



Extent of Adoption of Vegetable Production Practices by Vegetable Growers in Medak District of Telangana

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Authors' contributions

This work was carried out in collaboration between both authors. Author BS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author CS managed the literature searches. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/CJAST/2020/v39i3030977

Editor(s):

(1) Dr. Tushar Ranjan, Bihar Agricultural University, India.

Reviewers:

(1) Ojo Funmilola Mabel, Olusegun Agagu University of Science and Technology, Nigeria.

(2) Monier Morad Wahba, National Research Centre, Egypt.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/61553>

Original Research Article

Received 20 July 2020
Accepted 26 September 2020
Published 06 October 2020

ABSTRACT

The study was conducted in four villages of Mulugu mandal of Medak district of Telangana to assess the extent of adoption of recommended vegetable production practices and safety measures in handling pesticides by the vegetable growers. An interview schedule was prepared for collection data pertaining to the adoption of practices by the respondents. From the study, it could be concluded that, the with respect to the adoption, majority of the farmers (64.00%) fell under medium category of adoption followed by high (20.00%) and low (16.00%) categories. When practice wise adoption was assessed it was revealed that, majority of the farmers (76.00%) adopted plant protection practices followed by recommendations pertaining to the selection of seeds & sowing methods & time (72.00%) and application of manures and fertilizers (70.00%). Further, farmers opined that, powdery mildew; *Helicoverpa*, *Spodoptera* and Jassids were the important pests occur in vegetables. While coming to the safe handling of pesticides farmers opined that, they are taking personal protection measures like, use of face mask, gloves and turban while spraying of pesticides.

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Keywords: Adoption; recommended practices; safe use; vegetables.

1. INTRODUCTION

Diverse climatic conditions of India ensure availability of variety of fresh fruits and vegetables throughout the year. India ranks second after China in fruit and vegetable productions in the world second. From the Pocket Book of Agricultural Statistics 2019 published by the Directorate of Economics & Statistics, India produced 98.5 million metric tons of fruits and 185.8 million metric tons of vegetables with the area of 6.6 million hectares under fruits and 10.1 million hectares under vegetables. (Source: <https://eands.dacnet.nic.in/PDF/Pocket%20Book%202019.pdf>).

India has been blessed with wide range of climatic and physico-geographical conditions, and as such India is most suitable for growing various kinds of horticultural crops such as fruits, vegetables, flowers, nuts, spices and orchards. Fruits and vegetables are important supplements to human diet as they provide essential minerals, vitamins and fiber required for maintaining proper health. Fruits and vegetables account for nearly 90% of the total horticulture production in the country. India is now the second largest country in the production of fruits and vegetables in the world and is the leader in several horticultural crops, namely mango, banana, papaya, cashew nut, areca nut, potato and okra, Birthare [1].

Pesticides have become an integral part of cultivation which plays major role in agricultural productivity. The Indian pesticide market was worth 197 billion in 2018 and the market is further projected to reach 316 billion by 2024, growing at a CAGR of 8.1% during 2019 to 2024. The significance of pesticides have been increasing over the last few decades due to increase in demand of food grains to meet the requirements of the continuously growing population. In India, pests and diseases on an average damage /destroy eat away around 20 to 25% of the total food produced. Indiscriminate and extensive use of pesticides represents one of the major threats to public health and environment. Improper and inefficient use of pesticides can lead to secondary pest outbreaks, destruction of non-target species, soil, water and air contamination and residues in primary and derived agricultural products that endanger the environment and human health.

Safe use of pesticides depends on many factors; most important one is selecting the appropriate pesticides and using it according to the guidelines provided on the label. The pesticides are designed to kill different crop pests and are poisonous in nature, they adversely affect the farmers' health and environment when used without proper precautions. The unsafe and indiscriminate use of pesticides in agriculture by farmers may be due, lack of awareness about the safe use and handling of pesticides, lack of knowledge about risk from exposure to pesticides and most importantly, lack of accessibility to personal protection equipment. Though Do's and don'ts for safe handling are informed by public and private players, farmers rarely follow them. The health locus of control i.e., the degree to which individual believes that their health is controlled by internal or external factors, can be one of the explanations of farmers unsafe behaviors related to pesticide usage, Lau [2].

