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RESEARCH ARTICLE

Adoption of Harvest Management Practices by Onion Growers in Haryana

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ABSTRACT

Crop production consists of various cereals, pulses, oilseeds, commercial crops, and horticulture crops. Keeping the importance of vegetable production in view, this study was carried out in Mewat and Ambala districts of Haryana state to find out onion growers' adoption level of pre and post-harvest practices and also to identify the constraints encountered by them in the adoption of pre and post-harvest management practices. The results of the study showed that the majority of the onion-growing farmers have fully adopted practices such as proper transportation, weed control measures, time of sowing in the nursery and time of transplanting, recommended seed rate, and cultivars. The lack of finance for the purchase of inputs, the high price of pesticides, and the non-availability of skilled labour at transplanting and harvesting were major input-related constraints faced by farmers. Similarly, among market-related constraints, the lack of remunerative MSP policy by the government was reported very serious market-related constraint by onion farmers followed by middleman malpractices, wide price fluctuations, and a lack of marketing facilities in the village. The government should make concerted efforts with the active participation of other stakeholders in devising remunerative MSP policy and its implementation, affordable prices of insecticides and pesticides, and capacity building of field functionaries and farmers on post-harvest management practices along with plant protection measures to make the enterprise profitable as well sustainable.

Key words: *Adoption; Constraints, Harvest management practices, Onion growers*

In agriculture sectors, crop production has its own emphasis and importance. Crop production consists of various cereals, pulses, oilseeds, commercial crops, and horticulture crops. A large variety of vegetables, plantation, fruits, flowers, and spices crops are covered under horticulture crops. Being more remunerative than field crops, these are preferred by farmers, and especially, vegetable cultivation is especially vital and attractive for farmers nowadays. Vegetable crops are widely adaptable to different kinds of environments, whether soil, etc. which offer abundant scope for growing vegetables in situations like wasteland areas. Vegetable crops play an important role in the enhancement of the economy of the farmer as well as in commerce and the economy of the country through enhanced export trade. The contribution of fruits and vegetables in both production and export in our agrarian economy is over 10 per cent but hardly 2 per cent of the production is being processed. Total Horticulture production in 2021-22 is estimated to be 341.63 million tonnes, an increase of about 7.03 million tonnes (an increase of 2.10%) over 2020-21. The production of Vegetables is estimated to be 204.61 million tonnes, compared to. 200.45 million tonnes in 2020-21out of which onion production is estimated to be 31.70 million tonnes against 26.64 million tonnes in 2020-21. India holds the 2nd position in terms of area and 3rd position in terms of production of the total vegetables in the world. It is proven that in our routine diet and healthy diet, vegetables play a very significant role by supplying different minerals and vitamins to our body. Various researches also emphasize that any type of meal without vegetables is incomplete. A large population of India is vegetarian thereby for food and nutrition security vegetables have great importance. A healthy diet needs to include

