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Value-chain mapping of *Aonla* at Pratapgarh, Uttar Pradesh

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ABSTRACT

Since the economy of the Pratapgarh district of Uttar Pradesh is based on the cultivation and processing of Aonla, thus the study was undertaken with 15 processors, 20 producers and five intermediaries to develop a value chain map. The cost incurred (31 times) and net return (7 times) of the processing unit was higher compared to the production unit, and the rate of processed product (Rs 146/kg) was more than fresh Aonla (Rs 10/kg). It was found that channel IV, i.e. producer-retailer-consumer among producers and channel V, i.e. producer-processor-consumer among processors, was the most efficient channel based on a share in consumers' price and market efficiency. Further, the entrepreneurial environment promoted the value chain development of Aonla at Pratapgarh due to more driving forces (120.86) than restraining forces (64.26).

Key words: *Phyllanthus emblica*, Driving forces, Value chain map, Entrepreneurial environment, estraining forces

INTRODUCTION

Aonla, popularly known as Indian gooseberry (*Phyllanthus emblica*) is widely grown in Pratapgarh district of Uttar Pradesh which has been cited as worlds' largest producer of *Aonla*. In Pratapgarh, the area under *Aonla* was 17.33 thousand ha with the production of 185.82 thousand mt in 2015-16 (Horticultural Statistics at a Glance, 2018, MoAFW, 7). The *aonla* cultivation and processing is the strong source of income in Pratapgarh. Around seventy percent of *Aonla* produce in country comes from that district only. Further 800 families were engaged in *Aonla* producing and 400 families were engaged in its processing (CTED report, 3). It is good source of vitamin C and having medicinal value but it is not popular as table fruit due to its sour and astringent in taste. However, it can be processed into a number of food products like preserve, jam, jelly, juice, *laddu*, burfi, dried powder, candy, toffee, pickle, sauce, squash, RTS beverage, cider, shreds etc. (Goyal *et al.*, 6; Bhattacharyya and Bhattacharjee, 1). Since economy of Pratapgarh district is mainly based on *aonla* cultivation and processing as well as considering the huge potential of *aonla* to be processed into different products, the study was conducted to (a) identify the economic feasibility of production and processing units, (b) assess the marketing channels (for producer & processor) and its efficiency, (c) develop value chain map of *aonla* at Pratapgarh district of UP, and (d) to determine driving and restraining forces to upgrade value chain.

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MATERIALS AND METHODS

The study was conducted in purposively selected Pratapgarh district of Uttar Pradesh with 20 producers and 15 processors who were randomly selected. Further, 5 other stakeholders were selected randomly i.e. retailer, wholesaler, trader *etc*. to interview regarding marketing cost.

For developing the value chain map three major dimensions were considered i.e. activities, actors and entrepreneurial environment (AAE). The prime focus for developing value chain of any agricultural commodity was to identify the activities in order to add value to the commodity like starting with the production of agricultural commodity, grading, storage, sorting, distribution, processing, retailing and at last consumption. The next step was to identify the major actors involved in value chain like producers, intermediaries, processors, retailers and consumers. After identifying major actors, the feasible marketing channels were assessed through price spread, market efficiency and producers'/processors' share in consumers' price. The final step was to identify the existing entrepreneurial environment or support according to its reachability and importance in promoting value chain through venn diagram.

The Force Field Analysis developed by Lewin (8) was used to identify driving and restraining forces in order to determine entrepreneurial environment for upgrading value chain among *Aonla* processors in Pratapgarh, UP. The driving forces were identified through review of literature, expert opinion in six dimensions namely technical, infrastructure, market, financial, legal and socio-personal and for restraining forces scale developed by Gills (5) with modification. Thus, for its standardization, reliability and validity was

calculated. The reliability coefficient as per Spearman (10) for restraining forces was 0.95 and Cronbach's (2) alpha was 0.92. The content validity S-CVI/Ave (content validity index for overall scale) using Lynns' method (9) was worked out to be 0.90,which indicated the high reliability and validity of the scale.

