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## Supply Chain of Pomegranate and Its Value Addition: Impact of Improved Variety Bhagwa

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### Introduction

Pomegranate is believed to be native to Iran, from where it travelled by land route, between 3500-2000 BC in eastward direction, crossing erstwhile Indian subcontinent covering Afghanistan, Pakistan, Northern Himalayas (India) up to China. It travelled during same time through land route towards west side up to Africa and by sea route to Europe. Medicinal value of pomegranate has given the fruit required impetus to transport it from its origin to rest of the world.

The fruit is valued for its high remunerative returns under a wide range of climatically challenging cultivation conditions. Pomegranate can be grown with less water, tolerates high temperature variations and responds to high tech horticultural practices. It can be processed into variety of products besides, having fairly good export potential. Fruit is exported from India to faraway countries like UAE, Oman, Saudi Arabia, Netherlands, Qatar, Iran, Kuwait as well as to nearby countries like Nepal and Bangladesh.

### Impact of Improved Variety *Bhagwa* on Area and Production in India

Introduction of *Bhagwa* a high yielding and disease resistant variety, after 2003 has changed production scenario of pomegranate in India. The area under the crop has more than doubled in a short span of less than two decades. In 2010-11 the fruit was cultivated in 107 thousand hectare area which has now increased to 246 thousand hectares in 2018-19. In 2010-11 the total production of fruit was 7.43 lakh tones which has increased to four times 28.65 lakh tones in 2018-19 [1].

The popularity of *Bhagwa* variety in 2016-17 can be witnessed through tremendous increase in pomegranate area under cultivation (122.91%), production (279.15%) productivity (70.12%) and export (382.17%) as compared to those of 2003-04. Today more than one lakh families are earning livelihoods from this crop in India. The variety is soft seeded, bright red attractive rind and aril colour, the juice of fruit has sweet and mild acidic taste. The shine of rind enhances its market and export value. Weight of single fruit may cross 400 gms. Quality production of fruit has encouraged farmers to export the fruit to distant parts of world (Table 1).

Lecture delivered in training on Latest techniques in high density plantation of arid fruits, sponsored by MIDH, Himanchal Pradesh and organized at ICAR-CAZRI, Jodhpur from 17-21 December 2019.

State	Variety grown
Maharashtra	Ganesh, Bhagwa, G-137, Mridula and Ruby
Andhra Pradesh	Ganesh, Bhagwa, and G-137
Karnataka	Bhagwa, Jyoti and Ruby
Tamil Nadu	Mridula, Ganesh, Jyoti and Co-1 (hybrid)
Rajasthan	Jalore seed less and Bhagwa
Gujarat	Dholka, Jalore seed less and Ganesh
Madhya Pradesh	Jyoti and Bhagwa

**Table 1:** Varieties grown in major states of India.

### Production of Pomegranate in India and Some Leading States

India is leading pomegranate producing country in world (28.65 lakh tonne in 2018-19 first advance estimates). Maharashtra produces approximately 18 lakh tonne (64%), followed by Gujarat approximately 4.6 lakh tonne (16%), Karnataka approximately 2.68 lakh tones (9.5%) , Andhra Pradesh approximately 1.4 lakh tonne(5%), Madhya Pradesh approximately 1.14 lakh tonne(4%). Rajasthan produces approximately 0.92 % of total national production of pomegranate. Himanchal Pradesh produces 3150 tonne of pomegranate fruit.

Productivity of pomegranate (MT/Ha) is constantly rising since 2013-14, at present advance estimate shows productivity at 11.64 MT/Ha. State of Tamil Nadu has highest productivity (23.32 MT/Ha) followed by Gujarat (15.13 MT/Ha), Andhra Pradesh (14.76%), Telangana (13.33 MT/Ha) (**Table 2**) [2].

Year	Area ('000Ha)	Production('000MT)	Productivity(MT/HA)
2010-11	107.3	743.1	6.9
2011-12	112.2	772.4	6.9
2012-13	113.2	745.0	6.6
2013-14	131.0	1346.0	10.27
2015-16	197.0	2306.0	11.70
2016-17	216.0	2613.0	12.09
2017-18	234.0	2845.0	12.15
2018-19(I adv estimate)	246.0	2864.0	11.64

**Source:** Horticulture statistics at a glance 2018.

**Table 2:** Area, Production and Productivity of Pomegranate since 2010-11.

Area of pomegranate is constantly increasing in different states of India. Out of total area of pomegranate, Maharashtra owes 62 %, Gujarat 13 %, Karnataka 11.10%, Andhra Pradesh and Madhya Pradesh 4%, Rajasthan 1.89% and Himachal Pradesh has 1.18% area share. (Table3). Production is expected to increase by ten times and export seven times in near future.