nearly 500 g of vegetables and fruits accounting for at least 8 percent of the daily calorie intake as per the "my plate for the day." As per estimates, the per capita availability of vegetables in the country is 401 g which is comparable to the world average. The post-harvest losses in the case of fruits and vegetables across the globe have been reported up to the extent of 30- 40 per cent every year. These losses are more in tropical and sub-tropical countries like ours. The post-production losses are enormous in vegetables in comparison to fruits due to high perishability. The vegetable sector also suffers from a lack of availability of good quality planting material and low use of hybrid seed. Poor farm management and manual harvesting practices also contribute losses to in vegetable production in India. A vast quantity of vegetables is destroyed every year because of low adoption of recommended pre and post-harvest technologies. Due to the high perishability of vegetables, their cultivation requires proper and efficient management from sowing to harvesting as well as post-harvesting to enhance farm income through value addition which starts from the field and ends with the consumer. Among vegetables, the Indian onion is extremely important due to the highest foreign exchange earner among other vegetables. The country has exported 2,525,258.35 million tonnes of fresh onion to the world, worth Rs. 4,522.79 crores/ 561.38 USD Million during the year 2022-23. Maharashtra, Madhya Pradesh, Karnataka, and Gujarat are the major onion-growing states in India while Haryana has just a share of 3.4 percent of the total area under onion cultivation in the country (*NHB Report, 2018*). The productivity of onion in the state as well as onion growing districts was found low i.e., approximately 22 tonnes per hectare. Farmers are ambitious to earn more per unit profit in the present era of global and liberal trade in agriculture. The adoption of modern and scientific pre and post-harvest practices is necessary not only to augment productivity but also to enhance the quality of produce to get premium prices. The domestic a well as export demands of vegetables can be met by integrating the various technologies from production to post-harvest but recent research by *Singh et al. (2020)* in their study reported that 50.82 per cent of onion growers were medium-level adopters and were more energetic, knowledgeable, dynamic, and having more interest in adopting modern vegetable technologies. So, it is imperative that there were certain hindrances in the adoption of scientific practices. Keeping in view the above facts, the study was undertaken to find out onion growers' adoption level of pre and post-harvest practices and also to identify the constraints encountered by them in the adoption of pre and post-harvest management practices.

METHODOLOGY

The study following ex-post facto research design was conducted purposively in Haryana state of India which is endowed with better marketing opportunities due to Asia's largest vegetable market in its vicinity i.e., the National Capital, New Delhi. Mewat and Ambala districts from the state were selected purposively due to the highest area under onion cultivation as well as production. Then three onion-growing villages namely Badarpur, Dogari and Ghaghas were selected randomly from Firozpur Jhirka block and Akabarpur, Indana and Jalika villages were selected from Puna Hana block. Similarly, Rajokheri, Maka-maki, and Kambasi villages from Barara block and Baroli, Chotibasi, and Fatehpur were selected randomly from Narayangarh block. Finally, 10 onion-growing farmers selected randomly from each selected village were personally interviewed by the researcher to study the constraints faced by them in the adoption of pre and post-harvest management practices. The data were collected through a well-structured pretested interview schedule designed for constraints related to inputs, marketing, production and technical guidance aspects. Descriptive statistical measures like frequency, percentage, weighted mean and rank orders were used to analyse the data and tangible inferences of the study.

RESULTS AND DISCUSSION

Onion growers adoption level of pre and post-harvest management practices : The adoption level of onion growers refers to the extent up to which a farmer adopted pre and post-harvest management practices in order to enhance their economic level as well as their standard of living. It may be specific to a particular innovation, individual, and environment. Adoption of pre and post-harvesting practices or any innovation may vary from area to area as well as from individual farmer to farmer. Earlier socio-cultural, economic, and communicational characteristics and knowledge levels for pre and post-harvest management practices were discussed while in this section adoption level for pre and post-harvest management practices is explained. Different research and studies have

Table 1. Onion growers' adoption level of pre-and-post-harvest management practices (N=120)

