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Knowledge assessment of farmers regarding pesticides and pesticide practices in insect-pest/disease management process of apple

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Abstract

One of the biggest challenge faced by the apple growers of Kashmir valley is pest/disease management on which major share of their income is spent. This research study aimed to investigate the knowledge level of apple growers regarding pesticides and pesticide spraying practices so as to assess their pest/disease management process. The study was carried among apple growers of district Baramulla of Jammu and Kashmir. Data was collected through proportionate random sampling technique by conducting face to face interviews. The study revealed that more than half (56.00%) of the apple growers belonged to 38-61 years of age group, 52 per cent had education upto middle school, 90.00 per cent had marginal land holding (upto 1 ha), two-third (66.00%) had 12-29 years of farming experience, less than half (45.00%) had total annual income of Rs 160001-320000, (96.00%) of the apple growers had not received any training regarding apple cultivation, Cent per cent were applying pesticides for disease management, 92.66 per cent for insect-pest management, more than one-third (35.66%) had knowledge about the recommended spray schedule, 95.66 per cent were knowing the pesticides by trade name, 89.00 per cent were spraying insecticides along with pesticides, only 4.00 per cent were spraying recommended insecticides and fungicides. Cent per cent had knowledge regarding adverse health effects of pesticides and acknowledged that pesticides were harmful to human health, Age, education, farming experience, trainings received, had positive and significant relationship with knowledge level. The study suggests that comprehensive intervention measures including training programmes to farmers, consultations with plant protection scientists, horticulture extension functionaries prior to pesticides use, formulation of concentrations and spray scheduling are needed for continued quality fruit production with minimal risks of pesticides to the human health and the environment.

Keywords: Apple growers, disease management, knowledge level and pesticides

1. Introduction

Pesticides are a vital component and an integral part of modern agriculture. These chemicals quickly gained great popularity as an efficient, labor-saving, and economic tool in pest management in most agricultural sectors. They protect plants against diseases, harmful insects, fungi and weeds, (Wanwimolruk, *et al.* 2015) [16]. Over the last 60 years, farmers have achieved major progress in foodstuff production via the application of pesticides. Prevention or reduction of pest activities and agricultural losses at a reasonable cost improved crop yields and promoted food availability during all seasons. In certain cases, pesticides improved food nutritional value and safety (Narayanasamy, 2006) [12]. Therefore, reliable and quality-improved agricultural produce at affordable prices to buyers and consequently great profits to farmers would be ensured by the essential role of pesticides. As a matter of fact, pesticides provide such benefits not only to farmers and consumers, but also to the whole society (Damalas, 2009) [7].

At the global level, total pesticide use in agriculture was 2.7 million tons of active ingredients (Anonymous, 2022b) [4]. In other words, the most frequent method of managing pests and diseases in most agricultural sectors is through the application of pesticides (Hashemi and Damalas, 2010) [9] and now they have become an integral part of present day farming. Farmers depend heavily on pesticides, though several alternative strategies for pest management continue to evolve (Schreinemachers, *et al.* 2017) [14].

Regardless of the high costs, the widespread application of chemical pesticides has been preferred due to the benefits they provide in agriculture, particularly by protecting crops from pest damage. On the other hand, pesticides pose a serious danger to environment and human health. Worldwide, pesticide use has resulted in different cases of acute and chronic poisoning, with effects of varying hazard on human health, from mild effects even to death. About three million cases are reported worldwide every year that occur due to acute pesticides poisoning. Out of these, three

