International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2018; 6(4): 2059-2062

Received: 19-05-2018
Accepted: 20-06-2018

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Perception of green chilli growers regarding environmental risk in use of pesticides in Amravati and Buldana district

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Abstract
The present research was undertaken on topic 'Perception of green chilli growers regarding environmental risk in use of pesticides in Vidarbha region of Maharashtra state' conducted purposively in two district viz, Buldana and Amravati asit considered as a progressive agricultural belt, best suited climate, soil, irrigation facilities, skill and intensive cultivation practices adopted by the green chilli farmers and maximum area under green chilli crop. Ex-post facto research design was used for the present research. Out of two districts, two talukas and 20 villages, 300 green chilli growers constitute the sample size. The findings of the research study revealed that more than one third (37.33%) of the green chilli growers had medium level of perception regarding environmental risk in use of pesticides, (18.33 percent) green chilli growers had very low level of perception regarding environmental risk in use of pesticides, followed by (18.00%) green chilli growers had very high level of perception regarding environmental risk in use of pesticides. While 14.67 percent green chilli growers had low level of perception regarding environmental risk in use of pesticides.Further it also noted that 11.67 percent of green chilli growers had high perception regarding environmental risk in use of pesticides application in the green chilli field.

Keywords: Perception, environmental risk, pesticide use

Introduction
With the growing demand for enhancing food grain production to feed more than 121 crore people at one end and increasing yield losses due to pest infestation on the other, the farmers of India till recently have been relying on pesticides and chemical fertilizers. It is estimated that about thirty percent of the potential of food production is lost due to insect pests, diseases, weeds, rodents and birds. In terms of money, it is estimated that every year crops worth Rs.6000 crore are lost due to pests.

India, being a predominantly agricultural country, the foundation for the prosperity lies on agricultural production. Since, the task of feeding the large population, which is growing at phenomenal rate of 2.3 per year, is main problems of Indian agriculture to maintain per capita net availability of food grains which is admittedly inadequate. On the other hand there is huge loss of food grains due to damage caused by insect-pests, diseases and rodents. In India, the annual loss in food products by insect pests was estimated to the tune of 50 percent amounting Rs. 90,000 crores.

In the light of this, it is evident that the yield of crop can be increased significantly by adopting integrated pest management approaches. Technologically, chemical control is still the most effective method of controlling most of the insect pests, diseases and weeds, despite intensive researches into alternative methods and is still remain the powerful tools for pest management in spite of recent popular pressure to control and limit their use (Smith and Pimentel, 1978).

Exposure to pesticides both occupationally and environmentally causes a range of human health problems. It is estimated that nearly 10,000 deaths annually due to use of chemical pesticide worldwide, with about three-fourths of these occurring in developing countries. Horrigan, *et al*. (2006) [6].

What are Pesticides?

In nature, there are no pests. Humans label as "pests" any plants or animals that endanger our food supply, health, or comfort. To manage these pests we have "pesticides". These are products "intended for preventing, destroying, repelling, or mitigating any pest

Pesticides are substances meant for attracting, seducing, and then destroying any pest. They are a class of biocide. The most common use of pesticides is as plant protection products (also known as crop protection products), which in general protect plants from damaging influences such as weeds, fungi, or insects.

In the United States, pesticides are used on 900,000 farms and in 70 million households. Herbicides are the most widely used type of pesticide. Agriculture uses 75% of all pesticides, but 85% of all U.S. households have at least one pesticide in storage, and 63% have one to five stored. A Minnesota survey found that on a per-acre basis urban dwellers use herbicides for lawn care at rates equal to those used by farmers for food.

Total chemical pesticide consumption

Registration Committee (RC) has registered 260 technical grade pesticides and 585 pesticide formulations. Central Government from time to time alerts State Governments to adhere to the crop pest combination in their package of practices as approved by RC.

Table 1: Total chemical pesticide consumption in India.

