Original Research Article

Knowledge Gap and Safe Use of Pesticides by Vegetable Growers of Bihar

ABSTRACT

In this study, knowledge about pesticides and their safe use among vegetable growers of Purnea district was discussed. Data were collected from vegetable growers of Purnea district of Bihar. From the district, one block was purposively chosen. Three villages from one block, comprising of 50 respondents each were randomly chosen. The sample size was 150 vegetable growers.Frequency, percent, weighted mean and rank were used to analyze the data. It was found that majority of the respondents lack knowledge about banned pesticides and label on pesticide products.Finding discloses that there was lack of knowledge about proper disposal of pesticide and lack of knowledge about using protective clothing. Farmers' age, educational level, experience has positive effects on safe use of pesticides in vegetable cultivation. Under such condition, there is need of extension agents in establishing rapport with farmers on regular basis can help in enhancing knowledge level about safe use of pesticides among vegetable growers.

Keywords :Pesticides, vegetable growers, knowledge,safe use

1.INTRODUCTION

Agriculture is the basis of economy of Bihar.Major section of the population is dependent on agriculture for their livelihood. With each day, there is rise in population, causing immense pressure on natural resources such as land, air, water etc.Under such state, the use of chemicals in agricultural crops including vegetables for higher yield is the only option left. This compels farmerto use chemicals indiscriminately. In Bihar, the use of pesticides has increased from 787 MT in 2014-15 in 2014-15 to 981 MT in 2018-19.This increase in usage of pesticides may have been bymany factors such as due to lack of knowledge about pesticide usage and increase in incidences of insects and diseases attacks. As there is overuse of pesticides, itsnot only deteriorating natural resources but affecting human life too. Mengistie*et al.* (2017) found that majority of the vegetable growers (87%) had not received any training regarding handling and application of pesticides in vegetable crops. The vegetable growers were not using any protective equipment such as gloves, mask while spraying pesticides in the vegetable plots(Adeola, 2012). A greater majority of the farmers had favorable to highly favorable perception on pesticide use in vegetable production. Also, most of the respondents faced myriad of difficulties in dealing with pesticide, especially eye and skin difficulties(Naznin et al. 2018).However, certain level of education and experience has contributed significant knowledge on safety use of pesticides which further has to make farmers to practice correct methods while applying pesticides(Kumari and Reddy, 2013).Chemical pesticides were the primary choice for pest management. Growers used at least one form of personal protection equipment (PPE) during pesticide spray or handling, although the quality and appropriateness of the PPE warrants further investigation(Rijal et al. 2018).Social media connected farmers and experts in real-time basis can support farmers on pesticide management(Panda,2020).Under this backdrop, the present research was conducted to reveal the knowledge and practices of safe use of pesticides.

Comment [A1]: Explain in 1-2 sentences the problem of why many farmers in Bihar use pesticides

2.MATERIALS AND METHODS

Purnea district was purposively chosen for study because of commercial cultivation of vegetables. Three villages Chandi, Satdobh and Nayatola were selected under Purnea East block. Respondents were selected through random sampling methods. A sample of 50 respondents from each village was randomly selected. Thus, sample size becomes 150 for research study. The study was based both on primary and secondary data. Primary data was collected through developed schedule by personal interview and Secondary data was gathered through government database and published sources.Multiple choice questions were specially included in the schedule to assess knowledge gap.It was calculated using the formula as mentioned below .Further, *Five points scale* was used and weighted mean was calculated on the basis of different values assigned to different response. Later ranking was done in accordance to the weighted mean.

Comment [A2]: Explain variables used in research. What are the parameters used to determine the scale 1 to 5?

Knowledge gap = 1– $\frac{no.of right answer given by the respondents}{total no.of questions given to the respondents}$

3.RESULTS AND DISCUSSIONS

3.1.Socio-economic profile of vegetable growers

Table1 : Distribution of the respondents as per their age, education, farming experience and training received

Sl.No.	Socio-economic factors	Frequency	Per cent (%)
I. Age groups			
1	20-30 years	35	23.30
2	30-40 years	53	35.33
3	40-50 years	22	14.70
4	50-60 years	20	13.33
5	60-70 years	15	10.00
6	70-80 years	5	3.33
II. Educational level			
1	Functional literacy	29	19.30
2	Up to Primary school	7	4.70
3	Up to Middle school	36	24.00
4	Up to Secondary School	35	23.30
5	Up to Higher Secondary School	27	18.00
6	Graduation and Above	16	10.70
III. Farming Experience			
1	1-10 years	58	38.70
2	11-20 years	41	27.30
3	21-30 years	24	16.00
4	31-40 years	20	13.30
5	41-50 years	7	4.70
IV. Training Received			
1	Yes	41	27.30
2	No	109	72.70

The finding of Table 1 revealed that majority (35.33%) of the respondents involved in vegetable cultivation were of age group of 30-40 years, followed by 20-30 yearsof age group with 23.3%, 14.7% of respondents belonged to the age group of 40-50 years of age group, 13.33% of respondents belonged to 50-60 years age group, 10% respondents of the respondents belonged to 60-70 years of age group. Only 3.33% of the respondents belonged to the age group of 70-80 years.

