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Sonia Rani

Department of Extension Education, CCS Haryana Agricultural University, Hisar, Haryana, India

PS Shehrawat

Department of Extension Education, CCS Haryana Agricultural University, Hisar, Haryana, India

Pawan Kumar

Department of Extension Education, CCS Haryana Agricultural University, Hisar, Haryana, India

Farmer's knowledge level regarding handling, product prepared and value addition of horticultural crops

Sonia Rani, PS Shehrawat and Pawan Kumar

Abstract

The present study was conducted in Haryana state and two districts Hisar from southwest and Sonipat from northeast were selected, purposively. From each district, three blocks were selected randomly. Further, three villages were selected from each block making a total of 18 villages. From each village, ten farmers were selected randomly, making a total sample of 180 farmers. Hence, one hundred eighty farmers were interviewed for the study. It was found that majority of the farmers (82.22 per cent) had partial level but a few of them (17.22 per cent) had high level of knowledge regarding do you know about the value addition of horticultural and vegetable produce?', and none was found to have no knowledge of it, majority of the farmers (60.00 per cent) had high level 40.00 per cent had partial level of knowledge regarding 'Maturity index of fruits and vegetables' and none was found to have no knowledge of it, most of the farmers (94.44 per cent) possessed high level, while only 5.55 per cent had partial level of knowledge about 'Truck : predominant method' methods of transportation majority of the respondents (79.44 per cent) had no knowledge level, whereas 20.56 per cent of the respondents had partial level of knowledge about 'Citrus fruits - Candy, Pickles, Marmalade, Squash, Cordial, Juice, Jam', and none was found to have high level of knowledge of it. To reach the results aggregates total was calculated for each statement separately and on the basis of calculated scores, mean scores and mean score percentage were obtained which were ranked according to their maximum to minimum mean score percentage for assessing the knowledge level of the farmers.

Keywords: Knowledge, Farmer, Value addition and Vegetable

Introduction

Adding value is the process of changing or transforming a product from its original state to a more valuable as well as durable state. Many raw commodities have intrinsic value in their original state. For example, field corn grown, harvested and stored on a farm and then fed to livestock on that farm has value. Today fruits and vegetable farming as a diversified farming is important to generate employment round the year, supplement farm economy and to earn foreign exchange also by enhancing the export. As well as fruits play an important role in human nutrition offer diversity indirect, ecological sustainability and fight against hunger. They are sources of essential minerals, vitamins, dietary fibre, supply complex carbohydrates and proteins. They are good sources of calcium, phosphorus, iron, magnesium and contribute over 90 per cent of vitamin C. It is generally stated that the living standard of people can be judged by the production as well as consumption of fruits.

Olayemi *et al.* (2010) revealed that most of the tomatoes ball and hot pepper farmers experienced losses of 10-30 per cent during harvesting and transportation stages. The farmers harvested mostly when they had buyers, harvested at y ripe stage (90 per cent) and most still used the traditional basket and sacks as their packaging material in conveying produce resulting into massive post-harvest losses (62.5 per cent). These practices by the farmers often resulted in reduction of profit and in-availability of these products all through the seasons.

Arah *et al.* (2016) ^[1] revealed that the post-harvest quality and shelf life of the fruit in part would depend on some post-harvest handling practices and treatments carried out after harvest. Handling practices like harvesting, pre-cooling, cleaning and disinfecting, sorting and grading, packaging, storing and transportation played an important role in maintaining quality and extending shelf life. Using appropriate post-harvest treatments like refrigeration, heat treatment, modified atmosphere packaging (MAP), and 1methylcyclpropene (1MCP) and calcium chloride (CaCl₂) application was also vital. It was concluded by this study that the quality of the harvested fruit could be maintained and shelf life could also be extended by using appropriate post-harvest handling practices and treatment methods.