Pre-harvest management practices	PA No. (%)	NA No. (%)	TWS	WMS	Rank
Recommended cultivars	24(20)	nil	336	2.80	VI
Seed rate (4-6 kg/acre)	23(19.17)	nil	337	2.81	V
Time of sowing in nursery	17(14.17)	nil	343	2.85	II
Time of transplanting	17(14.17)	nil	343	2.85	II
Planting distance	20(16.67)	15(12.5)	310	2.58	IX
Treatment of nursery soil	33(27.5)	18(15.0)	291	2.42	XI
Seed treatment	21(17.5)	12(10)	315	2.62	VIII
Nursery raising	23(19.16)	16(13.33)	305	2.54	X
Manures and Fertilizers' recommended doses	24(20)	nil	336	2.80	VI
Irrigation (no. as well critical stages)	16(13.33)	nil	344	2.86	I
Weed control measures (chemical and mechanical)	17(14.17)	nil	343	2.85	II
Insect pests and their control measures	37(30.83)	26(21.67)	271	2.25	XII
Diseases and their control measures	21(17.5)	65(54.16)	209	1.74	XIII
Pre-harvest management practices					
Stop irrigation before 15 days of harvesting	Nil	53(44.16)	254	2.11	IX
The waiting period for spray of chemicals before harvesting (7-10 days)	17(14.16)	30(25)	283	2.35	VI
Maturity index	12(10)	nil	348	2.90	II
Proper harvesting	12(10)	12(10)	324	2.70	III
Precooling	30(25)	27(22.5)	276	2.30	VII
Sorting	40(33.33)	13(10.8)	294	2.45	V
Curing	20(16.67)	47(39.16)	246	2.05	X
Grading	45(37.5)	29(24.16)	257	2.14	VIII
Proper packaging Material	12(10)	12(10)	324	2.70	III
Storage (0^0C temp. and RH- 65-70%)	33(27.5)	43(35.83)	241	2.01	XI
Proper transportation	Nil	nil	360	3.00	I

PA=Partial adoption (2); NA=No adoption (1)

anticipated various means of high onion production at the farm level. The efficient use of recommended pre and post-harvesting practices by the farmers enabled them to enhance their production as well as able to improve their economic level. This might be possible only when the onion growers adopted efficient pre and post-harvest management practices at their farm level. The adoption status of pre and post-harvest management practices is represented in Table 1.

It is obvious from of data presented in Table 1 that first rank was achieved for adoption of proper irrigation facilities with WMS (2.86) followed by weed control measures, time of sowing in nursery and time of transplanting having 2nd rank with WMS (2.85) and fifth rank attained by proper seed rate having WMS (2.81). These practices were fully adopted by the respondents.

It further explains that onion farmers had partially adopted practices viz. manures and fertilizers and their recommended dosages and recommended cultivars having 6th rank with WMS (2.80), 8th and 9th rank attained by seed treatment and planting distance respectively having WMS 2.62 and 2.58 respectively.

Onion growers had least adopted or not adopted practices related to preventive or curative measures such as diseases and their control measures with a mean weighted score of 1.74 and ranked 13th followed by insect pests and their control measures having ranked 12th with WMS 2.25, 11th and 10th rank attained by treatment of nursery soil and nursery raising respectively having WMS 2.42 and 2.54 respectively.

It is obvious from the data (post-harvest management practices) presented in Table 1 that first rank in was achieved for adoption of proper transportation with WMS (3.00) followed by maturity index (WMS 2.90, rank 2nd) 3rd rank was achieved by proper harvesting and proper packaging material with WMS 2.70, and 5th rank attained by sorting having weighted mean score 2.45. These practices were fully adopted by the respondents.

It further explains that onion farmers had partially adopted practices viz. the waiting period for spray of chemicals before harvesting (7-10 days) having 6th rank with WMS 2.35, 7th rank attained by precooling with weighted mean score 2.30, and 8th rank attained by grading with weighted mean score 2.14.

Table 2. Correlation analysis of onion growers' antecedents in the adoption of pre- and post-harvest management practices of onion growers.

Variables	'r' values
Innovativeness	0.65**
Operational landholding	0.12*
Institutional sources	0.11
Non-institutional sources	0.23
Media sources	0.05
Family education	0.11
Economic motivation	0.66

*Significant at 1 per cent, **5 per cent and ***10 per cent level of significance.

Onion growers had least adopted or not adopted practices like storage, curing, and stop irrigation before 15 days of harvesting having ranked 11th,10th and 9th respectively with weighted mean scores of 2.01, 2.054, and 2.11 respectively.