The finding of Table 1 revealed that majority (24%) of the respondents had received education up to middle school, followed by 23.3% respondents up to secondary school, 19.3% of respondents had functional literacy, 18% respondents had completed Higher secondary school, 10.7% of respondents were Graduate and above degree . Only 4.7% of respondents had received education up to Primary School. None of the respondents were illiterate.

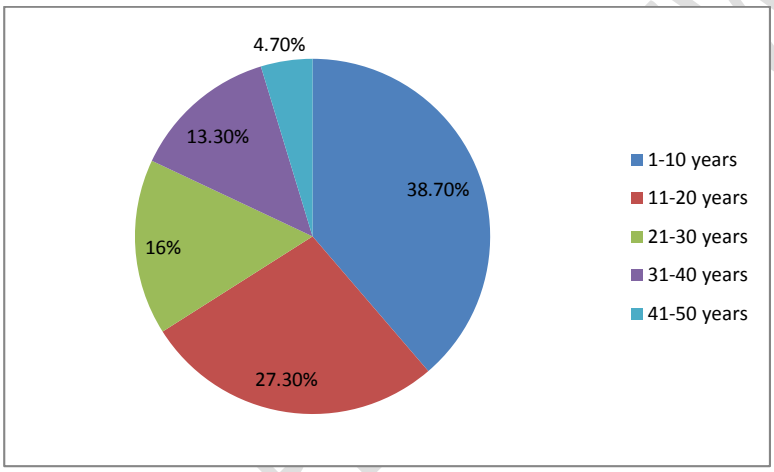

Figure 1: Farming Experiences of the vegetable growers

It was also noted that that majority (38.7%) of the respondents had newly started cultivation of vegetables as a profession with only 1-10 years of experience, followed by 11-20 years experience(27.3%), 21-30 years experience (16%), 31-40 years of experience(13.3%) and 41-50 years of experience (4.7%).The perusal of the Table 1 revealed that majority of the respondents (72.7%) had not received any training related to vegetable cultivation while 27.3% had received training.

Comment [A3]: Add discussion based on supporting literature or research that has been conducted previously regarding the age of cultivation experience

3.2. Knowledge level about pesticide usage

3.2.1. Knowledge about banned pesticide

The result of Table 2revealed that majority (42%) of the respondents had knowledge gap of >80% followed by 26.7% of respondents with knowledge gap of >60-80%, 18% of respondents with knowledge gap of >40-60%, 10.7% of respondents with knowledge gap of >20-40% and 2.6% of respondents with knowledge gap of up to 20%.

Comment [A4]: Add literature discussion about indicators of knowledge of pesticides. What are the parameters or indicators that the research object has knowledge of safe pesticides?

Table 2- Distribution of respondents as per their knowledge gap about banned pesticides.

Sl. No	Knowledge gap range	Frequency (f)	Percent (%)
1	Up to 20%	4	2.6
2	>20-40%	16	10.7
3	>40-60%	27	18
4	>60-80%	40	26.7
5	>80%	63	42
	Total	**150**	**100**

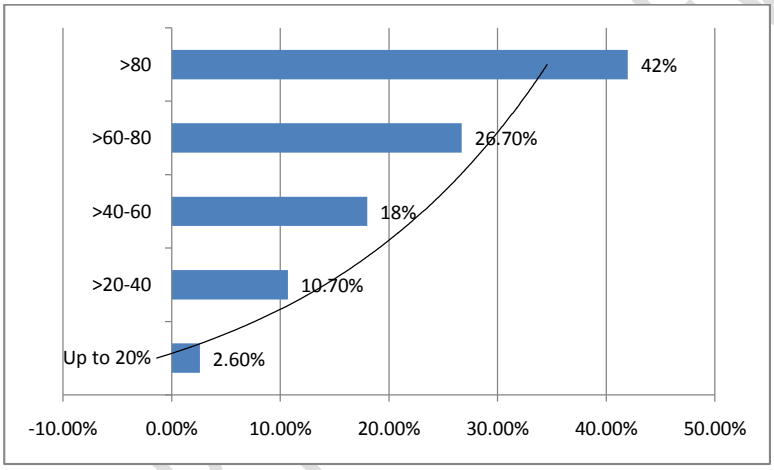

Figure 2: Vegetable Farmers Knowledge gap on banned pesticides

3.2.2. Knowledge about label on pesticide products

The finding of Table 3highlighted that majority (39.3%) of the respondents had knowledge gap of >50-75% followed by 34% of respondents with knowledge gap of >75%, 18.7% of respondents with >25-50% knowledge gap and 8% of respondents with up to 25% of knowledge gap.