In view of the aforementioned, this present study was undertaken to assess extent of adoption of recommended practices of vegetable production and safe measures in use of pesticides by the respondents.

2. MATERIALS AND METHODS

2.1 Selection of Area and Respondents

Medak district was selected purposively for the study as it is one of the major vegetable cultivating districts in the state. Three villages of Mulugu mandal were selected by following the simple random sampling technique. The selected villages are namely –Ksheersagar, Annasagar, Vaagunuthi and Kamalabad. One hundred (100) farmers were selected from the above named four villages in the ratio of twenty-five (25) farmers per village using simple random sampling method for the study.

2.2 Data Collection Tools and Procedures

Data were collected from the respondents through questionnaires with the help of interview schedule. Necessary precautions were taken to ensure that the questions in the schedule were unambiguous, clear, concise, complete, and comprehensive. The respondents were contacted in person mostly at a common place in each village.

2.3 Statistical Analysis

The data collected for the study were tabulated, processed and analyzed using simple statistical tools like frequency, percentages and rank order.

3. RESULTS AND DISCUSSION

3.1 Adoption of Recommended Vegetable Cultivation Practices

Rogers and Shoemaker [3] termed adoption as innovation decision process through which an individual passes from first knowledge of innovation to a decision to adopt or reject to later confirmation of this decision. To know the extent of adoption of recommended vegetable cultivation practices, an interview schedule with 20 statements comprising important practices were administered and responses on each item was measured on three point continuum i.e. fully adopted, partially adopted and not adopted with scores of 3, 2 and 1, respectively. The maximum and minimum possible scores were 60 and 20 respectively, whereas the maximum and minimum obtained scores were 48 and 18 respectively. Based on adoption scores obtained, the respondents were classified into following three categories by using exclusive class interval method. The results were expressed in the form of frequencies and percentages.

It was observed from the above table that, majority of the farmers (64.00%) fell under medium category of adoption followed by high (20.00%) and low (16.00%) categories. The result corroborates the report by Mali [4] and Singh et al. [5].

3.2 Practice Wise Adoption of Vegetable Cultivation Practices by the Respondents

An attempt was made to know the practice wise adoption of recommended practices of vegetable cultivation and from the following table it could be inferred that, the majority of the farmers adopted and were grouped under medium adoption category.

Among the recommended practices, plant protection, seeds and sowing, manures and fertilizers and land preparation were adopted by above seventy percent of the respondents. The similar results were also reported by Yadav [6] where he reported that, in practice wise adoption, adoption of "Use of HYV"s/hybrid varieties" (93.25 per cent) was slightly lower than 100 percent adoption and "Application of nitrogen at the time of sowing" which was adopted by the cauliflower growers to the extent of 80.33 per cent.

Table 1. Distribution of the respondents according to their extent of adoption of recommended practices of vegetable cultivation

S. no	Adoption level	Frequency	Percentage
1	High	20.00	20.00
2	Medium	64.00	64.00
3	Low	16.00	16.00

(n=100)

Table 2. Distribution of respondents according to their adoption of practice wise recommended package of vegetable cultivation

S. no	Practices	Percentage		
		High	Medium	Low
1	Land Preparation	15.00	68.00	17.00
2	Seeds and sowing	20.00	72.00	08.00
3	Water management	15.00	63.00	22.00
4	Manure & Fertilizer management	14.00	70.00	16.00
5	Intercultural operations	12.00	67.00	21.00
6	Plant protection measures	20.00	76.00	04.00
7	Harvesting & post –harvest technology	11.00	67.00	22.00

(n=100)

The probable reason for the above results was regular training programmes and field visits organized by the District Agricultural Advisory and Transfer of technology centre of the district and department officials facilitated them in clear understanding critical inputs and stages of the crops, and timely adoption of recommended practices helped them in better management of the crops. In spite of adopting all recommended practices due to price fluctuation in market sometimes vegetable farmers get very low prices and they would not be even able to recover costs incurred for raising vegetables. Reliance fresh, big baskets and ITC are some of the super markets operating their local collection centers in the nearby study area, to protect themselves from market fluctuations advised farmers to aggregate produce and supply to the above named centers for having regular income even in market distress conditions. The continuous price fluctuation is the major bottleneck in adoption of improved cultivation practices of vegetables. The results are in conformity with the findings of Agarwal, [7] and Tiwari [8].