The results of onion growers` adoption level of pre & post-harvest management practices showed that the majority of the onion-growing farmers have fully adopted the practices such as proper transportation, weed control measures, time of sowing in the nursery, and time of transplanting, recommended seed rate and cultivars. Onion farmers partially adopted practices viz. proper harvesting and using proper packaging material followed by seed treatment, planting distance, nursery raising, sorting, and treatment of nursery soil. While, onion growers had least adopted or not adopted practices related to preventive or curative measures such as diseases and their control measures, storage, curing, stoppage of irrigation before harvesting, grading, precooling, and waiting period for spray of chemicals before harvesting. The results of the study are in consonance with the findings from the studies carried out by *Ghanghas et al. (2017), Magray et.al (2017),* and *Priya et.al (2015).*

Examination of data presented in Table 2 related to correlation analysis depicts that adoption had a significant positive correlation with innovativeness (0.65) and operational landholding (0.12), and non-significant positive correlation with institutional sources (0.11), non-institutional sources(0.23), media sources(0.05), family education(0.11) and economic motivation(0.66). Results presented in Table 3 related to correlation analysis depict that innovativeness and operational land holding were positively and significantly correlated with the adoption of pre and post-harvest management practices.

Constraints faced by onion growers farmers in pre and post-harvest management practices:Data presented in Table 3 depicts that lack of finance for the purchase of inputs was the top-ranked very serious constraint reported by farmers with a weighted mean score of 1.94 followed by the high price of pesticides (rank 2nd & mean weighted score of 2.05), non-availability of skilled labour at the time of transplanting and harvesting, non-availability of quality seed and non-availability of inputs at right time in the village with mean scores of 1.96, 1.94 and 1.64 and rank 3rd, 4th and 5threspectively. The findings, therefore, concluded that lack of finance for the purchase of inputs, the high price of pesticides, and the non-availability of skilled labour at transplanting and harvesting were major input-related constraints faced by farmers. Findings are in congruence with the past findings of *Singh and Hansra (2018)* who reported the reasons for the non-adoption of pre and post-harvest management practices like high cost of fertilizers and pesticides, timely and skilled labour availability, impure seeds and chemicals, lack of marketing facility at village level etc.

It is obvious from the data presented in Table 3 that the lack of remunerative MSP policy by the government got first rank among very serious market-related constraints faced by onion farmers with a mean weighted score of 2.55 followed by middleman malpractices (mean score 2.36 & rank 2nd), wide price fluctuations and lack of marketing facilities at the village with mean weighted score 2.25 and rank third, less serious or not-so-serious constraints included, distress sales due to lower prices at harvesting, and the perishable nature of produce with mean scores of 2.06, 2.09, and ranking 7th and 8th respectively. The findings seem to be logical because, without proper MSP for a particular produce, farmers are unable to get remunerative prices for their produce, and middleman malpractices and wide price fluctuations are other marketing barriers for farmers. Findings agree with past observations of *Ghanghas et al. (2018)* who reported a lack of remunerative MSP policy, lower price of produce, price fluctuation, distress sale, perishable nature of vegetables, and high-cost inputs, etc. main constraints faced by vegetable farmers in adoption of post-harvest management practices.

This is evident from the data presented in Table 3 that unskilled labour was top-ranked very serious constraint with a weighted mean score of 2.09 followed

Table 3. Adoption of harvest management practices related to constraints faced by onion growers (N=120)

