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Bottlenecks in Production and Marketing of Apple in Mountainous and Inaccessible Areas of Chenab Valley

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ABSTRACT

Background: An attempt has been made in this study to identify the limitations encountered by the apple farmers in production and marketing which stall its growth in the study area. The present study has been carried out in the Jammu region of Jammu and Kashmir union territory with special emphasis on selected districts which fall under Chenab Valley, which is mostly hilly terrain and mountainous, as these regions had the highest area and production under apple crop.

Methods: The primary data has been collected by survey method by interviewing the apple farmers as well as different market functionaries directly through an especially prepared and pre-tested schedule. The Identified constraints of the farmers in the production and marketing of apple had been ranked by making use of the Garrett's Ranking Technique.

Result: The analysis of the study revealed large number of constraints in the production and marketing of the commercial varieties of apple in a selected area, out of which occurrence of apple disease such as stem black, powdery mildew, scab, nectaria Twig Blight, Alternative Twig Blight, Peppery Dark/Pink Disease. Similarly, some of the common pests reported are: Woolly Aphids, San Jose Scale, Stem Borer, Root Borer, Bark Borer had been the major problem faced by the growers, high labor cost, lack of latest technical knowledge, high cost of transportation, lack of transportation facilities and costly packing material have been identified as the major problems. In order to overcome the marketing problems of the study area apple producers should be organized as federation, cooperatives and union. The study calls for all government and non-governmental organizations to work together to expand and improve apple production and establish apple marketing hub for tackling the bottlenecks in the expansion of apple crop in the study area.

Key words: Apple, Chenab valley, Constraints, Marketing, Production.

INTRODUCTION

India is the world's largest apple producing country behind China and the United States. Despite this, India faces a supply gap in its domestic apple market as increasing demand from the growing middle class meets. Following the trade liberalization in April 1999, apple imports into India have grown dramatically, reaching 186,387 metric tonnes valued at US$197 million in 2012 from negligible imports of 20,093 metric tonnes ten years ago. The market shares of apples from the United States and China are 41 per cent and 31 per cent respectively, followed by Chile, New Zealand, Italy and others. About 95 to 98 per cent of fresh apple imports enter the market through the ports of Mumbai or Chennai. Chennai's port caters to the states of Tamil Nadu, Karnataka, Odisha, Andhra Pradesh and West Bengal, while the port of Mumbai supplies the entire western and northern Indian market (Report, 2013).

Among deciduous fruits, apple was the most important crop in terms of area, production and household economy in remote mountainous districts of Jammu region. The economic aspects of apple cultivation in few pockets of Jammu region are not less important, as apple is one of the key fruits with potential to generate income and employment in the high mountain districts of Jammu, especially with road constructions gaining pace in these areas. However most of the production units are small and often located in isolated and inaccessible areas where infrastructure such as roads, irrigation and storage facilities are inadequate or completely lacking. However, some well maintained and established apple orchards give better returns than field crops for the same piece of land. With the present increasing trend in the connectivity (road network) in remote high mountains and inaccessible districts, there is a great potential for increasing area and productivity of these fruit crops. It may also be mentioned that there are many factors which may boost the production of apple but among them cost and return coupled with marketing are considered to be the key factors for increasing the production. The apple growers

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before prioritizing the preference for establishing orchard ensures its cost and return factor, which is the main factor for bringing more area under apple production.

Apple is rich in vitamins, calcium, phosphorus, potassium and organic acids. In addition to its dietary value, apple tree can enhance soil conservation in highlands of Jammu region. The area under this fruit in Jammu and Kashmir state is 1,19,041 hectares with an annual production of 12,22,176 metric tons. The acreage under this fruit crop in Jammu Division is 11,067 hectares and the annual production is 13,813 metric tons. In Jammu Division apple is being grown in upper areas of Doda, Poonch, Udhampur, Kathua and Rajouri Districts (Anonymous, 2014). There were about 8 varieties of apples being cultivated in temperate region of Jammu which mostly constitute Red Delicious, Golden Delicious and Ambri. These three commercial varieties dominate in total apple production in the study area. The rest includes Razakwari, Maharaji, American, Balti and Royal Delicious varieties which were produced at subsistent levels. Apple is one of the key fruits with potential to generate income and employment in the high mountainous districts of Jammu, especially with road constructions gaining pace in these areas. However, a systematic study of production and marketing analysis for apple was not yet carried out till date to identify challenges and opportunities. To the best of my knowledge and reviewing literature it could be stated that this knowledge gap has been filled and thatthis information can now be shared with a wider audience.