Analytical tool

1. Price spread: Refers to the difference between the net price the farmer received and retailer price of the produce.
2. Market efficiency: Marketing efficiency is directly related to the cost involved in moving goods from the producer to the consumer and the quantity of services offered. If the cost incurred when compared with the services involved, is low, it will be efficient marketing. To measure the marketing efficiency of identified market two methods were used.

i) Shepherd's Method

$$MEI = \frac{V}{I} - 1$$

MEI = Marketing Efficiency Index
V = value of goods sold/ consumer price of goods
I = Total marketing cost present in particular channel

ii) Acharya's method

$$MEI = \frac{\text{Net Price Received by Farmer}}{TMM+TMC}$$

MEI = Marketing Efficiency Index
TMM = Total Marketing Margin
TMC = Total Marketing Cost

3. Producer's share in the consumer's rupee: Refers to the farmer's net price expressed as percentage of the retail price of agricultural commodity.
4. Break-even point: Break-even point indicates a situation where farmers neither earn profit nor in loss. In other word break-even points is a point where total cost meet total return plotted on a graph sheet.

RESULTS AND DISCUSSION

The cost incurred in processing unit (Rs 7864.715/q) was much higher than production unit (Rs 252.92/q) due to high investment in machineries, utilities (power etc.), expenses (GST, storage, transportation etc.), labour charge etc. Though the investment (31.09 times) was more for processing unit, but net return was also higher in case of processing unit (Rs 6801.952/q) compared to production unit (Rs 949.57/q) revealed from Table 1. Thus, processing helps in realizing more income, increasing shelf life of product, reducing wastage etc. The rate of processed product (Rs 14666.67/q) was higher than raw *Aonla* (Rs 1200/q), thus, income earned was more for processing unit. The break-even point at price was achieved earlier than actual price for both the enterprises (production unit- 21 %; processing unit- 65%), indicated economic feasibility of units. The break even yield was achieved at 173.05 q (63%) for processing unit and 77.77 q (21%) for production unit. It was seen that in case of production unit, no profit and no loss point reached earlier due to low investment. Further, benefit cost ratio was higher in case of production unit (4.8) than processing unit (1.8) due to comparative low initial investment and low cost of production in cultivating *Aonla* than processing it.

Table 1. Comparative profitability between Aonla processing unit and production unit (n=15).

Particular	Processing unit (n=15)	Production unit (n=20)	Difference	Times
Cost (Rs/q)	7864.715	252.9481	7611.77	31.09
Net return (Rs/q)	6801.952	949.57	5852.38	7.16
Rate (Rs/q)	14666.67	1200	13466.67	12.23
BEP at Price (Rs/q)	9632.15 (65 %)	252.94 (21 %)		
BEP at Yield (Q/unit)	173.05 (63 %)	77.70 (21 %)		
BC ratio	1.80	4.80		

The four marketing channels (I to IV) were identified for *Aonla* producer and three marketing channels (V to VII) were identified for *Aonla* processor as depicted in Table 2. It was found that producers' share in consumers' price decreases as the number of middleman increases, thus channel IV i.e. producer-retailer-consumer (66.67%) had highest producers' share in consumers' price and channel I i.e. producer-commission agent-wholesaler-retailer-consumer had lowest share (60%) in consumers' price. Similarly, in case of processor, Channel V i.e. Producer-Processor-Consumer (100%) was having highest share in consumers' price than Channel VI and VII (97.29%). Thus, it can be inferred that compared to producer, processors were having more share in consumers' price. Likewise, marketing efficiency decreases as the number of middleman increases. This result was found similar to the study conducted on comparative analysis of vegetable production, value addition and marketing in National Capital Region (Gills, 5). Among producers, Channel IV (7.55) and among processors, Channel V (126.83) possessed highest marketing efficiency according to Shepherd formula. Alike, according to Acharya's formula, marketing efficiency was more in Channel IV (1.83) among producers and channel V (1.1) among processors. It was also observed that marketing efficiency was more in case

Table 2. Price spread of *Aonla* producers and processors in different marketing channel