Constraints	Degree of seriousness			TWS	WMS	Rank
	VSC	SC	NSC			
	No. (%)	No. (%)	No. (%)			
Input constraints						
Non-availability of quality seed	27(22.5)	59(49.16)	34(28.34)	233	1.94	IV
Lack of finance for purchase of inputs	56(46.66)	35(29.16)	29(24.16)	267	2.23	I
High price of pesticides	31(25.83)	64(53.36)	25(20.83)	246	2.05	II
Non availability of inputs at proper time in village	13(10.80)	51(42.5)	56(46.66)	197	1.64	V
Non availability of skilled labour at farm field	34(28.33)	47(39.16)	39(32.50)	235	1.96	III
Marketing constraints						
High transportation cost	53(44.16)	40(33.33)	27(22.5)	266	2.22	V
Wide price fluctuation	57(47.5)	36(30)	27(22.5)	270	2.25	III
Lack of remunerative MSP policy	77(64.16)	32(26.66)	11(9.1)	306	2.55	I
Distress sale due to lower prices at the time of harvesting	41(34.16)	45(37.5)	34(28.33)	247	2.06	VIII
Lack of marketing facilities in village	53(44.16)	44(36.66)	23(19.16)	270	2.25	III
Middleman malpractices	63(52.5)	37(30.8)	20(16.67)	283	2.36	II
Perishable nature of produce	37(30.83)	57(47.5)	26(21.6)	251	2.09	VII
Lack of modern storage structures	43(35.8)	49(40.83)	28(23.33)	255	2.13	VI
Production constraints						
Poor drainage	27(22.5)	47(39.16)	46(38.33)	221	1.84	IV
Unskilled labour	37(30.83)	57(47.5)	26(21.66)	251	2.09	I
Lack of proper cropping sequence	12(10)	44(36.66)	64(53.33)	188	1.57	V
Heavy soils are not suitable for cultivation	23(19.16)	57(47.5)	40(33.33)	223	1.86	III
No crop insurance coverage	33(27.5)	63(52.5)	24(20)	249	2.08	II
Technical guidance constraints						
Lack of knowledge regarding post-harvest practices	43(35.83)	57(47.5)	20(16.67)	263	2.19	I
Lack of guidance for selection of cultivars and fertilizers	37(30.83)	54(45)	29(24.16)	248	2.07	IV
Lack of guidance for insect pest and disease control	41(34.16)	47(39.16)	32(26.67)	249	2.08	III
Lack of knowledge of field functionaries	43(35.83)	51(44.17)	24(20)	255	2.13	II

VSC=Very serious constraints (3); SC=Serious constraints (2) and NSC=Not so serious constraints (1)

by no crop insurance, ranked 2nd & with a mean score of 2.08, heavy soils are not suitable for cultivation, poor drainage, and lack of proper cropping sequence with mean weighted scores of 2.08, 1.84 and 1.57 and ranking as 3rd, 4th and 5th respectively for production-related constraints faced by farmers.

Data presented in Table 3 pertaining to technical guidance constraints faced by onion growers clearly indicate that lack of knowledge regarding post-harvest practices was the top-ranked constraint with a mean weighted score of 2.19 followed by lack of knowledge of field functionaries as second rank with a mean weighted score of 2.13, lack of guidance for insect pest and disease control measures and lack of guidance for selecting cultivars and fertilizers with total mean weighted score 2.08, 2.07 and 3rd and 4th ranks respectively. The findings, therefore, concluded that farmers were not provided proper guidance related to current advances in post-harvest management practices of onion.

CONCLUSION

As far as the adoption of Harvest Management Practices by Onion growers was concerned**,** the onion growers fully adopted the practices, namely, recommended cultivars, seed rate, time of sowing in the nursery, time of transplanting, planting distance, irrigation, maturity index, harvesting, proper transportation, and packaging. Partial adoption of practices like proper harvesting and packaging material seed treatment, planting distance, nursery raising, sorting, and treatment of nursery soil**.** Farmers have the least adoption or no adoption of curative measures such as diseases and their control measures followed by storage, curing, stoppage of irrigation before harvesting, grading, insect pests and their control measures, precooling, and waiting period for spray of chemicals before harvesting of produce. Regarding constraints faced by onion growers included lack of finance for the purchase of inputs, the high price of pesticides, lack of remunerative MSP

policy by the government, middleman malpractices, unskilled labour, no crop insurance coverage, lack of proper knowledge regarding post-harvest management practices as well lack of knowledge of these among field functionaries were very serious constraints experienced by the farmers. The government should seriously look into the problems faced by the onion growers and necessary steps or actions should be taken to formulate remunerative MSP policy and its implementation, affordable prices of insecticides and pesticides and organization of sufficient and proper training for both field functionaries and farmers to make the enterprise profitable and sustainable.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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