MATERIALS AND METHODS

The present study was carried out in the Jammu region of Jammu and Kashmir union territory with special emphasis on selected districts *viz*., Doda, Kishtwar and Rambam, as these regions had the highest area and production under apple crop. These regions fall under Chenab Valley, which are mostly hilly terrain and mountainous. Chenab Valley lies between the middle and outer Himalayan range in the Jammu region of Jammu and Kashmir, India. Both primary as well as secondary data has been used as per requirements of the study. The primary data from 180 respondents has been collected by survey method by interviewing the apple growers as well as different market functionaries directly through an especially prepared and pre-tested schedule. The required secondary data / information was collected from different sources/ agencies such as bulletins of Ministry of Horticulture, Government of India. Research Journals, Periodicals, Books, Directorate of Economics and Statistics, Government of India. Directorate of Economics and Statistics, Government of J and K and Directorate of Horticulture, Planning and Marketing, Narwal, Jammu, *etc*. A multistage sampling technique had been used for the present study. Doda, Kishtwar and Ramban districts comprised the universe of the sample and were selected purposively on the basis of maximum area and production under apple crop (Anonymous, 2017).

Analytical frame work

The factors responsible for low production and marketing problems were studied on large scale through an opinion survey conducted in the study area and the sample apple growers were asked to rank some of the identified constraints which they were facing. The order of merit assigned by the respondents was converted into scores by using the Garrett's ranking technique (Bhat and Choure, 2014). The method had been suggested by Garrett for converting the ranks into scores when a number of items ranked had differed from one respondent to another respondent.

The percentage position for each rank was found by using the formula:

$$\text{Per cent position} = \frac{100\ (R_{ij} - 0.5)}{N_j}$$

Where,

R_{ij} = Rank given to i_{th} constraint by the jth respondent.

N_j= Number of constraints ranked by the jth respondent.

By referring to the table given by Garrett, the percentage position estimated had been converted into scores. Then for each factor, the scores of the various respondents were added and divided by the number of respondents to arrive at the mean score. The factor with the highest mean score was given the first rank, followed by second, third and so on.

RESULTS AND DISCUSSION

Socio-economic profile of sample apple growers

The analysis of the occupational pattern in (Table 1). revealed that 67.22 per cent of the sample apple growers practiced agriculture as main occupation whereas; only 32.78 percent practiced agriculture as subsidiary occupation. The average annual income of the sample apple farmers was found to be ` 48077.46, ` 75542.86, ` 408333.3 for marginal, small and medium farmers from all sources, respectively. Farm land is scarce in Chenab valley highlands. Unlike cereal crop production which requires large farmland, cultivation of apple requires small plot of land and can be grown around homestead. Therefore, it is wise strategy to promote apple production in such starved farm plots. Apple was also the major cash crop in the highlands of study area. The land holding size of the farm households is highly fragmented and very small averaging. The average area under apple crop for marginal farmers was 0.19 acres, for small farmers 2.55 acres and 5.66 acres for medium farmers. Majority of the farmers ploughed their starved plot of land manually *via* hand farm tools. Apple production was impacting the livelihood of farming community in a better way. Moreover, the high demand of apple fruit made the apple production an interesting business for rural dwellers. Age plays a prominent role in the farming activities as it determines the effectiveness and competence of labor availability for apple production. The results in Table 1 also showed that majority (32.78 per cent) of the apple growers were in the age group of 41-50 years, followed by 31.67

Table 1: Socio-economic characteristics of sample apple growers.

