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The Attitude of Vegetable Growers towards Mitigating the Adverse Effects of Agricultural Chemicals

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Authors' contributions

This research was carried out in collaboration among all authors. Author GM designed the study, wrote the protocol, conducted survey and wrote the first draft of the manuscript. Author SG performed statistical analysis and authors NDCP and RDB managed literary searches. All authors read and approved the final manuscript.

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ABSTRACT

India is the world's second-largest producer of vegetables next to China, but the annual loss of fresh vegetables on an average is about 12 per cent in India which is significantly affecting the agricultural economy. Thus, crop protection is very much essential to prevent losses and feed the growing population. Chemical crop protection in India began in the year 1947-48 with the introduction of Benzene Hexa Chloride (BHC). Today India is the fourth largest producer of pesticide in the world. But over the years pesticides are being used more indiscriminately and unscientifically which has led to a negative impact on humans, soil, water and the environment as a whole. Due to the unscientific pesticide application, the pests gradually develop resistance to the poison that normally

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kills them. Even with all these ill-effects, it is inevitable to use pesticides to grow the crops and therefore they can be called as a necessary evil. The present study was conducted in Kolar district of Karnataka state in India during 2018-19 to ascertain the attitude of vegetable growers towards mitigating the ill-effects of agricultural chemicals. The data was collected from 120 vegetable growers using a pretested interview schedule. It was found that more than half of the vegetable growers (52.50%) had highly favourable attitude towards mitigating the ill-effects of agricultural chemicals; sixty per cent of the vegetable growers were undecided whether to spray pesticides in the opposite direction of the wind or along the direction of the wind. The study facilitates the agriculture and horticulture departments to train farmers enabling them to safely use, handle and store the agricultural chemicals.

Keywords: Attitude; vegetable growers; ill-effects; agricultural chemicals.

1. INTRODUCTION

India is the second largest producer of vegetables in the world [1]. Every year in India 35-45 percent of agricultural produce is lost due to pests and diseases besides post-harvest losses [2]. Further, the rising population and decreasing arable land have resulted in potential demand for increased food production. These conditions necessitate ensuring higher production by applying all available technological options including the use of agricultural chemicals.

India's vegetable productivity has increased over the years and stands at 17.97 million tonnes during the year 2018 [3]. The cultivation of high yielding varieties has promoted the use of fertilizers and pesticides without paying attention to adequate dosage and proper application method [4]. However, the haphazard use of fertilizers and pesticides gradually led to adverse effects on the environment and humans. Application of pesticides carelessly has killed people, animals, birds and the mounting residues of pesticides in the food have become a serious threat to the life itself [5]. Developing countries have been experiencing a significant shift in food consumption habits in recent decades. The relative importance of high-value commodities including vegetables is steadily increasing in South Asia in recent years [6].

Even with all these adverse effects, it has become inevitable for the vegetable growers to use agricultural chemicals to produce the crops and feed the growing population and hence they can be regarded as a necessary evil [7]. Therefore, present research was undertaken to ascertain the attitude of vegetable growers towards mitigating the adverse effects of agricultural chemicals. The study helps the agricultural and horticultural departments in sensitizing and training the vegetable growers concerning safe usage, handling and storage of agricultural chemicals.

2. MATERIALS AND METHODS

The study was conducted in Kolar district of Karnataka state in India during 2018-19. Ex-post facto research designwas followed. Kolar district was selected purposively owing to more area and production of vegetables in Karnataka state. Kolar district has five taluks, out of which Kolar and Malur blocks were purposively chosen for the study considering the larger area under vegetable crops in the district. A list of sixty vegetable growers from each of the above-said blocks was obtained from the Department of Horticulture Kolar and Malur respectively to ascertain the attitude of vegetable growers towards mitigating the ill-effects of agricultural chemicals. Thus the total sample size comprised of 120 vegetable growers. The data was collected using a pretested interview schedule which consisted of 22 questions on farmers' attitude towards mitigating the ill-effects of agricultural chemicals. All the questions were graded on a five-point continuum. The tabulation and analysis of data were done through Statistical Package for Social Sciences.