Year	Quantity (Unit: MT Technical Grade)
2012-13	45619
2013-14	60282
2014-15	57353
2015-16	56452

Source: States/UTs Zonal Conference on inputs (Plant Protection), 2016.

The data in Table 2 confirms a consistent downward trend of pesticide consumption in India from 60,282 metric tons in 2013-14 to 56,452 metric tons in 2015-16.

Over 98 percent of sprayed insecticides and 95 percent of herbicides reach a destination other than their target species, including non-target species, air, water, bottom sediments, and food. Pesticide contaminates land and water when it escapes from production sites and it being storage tanks, when it runs off from fields, when it is discarded, when it is sprayed aerially, and when it is sprayed into water to kill algae. The amount of pesticide that migrates from the intended application area is influenced by the particular chemical's properties: its propensity for binding to soil, its vapor pressure, its water solubility, and its resistance to being broken down over time. Factors in the soil, such as its texture, its ability to retain water, and the amount of organic matter contained in it, also affect the amount of pesticide that will leave the area. Some pesticides contribute to global warming and the depletion of the ozone layer. The impact of pesticide application on different components of environment is discussed in succeeding paragraph.

Chilli Farming

Chilli (Capsicum annum L.) is most widely used and universal spice of India belongs to the "Solanaceae" family. The nutritive value of chilli is excellent, chillies are rich in vitamins, especially in vitamin A and C. Every 100 gms of dried pods yield about 160 calories of energy through 36 gms carbohydrates, 18 gms proteins, 16 gms fat, 480 mg calcium, 3.1 mg. phosphorous, 31 mg iron 2.5mg niacin, 640 I.U. vitamin 'A' and 40 mg vitamin 'C'. India has immense potential to grow and export different types of chillies required to various markets around the world. India has produced around 1014.60 million tons of chilli with area of 654 million ha. and productivity 1551 kg/ha during 2005-06 (Source: Directorate of Arecanut and Spices Development). The most important chilli growing states in India are Andhra Pradesh (49%), Karnataka (15%) Maharashtra (6%) and Tamilnadu (3%) which constitute nearly 75 percent of the total area under chilli. India's chilli exports are currently in bull stage and chillies exports from India are mostly to Srilanka, USA, Nepal Mexicoand Bangladesh. Among these countries USA, Srilanka and Mexico are the major importers of India's chillies. China has emerged as the major exporter in the world market and as a serious competitor in the international market for India. India exported 1, 48,500tonnes of chilli valued Rs.807.75 crore in the year 2006-07(http:www.assocham.org/ prels/ show news. Phpid =1306). In Maharashtra state area, production and productivity of chilli was around 90 million ha, 44 million tonnesand 489 kg/ha respectively during 2006-07 (Source: Directorate of Arecanut and Spices Development

Chilli is one of the most valuable crop of India. Pungency in chillies is due to the active constituent "Capsaicin", an alkaloid, is extracted from chillies and is used to medicine. The fruit is actually called 'Chilli' and is used as a spice in a variety of cuisines all over the world in different forms as green chilli, dried redchilli (Jagtap-2012)

Vegetable crops provide an important source of income for the small and marginal farmers of our country. The increase in population, urbanization and the rising incomes have given great impetus to the cultivation of vegetable crops which form an important source of minerals, particularly calcium, magnesium and iron, vitamins like A,B-complex, C and fibres. Vegetables are largely required in the vegetarian diet of our people and the demand for vegetables is increasing (Bose and Som, 1986) [4].

But, now a days farmer are using excessive amount of pesticides in a wrong manner with disproportionate dosage, which leads to higher cost of cultivation as well as ecological imbalance. Hence, reducing the hazards arising due to pesticides needs, immediate action to be taken by the environmentalists and all other concerned to mitigate the health hazards to the enormous human population. In a country like India where farming is a family affair, the problem of reaching the target group gets further compounded. The farming family as a whole needs to be educated, then only the damages could be checked or at least minimized to a safe level. Only when they start to understand and appreciate the risks involved in the use of pesticides, then only changes can take place in the desired direction i.e. IPM.