million pesticide poisoning cases, two million are suicide attempts, and the rest are due to occupational or accidental poisoning. Farm workers exposure to pesticides has been associated with adverse health effects, ranging from short term impacts such as headaches and nausea to chronic impacts, such as various cancers, birth defects, infertility, neurological defects, respiratory diseases and endocrine disruption resulting in hundreds of fatalities, the majority of which occur in developing countries (Anonymous, 2014) [5]. One of the major challenge faced by the apple growers of Jammu and Kashmir is the pest control, these pests have drastically reduced the yield and quality of produce. For better production, pesticide use is imperative. It was assessed that about 33 per cent of the crop damage was prevented by utilizing pesticides. Without the use of pesticides, the damage by pests in fruits, vegetables and cereals may outstretch up to 78 per cent, 54 per cent and 32 per cent, respectively (Hangloo, 2019) [8]. As per the data, total pesticide consumption in the year 2009 in UT of Jammu and Kashmir was 1828.5 MT (Baba *et al.*, 2017) [6], which further increased to 2459 MT and 4086 MT in the year 2018 and 2021 respectively (Anonymous 2023 a) [3]. These figures indicate that there is a constant increase of about 34.5 percent in 2018 to 123.5 percent in 2021 in the consumption of pesticides in Jammu and Kashmir. Furthermore, data indicates that the estimated pesticide market of Jammu and Kashmir (UT) is around 400 million (rupees)with calculated shares from Multi National and National Companies as 33.6 per cent and 52.3 per cent, respectively in 2019. Out of the total sale of pesticides in UT of Jammu and Kashmir, fungicides alone accounted for 71.1 per cent followed by insecticides (15.4%), acaricides (7.7%) and others (5.8%). The pesticides applied on Apple together constituted about 83.00 per cent of total value of agro- chemicals utilized in the UT (Naqash *et al.*, 2019) [11]. With the rising demand of fruit crops and chemical pesticides, consistently million tons of toxic chemical pesticides like Chlorpyriphos, Mancozeb, Captan, Dimethoate, Phosalone etc., are being showered in the Apple plantations of Jammu and Kashmir. Apart from these recommended pesticides, farmers still use pesticides indiscriminately, which has affected the human health as well as environment. Due to enormous use of pesticides and its adverse effects on human beings, biosphere and ecological web- chain, the farmer's knowledge of pesticides and pesticide practices is vital. Keeping in view the importance and need of knowledge of pesticides for apple growers, the present study titled ''Knowledge assessment of farmers towards pesticides and pesticide practices in insect-pest/disease management process of apple'' has been attempted as it finds an important place in the process of human health management, conservation and protection of natural ecosystem and pest/disease management process. Apart from this, the study aims to point out role of farmers knowledge in pesticide selection and use and assist future efforts to optimize the use of pesticides among farmers.

2. Materials and Methods

2.1. Locale of the study

The study was carried out among Apple growers of district Baramulla of Jammu and Kashmir (UT) situated at 34.1980ºN Longitude and 74.3636º E latitude, spreads from Srinagar district and Ganderbal district in the east to the line of control in the west and from Kupwara district in the north and Bandipora district in the northwest to Poonch district in the south and Budgam district in the south west. Baramulla district is the largest district in the entire valley both with reference to population and area. The area is characterized by intensive application of pesticides due to diversity of crops such as vegetables and fruits and is the leading producer of apple in Jammu and Kashmir (UT) having an area of 25307.15 ha and production of 238303.44 MT (Anonymous, 2023 b) [4].

2.2. Sample selection

District Baramulla has 19 horticultural zones, among them 15 horticultural zones were selected purposively having maximum area and production under apple cultivation. A representative sample of 300 apple growers who were directly involved in pesticide application were randomly selected from the selected horticultural zones through proportionate allocation method. Formal interviews, field observations and diagnostic surveys were used to gather information on farmers safety practices towards pesticide exposure.

2.3. Questionnaire Development and Delivery

A Questionnaire was developed in English and was administered in Kashmiri language on farm that was understood by all the farmers. The interview questions were designed based on the relevant literature, authors personal experience in different agricultural practices and face validity of the questionnaire was confirmed by the panel of experts from pathology division of the university, horticultural extension functionaries and health care workers. The Questionnaire included closed ended questions and was pre-tested by randomly selecting 18 farmers from the non sampled area. An verbal approval from the respondents was obtained after describing the aim of the study. The Questionnaire contained three main sections. The first section was designed to collect information on personal characteristics of the respondents (Age, Education, Land holding, Farming experience, annual income and trainings received). The second section focused on farmers knowledge regarding pesticides and pesticide practices, usage and time of application of pesticides, spray schedule, spray intervals, pesticide labels and knowledge regarding effects of pesticides on human health. To assess the knowledge level of apple growers, different statements pertaining to pesticides and pesticide practices were framed and respondents were asked to response on the provided list by using nominal (Yes and No) scale.