Table 3- Distribution of respondents as per their knowledge gap about labels onpesticide products

Sl. No	Knowledge gap range	Frequency(f)	Per cent (%)
1	Up to 25%	12	8
2	>25-50%	28	18.7
3	>50-75%	59	39.3
4	>75%	51	34
	Total	150	100

3.2.3 Knowledge about safety measures during handling of pesticides

Five points scale was used and weighted mean was calculated on the basis of different values assigned to different response. Later ranking was done in accordance to the weighted mean. The finding of Table 4revealed that 'I wear protective clothing during handling' statement ranked 1st with weighted mean 3.82 followed by 'I read instructions on pesticide container label carefully before use' statement ranked 2nd with weighted mean 3.66, 'I use suitable equipments for measuring out, mixing and transferring pesticides' statement ranked 3rd with weighted mean 2.93, 'I follow recommended dose of pesticides' statement ranked 4th with weighted mean 2.52 and 'I scoop/ stir pesticides with bare hands' statement ranked 5th with weighted mean 2.03.

Comment [A5]: Add literature discussion about protective equipment during pesticide handling

Comment [A6]: Complete with a discussion based on literature and previous research studies regarding the dosage of pesticide use on vegetables

Table 4 - Distribution of respondent as per their knowledge gap about safety measures during handling of pesticides

Sl. No	Statements	SA	A	UD	DA	SDA	Weighted mean	Rank
1	I read instructions on pesticide container label carefully before use.	46.6% (70)	18.7% (28)	2.7% (4)	18% (27)	14% (21)	3.66	2nd
2	I wear protective clothing during handling.	35.3% (53)	41.3% (62)	2.7% (4)	11.3% (17)	9.4% (14)	3.82	1st
3	I use suitable equipments for measuring out, mixing and transferring pesticides.	22% (33)	16.6% (25)	4.7% (7)	46% (69)	10.7% (16)	2.93	3rd
4	I scoop/ stir pesticides with bare hands.	5.3% (8)	8% (12)	5.4% (8)	47.3% (71)	34% (51)	2.03	5th
5	I follow recommended dose of pesticides.	22.7% (34)	7.3% (11)	2.7% (4)	34% (51)	33.3% (50)	2.52	4th

(SA –Strongly agree, A – Agree, UD- Undecided, DA- Disagree, SDA- Strongly Disagree)

3.2.4 Knowledge about safety measures during disposal of pesticides

Five points scale was used and weighted mean was calculated on the basis of different values assigned to different response. Later ranking was done in accordance to the weighted mean. The finding of the Table 5 found that 'I dispose empty pesticide containers by throwing them anywhere after use' statement ranked 1st with weighted mean 3.2 followed by 'I dispose the empty pesticides containers by burning and burying it in depth' statement ranked 2nd with weighted mean 3.04, 'I dispose the left over spray solution at safer place viz. barren isolated land' statement ranked 3rd with weighted mean 2.7, 'I wash the empty pesticide container and reuse them' statement ranked 4th with weighted mean 2.12 and 'I keep the left over pesticides in drinking container' statement ranked 5th with weighted mean 2.00.

Comment [A7]: Add supporting literature or previously conducted research on the safety of pesticide disposal

Table 5- Distribution of respondents as per their knowledge gap about safety measures applied during disposal of pesticides

Sl. No	Statements	SA	A	UD	DA	SDA	Weighted mean	Rank
1	I dispose the empty pesticides containers by burning and burying it in depth.	36.7% (55)	12% (18)	0 (0)	22% (33)	29.3% (44)	3.04	2nd
2	I wash the empty pesticide container and reuse them.	4.6% (7)	14.7% (22)	4% (6)	42% (63)	34.7% (52)	2.12	4th
3	I dispose empty pesticide containers by throwing them anywhere after use.	39.3% (59)	12% (18)	1.4% (2)	24% (36)	23.3% (35)	3.2	1st
4	I keep the left over pesticides in drinking container.	5.3% (8)	12.7% (19)	4% (6)	33.3% (50)	44.7% (67)	2.00	5th
5	I dispose the left over spray solution at safer place viz. barren isolated land.	29.3% (44)	10% (15)	0 (0)	22.7% (34)	38% (57)	2.7	3rd

(SA –Strongly agree, A – Agree, UD- Undecided, DA- Disagree, SDA- Strongly Disagree)

4.CONCLUSION

The study revealed that the majority of the respondents were of the age group 30-40 years, having middle school qualification and with experience of 10 years. It was also found that majority of the respondents had wide knowledge gap about banned pesticides and labels on pesticide products. Majority of respondents also lack knowledge about handling of pesticides and safety measures applied during disposal of pesticides. There is need to provide training to the vegetable growers about vegetable cultivation. More training programs and awareness programs needs to be organized for vegetable growers for timely dissemination of information related to vegetable cultivation and practices. Krishi Vigyan Kendras, State Agriculture Departments in various states, Agricultural Universities and various other private and government extension agencies need to join hand to provide real time information at the grass root level to the farmers regarding using other non chemical practices for eradicating pests and diseases, as well as obtaining higher production of the vegetables round the year.

Comment [A8]: The contents of the conclusion is adjusted to the study of the research problem formulation

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