Materials and Methods

Locale of the study

The present study was undertaken in purposively selected, Amravati and Buldana district of Vidarbha region of Maharashtra state. Total two talukas namely Morshi and Chikhali were purposively selected for this study. For this study, Ex-post-facto research design was applied. Thus, from two talukas and 20 villages' 300 green chilli growers constitute the sample size.

Selection of respondents

The green chilli growers were selected from the list obtained from Taluka Agriculture Officer of Morshi and Chikhli taluka of Amravati and Buldana district. The farmers, who cultivated chilli crops for consecutive last three years, using pesticides and having minimum area 0.40 ha. under chilli cultivation, 15 green chilli growers were selected from each selected village randomly by lottery method of random sampling. Thus, from two talukas and 20 villages' 300 green chilli growers constitute the sample size. The whole sample was considered as respondents and they were interviewed for collection of data.

Measurement of farmer's perception

Perception is an activity through which an individual becomes aware of objects around him and of events taking place (Ray, 1990).

Perception in the present study is operationally defined as interpretation of green chilli growers in terms of environmental risk in use of pesticides based on their prior experience.

It will be measured with standardized scale developed by Badhe (2012) [3] with certain modifications. The scale consists of ten dimensions namely soil, water, air, animal, human being, birds, beneficial insects, target insects, aquatic life and food chain with 42 statements on a two continuum representing perceived yes and no with score of 1 and 0 respectively.

The perception index will be calculated by the following formula,

Then green chilli growers were classified into five categories on the basis of mean and standard deviation

Results and Discussion

Farmer's perception regarding environmental risk in use of pesticides

Perception is defined as a process by which organize and predict their sensory impressions in order to give meaning to other environmental risk. Farmers are using extreme amount of pesticide in an incorrect manner with uneven dosage, which leads to a higher cost of cultivation as well as ecological imbalance. Therefore, it was felt necessary to obtain information from the farmers about their perception about environmental risk in use of pesticides. The data regarding component wise perception of the farmers about environmental risk in use of pesticides in this regards are presented in table 2

Component wise perception of the farmers about environmental risk in use of pesticides

Component wise perception of the farmers about environmental risk in use of pesticides is work out by comparing score of each component with overall mean and standard deviation and categorized in following categories.

Table 2: Component wise perception of green chilli growers regarding environmental risk in use of pesticides n=300

S. No.	Component	Perception		
		Low	Medium	High
1	Soil	69 (23.00)	184 (61.33)	47 (15.67)
2	Water	136 (45.33)	149 (49.67)	15 (05.00)
3	Air	83 (27..67)	153 (51.00)	64 (21.33)
4	Animal	23 (07.67)	201 (67.00)	76 (25.33)
5	Human being	87 (29.00)	154 (51.33)	59 (19.67)
6	Birds	49 (16.33)	215 (71.67)	36 (12.00)
7	Beneficial insects	176 (58.67)	112 (37.33)	12 (04.00)
8	Target insects	153 (51.00)	83 (27..67)	64 (21.33)
9	Aquatic life	57 (19.00)	208 (69.33)	35 (11.67)
10	Food chain	120 (40.00)	169 (56.33)	11 (3.67)

It is reported from table. 2 that, As regards soil component (61.33%) green chilli growers had medium perception, (23.00%) green chilli growers had low perception, followed by (15.67%) green chilli growers had high perception regarding environmental risk in use of pesticides

It is observed table. 2 that, As regards water component (49.67%) green chilli growers had medium perception, (45.33%) green chilli growers had low perception, followed by meager (5.00%) green chilli growers had high perception regarding environmental risk in use of pesticides

It is revealed table. 2 that, As regards air component (51.00%) green chilli growers had medium perception, (21.33%) green chilli growers had low perception, followed by (21.33%), green chilli growers had high perception regarding environmental risk in use of pesticides

It is noted from table. 2 that, As regards animal component (67.00%) green chilli growers had medium perception, (25.33%) green chilli growers had high perception, followed by (07.67%) green chilli growers had low perception regarding environmental risk in use of pesticides

It also reported from table. 2 that, As regards human being component (51.33%) green chilli growers had medium perception, (29.00%) green chilli growers had low perception, followed by (19.67%) green chilli growers had high perception regarding environmental risk in use of pesticides.

