

Analysing awareness and perception of apple growers regarding amended APMC Act in Himachal Pradesh

MUSTFAHUSSAIN and ASHUTOSH SINGH

College of Agribusiness Management, G. B. Pant University of Agriculture and Technology, Pantnagar-263 145 (U. S. Nagar, Uttarakhand)

ABSTRACT: Indian agricultural marketing system is suffering from various problems viz. improper warehousing, lack of grading and packaging, inadequate transport facilities, presence of large number of middlemen, malpractices of traders, inadequate market information and insufficient funds etc. Long chain of middlemen decrease the producer's share in consumer rupee and exploit the farmer. Though Agricultural Produce Marketing Committees (APMCs) under the Agricultural Produce Marketing Committee Act, 1964 control and regulate buying and selling operations at all regulated agriculture marketing yards but there are lot of inefficiencies involved in practices of APMCs. However amended APMC Act prevents anticompetitive practices. There is no compulsion on the producer to sell their produce in APMC market yards, producer are quite free to sell directly to private companies or private market yards or farmers-consumer market under amended APMC Act. The present Study has analysed awareness and perception of apple growers regarding amended APMC Act. Two districts of Himachal Pradesh viz. Shimla and Kullu were selected on the basis of highest apple production. Apple growers were divided in two groups viz. Group 1 (growers who follow traditional supply chain) and Group 2 (growers who follow traditional and modern supply chain both).

Key words: Amended APMC Act, agricultural marketing system, APMC market yards, direct marketing, apni mandi, private market yards, modern marketing channels, price spread and marketing efficiency.

APMC Act, 1964 has played a pivotal role in the agricultural marketing system of the country. At the time of independence total regulated market were only 286 which have been increased up to 7246 in year 2007 (Singh, 2009). It is quite clear that regulated market yards have become biggest platforms for marketing of many agricultural produces in country. More than 350 agriculture commodities are traded through a network of 27777 wholesale and primary rural market yards (Agmarknet). Despite of this, marketing system became inadequate for producers and ultimate consumers in country. It has been experienced through many studies that traders and wholesalers are involved in malpractices and exploit the primary producers at great extent (Arora, 2005). Due to long supply chain, producers obtain only about 53 percent of final prices of agricultural commodities with 31 percent share of middlemen and the remaining 16 percent as market cost. There was also the provision of multiple taxes/fee imposed in the form of commission charges, market fee, octroi/entry & sales tax etc. However APMC Act clears that commission agents should charge the commission from buyers but in actual they charge it from salers/ producers. The rate of commission is also varied with great extent which is highly dependent upon size of marketable surplus and

negotiation ability of producers (Saraswat, 2006). The major issue which can be argued is that once the particular area of state/U. Ts is declared as a market area and falls under the jurisdiction of concerned market committee, no agency or person is allowed freely to carry on wholesale marketing activities. This practice of APMCs has closed all the gates and producer could sale their produces only at regulated market yards. Thus to have 'barrier-free' agricultural marketing system in country, choice of multiple and competitive market channel to farmers, independent regulatory authority to encourage private investors and smooth license & registration of traders in regulated market yards were advised (Singh, 2009). Thus APMC Act was needed to be revised which has been evolved as amended APMC Act titled as the "State Agricultural Produce Marketing (Development and Regulation) Act, 2003" (Farmer's Forum, 2011). Many states have introduced reforms fully and partially in agricultural marketing, the need of the hour is to consolidate the gains of reforms through appropriate policies and plans.

Now private player are allowed to procure apple from producers directly. Companies viz. Reliance Fresh, Godrej, Adani Agri Fresh, Mother Dairy, Fresh and

Table 1: State/ UTs wise progresses of amendments in APMC Act

S.No	Name of States	Stages of Progress
1	Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Nagaland, Orissa, Rajasthan, Sikkim, Tripura and Uttarakhand	APMC Act has been done for Direct Marketing; Contract Farming and Markets in Private/ Cooperative Sectors
2	NCT of Delhi Haryana, Punjab and Chandigarh. Punjab and Chandigarh	APMC Act has been done partially for Direct Marketing, Contract Farming and Private Markets Yards
3	Bihar*, Kerala, Manipur, Andaman & Nicobar Islands, Dadra & Nagar Haveli, Daman & Diu, and Lakshadweep	There is no APMC Act and hence not requiring reforms
4	Tamil Nadu	APMC Act already provides for the reforms
5	Mizoram, Meghalaya, Haryana, J&K, Uttarakhand, West Bengal, Pondicherry, NCT of Delhi and Uttar Pradesh.	Administrative action is initiated for the reforms

*APMC Act is repealed with effect from 1.9.2006.