3.3 Awareness of the Farmers about Important Pests and Diseases on Vegetable Crops

An attempt was made to obtain respondents awareness level with regard to important pests and diseases of vegetable crops, they opined differently. In case of sucking pests 44.00% expressed jassids as the important while the 27.00% felt thrips as the major problem. In response to fruit bores 56.00% farmers expressed *Helicoverpa* as the major problem while others felt *Spodoptera* as the major problem. With regard to diseases also, different opinions showed that 63.00% Powdery mildew as the major problem while the rest felt it was leaf spot.

Table 3. Distribution of respondents according to their awareness about important pest & diseases in vegetables

S. no	Type of pest/disease	Name of the pest	Percentage of respondent felt as problem	Rank
1	Sucking pests	Jassids	44.00	I
		Thrips	27.00	II
		Mites	14.00	III
		Aphids	8.00	IV
		Leaf miner	7.00	V
2	Fruit borer	<i>Helicoverpa</i>	56.00	I
		<i>Spodoptera</i>	44.00	II
3	Disease	Powdery mildew	63.00	I
		Leaf spot	37.00	II

3.4 Safe Use of Pesticides

3.4.1 Scheduling of sprays in a crop period

From the study area, it was found that the farmers were going for eleven sprays during crop period on an average once in 5 – 6 days spraying has been done on the vegetables. In a study conducted by H. Jeyanthi and S. Kombairaju [9], revealed that, pest management practices in four important vegetable crops, viz. chillies, cauliflower, brinjal and bhendi using farm level cross-sectional data. It was found that, on an average, cauliflower and brinjal are each given 15 applications, chillies was given 13 and bhendi was given 12 applications of pesticides. The study has suggested that for reducing pesticide-use, farmers need to be educated about different nonchemical control methods and should be encouraged to adopt integrated pest management (IPM) practices.

3.4.2 Opinion of the farmers about purchase and storing of pesticides

From Table 4, it could be observed that all the respondent farmers are purchasing pesticides from authorized dealer only and it was also observed that 91.00% of the farmers were storing the pesticides outside the house and only 9.00% of them are storing in the living house with precautions.

It was also observed that, 69.00% of the respondents were not reading the leaflet containing instructions attached to the pesticide bottle and only 31.00% of farmers were reading the leaflet containing instructions attached to the package. The results are in conformity with Rostami (2019) and Abdulla and Salman (2013).

3.5 Opinion of the Farmers on the Use of Recommended Personal Protection Equipment (PPE)

It was recorded from the responses that all the respondents are using face/nose mask and about 88.00% were using head dress followed by 54.00% using hand gloves and shoes. The turban/towels are used as face/nose mask and head dress. Same results were reported by Damalas and Abdollahzadeh [10] and Reddy et al. [11].

Devi [12] observed that about 80% of Indian farmers covered their faces and heads with cloth but remained barefoot.

3.6 Opinion of the Farmers about Safe Handling of Pesticides

From the Table 6, it was evident that, cent per cent of the respondents used measuring cylinder for preparation of an accurate dosage of spray fluid. It was also observed that, they were using

stirrer or a stick for through mixing of the chemicals and rinsing the empty containers. It was also observed that, none of the respondent resorted to drink water/eat/smoke during spraying which was a good indication. Due to their awareness about the hazardous affects of the pesticides farmers resorted to use personal protection equipment like face mask, turban hand gloves and adopting safe techniques while spraying.

