Post-Harvest Profile of Tomato

Directorate of Marketing and Inspection (DMI)
Department of Agriculture & Farmers Welfare
Ministry of Agriculture & Farmers Welfare
Government of India

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1.0 INTRODUCTION

1.1 Origin

The Tomato is the edible fruit of *solanum lycopersicum* commonly known as a tomato plants which belongs to the nightshade family, solanaceau. The English word Tomato comes from the Spanish word, 'tomate' derived from 'Nahuatl' (Aztec language) word 'tomatl'.

Tomato is originated in Peru of South America and name of crop came from the Aztec word "Tomato". The crop is of recent origin and first report of tomato was from Italy in 1544. Later spread was fast and the crop is grown throughout the length and breadth of world.

In early 19th Century tomato finally arrived in Asia. It arrived there under the guidance of British consul in Syria John Barker who directed first cultivation efforts. By mid 19th Century, tomato gained much popularity and started being used widely in Syria, Iran and China Modern age of commercially grown tomato started with the efforts of Alexander W. Livingston American botanist and scientists who dedicated much of his life of upgrading tomato with selective breeding into the most commonly known form we know today.

The high acidic content of the tomato makes it a prime candidate for canning, which is one of the main reasons the tomato was canned more than any other fruit or vegetable by the end of the 19th century. Tomato came to India by way of Portuguese explores during the early 16th century. Because tomatoes thrive in warm, sunny condition with no severe frost, the plants took well to Indian soils. Due to lack of evidences as it is not clear when and where cultivation of tomato started in India but it is clear that they were the Britishers who made it popular.

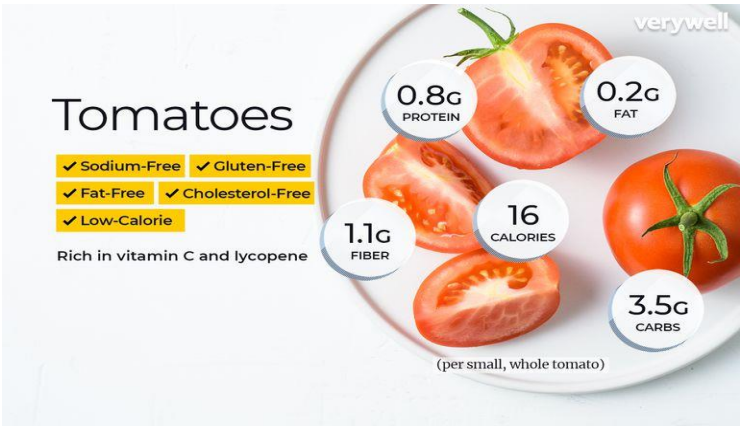
1.2 Importance

Tomato occupies a prime position in list of protective foods since it is a rich source of minerals like calcium (48 mg / 100g), sodium (12.9 mg), trace elements, copper (0.19 mg), vitamins like vitamin A (900 IU), vitamin C (27 mg), vitamin B complex (thiamine), essential amino acids and healthy organic acids like citric, formic and acetic acids. The attractive red colour of fruit is due to lycopene and yellow colour is due to carotenes. Peculiar flavour of tomato is due to presence of ethanol, acetaldehyde and a number of volatile flavour components found in fruit. Different forms of tomatine, a steroidal glycoalkaloid, are identified from various parts of plant. Tomato is a good appetizer and its soup is a good remedy for preventing constipation.