(Source:www.farmersforum.in/post-harvest/marketing/reforming-agri-marketing-reforms, 2011)

Healthy etc. procure apple directly from producers and offer healthy prices to primary producers but still many apple growers do not sell to private buyers in HP. They have good contacts with APMC traders and supplying apple to them. Though growers are exploited at great extent by traders and wholesalers and this intervention of intermediaries reduce the producer's share in consumer rupee (Pandey, 2013). It was also experienced many apple growers were not aware of amended APMC act. Thus present study has analysed the awareness and perception of apple growers regarding amended APMC Act.

MATERIALS AND METHODS

APMC act was amended in the state in year 2005. Thus the state of Himachal Pradesh was purposively selected for the present study. The districts Shimla and Kullu have highest apple production in the state. Thus districts Shimla and Kullu were purposively selected from Himachal Pradesh. Apple is grown in all blocks of district Shimla but blocks Jubbal-Kotkhai and Rohru lead the district in apple production. Therefore blocks Jubbal-Kotkhai and Rohru were purposively selected from district Shimla. On other hand Kullu and Nagar have highest apple production in district Kullu. Thus blocks Kullu and Nagar were purposively selected from district Kullu. List of revenue villages of concerned blocks was prepared and two revenue villages from each block were selected randomly. Thus villages Kiari and Jashla from block Jubbal-Kotkhai, villages Bhalara and Bijory from block Rohru were chosen. Similarly villages Nagabag and Bandrol from block Kullu, villages Puid and Raison from block Nagar were randomly selected. Prior to final

survey, selected villages were visited and list of apple growers who have 10 and more bearing trees was prepared. In the next step apple growers were categorized into two groups:

- 1) Growers who follow traditional supply chain and
- 2) Growers who follow the traditional as well as modern supply chain.

Fifteen percent growers from both the groups were selected by adopting simple random sampling and survey was conducted. Therefore 58 respondents were selected in Group 1 and 30 respondents were selected in Group 2. Descriptive Research Design was adopted for accumulating information about different aspects of apple growers. Secondary data was collected from concerned web sites, books, journals, concerned departments, while primary data was collected with the help of 'structured questionnaire'. 'Z Test' was used for hypothesis testing for difference between proportions of sampled growers who were aware of amendments of APMC Act. Following statistic was worked out:

$$z = \frac{\hat{p}_1 \times \hat{p}_2}{\sqrt{\frac{\hat{p}_1 \times \hat{p}_2}{n_1} + \frac{\hat{p}_2 \times \hat{p}_2}{n_2}}}$$

Where,

\hat{p}_1 = Proportion of Success in Sample One

\hat{p}_2 = Proportion of Success in Sample Two

$\hat{p}_1 = 1 - \hat{p}_1$

$\hat{p}_2 = 1 - \hat{p}_2$

n_1 = size of sample 1

n_2 = size of sample 2 and $\sqrt{\frac{\hat{p}_1 \times \hat{p}_2}{n_1} + \frac{\hat{p}_2 \times \hat{p}_2}{n_2}}$ = the standard

error of difference between two sample proportions. Then rejection region(s) was developed depending upon the H_a for a given level of significance and on its basis significance of the sample result was judged for accepting or rejecting H_0 . Besides this, composite weighted score was calculated by using five point rating scale for evaluating the perception of apple growers about amended APMC Act

RESULTS AND DISCUSSION

The results of the survey have been discussed in detail under following sections.

Awareness of respondents regarding amended APMC Act

Table 2 shows awareness of respondents regarding amended APMC Act. Three modern marketing channels viz. Direct procurement by companies, Private market yards and Apni Mandi were taken in to consideration which came in to existence after implementation of amended APMC Act.

It is evident from the table that 98.28 percent respondents in Group 1 and 100 percent of respondents in Group 2 were aware of direct procurement by private players. It is also clear from the table that 64 percent of respondents in Group 1 and 56.67 percent of respondents in Group 2 were aware of Private market yards. Table shows that 32.76 percent of respondents in Group 1 and 53.33 percent of respondents in Group 2 were aware of Apni Mandi. During the survey it was found that maximum respondents in Group 1 (67.24 percent) and 46.67 percent of respondents in Group 2 were not aware of Apni Mandi.