States/Uts	2015-16		2016-17		2017-18	
	A	P	A	P	A	P
Andhra Pradesh	8.39	113.28	7.95	119.14	9.47	139.02
Gujarat	18.54	278.10	23.18	350.82	30.51	461.75
Himachal Pradesh	2.48	1.99	2.67	2.74	2.77	3.15
Karnataka	27.26	319.34	26.58	378.14	25.97	268.23
Madhya Pradesh	6.28	54.20	9.35	102.93	9.68	114.27
Maharashtra	128.40	1486.11	140.72	1616.50	147.91	1789.46
Rajasthan	2.47	10.05	2.86	10.38	4.44	26.58
Tamil Nadu	0.48	15.92	0.57	15.83	0.56	13.06
Telangana	1.84	25.02	1.21	11.28	1.49	19.87
Others	0.77	2.54	0.95	5.07	1.15	9.14
Total	196.89	2306.44	216.03	2612.8	233.93	2844.52

**Source:** Horticulture statistics at a glance 2018.

**Table 3:** State-wise Area and Production of Pomegranate since 2015-16 to 2017-18, Area in '000Ha, Production in '000MT.

### Supply Chain Management, Catchment and Collection Centers of Pomegranate

In Maharashtra state pomegranate are commercially cultivated in Solapur, Nashik, Ahmednagar and Pune districts. In Karnataka state it is mainly grown in Chitradurga, Bellary, Tumkur, Bijapur, Bagalkot districts. In Gujarat state it is cultivated in Kachchh, Banas kantha, and Mehsana districts. In Andhra Pradesh it is grown in Anantpur and Chittoor districts. The variety Ganesh and Bhagwa cultivated in Maharashtra are suitable for export purposes (**Table4**) [3].

State	Collection center (Market)	Catchment Area
Maharashtra	Solapur	Karmala, Barsi, Madha, Mohol, Mangalwedha, Singole, Malsira, Pandharpur, Akalkot.
	Nasik	Kalvan, Peint, Igatpuri, Sinnar, Niphad, Yeola, Nandgaon, Satana Furgana, Dindori, Melgaon
	Sangli	Atpadi, Khanapur, Islampur, Shirala, Valva, Tasgaon, Kavathe, Mahankal, Jath, Miraj
	Ahmednagar	Srirampur, Sangamner, Akola, Rahuri, Nevasa, Parner, Pathardi, Srigonda,
	Pune	Junnar, Ambegaon, Ghod, Rajgurunagar, Wadgaon, Sirur, Mulshi, Welhe, Purandhar, Bhor, Baramati, Indapur, Daund, Saswad
	Satara	Mahabaleshwar, Khandala, Wai, Phaltan, Koregaon, Khata, Patan, Karad, Vadug.
Karnataka	Bijapur	Indi, Sindgi, Basavna Bagevadi, Muddebihal, Tikota.
	Belgaun	Athni, Arkali, Chikodi, Mukeri, Bailhongal, Ramdurg
	Bagalkot	Jamkhandi, Mudhol, Hungund, Badami.
Andhra Pradesh	Anantpur	Guntakal, Gooty, Rayalacheruve, Uravakonda, Kanekallu, Rayadurg, Kalyandurg, Kambadur, Manakasira, Nallamada
Gujarat	Bhavnagar	Botad, Gadhdha, Valbhipur, Umralla, Mandir, Gariadhar, Palitana, Talaja, Chogha, Vaibhipur.
	Ahemdabad	Mandal, Rampura, Samand, Bavia, Dholka, Dhandhkulla, Ranapur.
	Sabarkantha	Vijarnagar, Khedbrahma, Vadali, Idar, Bhiloda, Talod, Dhansura, Bayad, Malpur, Meghraj, Bhiloda
Rajasthan**	Barmer	Balotra, Budiwada, Baytu
	Jodhpur	Shergarh
Himachal Pradesh	Shimla	Rampur, Kumarsain
	Kullu	Bajaura, Sunder nagar
	Sirmaur	Rajgarh
	Solan	Nauni, Kandaghat
*Tamil Nadu, Uttar Pradesh, Madhya Pradesh are upcoming states.		
**Jaipur, Ajmer, Alwar, Tonk, Sriganganagar, Kota, Pali, Jalore, Banswara, Sawai Madhopur, Bhilwara, Jhunjunu, Sirohi are also competing upcoming districts of Rajasthan.		