It is illustrated from table. 2 that, As regards birds component (71.67%) green chilli growers had medium perception, (16.33%) green chilli growers had low perception, followed by (12.00%) green chilli growers had high perception regarding environmental risk in use of pesticides.

In case of environmental risk of pesticides use on beneficial insect is concerned; more than half (58.67%) green chilli growers had low perception, (37.33%) green chilli growers had medium perception, followed by meager (4.00%) green chilli growers had high perception regarding environmental risk in use of pesticides.

It also observed table. 2 that, As regards target insect's component more than half (51.00%) green chilli growers had low perception, (27.67%) green chilli growers had medium perception and followed by (21.33%) green chilli growers had high perception regarding environmental risk in use of pesticides

In case of aquatic animals is concerned; majority of the green chilli growers (69.33%) had medium level of perception,

(19.00%) green chilli growers had low perception, followed by (11.67%) green chilli growers had high perception regarding environmental risk in use of pesticides

Further it is observed table. 2 that, As regards food chain component (56.33%) green chilli growers had medium perception, (40.00%) green chilli growers had low perception, followed by meager (3.67%) green chilli growers had high perception regarding environmental risk in use of pesticides

So it can be concluded from above table that majority of the green chilli growers had medium to low level perception regarding environmental risk in pesticides use, i.e soil, animals, birds and aquatic life.

Table 3: Distribution of the green chilli growers according to their level of perception regarding environmental risk in use of pesticides n=300

S. No.	Perception Level	Frequency	Percentage
1	Very low (Up to 37.54 score)	55	18.33
2	Low (in between 37.55 to 44.25 score)	44	14.67
3	Medium (in between 44.26 to 57.65 score)	112	37.33
4	High (in between 57.66 to 64.36 score)	35	11.67
5	Very High (Above 64.36 score)	54	18.00
Total		300	100.00

Mean- 50.95, 0.5 SD- 6.70, SD-13.41

It is observed from table 3 that, more than one third (37.33%) green chilli growers medium level of perception regarding environmental risk in use of pesticides, 18.33 percent green chilli growers had very low perception level, followed by (18.00%) green chilli growers had very high perception. Further it is noted that 14.67 percent and 11.67 percent of them had low and high perception level regarding environmental risk in use of pesticides, respectively.

This finding is in the line with finding of Kulkarni (1998), Rao and Dube (2001) [11], Sawant (2001) [12], Badhe (2012) [3], Madhu (2013) [7] and Preeti (2014)

The probable reason behind medium to very low perception might be that less awareness regarding recommended doses of pesticide. It was also noted that the chilli growers still depends on Krishi Seva Kendra's for pesticides use, control measures and doses of pesticides.

Conclusion

It can be concluded that majority of the farmers had good perception regarding environmental risk in pesticides use on soil, animals, birds and aquatic life. This might be due to their general thinking that pesticides which kill target pest that also affect on these component also. Poor perception was observed in case of food chain, human being, beneficial insects and target insects due to their lack of knowledge about harmful effect of pesticides on these components and lack of knowledge about recommended pesticides and doses of application for the control of particular pest.it can be inferred that (33.00 percent) of the farmers had low to very low and (29.67 percent) of the farmers had high to very high perception regarding environmental risk in use of pesticides. The probable reason behind medium to very low perception might be that less awareness programmes on this topics, lack of knowledge about identification of pest and recommended doses of pesticide and farmers still depends on Krishi Seva Kendra's for pesticides use, control measures and doses of pesticides.

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