Hypothesis testing for difference between proportions of success

The Z test was employed to test the difference between proportion of success is significant or not.

Table 2: Awareness of respondents regarding amended APMC Act

S No.	APMC Act Amendments	Remarks	Respondents			
			Group 1 N= 58	Percentage	Group 2 N= 30	Percentage
1	Direct Procurement by Companies	Yes	57	98.28	30	100
		No	1	1.72	0	0
2	Private Market Yards	Yes	37	63.79	17	56.67
		No	21	36.21	13	43.33
3	Apni Mandi	Yes	19	32.76	16	53.33
		No	39	67.24	14	46.67

A. Awareness regarding direct procurement by companies

H_0 : Proportionally equal number of respondents in Group 1 and Group 2 are aware of direct procurement by companies.

H_1 : Respondents in Group 1 and Group 2 aware of direct procurement by companies are significantly different in their proportions. The calculated value of z is -1.17 and as H_1 is the two sided, it has been determined the rejection region is applying two tailed test at 5 percent level of significance and it comes to under normal curve area table:

$$R: z < 1.960$$

The calculated value falls in the acceptance region thus H_0 has been accepted and H_1 has been rejected and it has been concluded that proportionally equal number of respondents of both the groups are aware of direct procurement by companies.

Awareness regarding private market yard

H_0 : Proportionally equal number of respondents in Group 1 and Group 2 are aware of private market yards.

H_1 : Respondents in Group 1 and Group 2 aware of private market yards are significantly different in their proportions. The calculated value of z is 0.64 as H_1 is the two sided, it has been determined the rejection region applying two tailed test at 5 percent level of significance and it comes to under normal curve area table:

$$R: z < 1.960$$

The calculated value of z falls in acceptance region thus H_0 was accepted and it was concluded that proportionally equal number of respondents of both the groups are aware of private market yards.

Awareness regarding apni mandi

H_0 : Proportionally equal number of respondents in Group 1 and Group 2 are aware of Apni Mandi.

H_1 : Respondents in Group 1 and Group 2 aware of Apni Mandi are significantly different in their proportions.

The calculated value of z is -2.01 as H_1 is the two sided, it has been determined the rejection region applying two tailed test at 5 percent level of significance and it comes to under normal curve area table:

$$R: z > 1.960$$

The calculated value does not falls under acceptance region thus H_0 is rejected and it was concluded that : Respondents in Group 1 and Group 2 aware of Apni Mandi are significantly different in their proportions.

Perception of respondents regarding amended APMC Act

The perception of respondents regarding amended APMC act was analysed on the basis of awarding the weights to the factors identified as important in apple marketing system. Respondents were asked to reveal their perception regarding traditional as well as modern marketing channels viz. Channel 1 (APMC Market yards), Channel 2 (Direct Procurement by Companies), Channel 3 (Private market yards) and Channel 4 (Apni Mandi). Ten factors including fair grading and sorting, time consumed in transaction, transportation cost, packaging cost, proximity from orchards, timely payment, price awareness before sale, fair price realization, facilities for loans and advances and rejection rate were identified and analysed. Four steps were followed to assess the perception of respondents. In first step, importance of each factor was asked from respondents by using five points scale. In second step, average satisfaction level of respondents against factors in each channel was calculated. Weighted score and composite weighted score were calculated in third and fourth steps respectively.

Ranking of the factors on the basis of their importance

Table 3 shows that the factors ranked on the basis of their weights. It is evident from the table that among all the factors, respondents have given the first rank to facility for loans and advances (F9). It was observed that mainly small growers seek loans and advances from traders. Commission agents generally provide the loans