Actor	Particulars	Marketing Channel (Rs/q)						
		I	II	III	IV	V	VI	VII
Producer	GPR	1200	1200	1100	1100	1000	1000	1200
	MC	194	194	32	32	0	0	194
	NPR	1006	1006	1068	1068	1000	1000	1006
Commission Agent	GPR	1350	1350	0	0	0	0	1350
	MC	84	84	0	0	0	0	84
	MM	66	66	0	0	0	0	66
Wholesaler	GPR	1650	0	1400	0	0	0	0
	MC	196	0	124	0	0	0	0
	MM	104	0	176	0	0	0	0
Processor	GPR	0	0	0	0	14700	14400	14400
	VAC	0	0	0	0	6660	6660	6660
	MC	0	0	0	0	115	115	167
	MM	0	0	0	0	6925	6625	6223
Retailer	GPR	2000	1800	1700	1650	0	14800	14800
	MC	233	213	151	161	0	42	42
	MM	117	237	149	389	0	358	358
Consumer	CP	2000	1800	1700	1650	14700	14800	14800
Producer/Processor share in Consumer Price		60	66.57	64.705	66.67	100	97.29	97.29
Market Efficiency (Shepherd's Formula)		1.82	2.66	4.54	7.55	126.83	93.27	29.39
Market Efficiency (Acharya's Formula)		1.01	1.26	1.68	1.83	1.1	1.09	1.09

*(GPR- Gross Price Received, NPR- Net Price Received, MC- Marketing Cost, MM- Marketing Margin, VAC- Value Addition Cost, CP- Consumer Price)

of processor than producer, thus due to processing marketing efficiency increases may be because of low fluctuation in processed product compared to fresh *Aonla*.

According to various definition of value chain three major dimensions were identified i.e. actors, activities and environment for efficient value chain. Thus, the study considered these dimension for developing value chain map as indicated in Fig. 1. The major activities for value chain were identified as production of *Aonla* by producers, distribution of *Aonla* through intermediaries or directly to processor, processing into various products i.e. *amla candy, juice, laddu, burfi, churan, murabba* etc., retailing the processed products and finally consumption. After identifying activities, actors were identified for *Aonla* production and processing. The channel IV for producer and channel V for processor was found to be the most efficient due to high market efficiency and share in consumers' price because of less number of intermediaries. During peak season, if processors were directly purchasing *Aonla* from producer at Rs 10/kg and then cost of value addition was calculated as Rs 66/kg (excluding raw material cost) and then selling it either directly to consumer (Rs 14470/q) or through retailer (Rs 14440/q). During peak season, processor had margin of around Rs 68/kg (excluding marketing cost) but it was seen that price of raw material fluctuated from Rs 10/kg to Rs 28/kg. So, if the raw material cost around Rs 28/kg then the processor margin would reduce to Rs 50/kg (excluding marketing cost).

The entrepreneurial environment has been represented through venn diagram, so inner orbit indicated within 10 km of reach from processing unit, middle orbit indicated 20 km and outer circle indicated 30 km and beyond that more than 30 km. The size of circle represents the importance, smaller circle shows less importance, middle circle shows moderate importance and large circle indicates high importance. Thus, the entrepreneurial environment for *Aonla* processors indicated that registration, machine maintenance centre and quality certification agency were falling in middle orbit means within 20 km of reachability. ICAR institutional support, training institutes and college related to entrepreneurship and food processing were beyond 30 km of reach.