However, more research on higher-order controls to reduce pesticide exposure, understand the reasons for the poor utilization of personal protection equipment (PPE), and identify effective training methods is needed MacFarlane et al. [13]. Several previous studies focused on providing education on pesticide safety and protection standards for workers in order to mitigate health risks; owing to their insufficient knowledge of the harmful effects of pesticide exposure, farmers and farm workers rarely adopt pre-cautionary measures while applying pesticides Khan, [14]; Ejaz et al. [15].

Table 4. Distribution of respondents according to their opinion about purchase and storing of pesticides

S. no	Item	Activity	Responses in percent
1	Purchase Pesticides	Authorized Dealer	100.00
2	Store Pesticide in	Living House	09.00
		Outside the House	91.00
3	Pesticides-Packing	Reading	31.00
		Not reading	69.00

(n=100)

Table 5. Distribution of farmers according to their opinion about use of PPE

S. no	Item of PPE	Responses in percent
1	Face mask/nose mask	100.00
2	Head dress/Turban	88.00
3	Hand gloves/Shoes	54.00

(n=100)

Table 6. Distribution of respondents according to their responses about safe handling of pesticides

S. no	Item	Responses in percent
1	Measuring cylinder	100.00
2	Mixing with stirrer	100.00
3	Drink/eat/smoke	100.00
4	Rinse empty container	100.00

(n=100)

Table 7. Distribution of farmers according to their opinion about disposal of empty pesticide containers

S. no	Disposal method	Responses in percent
1	Burying in the field	72.00
2	Thrown on the open field	28.00
3	Re use for house hold purposes	00.00

(n=100)

3.7 Opinion of the Farmers about Disposal of Empty Pesticide Containers

Regarding the disposal empty pesticide containers, 72 per cent of them told that, they are burying in the field itself and other farmers reported that, they are cleaning and throwing in the field. No one is reusing the empty containers. The reasons expressed during discussions are quiet interesting to note that present day chemicals are available in small bottles in high concentrated forms (50 ml, 100 ml etc), hence they are of no use in daily routines and some expressed that the repeated advice from the field staff and other extension functionaries they are disposing in the field itself.

Mubushar et al. [16], reported regarding the storage of pesticides on animal farms, about 54.4% do not store them in a separate place, indicating unhealthy practices. A total of 35.4% of farmers some-times store them in a separate place, and a small number of respondents (10.3%) never store pesticides at home in a separate place. These results are in line with Konradsen et al. [17], who reported that a majority of the respondents (82%) in Sri Lanka kept pesticides at home under lock and key, while 46% stored them on their farms. The results of a study conducted in Tanzania by Lekei et al. [18] indicated that a majority of respondents (81%) often used residential rooms as a storage place for their pesticides. Zhang and Lu [19] reported that farmers in China used bed-rooms, granaries, and kitchens for pesticide storage.

3.8 Knowledge on Maintenance Sprayers

About cent percent of the farmers expressed that they have knowledge on upkeep of the sprayers. 100% expressed that generally wire used to remove obstacles. A good social responsibility also observed from the results that more than 80% of the respondents are not using common

canals for cleaning sprayers which otherwise a great source of water pollution.

It was also observed from the discussion with the farmers that, about 52% of the respondents are taking bath and 84% are changing clothes and only 25.00% are aware of the colour triangle indication on the bottles. Regarding first aid only 22.00% respondents have the knowledge. Health problems expressed by very negligible per cent and many expressed that new generation chemicals do cause many health problems.

4. CONCLUSION

Vegetable production provides a promising economic opportunity for reducing rural poverty and unemployment and it is a key component of farm diversification strategies. Vegetables are mankind's most affordable source of vitamins and minerals needed for good health. The results presented in the above revealed that, majority of the were categorized medium level of adoption of the vegetable production technologies and practice wise adoption depicted that, plant protection and seeds were the important practices adopted by the majority of the respondents. From the results depicted above it was obvious that majority of the respondents were using the personal protection measures like face mask, gloves, turban and it was also found that farmers were disposing the pesticide containers properly and not using them house hold purposes. Regular training and awareness programmes on safe handling measures would be useful in creating more awareness and minimizing the risk of pesticide exposure.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/61553>