Corresponding Author: Sonia Rani Department of Extension Education, CCS Haryana Agricultural University, Hisar, Haryana, India Wakholi *et al.* (2015) ^[7] found that many of these small-scale farmers employed relative simple and inexpensive techniques in handling their limited volumes of produce. Several factors could be addressed to reduce post-harvest losses, including weak policies, inferior infrastructure, and poor market strategies. However, the lack of basic knowledge (including demographic, scientific and economic knowledge) among the stakeholders (e.g., researchers, farmers, governments, non-government organizations and merchants) on how to develop, implement, use and sustain the recommended handling technologies was probably the most problematic.

Awagu *et al.* (2014) ^[2] obtained information on farmer's storage potential of fruits and vegetables such as stages and time of harvest, harvesting and processing methods, transportation, storage conditions, packaging and storage. The results revealed that bulks of farmers were made up of fairly young people. Most of the farming operations were done manually with tomato and onions produced majorly. Products were majorly sold immediately after harvest with poor processing, packaging, transporting and storage systems. Conclusively, the farmers lacked general knowledge in storage technology, properly due lack of farming experience, therefore, these could be responsible for the huge losses of fruits and vegetables in Kano state and the country at large.

Materials and Methods

Locale of the Study

The present study was conducted in Haryana state and two districts Hisar from south West and Sonipat from north East were selected purposively. Further, three villages were selected from each block making a total of 18 villages. From each village, 10 farmers were selected randomly, making a total sample of one hundred eighteen farmers. Hence, 180 farmers were interviewed for the study. Three blocks from each district i.e. Hisar and Sonipat were selected, purposively. From Hisar, three blocks namely, Hisar I, Hisar II and Adampur, and from Sonipat, blocks Ganaur, Gohana and Murthal were selected, randomly. Thus, six blocks were selected for the study.Out of the six selected blocks, two villages from each block were selected randomly. Thus, a total number of 18 villages, namely, Dobhi, Dhiranwas and Ladwa from block Hisar I, Saharwa, Chiraud and Talwandi Rukka from block Hisar II and Kherampur, Kohli and Siswal from block Adampur, while Bain, Chirsmi and Mohamadpur Majra from Ganaur, Jagsi, Riwara and Baroda Thuthan from Gohana block and Makimpur, Dipalpur and Paldi from Murthal block were selected randomly also.

Collection of Data

For assessing the knowledge, constraints, prospects, training need and perception impact data were collected by conducting personal interview with the respondent at their home/working center. The interview of every individual was taken separately so that the others did not influence the answers. In order to measure the knowledge level of farmers they were asked to reply as set of questions on selected of value addition in horticultural and vegetable crops. The scores so obtained were placed under three categories on the basis of knowledge they possessed i.e. 'full', 'partial' and 'no knowledge' weightage given to these response categories was 3, 2 and 1 respectively. Aggregate total was calculated for each constraint separately and on the basis of calculated scores, mean scores and weighted mean score percentage were obtained which were ranked according to their maximum to minimum mean score percentage for assessing the seriousness of constraints. The maximum weighted mean score percentage so obtained was given the rank 1st and the next subsequent one was given the rank 2nd and so on the descending order.

3.6 Analysis of Data

The information collected through the responses of the respondents, was suitably coded, tabulated and analyzed to draw meaningful inferences by using statistical tools such as frequency distribution, percentages, weighted mean scores, rank order, correlation and regression.

Result and Discussion

Farmer's knowledge of value addition in horticultural and vegetables produce

The existing knowledge of farmer has been presented in Table 1 and practice-wise knowledge level of the respondents was worked out for interpretation.

It was found that majority of the farmers (82.22 per cent) had partial level but a few of them (17.22 per cent) had high level of knowledge regarding do you know about the value addition of horticultural and vegetable produce?', and none was found to have no knowledge of it. It was observed that (80.55 per cent) of the respondents possessed partial level of knowledge, 16.66 per cent had no knowledge level and only 2.77 per cent of the respondents had high level of knowledge about do you know types of value addition?. The study revealed that maximum number of farmers (80.55 per cent) possessed partial level, while only 16.66 per cent no knowledge level and only 2.77 per cent of the respondents had high level of knowledge about of useful form about value addition.