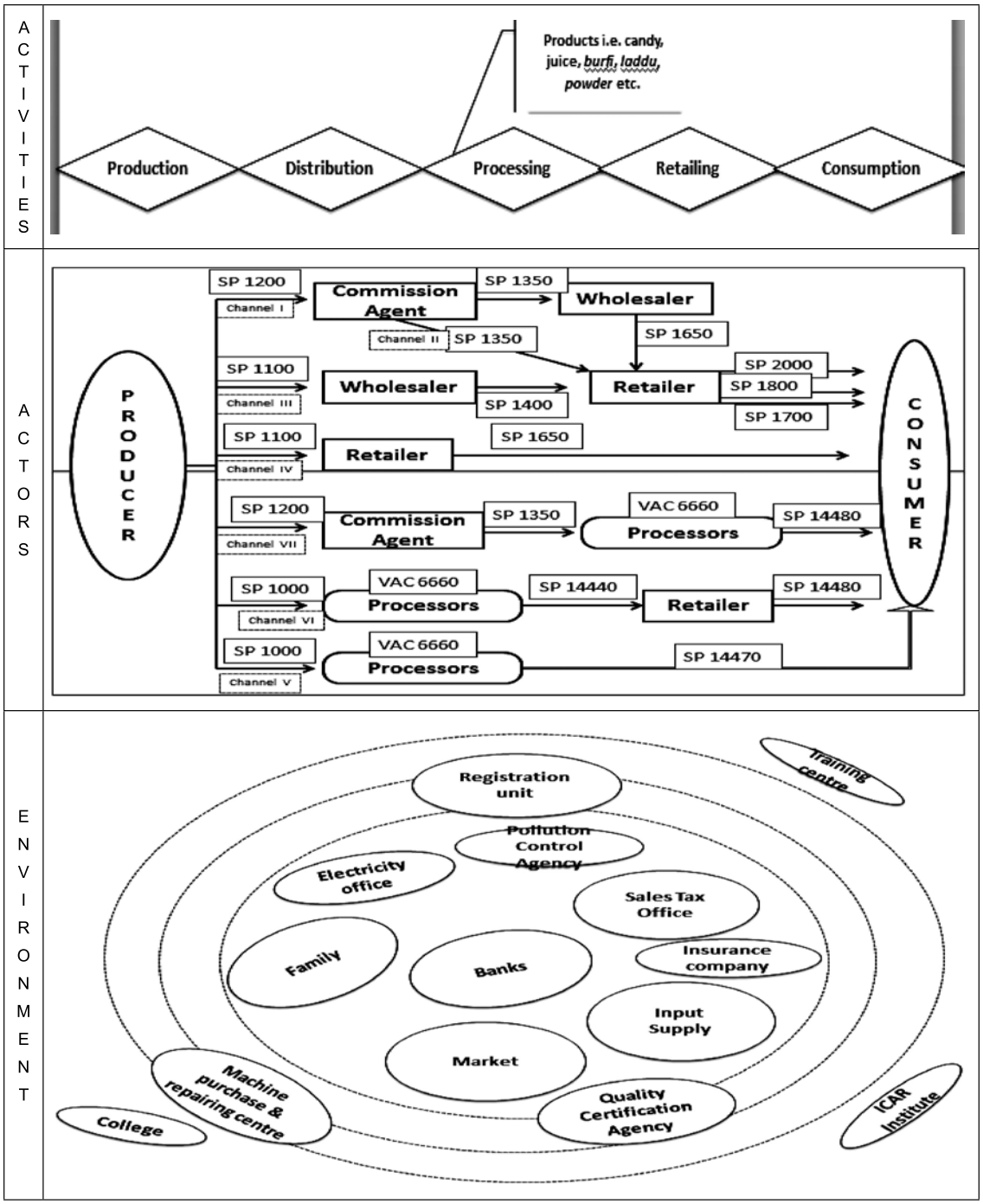

Fig. 1. Representing value chain map of *aonla* at Pratapgarh, UP.

The other supporting environment like input supply, market, sale tax office, family, bank, etc. were within the reach of 10 km. Based on importance of entrepreneurial environment, most important factors were input supply, market, bank, family support, registration and quality certification agency, however, moderately important institutions were electricity office and insurance company. Although ICAR institutions, college related to entrepreneurship and/or food processing and training centres were found least important factors for promoting entrepreneurial environment as most of the processors were getting less assistance from these institutions due to its location at far distance.

Force Field Analysis to identify driving and restraining forces for value chain development of *Aonla* processors

The Table 3 indicates that there was significant (Z=-4.78, p<0.001) difference between driving and restraining forces for *Aonla* processor. Therefore, it can be inferred that driving forces mean score (120.86) was higher compared to restraining forces mean score (64.26) which indicates that entrepreneurial environment was quite promoting to upgrade value chain at Pratapgarh in Uttar Pradesh for *Aonla* processing as depicted in Fig. 2. The factors responsible for more driving forces were timely and regular availability of *Aonla*(5), suitable variety (4.8), skilled labour (4.5), direct marketing of processed products (5), direct contact between processor and producers (4.8), credit facility (4.9), awareness of quality and safety standards (4.4), family involvement in processing (4.8), GST promoted trade transparency (3.6), digital payment (3.4), ease in registering processing unit (4.4), awareness of price policy (4) etc.