2.4. Data Analysis

Data were coded, entered and then analyzed using Statistical Package for Social Science (SPSS) version 20, and Microsoft office excel 2010, Descriptive results were expressed as frequencies, percentage, mean and correlation was used to measure possible relation between socio-economic characteristics and knowledge level.

3. Results and Discussion

3.1. Demographic characteristics of apple growers

Table 1 depicts that majority (56.00%) of the farmers were

in age group between 38-61 years with an average age of 49.37 years, slightly less than one-fourth (23.67%) were below 37 years and around one fifth (20.33%) were 61 years and above Majority (52.33%) of the farmers were educated upto middle school, 17.00 per cent were illiterate or had not received any formal schooling, 11 per cent had received education upto high school level, 10 per cent upto senior secondary level and only 9.67 per cent were having graduate. Majority (87.34%) of the farmers were having marginal (upto 1 ha) land holding, 66 per cent of the farmers were having medium farming of 19.84 years. While as only 11.67 per cent were having more than 29 years of experience. 45.00 per cent were having annual income between Rs 160001-320000, followed by slightly less 40.00 per cent having Upto Rs 160000. While as only 15.00 per cent were having annual income above Rs 320000. Majority (96.00%) of the farmers had not received any training regarding apple cultivation.

Table 1: Socio-economic characteristics of apple growers n=300

Variable	Category	Frequency (%age)
Age (Mean=49.37)	Upto 37 years	71 (23.67)
	38-61 years	168 (56.00)
	> 61 years	61 (20.33)
Education	Illiterate	51 (17.00)
	Middle school	157 (52.33)
	High school	33 (11.00)
	Higher secondary	30 (10.00)
	Graduate	29 (9.67)
Land holding	Marginal	270 (90.00)
	Small	23 (7.67)
	Medium	07 (2.33)
Farming Experience (Mean 19.84)	Low (<11 years)	67 (22.33)
	Medium (12-29 years)	198 (66.00)
	High (>29 years)	35 (11.67)
Annual income Mean =240000	Upto Rs 160000	120 (40.00)
	Rs 160001-320000	135 (45.00)
	Above Rs 320000	45 (15.00)
Trainings Received	Yes	12 (4.00)
	No	388 (96.00)

3.2 Respondents knowledge regarding pesticides and pesticide practices

The data in Table 2 reveals that less than cent per cent (95.67%) were knowing the name of pesticide used, while as 4.33 per cent were not knowing the name of pesticide used, all of these (95.67%) were remembering pesticides by trade name, it might be due to the fact that farmers are continuously using the pesticides and procure the pesticides from pesticide dealers who may be promoting a particular pesticide on its trade name. The findings are supported by *Abbassy* (2017) [1]. 15.67 per cent were remembering pesticides by technical name and considerable proportion (15.67%) of them were remembering pesticides by both technical name as well as trade name. Majority (89.00%) of the apple growers expressed that it is good to spray insecticides along with the fungicides. The table also elicits that less than two-third (60.67%) of the apple growers prepare pesticide solutions at water sources, followed by 31.00 per cent and 8.33 per cent who prepare pesticide solutions in orchards and at home respectively based on easiness or where they feel comfortable. which might be due to their poor knowledge, unfavorable climatic conditions or for their easiness. Majority (85.33%) of the apple growers get water for preparation of spray solutions from nearby streams, 12.67 per cent get from borewells and only 2.00 per cent had already stored water which is used for preparation of spray solutions. Major proportion (80.67%) of the apple growers were knowing how to operate sprayers, motors and other machinery, which might be due their experience in handling spray equipments. While as, 19.33 per cent were not having any knowledge regarding operation of sprayers and other machinery.