In case of right place, only (78.88 per cent) of the respondents had partial, 18.33 per cent had no knowledge and 2.77 per cent had high level of knowledge. It was revealed from the table 4.5 that majority of the respondents (78.33 per cent) had partial level, whereas 18.88 per cent of the respondents had no knowledge and (2.77 per cent) of the respondents had high level of knowledge about right time. Utility, most of the respondents (61.11 per cent) had no knowledge level, 34.44 per cent had partial level and only (4.44 per cent) had high level of knowledge.

It is also observed from Table 1 that (90 per cent) of the respondents had partial level of knowledge while (10 per cent) had high level of knowledge regarding 'do you know the three ways of value addition?', and none was found to have no knowledge of it. It was found that majority of the respondents (66.11 per cent) had high level, 31.66 per cent had partial level and only 2.22 per cent had no knowledge about primary level including cleaning, grading, packaging of fruit and vegetable products. Secondary level included basic processing, packaging and branding. eg. packed items. It was observed that (53.88 per cent) of the respondents had no knowledge level, 43.33 per cent each had partial and 2.77 per cent had high level of knowledge. As regard with tertiary level included i.e high end processing which required supply chain management, processing technology, packaging, branding, marketing, etc. e.g. potato chips, it was observed that 83.88 per cent of the respondents had no knowledge level, 13.33 per cent had partial and 2.77 per cent had high level of knowledge. It was found that (53.33 per cent) of the respondents had no knowledge level, 43.88 per cent had partial and 2.77 per cent had high level of knowledge regarding 'do you know the value added product price is higher than the fresh produce?'

S. No.	Statements	High	Knowledge Level (%) Partial	No knowledge	Total weighted Score	Weighted mean Score
1.	Do you know about the value addition of horticultural and vegetables produce?	32 (17.22)	148 (82.22)	0 (0.00)	392	2.17
	Do you know types of value addition?	5 (2.77)	145 (80.55)	30 (16.66)	335	1.86
	(a). Useful form	5 (2.77)	145 (80.55)	30 (16.66)	335	1.86
2.	(b). Right place	5 (2.77)	142 (78.88)	33 (18.33)	332	1.84
	(c). Right time	5 (2.77)	141 (78.33)	34 (18.88)	331	1.84
Ī	(d). Utility	8 (4.44)	62 (34.44)	110 (61.11)	258	1.43
3.	Do you know the three ways of value addition?	18 (10)	162 (90)	0 (0.00)	378	2.10
	(a). Primary level includes cleaning, grading, packaging of fruits and vegetables products	119 (66.11)	57 (31.66)	4 (2.22)	475	2.63
	(b). Secondary level includes basic processing, packaging and branding eg. packed items	5 (2.77)	78 (43.33)	97 (53.88)	268	1.48
	(c). Tertiary level includes high end processing which requires supply chain management, processing technology, packaging, branding, marketing etc. e.g. potato chips	5 (2.77)	24 (13.33)	151 (83.88)	214	1.18
4.	Do you know the value added product price is higher than the fresh produce?	96 (53.33)	79 (43.88)	5 (2.77)	451	2.50

Table 1: Farmer's knowledge	level of value added horticultural an	nd vegetable produce $(n=180)$
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Figures in parentheses in column 3, 4 and 5 indicate percentages; column 6 indicates total weighted score and column 7 indicates weighted mean scores.

Farmer's knowledge regarding handling of fruits and vegetables during harvesting

Table 2 revealed that majority of the farmers (60.00 per cent) had high level 40.00 per cent had partial level of knowledge regarding 'Maturity index of fruits and vegetables' and none was found to have no knowledge of it. It was observed that 60.00 per cent of the respondents possessed high level of knowledge, 40.00 per cent had partial level and (5.56 per cent) had no knowledge about 'Skin colour, shape, size, aroma', and none was found to have no knowledge of it. The study revealed that majority of the farmers (50.56 per cent) possessed partial level while 49.44 per cent had high level of knowledge about 'leaf colour change: e.g. root crop (Potato)',

and none was found to have no knowledge of it. It was found that knowledge about 'firmness: detected by touch', 50.56 per cent of respondents had partial, 48.33 per cent had high and 1.11 per cent had no knowledge.