Particulars	Marginal farmers	Small farmers	Medium Farmers	Per centage of total
Agriculture as occupation				
Main	98	22	1	67.22
Subsidiary	44	13	2	32.78
**Average annual income ` **	48077.46	75542.86	408333.3	
Average number of apple trees	81.38	175.8	313.66	
Average land holding (Acres)	1.27	3.54	6.82	
Average area under apple (Acres)	0.19	2.55	5.66	
Age group of the farmers				
Below 30	33	6	0	21.67
31 to 40	45	11	1	31.67
41 to 50	43	14	2	32.78
Above 50	21	4	0	13.89
Educational attainment				
Primary	29	5	1	19.44
Middle	18	9	0	15.00
Intermediate	23	7	1	17.22
Graduation or above	21	4	1	14.44
Illiterate	51	10	0	33.89
Family size				
Small (1-4)	7	0	0	3.89
Medium (4-6)	30	11	0	22.78
Large (>6)	105	24	3	73.33
Family type				
Nucleus	95	24	1	66.67
Joint	47	11	2	33.33
Average family size	8.40	7.97	10.33	

Source: Primary data.

per cent in the age group of 31-40 years, 21.67 per cent below 30 years of age and above 50 were only 13.89 per cent of the sample apple growers. This indicated that apple cultivation was mainly done by the young adult farmers within the age group of 20-50 years. This agrees with the findings of Adeola *et al.* (2008); Sani *et al.* (2010) and Dauda *et al.* (2014) who said 76.67 per cent are within the age group of 30-49 years of age. This is because these categories of farmers are still strong and have the ability to supply the required labor in agriculture activities to boost production and also increase resource use efficiency. Among the respondents, 33.89 per cent were illiterate, 19.44 per cent received primary education, 17.22 per cent received intermediate education, 15 per cent received middle education and 14.44 per cent were Graduate or above. About 66.67 per cent of the sample farmers were having nucleus family and 33.33 per cent were having joint family. The proportion of male members in the family was more than their female counterparts. The average family size of sample apple growers was found to be 8.40 for marginal farmers, 7.97 for small farmers and 10.33 for medium farmers.

Constraints in production of apple

It could be observed from (Table 2) that prevalence of apple disease such as Stem Black, Powdery Mildew, Scab, Nectaria Twig Blight, Alternative Twig Blight, Peppery Dark / Pink Disease. Similarly, some of the common pests reported are: Woolly Aphids, San Jose Scale, Stem Borer, Root Borer, Bark Borer had been the major problem faced by the Growers with a mean score of 83.00. During peak agricultural seasons, the wage rate was around ` 350-500 per man-day. However the actual wages varied from location to location depending upon prevailing wage levels for skilled and unskilled labor. Only small and medium farmers had been employing wage laborers, rest of the farmers mostly employed family labor for apple cultivation.

The high labor cost had been the second important problem with a mean score of 72.00. The farmers in the study area did not have knowledge on improved technologies of apple growing and post harvest management. Therefore, the third important problem recognized by the sample apple growers had been the lack of latest technical knowledge with a mean score of 65.00. Farmers paid higher price for pesticides because of the presence of a number of intermediaries in the channel. The marketing efficiency has been relatively low in the channel where farmers purchase pesticides from the traders. Farmers applied pesticides indiscriminately in violation of the scientific recommendations. About one-third of the pesticides available in the market were reported to be either

Table 2: Rank of production problems faced by the apple growers in study area.

Production problems	Garrett's % position $= \frac{100\ (R_{ij} - 0.5)}{N_j}$	Garret's rank mean score	Rank
High labor cost	13.64	72.00	II
Non-availability of good quality FYM in time	50.00	50.00	VI
Lack of latest technical knowledge	22.73	65.00	III
High cost of pesticides /fungicides	31.82	60.00	V
Educated members go outside/outmig ration of labor	77.27	35.29	IX
Inadequate/expensive/ no irrigation facilities	40.91	63.50	IV
Lack of good quality seedlings in sufficient quantity	86.36	19.82	X
Non-availability of labor during peak period	68.18	41.00	VIII
Lack of timely availability of credit facilities	59.09	45.00	VII
Occurrence of apple disease	4.55	83.00	I

Source: Primary data.

sub-standard or spurious. The existence of unlicensed dealers/ traders has further accentuated the magnitude of malpractices in the pesticide delivery system, similar findings has been shown by Baba *et al.* (2012) and Naqash *et al.* (2017). Inadequate / expensive / no irrigation facilities, High Cost of pesticides / fungicides, non-availability of quality farmyard manure, lack of timely availability of credit facilities and non-availability of labor during peak period had been the fourth, fifth, sixth, seventh and eighth important problems with mean score of 63.50, 60.00, 50.00, 45.00 and 41.00, respectively. No special provisions from government regarding monitoring, finance, precautions, standard pesticides and fungicides and fertilizers had stalled the growth of apple production in the study area.

