past, efforts have been made to increase the production of vegetables by developing large number of high yielding, good quality and disease resistant varieties/hybrids and other required cultivation packages. These high yielding varieties/hybrids are more input responsive. Our ancestors had followed farming practices which were eco-friendly and used inputs available on the farm itself to grow the crops. Later, use of agricultural chemicals as the major technological option to ensure crop protection and productivity got impetus and it was considered as a boon for the sector (Muhammad *et al.* 2019).

The use of high yielding varieties (HYVs) has promoted the use of fertilizers and pesticides without paying attention to adequate dosage, proper application method and waiting times. However, the haphazard use of fertilizers and pesticides gradually leads to many dangerous environment and human impacts. Pesticides have been carelessly used which has led to ground water pollution, eutrophication, poisoning and death of livestock, birds and animals and other non-target organisms (Nagarajan *et al.* 2010).

Even with all these ill-effects it is inevitable to use agricultural chemicals to grow the crops to feed the growing population and therefore they can be called as necessary evil (Abang *et al.* 2013). Although, numerous studies talk about adverse effects of agro-chemicals, little has been revealed about the knowledge of farmers about the effects of these agricultural chemicals. Therefore a research study was undertaken with the objectives to understand the knowledge of vegetable growers on the effects

of agricultural chemicals and to study the association between their profile characteristics and knowledge on the effects of agricultural chemicals.

Material and Methods

The investigation was conducted during the year 2018-19 and an ex-post facto research design was followed to assess the knowledge of vegetable growers on the effects of agricultural chemicals. Kolar district was selected purposively owing to more area and production of vegetables in Karnataka State. Kolar district has five blocks, out of which Kolar and Malur blocks were purposively chosen for the study considering the larger area under vegetable crops in the district. The statistical tools like frequency, percentage, mean, standard deviation and chi-square test was used and the data was collected from the vegetable growers using the pretested interview schedule.

Results and Discussion

1. Overall knowledge of vegetable growers on the effects of agricultural chemicals

The results presented in Table 1 revealed that, more than forty per cent of the respondents. (42.50 %) belonged to medium level of knowledge on the effects of agricultural chemicals, followed by low (31.67 %) and high (25.83 %) level.

Table 1: Overall knowledge of vegetable growers on the effects of agricultural chemicals

(n=120)

Category	Criteria	f	(%)
Knowledge	Low (< 9.24)	34	31.67
	Medium (9.24-12.37)	53	42.50
	High (> 12.37)	33	25.83
	Mean	16.19	
	SD	3.13	

2. Item-wise knowledge of vegetable growers on the ill-effects of agricultural chemicals

Results in the Table 2 showed that nearly one-fourth of the respondents. (24.38%) were having lower knowledge about the ill-effects of agricultural chemicals on humans and animals. This was because, the adverse effects of agricultural chemicals are not immediately observable, mostly hidden and affect in long run. Therefore, farmers are to be adequately exposed to this serious issue.

Table 2 also reveals that majority of the vegetable growers (59.58 %) had knowledge on the ill-effects of agricultural chemicals on soil fertility, soil microflora and plants. Similar results were found by Pratibha and Shachi, 2016. Sixty per cent of them knew about the ill-effects on water bodies (60.00%). This may be due to the fact that, most of the farmers in the area approach the soil testing laboratories of horticulture department or KVK wherein the officials and scientists orient them towards importance of soil health conservation. Further farmers of Kolar district are known for judicious use of water. As a result of these, farmers could have gained higher knowledge about the ill effects on soil and water.