Table 2 revealed that 44.44 per cent respondents had partial level whereas 40.56 per cent of the respondents had no knowledge level and 15.00 per cent had high level of knowledge about 'Juice content: orange, lemon, grapefruit, mandarins'. Regarding 'Sugars: measured by hydrometer or refractometer', majority of the respondents (57.22 per cent) had no knowledge level, 27.78 per cent had partial level and only 15.00 per cent had high level of knowledge. It is also observed from Table 4.13 that 71.67 per cent of the respondents had no knowledge while 20.00 per cent had partial and 8.33 per cent had high level of knowledge regarding 'Starch content: fruit colour change'.

S. No.	Statements	High	Knowledge Level (%) Partial	No knowledge	Total weighted Score	Weighted Mean Score
1.	Maturity index for fruits and vegetables	108 (60.00)	72 (40.00)	0 (0.00)	468	2.60
2.	Skin colour, shape, size, aroma	108(60.00)	72 (40.00)	0 (0.00)	468	2.60
3.	Leaf colour change: e.g. root crop (Potato)	89 (49.33)	91 (50.56)	0 (0.00)	449	2.49
4.	Firmness: detected by touch	87 (48.33)	91 (50.56)	2 (1.11)	445	2.47
5.	Juice content: orange, lemon, grapefruit, mandarins	27 (15.00)	80 (44.44)	73 (40.56)	314	1.74
6.	Sugars: measured by hydrometer or refractrometer	27 (15.00)	50 (27.78)	103 (57.22)	284	1.57
7.	Starch content: fruit colour change	15 (15.00)	36 (20.00)	129 (71.67)	246	1.36

Table 2: Farmer's knowledge regarding handling of fruits and vegetables during harvesting (n=180)

Figures in parentheses in column 3, 4 and 5 indicate percentages; column 6 indicates total weighted score and column 7 indicates weighted mean scores.

Knowledge towards transportation

Table 3 revealed that most of the farmers (94.44 per cent) possessed high level, while only 5.55 per cent had partial level of knowledge about 'Truck: predominant method' methods of transportation. Regarding 'Fast & reliable, and none was found to have no knowledge of it. 'Rail: more

expensive but faster', majority (71.11 per cent) of the respondents had partial, 28.89 per cent had no knowledge, and none was found to have high level of knowledge of it.

Table 3 revealed that majority of the respondents (50.56 per cent) had no knowledge level whereas 49.44 per cent of the respondents had partial level of knowledge about 'Water: inexpensive but no knowledge'. In case of Air: Fastest, expensive, & inconsistent scheduling and temperature control', most of the respondents (87.78 per cent) had no knowledge level, 12.22 per cent had partial level of

knowledge, and none was found to have high level of knowledge of it.

Knowledge Total Weighted S. No. High Level (%) No knowledge weighted Statements mean Partial score score 170 (94.44) 1. Truck: predominant method. Fast & reliable 10 (5.55) 0 (0.00) 530 2.94 0 (0.00) 128 (71.11) 52 (28.89) 308 1.71 2. Rail: more expensive but faster 91 (50.56) 3. Water: inexpensive but no knowledge 0 (0.00) 89 (49.44) 269 1.49 Air: Fastest, expensive, & inconsistent 4. 0 (0.00) 22 (12.22) 158 (87.78) 202 1.12 scheduling and temperature control

Table 3: Knowledge towards transportation (n=180)

Figures in parentheses in column 3, 4 and 5 indicate percentages; column 6 indicates total weighted score and column 7 indicates weighted mean scores.