3. RESULTS AND DISCUSSION

The findings of the present study in line with the objective formulated are presented under the following titles.

3.1 Overall Attitude of Vegetable Growers towards Mitigating the Ill-effects of Agricultural Chemicals

The results presented in Table 1 revealed that more than half of the respondents (52.50%) had

Table 1. Overall attitude of vegetable growers towards mitigating the ill-effects of agricultural chemicals

(n=120)

Sl. no.	Category	Criteria	Frequency	Percentage (%)
1	Less favourable	Less than (Mean - 0.5 SD)	35	29.17
2	Favourable	In between(Mean ± 0.5* SD)	22	18.33
3	Highly favourable	More than(Mean + 0.5 *SD)	63	52.50
		Mean=50.72; SD=2.04		

Table 2. Statement wise vegetable growers' attitude towards mitigating the ill-effects of agricultural chemicals

Sl. no.	Statements	Degree of agreement									
		SA		A		UD		D		SD	
		f	%	f	%	f	%	f	%	f	%
1	Farmers' should always use only scientists' recommended chemicals for controlling pests	23	19.16	57	47.50	0	0.00	27	22.50	13	10.83
2	One should apply only scientifically recommended dosage of agricultural chemicals to prevent any ill-effects	27	22.50	63	52.50	0	0.00	30	25.00	0	0.00
3	Every farmer should ensure that the pesticide container is always tightly closed to avoid leakage or spillage during transportation and storage	37	30.83	83	69.16	0	0.00	0	0.00	0	0.00
4	One should make sure that the equipment used for spraying agricultural chemicals is perfect in working order and calibrate every time before using them	22	18.33	43	35.83	16	13.33	9	7.5	30	25.00
5	One must cover the economic and edible parts of the plant before applying agricultural chemicals	7	5.83	32	26.66	7	5.83	33	27.50	41	34.16
6	One should never use his mouth to siphon the chemical from the container	42	35.00	65	54.16	13	10.83	0	0.00	0	0.00
7	One should always handle the agricultural chemicals container safely without any physical damage	33	27.50	72	60.00	15	12.50	0	0.00	0	0.00
8	One should always use protective gloves and boots to mix/stir the agricultural chemicals	3	2.50	8	6.60	04	3.3	62	51.66	44	36.66
9	One should choose only a calm day for better application of agricultural chemicals to avoid any drift	2	1.66	7	5.83	11	9.16	57	47.50	43	35.83
10	One should always apply agricultural chemicals in the	3	2.50	12	10	72	60.00	23	19.16	10	8.33

Sl. no.	Statements	Degree of agreement									
		SA		A		UD		D		SD	
		f	%	f	%	f	%	f	%	f	%
	opposite direction of wind										
11	One should apply agricultural chemicals during dawn and dusk as honeybees are inactive at that time	6	5.00	27	22.50	53	44.16	29	24.16	5	4.16
12	One should not smoke or eat anything during application of agricultural chemicals	33	27.50	57	47.50	10	8.33	13	10.83	7	5.83
13	One must take bath with soap and clean water after the application of agricultural chemicals	30	25.00	63	52.50	7	5.83	11	9.16	9	7.5
14	One should compulsorily follow the waiting period for harvesting to avoid residues of agricultural chemicals in produce	3	2.50	16	13.33	47	39.16	37	30.83	17	14.16
15	One should dump the empty pesticide bottle into water body as a best disposal method	19	15.83	27	22.50	48	40.00	17	14.16	9	7.50
16	One should ensure decontamination of agricultural chemical container before burying it in the wasteland	7	5.83	19	15.83	57	47.50	23	19.16	14	11.66
17	One should always puncture empty agricultural chemicals container and never use for domestic purpose	4	3.33	15	12.50	60	50.00	30	25.00	11	9.16
18	One should burn the empty agricultural chemicals container as a safe disposal practice	23	19.16	37	30.83	11	9.16	32	26.66	17	14.16
19	One should not use simple eye drops to address the eyes affected during spraying of agricultural chemicals but consult the doctor immediately	17	14.16	27	22.50	29	24.16	36	30.00	11	9.16
20	Vomiting should be induced immediately by administering two table spoon of salt in a glass of water to a person who has consumed agricultural chemicals as a right first aid	14	11.66	21	17.50	25	20.83	43	35.83	17	14.16
21	One should ensure to read out the instructions on the label before using agricultural chemicals	21	17.50	45	37.50	22	18.33	21	17.50	11	9.16
22	One should mandatorily wash the fruits and vegetables thoroughly before consumption to remove the chemical residues which would affect the health	47	39.16	63	52.50	0	0.00	7	5.83	3	2.5