Table 2: Item-wise knowledge of vegetable growers on the ill-effects of agricultural chemicals

(n=120)

Sl. No	Knowledge items	Knowledge	
		Frequency	Per cent
A	**Knowledge about ill effects on human health**		
1	Poisoning from Agricultural chemicals causes- headache, nausea and vomiting	12	10
2	Agricultural chemicals enter human body through- inhalation, Contact with skin and eyes and ingestion	37	30.83
3	Long term exposure to agricultural chemicals results in- serious health issue	1	0.83
4	Agricultural chemicals effects in humans ranges from- simple skin irritation to death	67	55.83
	Average		24.38
B	**Knowledge about ill effects on soil and plants**		
5	Usage of same fertilizers for a long time- reduces soil fertility	72	60.00
6	Excessive dosage of agricultural chemicals are toxic to- soil microflora	64	53.33
7	Agricultural chemicals residues affect- ground and	39	32.5

	surface water and edible and economic parts of the plant		
8	More than recommended level of application of agricultural chemicals- affects plant health	111	92.5
	Average		59.58
C	**Knowledge about ill effects on water bodies**		
9	Drifting of agricultural chemicals into water bodies- causes growth of unwanted plants, affects aquatic animals	72	60.00
D	**Knowledge about ill effects on non-target organisms**		
10	Exposure of farm animals to agricultural chemicals- affects farm animal health	29	24.17
11	Feeding farm animals with fodder Contaminated by agricultural chemicals- affects their digestive system	37	30.83
12	Application of agricultural chemicals during day time- causes death of honeybees and other natural predators	33	27.50
	Average		27.50
E	**Knowledge of respondents about pesticide labelling**		
13	Following information is given on the agricultural chemicals container- toxicity level, active ingredient, safe storage and usage etc.	36	30.00
14	Red colour on the agricultural chemicals container indicates- extremely toxic level	64	53.33
	Average		41.66
F	**Knowledge on preventing ill-effects of agricultural chemicals**		
15	Applying only recommended dosage of agricultural chemicals	66	55.00
16	Using personal protective equipments like mouth masks, hand gloves, boots etc.	55	45.83
17	Taking complete bath using soap immediately after application of agricultural chemicals	93	77.50
18	Puncture the pesticide bottle to prevent its reuse and burry in the waste land	83	69.17
	Average		61.87
G	**Other ill effects**		
19	Application of non-selective herbicide results in-eradication of desirable plants	84	70.00
20	Agricultural chemicals affect- crop pests, honeybees, earthworms and fishes	31	25.83
21	Increase in pest population even after spraying of agricultural chemicals is due to- destruction of natural enemies	65	54.17
22	Development of resistance by the pests is due to-indiscriminate use of agricultural chemicals	70	58.33

	Average		52.08

3. Item-wise knowledge of vegetable growers on the positive effects of agricultural chemicals

The data presented in the Table 3 reveals the knowledge level of vegetable growers on the positive effects of agricultural chemicals. Sixty per cent (60.83 %) of the vegetable growers acknowledged that the best way to eliminate weeds in the field is by use of herbicides which might be due to their favourable experience such as saving of time, reduction in labour cost, eliminating drudgery associated with manual weeding. These results were parallel with the studies made by Abang *et al.* 2013 and Catherine *et al.* 2017. About half of the farmers (51.67 %) agreed that application of agro-chemicals increased the yield. Similar outcomes were reported by Gagandeep *et al.* 2016. Close to half of them (49.17 %) revealed that seed dormancy can be broken using agro-chemicals. About 40 per cent of them used agro-chemicals for decomposition of crop-residues on their farms. Nearly 25 per cent of the vegetable growers said that they effectively controlled storage losses by use of rodenticides and other storage pesticides. However, only 35 per cent of the farmers were aware of protective clothing during spraying pesticides which is a matter of serious concern with respect to their health and farmers need to be sensitized regarding personal protection. Similar results were reflected by Catherine *et al.* 2017. Despite of many advantages in crop production, excessive use of these agro-chemicals threaten the sustainable nature of agriculture which was also revealed by studies of Nagarajan *et al.* 2010. Therefore, it is suggested to formulate policies regarding educating and training farmers about optimum use of agro-chemicals.