**Table 4:** State-wise collection and catchment area\*

Two type of markets are revolving around the collection centers depending on quality of fruit. The wholesale export market works through service providers, whose job is to ascertain quality production and purchase the entire orchard from farmers before the crop is harvested. The first quality fruit is harvested, graded, cleaned and packed in different sizes of corrugated fiber boxes as per specification of the region or country. Collected fruit is exported through Mumbai and Kolkata ports to different countries (**Table5**).

2018-2019			
Sr. No.	Country	Qty	Value
1	U Arab Emirates	74,363.70	42,980.12
2	Bangladesh	49,088.22	34,864.68
3	Nepal	13,384.65	18,283.60
4	Oman	31,156.76	13,559.87
5	Saudi Arab	18,064.77	11,714.31
6	Netherland	5,306.63	10,068.48
7	Qatar	12,513.76	7,801.42
8	Iran	18,133.55	6,825.37

9	Kuwait	5,736.87	4,082.94
10	Iraq	9,492.89	3,181.62
	<b>Total</b>	<b>3,37,241.80</b>	<b>1,53,362.41</b>
Quantity in MT Value in Rs Lacs <b>Source: APEDA agri exchange</b>			

**Table 5:** Country wise export of Pomegranate from India.

The export market of pomegranate(HS Code:08109010)requires certification of specifications regarding pesticide residue level, end to end encryption of producer, exporter and destination country (Table6).Documents relating to exports relate to goods invoice, packing list and certificate of origin. Shipment related documents are mate receipts, shipping bill, bill of handing, airway/sea bill. Payment documents must carry letter of credit, bill of exchange. The quality documents must contain phytosanitary certificate, GLOBAL GAP certification, and health certificate. Documents relating to foreign exchange regulations, GR form, RBI documents, bank realization certificate. The various chain of events in export of pomegranate requires quality checks at

- Production
- Monitoring pesticide/fungicide application programme
- Inspection at farm level or final field survey
- Harvesting by clippers and cutting stem
- Transport to pack house
- Receipt of pack house
- Rejection of unwanted fruit
- Washing with disinfectant and then with clean water
- Removal of excess water
- Treatment with fungicide and wax
- Drying
- Sizing
- Grading for quality
- Nose cleaning
- Packing into Corrugated fiber boxes
- Precooling
- Pelletization
- Storage in cold store
- Container loading
- Transportation to port

Variety	Countries		
	Middle East	Netherlands/Germany	U.K
Ganesh, Bhagwa	300-450 gm Red	250-300 gm Red	250-300 gm Red
Akrata, Mrudula	200-250 gm Deep red	200-250 gm Deep red	200-250 gm Deep red
Packing	5 kg	3 kg	3 kg
Storage	5 °C	5 °C	5 °C
Export	By Sea	By Sea	By Sea
<b>Source: Maharashtra state Agriculture Marketing Board</b>			

**Table 6:** Export Specification for Pomegranate.

The second type of market is localized wholesale/ retail market operating mainly for domestic consumption, fruit is collected and purchased in district Mandi, from where it is transported to bigger mandis through land routes to various parts of country mainly Delhi. The fruit that is coming to smaller mandi may be of Grade I/II/III quality sold at rates as per visual sensation (**Figure 1**).

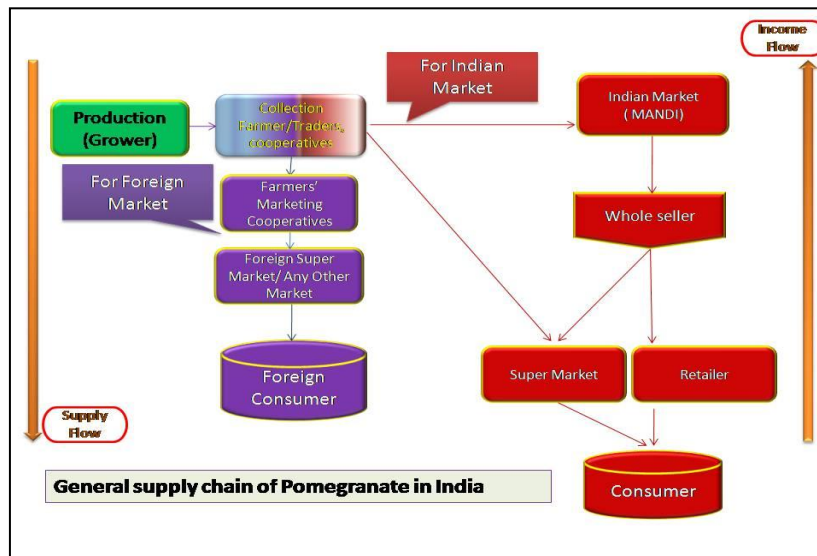


Figure 1: General supply chain of pomegranate in India.