both for productive and nonproductive purposes. Fair price realization (F8) is the second most important factor next to F9. Growers follow those marketing channels where they perceive that price realization is fair. It was evident from present study that price realization is higher in modern marketing channel than traditional channels. Price awareness before the sale (F7) plays an important role in apple marketing. Table 3 shows that F7 is the third most important factor. During the survey it was observed that maximum respondents bring their produce to market yards with no awareness about the prevalent market price. They depend either on telephonic conversation or words of mouth communication with the peer group. It was also analysed that information gap between growers and buyers regarding price is one of biggest problem in apple supply chain in Himachal Pradesh. Respondents have given fourth rank to rejection rate (F10). It was analysed that big volume of apple is rejected due to produce does not match with the required standards. It was observed during the study that the produce is procured by the private players in bulk and no quality test is conducted at farm level at the time of procurement. These quality tests are made at the time and place convenient to procurer. In case, if the sample fails the whole lot is rejected. Now the growers don't have any option but to make a distress sale which ultimately brings huge loss and exploitation of growers. It is clearly shown in table that respondents have given fifth rank to transportation cost (F3). It was observed that small and medium growers approach local market yards while large growers generally go for distant market yards to get the better prices for their produce. Table elicits that respondents have given sixth rank to timely payment factor (F6). Growers seek those channels where they can receive the cash and kind in the shortest time period. It was observed that growers sometimes sell their produce to village person for getting immediate hard cash. However village person give the lower prices than other established buyers. Respondents have given seventh rank to time consumed in transaction (F2). Huge time is consumed in transportation, auction, loading and unloading operations. Respondents have given eighth rank to packaging cost (F4).

It was observed that maximum growers of both the groups are conscious about packaging and pay all possible efforts to keep apple free from scratches and external pressure. Maximum growers use CFB carton followed by wooden basket and plastic crates. Growers who sell C grade apple to processing units viz. HPMC use gunny bags. Plastic crate needs huge investment but its durability save the large amount of money of growers and

Table 3: Ranking of the factors

	Factors	Weights	Rank
F9	Facilities for Loans and Advances	3.01	I
F8	Fair Price Realization	2.67	II
F7	Price Awareness before Sale	2.21	III
F10	Rejection Rate	2.07	IV
F3	Transportation Cost	2.03	V
F6	Timely Payment	2.00	VI
F2	Time Consumed in Transaction	1.93	VII
F4	Packaging Cost	1.86	VIII
F5	Proximity from Orchards	1.70	IX
F1	Fair Grading and Sorting	1.66	X

they do not need to incur cost on packaging materials every time. Table 1.3 elicits that respondents have given ninth rank to this factor (F5). Proximity saves the time and money for grower. It plays the prominent role where produce is procured directly by companies from orchards because proximity provides the ease in transportation and loading for buyers. Respondents have given tenth rank to fair grading and sorting (F8). Apple is graded in various grades viz. A, B, and C and packed accordingly. Graded apple is sold at higher price and increase net income for orchardists.

Importance of the factors in different channels

Table 4 has revealed the importance of the factors in different marketing channels adopted by respondents in Group 1 and Group 2. Table has elicited that F1 has got the highest weighted score in channel2 (6.42) followed by Channel3 (5.43), channel4 (3.54) and channel 1 (3.12). This analysis has shown that respondents perceived fair grading and sorting is the most important factor in channel 2 followed by Channel 3, channel 4 and channel 1. Data pertaining to time consumed in transaction has revealed that F2 has got highest weighted score in channel 2 (5.98) followed by channel 3 (5.40), channel 3 (5.02) and channel 1 (4.03). It is quite clear that F2 is found to be the most important in channel 2 followed by channel 3 and channel 1. Thus respondents have perceived that minimum time is consumed in transaction under channel 2 while huge time is consumed in transaction under traditional marketing channel (Channel 1). Table has further elicited that F3 has got highest score in channel 4 (7.31) followed by channel 2 (6.96), channel 3 (5.28) and channel 1 (4.16). Thus F3 is found to be the most important in channel 4 followed by channel 2, channel 3 and channel 1. During the survey it was observed that respondents have to incur low cost on transportation in channel 4 (Apni Mandi) because these

local yards are situated nearby the orchards and growers bring produce either by animal or small vehicles. However growers face high transportation cost for distant market yards. It is evident from the table 1.2 that F4 has received highest weighted score in channel 2 (7.94) followed by channel4 (7.57), channel 3 (5.45) and channel 1 (3.78). Thus packaging cost is perceived to be the most important in channel 2 followed by channel 4, channel 3 and channel 1. It was analysed that growers have to incur comparatively higher cost on packaging in channel1 while growers who follow the supply chain of Adani, do not incur any cost on packaging because Adani distributes plastic crates to its member apple growers. It was also observed that growers, who approach Apni Mandi, bring their produce in gunny bags or wooden basket which is relatively lower cost packaging method.