Table 3: Item-wise knowledge of vegetable growers' on the positive effects of agricultural chemicals

(n=120)

Sl. No.	Knowledge items	Frequency	Per cent
1	The use of herbicides to control the weeds has benefits like- saves time, saves labour cost, reduces drudgery of manual weeding	26	21.67
2	Protective clothing aids used during applying agricultural chemicals includes- mask, gloves, boots and eyeglass	42	35.00
3	Best way to eliminate weed in the field is- use of herbicides	73	60.83

4	Use of agricultural chemicals is better option for- increasing yield, enhancing fruit size, Enhancing flowering	62	51.67
5	Termites and wood-boring insects can be easily managed by- use of insecticides	38	31.67
6	Efficient way of eradicating parthenium - use of herbicides	41	34.17
7	To undertake eco-friendly farming one should opt for- Integrated farming	26	21.67
8	Best method to prevent seed borne pathogen- seed treatment with recommended chemical	36	30.00
9	Application of recommended dosage of fertilizer- helps in achieving potential yield of the crop	39	32.50
10	Seed dormancy in nursery is overcome by- breaking dormancy using recommended chemical	59	49.17
11	Pest and disease infections in pruned plantations can be easily managed by- Bordeaux mixture	40	33.33
12	Nutrient deficiency at flowering stage of crop can be managed by – application of foliar nutrients	19	15.83
13	Decomposition of crop residue is made easier with- application of composting culture	50	41.67
14	Female flower ratio can be increased through- applying auxins/ ethylene	27	22.5
15	To decrease the ph of alkaline soil- apply gypsum	43	35.83
16	Storage loss of farm produce can be economically managed through- use of storage chemicals	17	14.17
17	Rat menace in farm and home can be easily managed by- use of rodenticides	10	8.33

Conclusion

The results revealed that more than forty per cent of the respondents (42.50 %) of the vegetable growers belonged to medium level of knowledge on the effects of agricultural chemicals whereas, 31.67 and 25.83 per cent of the respondents belonged to low and high knowledge categories, respectively. Nearly one-fourth of the respondents (24.38%) were having lower knowledge about the ill-effects of agricultural chemicals on humans and animals, majority of the vegetable growers (59.58 %) had knowledge on the ill-effects of agricultural chemicals on soil fertility, soil microflora and plants and sixty per cent of the vegetable growers acknowledged that that the economical way to eliminate weeds in the field is by use of herbicide chemicals. The independent variables like education, farming experience, extension

professional contact and extension participation were found to have significant association with the knowledge of vegetable growers on effects of agricultural chemicals (Catherine *et al.* 2017). This necessitates the extension agencies to make intervention in order to sensitize farmers about effects of agro-chemicals, importance of personal protection during spraying, optimum use of agro-chemicals and also persuade them to shift gradually to organic and natural farming which is the need of the hour and ensure sustainable farming for a continuous livelihood.

Application of research

This is a research study of unique kind which tries to test the non-material aspects of vegetable growers. The findings will be very useful for the government organizations such as Pollution Control Board and other environmental concerned departments. It is a timely study for the Department of Agriculture which is seriously implementing integrated systems of pest control and nutrient application and also thinking of organic farming. For many other environmentalists, it will be an eye opener regarding farmer's knowledge and attitude towards what they have been talking about and why they want to avoid use of agricultural chemicals in crop production which was also expressed by Anand, in his study "Green growth and agriculture in Himachal Pradesh" in 2015. It helps the extension personnel in identifying areas for disseminating the information related to the ill-effects of agricultural chemicals and also develop training programmes for the farmers regarding safe usage, handling and application of agricultural chemicals.

Research category: Social Science category. Ex-Post facto research design. structured interview schedule was used for collection of data from the vegetable growers.

Study area: Kolar district of Karnataka, India, in which Kolar and Malur taluks were selected purposively to know the knowledge level of vegetable growers on the effects of agricultural chemicals.

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