1.3 Nutritional value

Table 1 : Nutritive value of tomato

Tomato Nutrition Facts	
Serving Size 1 small whole (2-2/5" diameter) (91 g)	
Per Serving	**% Daily Value***
Calories 16	
Calories from Fat 2	
Total Fat 0.2g	**0%**
Saturated Fat 0g	**0%**
Polyunsaturated Fat 0.1g	
Monounsaturated Fat 0g	
Cholesterol 0mg	**0%**
Sodium 4mg	**0%**
Potassium 215.67mg	**6%**
Carbohydrates 3.5g	**1%**
Dietary Fiber 1.1g	**4%**
Sugars 2.4g	
Protein 0.8g	
Vitamin A 15% · Vitamin C 21%	
Calcium 1% · Iron 1%	



2.0 PRODUCTION SCENARIO

2.1 Major producing countries in the world:

In 2017, the worldwide production of tomatoes totaled 170.8 million tons. China, the leading producer of tomatoes, accounted for 31% of the total production. India and Nigeria followed with the second and third highest production of tomatoes in the world.

Table 2 : Area and Production of major Tomato producing countries 2015-17

	2018		2019		2020	
Country	Area (Ha)	Prod (MT)	Area (Ha)	Prod (MT)	Area (Ha)	Prod (MT)
China	1071339	60919328	1086771	62869502	1107485	64768158
India	789000	19759000	781000	19007000	812000	20573000
Türkiye	174161	12150000	180424	12841990	181879	13204015
USA	130270	12613090	110763	12162045	110439	12227402
Egypt	174802	6777754	174730	6814460	170862	6731220
Italy	97090	5798100	99020	5777610	99780	6247910
Iran	106705	4930169	122459	5457855	129058	5787094
Spain	56130	4768600	56940	5000560	55470	4312900
Mexico	90323	4559375	87917	4271914	84926	4137342
Brazil	57388	4126988	54591	3920997	51960	3753595
Nigeria	870794	3500000	844834	3798939	844445	3693722
Russia	82366	2899664	81270	3014989	80765	2975588
Ukrain	73100	2324070	72900	2224440	74900	2250300
World	4876142	178024027	5004555	180231376	4999181	183014805

Source : FAO Statistical Database

2.2 Major producing states in India

Tomato is one of the major horticulture crops of the country. With an estimated production of 22320 thousand metric tonnes in 2017-18 (area 1580 thousand Ha), India is one of the largest producers of tomatoes in the world, second only to China. Around 11 per cent of the total world production of tomatoes is cultivated in India.

Madhya Pradesh holds the top position in tomato production, with production of 2805.07 thousand metric tonnes in the year 2020-21 followed by Andhra Pradesh (2450.67 thousand metric tonnes. Karnataka is the third largest producer of tomatoes with production of 2077 thousand metric tonnes.

Table 3: Major Contributors to Tomato area and production in India

Sl. No.	State	TE 2017-18 Tomato		AE 2020-21		Contribution of states to Tomato A & P		
		Area ('000 ha)	Production ('000 tonnes)	Area ('000 ha)	Production ('000 tonnes)	Area (% of India)	Production (% of India)	
1	All India	786.63	19733.20	851.69	21002.81	-	-	MP, AP and Karnataka are the major tomato growing states in India
2	Madhya Pradesh	84.54	2474.92	96.45	2825.07	11.32	13.45	
3	Karnataka	61.89	2014.86	67.00	2077.00	7.87	9.89	
4	Andhra Pradesh	56.85	3153.96	57.67	2450.67	6.77	11.67	
5	Telangana	45.81	1055.66	24.99	681.97	2.93	3.25	
6	Gujarat	47.26	1362.83	48.42	1394.89	5.69	6.64	
7	Odisha	90.97	1304.76	95.56	1460.95	11.22	6.96	