Data pertaining to Proximity from Orchards revealed that F5 has got highest weighted score in channel4 (6.51) followed by channel 2 (5.90), channel 3 (4.30) and channel 1 (3.49). It was observed that respondents approach Apni Mandi because of ease in access and lower transportation cost than other channels. Therefore proximity is perceived to be the most important in channel 4 followed by channel 2, channel 3 and channel 1. Table 4 further shows that Timely Payment (F6) has got highest weighted score in channel2 (7.66) followed by channel4 (7.54), channel3 (6.20) and channel 1 (4.04). Thus F6 is perceived to be the most important in channel 2 followed by channel 4, channel 3 and channel 1 respectively. It was also observed that private players make the payment within 7-15 days while lead time of making the payment is 1.5-2.5 month in traditional channel. Private market's commission agents also cash the bill within 10 days while in Apni Mandi only cash sales are made. Table 4 has further shown that F7 has got highest weighted score in channel2 (7.29) followed by channel3 (6.78), channel4 (4.93) and channel1 (3.51).

Therefore price awareness before sale is found to be the most important in channel 2 followed by channel3, channel 4 and channel 1. It was observed that respondents were aware of price of their produce under modern marketing channel while they were unable to get any information regarding price before sale in traditional marketing channels. Announcement of price before 5-10 days by private players make the growers able to take decision that where they should sell their produce. Private commission agents also declare price before the maturity of produce. However most of the time growers become unaware of price before sale under traditional marketing channel. Data pertaining to fair price realization has elicited that F8 has received highest weighted score in channel2 (9.69) followed by channel 3 (9.00), channel 1 (6.30) and channel 4 (5.61). Thus F8 is found to be the most important in channel 2 followed by channel 3, channel 1 and channel 4. Findings are evident from survey where it was observed that fair price realization is one of the important factors. It was observed that growers have received highest price in channel 2 where companies procure apple directly from growers. Facility for Loans and Advances are perceived to be the most important among the all factors. Table has revealed that F9 has got highest score in channel1 (10.26) followed by channel 3 (7.43), channel 2 (4.73) and channel 4 (4.30). Analysis has shown that F9 is perceived to be the most important in channel 1 followed by channel 3, channel 2, and channel 4. During the survey it was observed that commission agents of APMC market yards provide the productive and nonproductive loans and advances to primary growers. However growers have become liable to sell their produce to commission agents though they offer comparatively lower price than private players. During the survey it was also observed that few private commission agents also provide the loans and advances

to apple growers. Few processors who produce C grade apple from Apni Mandi provide loans and advances to growers for short time. Table 1.4 has shown that Rejection rate of produce (F10) has got the highest weighted score in channel 1 (7.00) followed by channel 4 (6.77), channel 3 (6.48) and channel 2 (4.08). Thus F10 is perceived to be the most important in channel1 followed by channel4, channel3, and channel 2. During the survey it was analysed that private companies reject the produce at higher rate than APMC commission agents. It was observed the private players procure A grade apple. Few boxes are selected randomly from whole lot and grading and sorting is conducted if apple matches the standards, lot is accepted otherwise companies reject the produce.

CONCLUSION

It was found that many respondents in both the groups were unaware of amended APMC Act. It was also concluded that direct procurement by companies was known by maximum respondents while minimum numbers of respondents knew about Apni Mandi. It was observed that maximum respondents did not know that these new patterns of marketing came in to their existence after implementation of amended APMC Act. Perception level of all respondents was assessed by taking 10 factors viz. Fair Grading and Sorting (F1), Time Consumed in Transaction (F2), Transportation Cost (F3), Packaging Cost (F4), Proximity from Orchards (F5), Timely Payment (F6), Price Awareness before Sale (F7), Fair Price Realization (F8), Facilities for Loans and Advances (F9) and Rejection Rate (F10) in to consideration. Four marketing channels including APMC Market yards (channel1), Direct procurement by companies (channel 2), Private market yards (channel 3) and Apni Mandi (Channel4) were considered. Composite weighted score