Moreover, educated members go outside / outmigration of labor and lack of good quality seedlings / saplings in sufficient quantity had been the ninth and tenth problems with mean score of 35.29 and 19.82, respectively. Furthermore, apple production in the study area is characterized by poor agronomic practices resulting in poor yields and quality. The yield can be improved both in quality and quantity through the technological use of clonal rootstocks as reported in the findings of Earles *et al.* (1999) and Reshi *et al.* (2010). The survey also verified whether farmers apply important agronomic practices or not. Agronomic practices were necessary steps farmers incorporated into their farm management system to improve soil quality, enhance water use, manage crop residual and improve the farming system through optimum application and management of agricultural inputs and technologies. The common agronomic practices on apple production are application of organic fertilizers and farm yard manures, grafting and pruning using appropriate equipment, spacing, intercropping and disease control. In view of that, the study showed that all producers intercrop vegetables, pulses and maize. Similarly, all of them apply organic fertilizer (manure) besides other artificial fertilizers and manures without recommended dosage and also use traditional treatment to control apple disease like apple scab and powdery mildew. Apple production in some areas is organic and hence livestock ownership which is the main source of organic fertilizer in the area is important. Pruning enhances apple fruit production and quality through increased efficiency of light utilization, ease of air circulation through the canopy and decrease incidence of fungal disease. In light with this, the study revealed that majority of the producers mostly marginal farmers did not prune and graft their apple tree for they had no appropriate pruning and grafting equipment. The sampled farmers responded that absence of the pruning and grafting materials at local market and the lack of technical knowledge made them not to do it.

Constraints in marketing of apple

It could be observed from (Table 3) that high cost of transportation had been the major marketing problem faced by the growers with a mean score of 85.59. Lack of transportation facilities had been the second important problem with a mean score of 75.00. The third important problem had been the costly packing material with a mean score of 69.00. Lack of processing units and cooperative society, high commission charges, unorganized marketing and low price paid to farmer, lack of market information and non-availability of market had been the fourth, fifth, sixth, seventh and eighth important problems with mean score of 63.00, 59.00, 56.00, 52.00 and 49.00, respectively. The fundamental cause of marketing problems was that growers not being organized either producers or traders. Apple producers must be organized in the study area in order to create significant portion for apple export to distant markets. Moreover, exploitation by middlemen, high perishability of the fruits, not getting remunerative price and non-receipt of payment in time had been the ninth, tenth, eleventh and twelfth problems with mean score of 45.00, 41.00, 37.00 and 32.00, respectively.

In the light of given marketing problems no provisions have been made so far to process the fruit so that income of growers and other intermediaries could be increased manifold. In addition to these marketing problems, less

Table 3: Rank of marketing problems faced by the apple growers in study area.

Marketing problems	Garrett's % position $= \frac{100\ (R_{ij} - 0.5)}{N_j}$	Garret's rank mean score	Rank
Not getting remunerative price	75.00	37.00	XI
Packing material is costly	17.86	69.00	III
Packages not returned to grower	89.29	0.15	XIV
Less demand of fruit due to competition of other alternatives	96.43	14.00	XIII
Exploitation by middlemen	60.71	45.00	IX
High cost of transportation	3.57	85.59	I
High commission charges	32.14	59.00	V
Non-receipt of payment in time	82.14	32.00	XII
Lack of market information	46.43	52.00	VII
Un-organised marketing and low price paid to farmer	39.29	56.00	VI
High perishability of the fruits	67.86	41.00	X
Non-availability of market	53.57	49.00	VIII
Lack of processing units and cooperative society	25.00	63.00	IV
Lack of transportation facilities	10.71	75.00	II

Source: Primary data.

demand of fruit was due to competition of other alternatives and packages not returned to growers had been ranked Thirteenth and Fourteenth with mean score of 14.00 and 0.15, respectively.