Products prepared from fruits

It was found that majority of the farmer 79.44 per cent had no knowledge level 17.78 per cent had partial and 2.77 per cent had high level of knowledge regarding prepration 'Amla – Jam, Candy, Syrup, Pickles, Chutney, Dried, Preserves, Shred, Triphla, Ayurvedic medicine, Marmalade, Pulp and Sauces'. It was observed that 81.11 per cent of the respondents possessed no knowledge, 15.56 per cent had partial level and 3.33 per cent had high level of knowledge

about prepration of 'Mango – Juice, RTS (Ready-to-serve), Nectar, Squash, Jam, Toffee, Amchur, Pickles, Chutney, Canned mango, Mango powder, Mango concentrate, Pulp, Puree, Immaydu (immature mango) and Mango candy'. The study revealed that majority of the farmers (81.67 per cent) had no knowledge level, whereas 15.56 per cent had partial and only 2.77 per cent had high level of knowledge about preparation of 'Strawberry – Juice , Squash, Chutney, Jam, Jelly and Candy'. Regarding preparation of 'Ber – Candy, Preserve, Canned ber, Jam', only 79.44 per cent of the respondents had no knowledge, 20.56 per cent had partial and none had high level of knowledge.

Fable 4: Produc	s prepared from	fruits (n=180)
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S. No.	Fruit products	High	Knowledge Level (%) Partial	No knowledge	Total weighted Score	Weighted Mean Score
1.	Amla – Jam, Candy, Syrup, Pickles, Chutney, Dried, Preserves, Shred, Triphla, Ayurvedic medicine, Marmalade, Pulp, Sauces	5 (2.77)	32 (17.78)	143 (79.44)	222	1.23
2.	Mango – Juice, RTS, Nectar, Squash, Jam, Toffee, Amchur, Pickles, Chutney, Canned mango, Mango powder, Mango concentrate, Pulp, Puree, Immaydu (immature mango), Mango candy	6 (3.33)	28 (15.56)	146 (81.11)	220	1.22
3.	Strawberry – Juice, Squash, Chutney, Jam, Jelly, Candy	5 (2.77)	28 (15.56)	147 (81.67)	218	1.21
4.	Ber – Candy, Preserve, Canned ber, Jam	0 (0.00)	37 (20.56)	143 (79.44)	217	1.20
5.	Citrus fruits – Candy, Pickles, Marmalade, Squash, Cordial, Juice, Jam	0 (0.00)	37 (20.56)	143 (79.44)	217	1.20
6.	Grapes – Wine, Juice, Raisin, Jam, Vinegar	0 (0.00)	28 (15.56)	152 (84.44)	208	1.15
7.	Guava – Jelly, Toffee, Nectar, Canned guava, Mixed fruit squash, Vinegar, Jam, Juice, Pulp, RTS beverages, Guava-lime-ginger RTS, Dehydration of guava fruits	0 (0.00)	28 (15.56)	152 (84.44)	208	1.15

Figures in parentheses in column 3, 4 and 5 indicate percentages; column 6 indicates total weighted score and column 7 indicates weighted mean scores.

Table 4 revealed that majority of the respondents (79.44 per cent) had no knowledge level, whereas 20.56 per cent of the respondents had partial level of knowledge about 'Citrus fruits – Candy, Pickles, Marmalade, Squash, Cordial, Juice, Jam', and none was found to have high level of knowledge of it. Regarding 'Grapes – Wine, Juice, Raisin, Jam, Vinegar', most of the respondents (84.44 per cent) had no knowledge level, 15.56 per cent had partial level of knowledge and none was found to have high level of knowledge of it. It is also observed from Table 4 that 84.44 per cent of the respondents had no knowledge, while 15.56 per cent had partial level of knowledge of knowledge regarding preparation of 'Guava – Jelly, Toffee, Nectar, Canned guava, Mixed fruit squash, Vinegar, Jam,

Juice, Pulp, RTS beverages, Guava-lime-ginger RTS, Dehydration of guava fruits;, and none was found to have high level of knowledge of it.