### Value Addition in Pomegranate

Fresh produce availability for value addition is only 2-3% of the total produce of pomegranate, however scope do exist in this sector. Approximately 3-16% food worth a value of Rs. 92651/- corers is lost every year as wastage. Rajasthan’s post-harvest losses are to the tune of 0.20 million MT in fruits and 0.27 million MT in vegetables. Rajasthan has great scope for expansion of agro industries as only 857 factories are presently working. It engages 2.22% population of state’s employed persons. A very important contribution to processing ventures comes from unorganized house hold sector where food is cooked by women. Mothers and Grandmothers have made their daughters custodian of knowledge of cooking by rigorous home training. Therefore, a great scope exists for using this semi-skilled resource to become great entrepreneurs by economizing on reducing losses. If current domestic consumption and exports of fruits and vegetables is kept at constant even then scope exists for processing 0.18 MT of fruits and 0.22 MT of vegetables (Figure 2) [4].

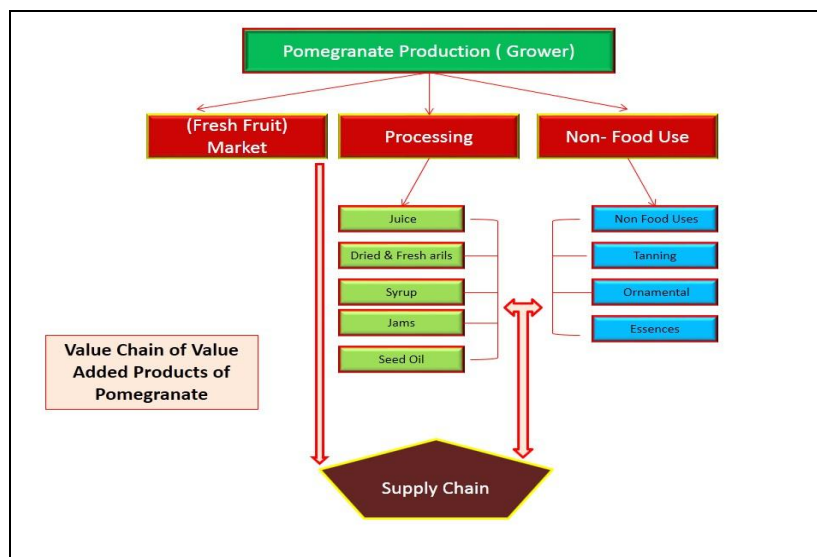


Figure 2: Value chain of value added products of pomegranate.

### Conclusion

Pomegranate is believed to be native to Iran, from where it travelled by land route, between 3500-2000 BC in eastward direction, crossing erstwhile Indian subcontinent covering Afghanistan, Pakistan, Northern Himalayas (India) up to China. Fruit is exported from India to faraway countries like UAE, Oman, Saudi Arabia, Netherlands, Qatar, Iran, Kuwait as well as to nearby countries like Nepal and Bangladesh. In 2010-11 the fruit was cultivated in 107 thousand hectare area which has now increased to 246 thousand

hectares in 2018-19. In 2010-11 the total production of fruit was 7.43 lakh tones which has increased to four times 28.65 lakh tones in 2018-19. The popularity of *Bhagwa* variety in 2016-17 can be witnessed through tremendous increase in pomegranate area under cultivation (122.91%), production (279.15%) productivity (70.12%) and export (382.17%) as compared to those of 2003-04. Two types of markets are revolving around the collection centers depending on quality of fruit. The wholesale export market works through service providers, whose job is to ascertain quality production and purchase the entire orchard from farmers before the crop is harvested. The first quality fruit is harvested, graded, cleaned and packed in different sizes of corrugated fiber boxes as per specification of the region or country. The second type of market is localized wholesale/ retail market operating mainly for domestic consumption, fruit is collected and purchased in district Mandi, from where it is transported to bigger mandis through land routes to various parts of country mainly Delhi. Fresh produce availability for value addition is only 2-3% of the total produce of pomegranate, however scope do exist in this sector. Approximately 3-16% food worth a value of Rs. 92651/- crores is lost every year as wastage. A very important contribution to processing ventures comes from unorganized house hold sector where food is cooked by women. Mothers and Grandmothers have made their daughters custodian of knowledge of cooking by rigorous home training. Therefore, a great scope exists for using this semi-skilled resource to become great entrepreneurs by economizing on reducing losses. Pomegranate therefore is a potential fruit for livelihood security of farmers in India.

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