Table 2: Knowledge of apple growers regarding pesticides and pesticide Practices. n=300

Statement	Practice	Frequency (%age)
Do you know the name of pesticide used	Yes *	287 (95.67)
	No	13(4.33)
How do you remember pesticides (n=287)* * Multiple responses	By trade name	287 (95.67)
	By technical name	45 (15.67)
	Trade as well as technical	45 (15.67)
Is it good to spray insecticides along with fungicides	Yes	267 (89.00)
	No	33 (11.00)
Where do you prepare pesticide solutions	At Home	25 (8.33)
	In orchards	93 (31.00)
	At water sources	182 (60.67)
Where do you get water for preparation of spray solutions	From borewell	38 (12.67)
	Nearby streams	256 (85.33)
	Already stored	06 (2.00)
Do you Know how to operate sprayers and other machinery	Yes	242 (80.67)
	No	58 (19.33)

3.3 Knowledge regarding usage and time of application of pesticides

The data from Table 3 clearly depicts that cent per cent of the apple growers were spraying pesticides to control different diseases, 92.67 per cent spray pesticides to control insect-pests, considerable proportion (16.00%) of apple growers spray pesticides to control household pests and a small proportion 2.33 per cent and 5.67 per cent were spraying pesticides for weed management and other (Veterinary) purposes (Table 3). Majority (64.67%) of the apple growers were spraying during morning and evening hours, 19.67 per cent were not having any knowledge regarding time of application of pesticides and spray any time during the day and a considerable number (15.66%) of apple growers were having a good knowledge regarding time of application of pesticides spray depending on

weather. It might be due to the fact that major losses in apple occur due to infestation caused by insect-pests and diseases and farmers are well aware about the losses caused by insects/pests and diseases. Same findings were reported by Rajal *et al.* (2018) [13].

Table 3: Knowledge regarding usage and time of application of pesticides. n=300

Statement	Practice	Frequency (%age)
Why do you apply pesticides* * Multiple responses	Insect-Pest management	278(92.67)
	Plant disease management	300(100)
	Weed management	07 (2.33)
	Household pest management	48 (16.00)
	Other (Veterinary purposes)	17 (5.67)
When should we apply pesticides	Morning/Evening	194(64.67)
	Any time	59 (19.67)
	Depends on climate	47 (15.66)

Majority were having knowledge regarding the time of application of pesticides, same may be due to that farmers might have knowledge regarding the aftermaths of spraying pesticides in hot and humid climate. The findings are in line with the results of *Tyagi et al* (2015) [15]

3.4 Knowledge regarding spray schedule and pesticide labels

It is evident from the data in table-4 that majority (64.33%) of the apple growers were not having any knowledge regarding the recommended spray schedule. Majority (79.33%) of the apple growers were having knowledge regarding different stages of apple development. Less than two-third of the apple growers were not having any knowledge regarding the pesticide to be sprayed at different stages of apple development (Yousuf *et al* 2020) [17]. This might be due to the fact that majority of the apple growers have low source of information, majority have not received any training from different organizations and farmers get information from pesticide dealers while procuring the pesticides, which may not have knowledge regarding the recommended spray schedule. Majority (78.67%) of apple growers were not reading pesticide labels indicates a general ignorance of the importance of reading pesticides to reduce pesticides exposure and risks or may be due to low education they are unable to read or not interested to read. These findings are supported by the results of *Al-Zadjali et al* (2015) [2].

Table 4: Respondents knowledge regarding spray schedule, apple development stages and pesticide labels n=300

Statement	Response	Frequency (%age)
Do you know the recommended spray schedule	Yes	107 (35.67)
	No	193 (64.33)
Do you know different stages of fruit (Apple) development	Yes	238 (79.33)
	No	62 (20.67)
Do you know which pesticide to spray at which stage of fruit (Apple) development	Yes	107 (35.67)
	No	193 (64.33)
Do you read pesticide labels	Yes	64 (21.33)
	No	236 (78.67)

Table 5: Respondents knowledge regarding spray intervals. n=300

Statement	Practice	Frequency (%age)
How many days we should keep between two fungicide sprays	5-10 days	32 (10.67)
	10-15 days	213 (71.00)
	>15 days	55 (18.33)
	Total	300 (100)
Do you spray during full bloom period	Yes	0 (0.00)
	No	300 (100.00)
Do you know about pre harvest no spray interval	Yes	56 (18.67)
	No	244 (81.33)
Do you stop spraying during pre harvest interval	Yes	47 (15.67)
	No	253 (48.33)
How many days you stop spraying before harvest	<10days	05 (1.67)
	10-15 days	92 (30.67)
	15-20 days	148 (49.33)
	>20days	55 (18.33)
	Total	300 (100)