Table 4: Composite weighted score of different apple marketing channels

Factors	W	Ch. 1	WS	Ch.2	WS	Ch. 3	WS	Ch. 4	WS
F1 Fair Grading and Sorting	1.66	1.88	3.12	3.87	6.42	3.27	5.43	2.13	3.54
F2 Time Consumed in Transaction	1.93	2.09	4.03	3.10	5.98	2.80	5.40	2.60	5.02
F3 Transportation Cost	2.03	2.05	4.16	3.43	6.96	2.60	5.28	3.60	7.31
F4 Packaging Cost	1.86	2.03	3.78	4.27	7.94	2.93	5.45	4.07	7.57
F5 Proximity from Orchards	1.70	2.05	3.49	3.47	5.90	2.53	4.30	3.83	6.51
F6 Timely Payment	2.00	2.02	4.04	3.83	7.66	3.10	6.20	3.77	7.54
F7 Price Awareness before Sale	2.21	1.59	3.51	3.30	7.29	3.07	6.78	2.23	4.93
F8 Fair Price Realization	2.67	2.36	6.30	3.63	9.69	3.37	9.00	2.10	5.61
F9 Facility for Loans and Advances	3.01	3.41	10.26	1.57	4.73	2.47	7.43	1.43	4.30
F10 Rejection Rate	2.07	3.38	7.00	1.97	4.08	3.13	6.48	3.27	6.77
Composite Weighted Score			49.69	-	66.66	-	61.76	-	59.09

W- Weight, WS- Weighted Score, Ch. Channel

was calculated on the basis of weights and satisfaction level against the factors in four channels. It was concluded that composite weighted score is highest for channel 2 (66.66) followed by channel 3 (61.76), channel 4 (59.09) and channel 1 (49.69). Thus according to respondents marketing channel 2 is the most preferred channel followed by channel 3, channel 4 and channel 1. Factors were also ranked on the basis of their weights and it was found that respondents have given first rank to loans and advances (F9) followed by fair price realization (F8), price awareness before sale (F7), rejection rate (F10), transportation cost (F3), timely payment (F6), time consumed in transaction (F2), packaging cost (F4), proximity from orchards (F5), fair grading and sorting (F1).

REFERENCES

- Arora, V.P.S. (2005). Marketing and Export of Horticultural Products of Uttaranchal: Status, Potential and Strategies. *Indian Journal of Agricultural Marketing*, 19(2): 194-201.
- Saraswat, S.P., Dhaiya, P.S., and Singh, P., (2006). Production and Marketing of Peach Fruit: A Case Study of Rajgarh Area of District Sirmour in Himachal Pradesh. *Indian Journal of Agricultural Marketing*, 20(2): 81-91.
- Pandey, M., Baker Gregory, A. and Tewari D. (2013). Supply Chain Re-Engineering in The Fresh Produce Industry: A Case Study of Adani Agri-Fresh. *International Food and Agribusiness Management Review*. 16(1): 115-136.
- Singh Surendra, P., Sikka, B.K. and Singh, Ashutosh. (2009). Supply Chain Management and Indian Fresh Produce Supply Chain: Opportunities and Challenges proceeding of 19th annual world symposium of International food & agribusiness management association held at Budapest, Hungary, June 20-23.
- State/ UTs wise progresses of amendments in APMC Act published on Internet. <http://farmersforum.in/post-harvest/marketing/reforming-agri-marketing-reforms>. Accessed on 28 September 2012.
- Panel urges States to amend APMC Act to remove 'barriers'. Published on Internet <http://www.thehindubusinessline.com>. Accessed on 12 December 2012.
- NHB report published on Internet. [http://nhb.gov.in/model-project-reports/Horticulture% 20 Crops% 5 Capple% 5 Capple1.htm](http://nhb.gov.in/model-project-reports/Horticulture%20Crops%5Capple%5Capple1.htm). Accessed on 3 January 2013.
- Facts about Indian Agriculture published on Internet. http://wikipedia.org/wiki/indian_agriculture. Accessed on 15 January 2013.
- Agricultural Production facts published on Internet. http://agriexchange.apeda.gov.in/India%20Production/India_Productions.aspx?hscode=08081000. Accessed on 23 January 2013.
- Price wise commodity list published by Agmarknet on Internet. http://agmarknet.nic.in/commodity_list. Accessed on 2 February 2013.
- Facts about production of Indian horticultural crops published on Internet. <http://nhb.gov.in>. National Horticulture Database. Accessed on 5 February 2013.
- Article on Apple published on Internet. <http://en.wikipedia.org/wiki/Apple>. Accessed on 5 February 2013.

Received: December 22, 2014

Accepted: April 22, 2016