Table 3. Representation of driving forces (DF) and restraining forces (RF) for *Aonla* processors

Respondent	Cases	N	Mean rank	Z
Aonla Processor	DF>RF	30	15.50	-4.783 (p<0.001)
	RF>DF	0	0	
	DF=RF	0	0	

However, the major factors responsible for restraining forces were lack of training nearby (2.75) and its follow up (3.7), lack of entrepreneurial education (2.7), difficulty in obtaining subsidy (2.2), difficulty in getting license (2.8), limited storage facility (2.5), high initial investment (2), lack of machinery affordability (2.6), machinery availability nearby (2), transport bottleneck (2.1), demonetization affected turnover

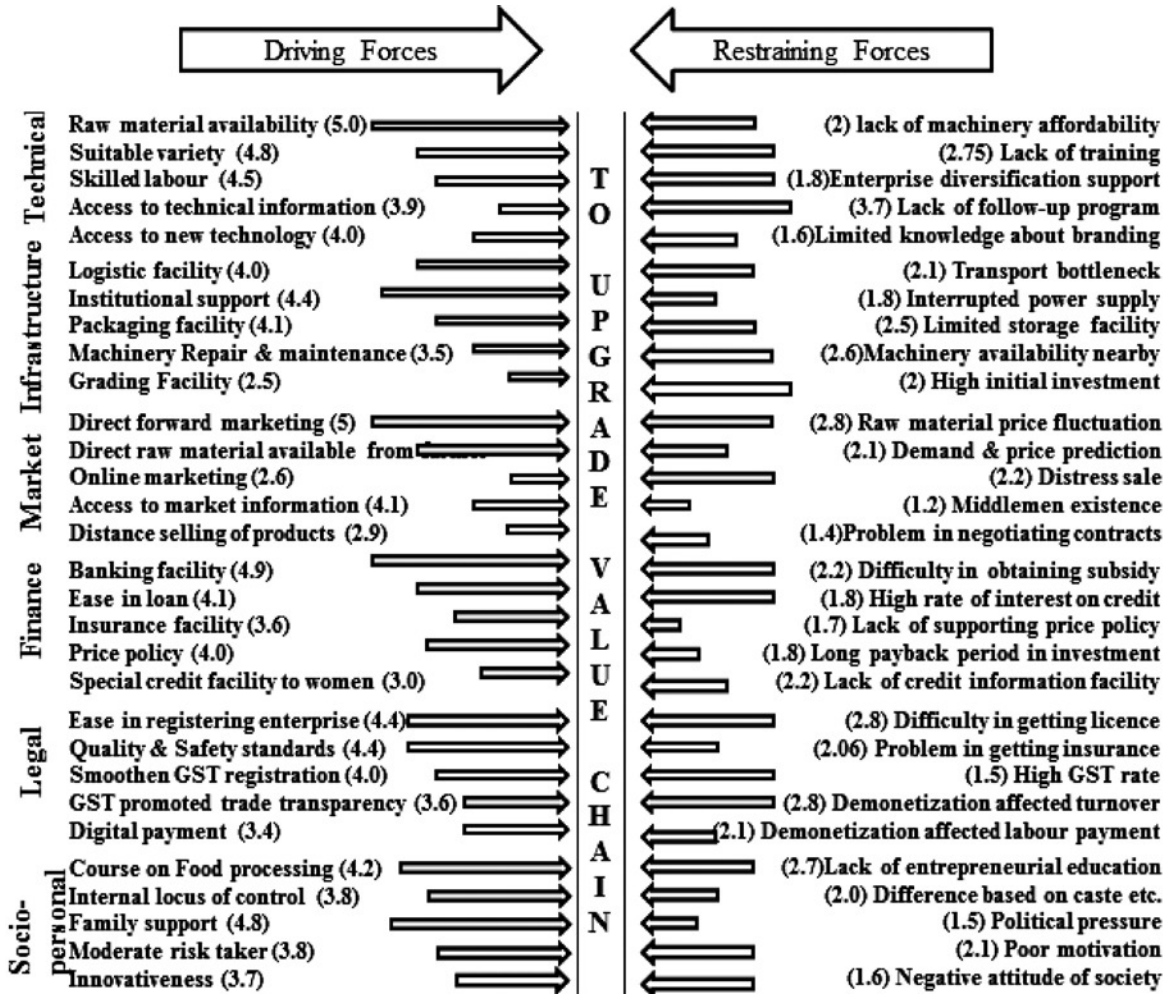

Fig. 2: Force field analysis to identify driving and restraining forces for VCD of *aonla* processor.