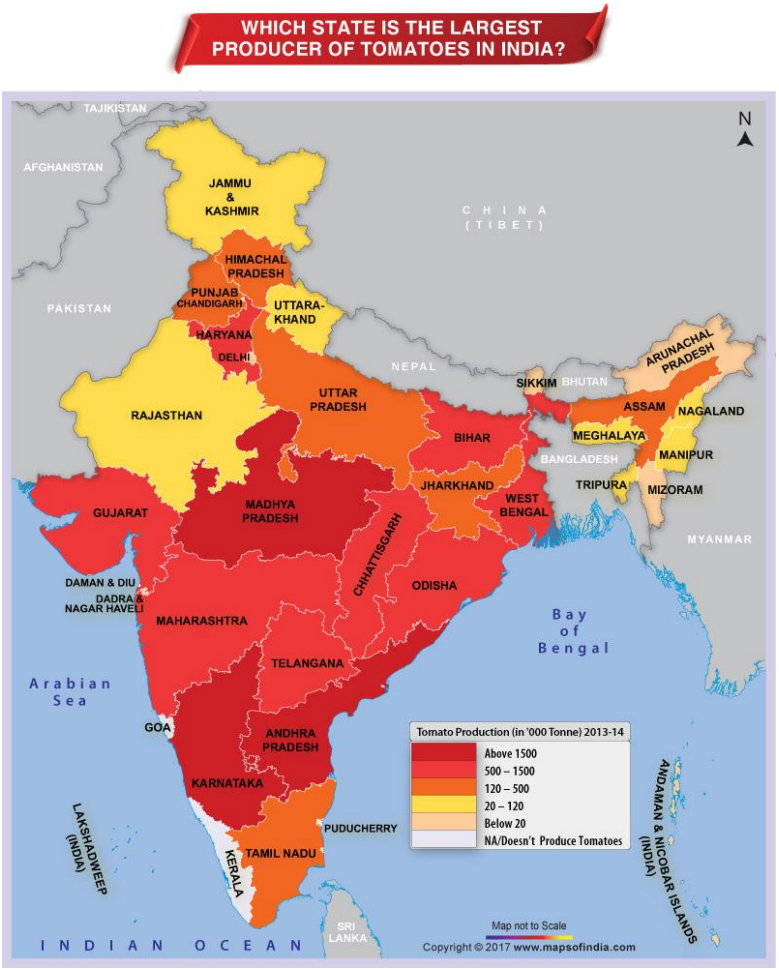


Fig 1 : Tomato producing states in India

Table 4: State-wise tomato production in the country

State/ UTs	Five Year Average (2014-15 to 2018-19)		AE 2020-21	
	Production ('000 tonnes)	% Share	Production ('000 tonnes)	% Share
Andhra Pradesh	2687.78	14.27	2450.67	11.67
Madhya Pradesh	2423.56	12.87	2825.07	13.45
Karnataka	1935.80	10.28	2077.00	9.89
Odisha	1318.68	7.00	1460.95	6.95
Gujarat	1342.81	7.13	1394.89	6.64
West Bengal	1224.08	6.50	1275.76	6.07
Bihar	992.62	5.27	951.36	4.53
Maharashtra	962.19	5.11	1124.96	5.35
Telangana	1027.86	5.46	681.97	3.25
Haryana	677.98	3.60	395.04	1.88
Uttar Pradesh	750.07	3.98	902.38	4.29
Tamil Nadu	660.91	3.51	2370.58	11.29
Total of above states	16090.34	84.98	17910.63	85.28
Other states	2828.05	15.02	3092.18	14.72
All India	18832.39	100	21002.81	100

Major Producing States/Districts in India:

1) Madhya Pradesh (Chhindwara, Shivpuri, Jhabua, Shajapur, Raisen etc.)
2) Andhra Pradesh (Chittoor, Anantapur, Kadapa, Kurnool, Guntur etc.)
3) Karnataka (Kolar, Haveri, Belgaum, Chikballapur, Mandya etc.)
4) Telangana (Medak, Adilabad, Mahbubnagar, Warangal, Rangareddi etc.)
5) Gujarat (Banas Kantha, Ahmadabad, Mahesana, Anand, Kheda etc.)