3.5 Knowledge regarding spray intervals

Majority of the apple growers were spraying at an interval of 10-15 days, 18.33 per cent were spraying at an interval of more than 15 days, where as 10.67 per cent of apple growers were spraying at 5-10 days of interval (Table 5). 49.33 per cent of the apple growers stop spray before 15-20 days, the trend varies as it depends on the intensity of disease, pest infestation and weather conditions of the particular region,

(30.67%) stop spray 10-15 days before harvest, (18.33%) stop spray more than 20 days before harvest and 1.67 per cent stop spray less than 10 days before harvest. This trend was followed because majority (81.33%) of the apple growers were not having any knowledge regarding pre-harvest spray interval. The findings were supported by Abbassy (2017) [1].

3.6 Knowledge regarding health effects of pesticides

The data in table 6 indicates that cent per cent of the apple growers were having knowledge regarding adverse health effects of pesticides, which might be due to the adverse health effects which they experience during pesticide usage. Less than two-third (62.33%) of the apple growers claimed that all pesticides have same adverse health effects, which could be due to mixing of pesticides and inability to diagnose the effects of a particular pesticide. Majority of the apple growers (97.33%) were not having any knowledge regarding the banned pesticides, which might be due to their inexperience with such pesticides. Among apple growers who were aware that some pesticides have been banned, half of them were not having any knowledge regarding the reasons of banning these pesticides, which may be due to low source of information and education. The results are in consonance with the findings of Jallow *et al.* (2017) [10].

Table 6: Respondents knowledge regarding health effects of pesticides. n=300

Statement	Response	Frequency (%age)
Do you know the adverse health effects of pesticides	Yes	300 (100)
	No	0 (0.00)
Does all pesticides have same adverse health effects	Yes	187 (62.33)
	No	113 (37.67)
Do you know some pesticides are banned	Yes	08 (2.67)
	No	292 (97.33)
Do you know the reasons for banning the pesticides (n=08) * * Multiple response	Highly toxic	04 (50.00)
	Not effective	02 (25.00)
	Expensive	0 (0.00)
	Don't know	04 (50.00)

Table 7: Correlation between socio-economic characteristics of apple growers with knowledge level.

Characteristics	Co-relation coefficient (r)	P value
Age	0.245**	0.00
Education	0.561*	0.009
Total land holding	-0.016	0.673
Total farming experience	0.157**	0.006
Total Annual Income	0.260	0.856
Training received	0.247*	0.007

* Correlation is significant at the 0.01 level, ** Correlation is significant at the 0.05 level

3.6 Relation between socio-economic characteristics of apple growers with knowledge Level.

Table 7 depicts the correlation coefficient values indicating the relationship of socio-economic characteristics of apple growers with knowledge level. Age, education, farming experience and trainings received had significant relation with their knowledge. The study leads us to the fact that as the age and farming experience increases the knowledge level of farmers increases, educated farmers have access to various sources of information like books, social media, labels and different horticultural websites and farmers who receive training from different sources gain knowledge and develop skill. The result also depicts that land holding and annual income did not establish significant relation with their knowledge level, because most of the apple growers were having marginal land holding and low income (*Yousuf et al.* 2022) [18].

4. Conclusion

Apple production is an important economic pursuit and source of livelihood to large number of people of Jammu and Kashmir. Major share of income of apple growers is spent on pesticide procurement for pest/disease management process but due to poor knowledge regarding pesticides, spray schedules, spray intervals and other pesticide practices, pest and diseases are not managed to that extent. Apple growers should give much emphasis on consultation with plant protection scientists, horticulture extension functionaries prior to procurement of pesticides formulation of concentrations and spray scheduling. Demand driven training programmes, front line demonstrations and on farm trails should be conducted by visiting in the farmers field instead of lectures. To bridge the gap between farmers and horticultural extension functionaries social media groups should be formed so that information can be disseminated at right time. When planning and conducting training programmers much emphasis should be given on spray schedule, formulation of concentrations, spray intervals, pesticide labels, adversity due to mixing of pesticides pesticide procurement and health hazards due to improper use of pesticides.