(2.8), demonetization affected labour payment (2.1), interrupted power supply (1.8) etc. Although some restraining forces were existing in Pratapgarh for *Aonla* processing but driving forces was much higher to upgrade value chain. The emphasis should be given to reduce restraining forces and increase driving forces to improve the entrepreneurial environment further.

Cross sectional analysis of the value chain map of aonla identified in the Pratapgarh, Uttar Pradesh showed that both processing and production units were economically feasible based on break even point at yield and price as well as benefit cost ratio. However, the cost incurred (Rs 7864.71/q) and net return (Rs 6801.95/q) was higher for processing unit than production unit (cost= Rs 252.74/q; net return= Rs 949.57/q). Also the farmers were getting more prices for processed product (Rs 146/kg) than fresh *Aonla* (Rs 10/kg) at peak season.

The channel IV i.e. producer-retailer-consumer for producer and channel V i.e. producer-processor-consumer for processor was found to be the most efficient due to high market efficiency and share in consumers' price because of less number of intermediaries. Further driving and restraining forces analysis for *Aonla* processor showed that driving forces score (120.86) was higher compared to restraining forces score (64.26) and they were statistically significant different ($Z=-4.78$, $p<0.001$) which indicate that entrepreneurial environment was quite promoting to upgrade value chain.

Although the entrepreneurial environment was quite promoting for *Aonla* processor but still emphasis should be given to reduce the retraining forces and encourage driving forces. The stressed should be given to link these small processors to distant market, so that they can sell their products beyond locality as most of them were engaged in direct marketing so due to more competition they were getting low price of their products. Most of the processors were unaware about online marketing strategy, thus, emphasis should be given to link them to online market. Although, government initiated e NAM program but most of them were unaware about this initiative. Many of the processors had learn the processing techniques by seeing their neighbours, they were never been exposed to any training, so they were lacking in scientific orientation. Therefore, nearby training facility, courses related to food processing and entrepreneurial education should be started to motivate and inspire them more. The diversification of enterprise should be promoted to increase the income of processors.

AUTHORS' CONTRIBUTION

Conceptualization of research (Shruti); Designing of the experiments (R.R Burman. and Shruti); Contribution of experimental materials (Shruti); Execution of field/lab experiments and data collection (Shruti and J P Sharma); Analysis of data and interpretation (Shruti and J P Sharma.); Preparation of the manuscript (Shruti, JP Sharma and R R Burman.).

DECLARATION

The authors declare no conflict of interest.

REFERENCES

1. Bhattacharyya, B. K. and Bhattacharjee, D.2007. Bactriocin: A biological food preservative. *J. Food Sci. Technol.* **44**: 459-64.
2. Cronbach, L. J. 1951. Coefficient alpha and the internal structure of tests. *Psychometrika* **16**:297-334.
3. CTED. 2017. Report of Centre of Technology and Entrepreneurship Development. Amla cluster. http://ctedindia.org/wp-content/uploads/2017/08/details-of-Amla-Cluster-CTED-1.pdf
4. Gills, R., Sharma, J. P. Burman, R. R. Sharma R.R. and Kar, Amit. 2016. Comparative analysis of vegetable production, value addition and marketing in National Capital Region. *Indian J. Hortic.* **73**: 87-93.
5. Gills, R. 2015. Post-Harvest Decision Making Pattern and Marketing Behaviour of Peri-Urban Farmers. Ph D thesis, ICAR-IARI, New Delhi.
6. Goyal, R. K., Patil, R. T, Kingsly, A.R.P., Walia, H. and Kumar, P. 2008. Status of post-harvest technology of *Aonla* in India- A Review. *Amer. J. Food Technol.* **3**: 13-23.
7. Horticultural Statistics at a Glance 2018. Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division, Government of India, Krishi Bhawan, New Delhi.
8. Lewin, K. 1951. *Field Theory in Social Science* (C. Dorwin ed.), Harper and Row, New York
9. Lynn, M.R. 1986. Determination and quantification of content validity. *Nursing Res*. **35**: 382–85.
10. Spearman, C. 1910. Correlation calculated from faulty data. *British J. Psychol.* **3**: 271–95.

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