Peak Harvesting Season:

1) Madhya Pradesh : January, February, October and December
2) Andhra Pradesh : January to December
3) Karnataka : May to July
4) Telangana : January to December
5) Gujarat : January, February, March and December

Status of Kharif Tomato Area Sown in Major States (as on 31st July, 2021)

- Sowing of the Kharif Tomato (including Late-Kharif) is continuing in Karnataka, Maharashtra, Andhra Pradesh, Tamil Nadu, Chhattisgarh, Madhya Pradesh, Telangana, and Himachal Pradesh and just started in Haryana.
- Area under Kharif Tomato (including Late-Kharif) in the country for the year 2021-22 is reported to be **1.22 Lakh Ha** and in the corresponding period for last year was 0.97 Lakh Ha.
- Out of 1.22 Lakh Ha area sown so far, an area of 0.08 Lakh Ha damaged due to rains in Madhya Pradesh (7.743 Thousand Ha) and Karnataka (0.63 Thousand Ha).
- State-wise Sowing status of Kharif Tomato (including Late-Kharif) as reported is provided below:-

Table 5: Kharif tomato area sown in the major states

Status of Kharif Tomato Area Sown in Major States (as on 31st July, 2021)								
								Area: '000 Ha; Production: '000 Tonne
S. No.	State	**2021-22**				**2020-21**		
		Target	Kharif sowing current year till date	Area affected by rains	Net Area Sown	Area Sown in Corresponding period	Total Kharif Area Sown	Production
(a)	(b)	(c)	(d)	(e)	(f)=(d)-(e)	(g)	(h)	(i)
1	Karnataka	39.10	28.41	0.63	27.78	15.84	28.00	868.00
2	Maharashtra	35.00	4.65	0.00	4.65	16.00	36.00	728.00
3	Andhra Pradesh	23.09	18.39	0.00	18.39	18.23	21.00	960.00
4	Tamil Nadu	45.00	10.66	0.00	10.66	10.56	43.00	1181.00
5	Chhattisgarh	25.08	18.10	0.00	18.10		25.00	466.00
6	Madhya Pradesh	34.00	17.58	7.43	10.15	9.75	31.00	872.00
7	Telangana	15.00	4.63	0.00	4.63	6.80	12.00	300.00
8	Himachal Pradesh	12.50	12.65	0.00	12.65	12.97	12.00	503.00
9	Uttarakhand				0.00		7.00	58.00
10	Haryana	2.00	0.56	0.00	0.56	0.26	0.00	0.00
11	Uttar Pradesh	9.10	6.73	0.00	6.73	6.32	9.00	361.00
12	Gujarat				0.00		25.00	716.00
13	Odisha				0.00		32.00	462.00
14	West Bengal				0.00		0.00	0.00
15	Bihar				0.00		0.00	0.00
Total of above States (in Thousand)		219.88	122.36	8.06	114.30	96.72	281.00	7475.00
Total of above States (in Lakh)		**2.20**	**1.22**	**0.08**	**1.14**	**0.97**	**2.81**	**74.75**

2.3 Major commercial varieties grown in India

Table 6 A: Tomato cultivars grown in India

Sl. No.	Name of Hybrid /Variety	Institute/ Company	Characteristics
Private Sector Hybrids/Varieties			
1	Karnataka	Indo-American hybrid seeds company	Fruit starts 80 days after transplanting. Fruits are long, globed shape and resistant to fusarium, varticilum and nematode.
2	Ramya	Indo-American Hybrid Seeds Bangalore	Fruits are round bright having average weight 90 gram, seed rate 60 gram/acre, 65 days after transplanting. Fruits are ready, average yield 165 gram per plant. Fruits are based for soup, salad, pickle and ketch-up.
3	Rupali	Indo-American Hybrid Seeds Co.	Fruits are round, attractively bright red colour with tight skin. These are suitable for distant market. This variety is of 4 months duration.
4	Amogh	Namdhari Seeds Pvt. Ltd. Bangalore	This varieties suitable for east and south India. Fruits are ready for picking after 75-80 days of transplanting, round fruits weighing 75-80 gram, TSS fruit juice is 5.0-5.2 brix.
5	Ustava	Namdhari Seeds Pvt.Ltd. Bangalore	This is suitable for south, east and central India, fruits are big stought having weight of 90 gram per fruit, first picking after 80 days of transplanting. This is resistant to fruit cracking.
6	N.S.-816	Namdhari Seeds Pvt.Ltd. Bangalore	This is suitable in east and north India, for Rabi and Summer season. Fruits are very attractive in colour, oval shaped having 100-110 gram weight and stout and suitable for local and distant market. Fruits are first picking of fruits 85 days after transplanting and there is no needs of staking are plants are as growing straight.