5. Authors Contribution

Conceptualization of research work and designing of experiments (D.Y, L.A, M.I.B), Execution of field experiments and data collection (D.Y), Analysis of data and interpretation (D.Y,L.A, Z.A.S), preparation of manuscript (D.Y, Z.A.S)

6. Conflicts of Interest

There is no sort of conflict of interest on the part of authors.

7. References

1. Abbassy MMS. Farmer's knowledge, attitudes and practices, and their exposure to pesticide residues after application on the vegetable and fruit crops. Case study: North of Delta, Egypt. J Environ Anal Toxicol. 2017;7(5):2161-0525.

2. Al-Zadjali S, Morse S, Chenoweth J, Deadman M. Personal safety issues related to the use of pesticides in agricultural production in Al-Batinah region of Northern Oman. Sci Total Environ. 2015;502:457-461.
3. Anonymous. State wise consumption of pesticides. GOI, MOA & FW. Directorate of Plant Protection, Quarantine & Storage; c2023a.
4. Anonymous. Directorate of Economics and Statistics/Baramulla district at a glance; c2023b.
5. Anonymous. WHO, The impact of pesticides on health: Preventing intentional and unintentional deaths from pesticide poisoning. World Health Organization, Geneva; c2014.
6. Baba SH, Malik HA, Mir SA, Hamid Y, Kachroo MM. Externalities of pesticide application on apple in Kashmir Valley. Agric Econ Res Rev. 2017;30(1):81-92.
7. Damalas CA. Understanding benefits and risks of pesticide use. Sci Res Essays. 2009;4:945-9.
8. Hangloo RL. Agricultural technology in Kashmir (AD 1600 to 1900). Medieval Hist J. 2019;11:63-99.
9. Hashemi M, Damalas CA. Farmers' perceptions of pesticide efficacy: Reflections on the importance of pest management practices adoption. J Sustain Agric. 2010;35:69-85.
10. Jallow M, Awadh D, Albaho M, Devi V, Thomas B. Pesticide risk behaviors and factors influencing pesticide use among farmers in Kuwait. Sci Total Environ. 2017;574:490-498.
11. Naqash FW, Wani SA, Mir SA, Wani SA, Baba WM, Malik HA. Economics of pesticide use in the apple-producing areas of Kashmir Valley. IJARIIE. 2019;5(4):2395-4396.
12. Narayanasamy P. Postharvest pathogens and disease management. New York: John Wiley & Sons; c2006.
13. Rijal JP, Regmi R, Ghimire R, Puri KD, Gyawaly S, Poudel S. Farmers' knowledge on pesticide safety and pest management practices: A case study of vegetable growers in Chitwan, Nepal. Agriculture. 2018;8(1):16.
14. Schreinemachers P, Chen H, Nguyen T, Buntong B, Bouapaoe L, Gautam SLN, *et al*. Pesticide dependence of smallholder vegetable farmers in Southeast Asia. Sci Total Environ. 2017;593-594:470-477.
15. Tyagi H, Gautam T, Prashar P. Survey of pesticide use pattern and farmers' perception: A case study from cauliflower and tomato cultivating areas of district Faridabad, Haryana, India. Int J Medipharm Res. 2015;1(03):139-146.
16. Wanwimolruk S, Kanchanamayoon O, Phopin K, Prachayasittikul V. Food safety in Thailand: Pesticide residues found in Chinese kale (*Brassica oleracea*), a commonly consumed vegetable in Asian countries. Sci Total Environ. 2015;532:447-455.
17. Yousuf D. Thematic areas for training needs of cherry growers: A study in district Baramulla of Kashmir Valley. Curr J Appl Sci Technol. 2020;39(13):63-71.
18. Yousuf D. Knowledge and skill assessment of farmers regarding cherry cultivation practices: A study of district Baramulla of Jammu and Kashmir. Asian J Agric Ext Econ Sociol. 2022;40(7):51-63.