In consequence, to solve the marketing problems in the study area apple producers should be organized as federation, cooperative, and union. Off course, unorganized producers are always been alone and are often being exploited by the middlemen. The result of that they do not fix price as they want, dealer and middleman take the considerable share of value added and consumers have to pay more for the goods all this problems will be solved by only establishing legitimately producer organization such as farmers union, producer export union and Research Progressive. The results of the study correspond to that of Oguz *et al.* (2006) and Oguz *et al.* (2009).

CONCLUSION

The analysis of the study revealed large number of constraints in the production and marketing of the commercial varieties of apple in a selected area, out of which occurrence of apple disease, high labor cost, lack of latest technical knowledge, high cost of transportation, lack of transportation facilities and costly packing material has been identified as the major problems besides other multiple problems which are compulsorily needed to be addressed by the horticulture departments. Absence of efficient marketing organization and lack of transportation facilities in domestic markets are creating various marketing problems. Establishing producer organizations are necessary for surviving in external competition, even for sustainability in the markets. Productivity, good quality and consumer pleasure are the means in order to take advantage from the competition in the markets. The study calls for all government and non-governmental organizations to work together to expand and improve apple production and establish apple marketing hub for tackling the bottlenecks in the expansion of apple crop in the study area.

REFERENCES

Adeola, R.G., Adebayor, O.O. and Oyelere, G.O., (2008). Effects of the Federal Government Special rice programs me on rice yield and farmers income in Oyo State. Journal of Agriculture and Environment. 1(1): 1-7.

Anonymous, (2014). Comprehensive District Agriculture Plan, Directorate of Agriculture, Jammu (J & K), Government of Jammu and Kashmir. 7: p. 8.

Anonymous, (2017). Department of Horticulture, Jammu. Governmant of Jammu and Kashmir, Retrieved on 15 January 2019 from http://www.hortijmu.jk.gov.in/pdf/horti129may2017.pdf.

Baba, S.H., Wani, M.H. and Malik, H.A. (2012). Fruit economy linkages and its role in employment generation and rural upliftment in Jammu and Kashmir. Final technical report of Horticultural Technology Mission Project. Division of Agricultural Economics and Marketing SKUAST-K, Shalimar, J and K. 287-351.

Bhat, T.M. and Choure, T. (2014). Status and Strength of Apple Industry in Jammu and Kashmir. International Journal of Research. 1(4): 277-283.

Dauda, S.N., Tiamiyu, S.A. and Ibrahim, S.T., (2014). Analysis of resource use efficiency of low land rice production in Katcha Local Government Area of Niger State. IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS).7(6): 35-39.

Earles, R., Ames, G., Balasubrahmanium, R. and Born, H., (1999). Organic and low spray apple production, *ATTRA,* fayetteville, AR. International Journal of Farm Sciences. 7(1): 154-59.

Naqash, F., Hamid, N. and Kapila, D.K. (2017). A case study on economic analysis of marketing and price spread of apple fruit in Kashmir valley of J and K state, Internat. Research Journal of Agril. Eco. and Stat. 8(2): 440-447.

Oğuz, C., Karakayaci, Z. and Kalyoncu., I.H. (2009). Apple production and marketing in Turkey. International symposium on sustainable development, June 9-10, Sarajevo.

Oğuz, C., Peker, K. Kan, A. and Besen, T. (2006). Apple marketing in Turkey. International Horticulture Quality Conference, BOKU Vienna, Austria, 2-6 February.

Report, (2013). Global Agricultural Information Network. USDA Foreign Agricultural service. Retrieved on 15 sep. 2014 from www.2013 Apple ProductBrief New Delhi_India_6-19-2013.pdf.

Reshi, M.I., Malik, M.A. and Kumar, V. (2010). Assessment of problems and prospects of apple production and marketing in Kashmir Valley, India. Journal of Environmental Research and Development. 4(4): 1077-1082.

Sani, A., Yakubu, A.A and Bello, H.M. (2010). Resource use efficiency in rice production under small scale irrigation in bunkere local government area of Kano state. Indian Journal of Agricultural Economics. 52(3): 630-631.