Products prepared from vegetables

Table 5 revealed that majority of the farmer (59.44 per cent) had no knowledge level, 31.67 per cent had partial and 8.89 per cent had high level of knowledge regarding 'Carrot products like – Canned carrot, Chips, Candy, Kheer, Halwa, Powder, Juice, Beverages, Preserve and intermediate moisture products, Soup, Wine, Stews, Curries, Pies, Jam, Pickles'. It was observed that 65.56 per cent of the respondents possessed no knowledge, potato products like 31.67 per cent had partial level and 2.77 per cent had high level of knowledge about 'Potato – French fries, Fast food, Potato chips and Potato flakes'. The study revealed that majority of the farmers (79.44 per cent) had no knowledge level, whereas 17.78 per cent of

the respondents had partial and only 2.77 per cent of the respondents had high level of knowledge about 'Tomato – Tomato paste, Tomato sauce, Ketchup, Chutney, Tomato soup mix, Dehydrated tomato'. It was found that 'Green Leafy Vegetables – Dehydrated green powder, Leaf powder (curry leaf + coriander leaf), Green based Ready to Use vegetable soup mix, Cucumber pickles, Cauliflower pickles, Green chili pickles, Garlic pickles, Vegetable soup mix (onions, carrot, beans, cauliflower, cabbage, tomato, spinach)', 79.44 per cent of respondents had no knowledge,

20.56 per cent had partial level of knowledge and none was found to have high level of knowledge of it. Table 5 revealed that majority of the respondents (84.44 per cent) had no knowledge level, whereas 15.56 per cent of the respondents had partial level of knowledge about 'Other Vegetable produts - Totti fruity from bottle gouard, Ready to Use cluster bean poriyal, Vegetables halwa, Onion powder, Corn soup mix (onion+baby corn+tomato)' and none was found to have high level of knowledge of it.

Table 5: Products	prepared from	vegetables (n	=180)
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S. No.	Vegetable products	High	Knowledge Level (%) Partial	No knowledge	Total weighted Score	Weighted mean Score
1.	Carrot – Canned carrot, Chips, Candy, Kheer, Halwa, Powder, Juice, Beverages, Preserve and intermediate moisture products, Soup, Wine, Stews, Curries, Pies, Jam, Pickles	16 (8.89)	57 (31.67)	107 (59.44)	269	1.49
2.	Potato – French fries, Fast food, Potato chips, Potato flakes	5 (2.77)	57 (31.67)	118 (65.56)	247	1.37
3.	Tomato – Tomato paste, Tomato sauce, Ketchup, Chutney, Tomato soup mix, Dehydrated tomato	5 (2.77)	32 (17.78)	143 (79.44)	222	1.23
4.	Green Leafy Vegetables – Dehydrated green powder, Leaf powder (curry leaf + coriander leaf), Green based ready-to-use vegetable soup mix, Cucumber pickles, Caulifno knowledgeer pickles, Green chilli pickles, Garlic pickles, Vegetable soup mix (onions, carrot, beans, caulifno knowledgeer, cabbage, tomato, spinach)	0 (0.00)	37 (20.56)	143 (79.44)	217	1.20
5.	Other Vegetables-Totti fruity from bottle guard, Ready-to-use cluster bean poriyal, Vegetables halwa, Onion powder, Corn soup mix (onion+baby corn+tomato)	0 (0.00)	28 (15.56)	152 (84.44)	208	1.15

Figures in parentheses in column 3, 4 and 5 indicate percentages; column 6 indicates total weighted score and column 7 indicates weighted mean scores.

Conclusion

It was concluded from the observation that most of the respondents had medium to high level of knowledge towards value addition horticulture and vegetable crops in Hisar and Sonipat districts. . It was found that majority of the farmers (82.22 per cent) had partial level but a few of them (17.22 per cent) had high level of knowledge regarding do you know about the value addition of horticultural and vegetable produce?', and none was found to have no knowledge of it, majority of the farmers (60.00 per cent) had high level 40.00 per cent had partial level of knowledge regarding 'Maturity index of fruits and vegetables' and none was found to have no knowledge of it, most of the farmers (94.44 per cent) possessed high level, while only 5.55 per cent had partial level of knowledge about 'Truck : predominant method' methods of transportation majority of the respondents (79.44 per cent) had no knowledge level, whereas 20.56 per cent of the respondents had partial level of knowledge about 'Citrus fruits - Candy, Pickles, Marmalade, Squash, Cordial, Juice, Jam', and none was found to have high level of knowledge of it.. It was found that farmers were interested to know about the handling, product prepared and value addition in horticulture and vegetable crops to raise their income.

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