SA: Strongly agree, A: Agree, UD: Undecided, D: Disagree, SD: Strongly disagree

highly favourable attitude towards mitigating the ill-effects of agricultural chemicals. This was because of good contact of vegetable growers with the extensional personnel and pesticide suppliers as well as mass media exposure, more than one fourth (29.17%) of them had less favourable attitude because of their inability to recognize the adverse effects of agricultural chemicals on their health, soil, water, animals and birds and the environment as it is gradual and this, in turn, was due to lack of exposure of vegetable growers to a formal training or skill development on pesticide handling, usage and storage [8]. Only 18.33 per cent of the vegetable growers had favourable attitude towards mitigating the ill-effects of agricultural chemicals because of insufficient knowledge regarding the ill-effects of agricultural chemicals who believed that, the use of agricultural chemicals was an inevitable option for controlling pests and obtaining economically good yield. The results are consistent with the findings of Indira et al. [9] and Maria et al. [10] wherein more than80 per cent of the farmers had highly favourable attitude towards use of personal protective equipments and low level of knowledge regarding adverse effects of pesticide among 37 per cent of the respondents respectively [11].

3.2 Statement Wise Attitude of Vegetable Growers towards Mitigating the Ill-Effects of Agricultural Chemicals

Table 2 revealed that nearly half of the respondents (47.00%) strongly agreed that one should mandatorily wash the vegetables thoroughly before consumption to remove the chemical residues which would affect the health. This attitude was commonly observed among the many vegetable growers, but still 53 per cent of them ignored cleaning of vegetables as they were unaware of pesticide residual effect [12]. More than two-thirds of the respondents (69.16%) agreed that every farmer should ensure that the pesticide container is always tightly closed to avoid leakage or spillage during storage which reflected in the study made by Nagarajan et al. [13] who reported that 54.34 per cent of the respondents practiced safe use of insecticides and herbicides [14]. Sixty per cent of the respondents were undecided about applying agricultural chemicals along the direction of the wind or in the opposite direction. Nearly half of the respondents (48.66%) disagreed that one should always use protective boots to mix/stir the agricultural chemicals confirming with the findings of Rijal et al. [15] who reported thatonly 37 per cent of the respondents agreed to wear protective gloves and boots.More than one-third of the vegetable growers (35.83%) strongly disagreed that one should choose only a calm day for better application of agricultural chemicals to avoid any drift [16]. This was because they were more concerned about the timing of fertilizer or pesticide spraying rather than climatic factors like wind and sunlight etc.

4. CONCLUSION

The study reveals that the vegetable growers are not in a position to recognize the ill-effects associated with the use of agricultural chemicals and even if they do they do not know the preventive mechanisms to be adopted to prevent those ill-effects. This is because they are not exposed to any of the awareness or training programmes regarding the adverse effects of agricultural chemicals. But some of the vegetable growers reported that they used agricultural chemicals excessively despite knowing about its adverse effects as it is inevitable to use them and protect the crops from insects, pests and diseases. Hence, agricultural and horticultural departments in the study area must come out with awareness and training programmes on safe usage, handling and disposal of agricultural chemicals and simultaneously promote the use of personal protective equipment like hand gloves, boots, face masks etc. among the vegetable growers.

APPLICATION OF RESEARCH

The findings will be very useful for government organizations such as the Pollution Control Board and other environmental concerned departments. It is a timely study for the Department of Agriculture which is seriously implementing Integrated Pest Management and organic farming. 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.

CONSENT

As per international standard Farmers' written consent has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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