7	N.S.-815	Namdhari Seeds Pvt. Ltd., Bangalore	Suitable for plains of south and east for kharif and rabi season. Fruits are oval round having average weight 70-80 gram.
8	N.S.-812	Namdhari Seeds Pvt. Ltd., Bangalore	Fruits are oval tight having light dot on the skin. Resistant to fruit cracking having average weight 80-85 gram.
9	N.S.-535	Namdhari Seeds Pvt.Ltd. Bangalore	This is suitable for rabi and kharif season. Fruits are long with attractive colour having weight 90 gram per fruit.
10	Suraksha	Namdhari Seeds Pvt.Ltd. Bangalore	This is resistant to bacterial wilt and based for south and north India. First picking 75-80 days after transplanting. Fruits are attractive with 100-gram weight. TSS of fruit is 4.8 to 5.2 brix.
11	Century-12	Century Seeds Pvt. Ltd. New Delhi	Fruits are round with deep red colour and tight skin therefore suitable for distant market average weight of fruit is 70-80 gram.
12	Suman	Century Seeds Pvt. Ltd. New Delhi	It requires staking and fruit is round and separate instead of bunching. Weight of fruit is 50-60 gram.
13	Manmohan	Century Seeds Pvt. Ltd. New Delhi	50 days after transplanting fruiting is start fruits are deep red in colour having average weight 80-90 gram and skin is tight, suitable for distant market without damage.
14	Swarna	Century Seeds Pvt. Ltd. New Delhi	Fruits are pear shapes having average rate 40-50 gram. This is a high yielding variety.
15	Hybrid No. 14	Century Seeds Pvt. Ltd. New Delhi	High yielding variety.
16	Hybrid No. 15	Century Seeds Pvt. Ltd.New Delhi	This is suitable for kitchen gardening and fruits are cherry like, high yielding variety.
17	Apurva	Nunhems Proagro Seeds Pvt. Ltd., New Delhi	Fruits flat-round and thick. Average weight of fruit is 110-120 gram and fruits are bright red. Somewhat resistant to blight, suitable for distant market.

18	Divya	NunhemsProagro Seeds Pvt. Ltd., New Delhi	Height of plant is 95-110 cm. First picking of fruit is 60-65 days after transplanting. Fruits are bright, round having average weight 80-90 gram. Average yields 95-100 tonnes per hectare.
19	Pradnya	Nunhems Proagro Seeds Pvt. Ltd., New Delhi	Fruits are bright red colour, round having average weight 90-100 gram and ready for picking 75-80 days after transplanting. Average yield 100-110 tonnes per hectare and best for distant transport.
20	T.H.-390	Nunhems Proagro Seeds Pvt. Ltd.,	Fruits are round, red having average weight 80-100 gram, resistant to blight and suitable for distant market. Average yields 90-100 tonnes per hectare.
21	Abhiman	Nunhems Proagro Seeds Pvt. Ltd., New Delhi	Best of processing and suitable for local mandi and hill regions, fruits are round red in colour having average weight 95-100 gram.
22	Arth-3	Ankur Seeds Pvt. Ltd.,	Fruits are oval round, deep red. Picking starts 80-85 days after transplanting and lasts upto 160-180 days. Average yield 880-950 quintal per hectare. It is recommended for Assam, West Bengal, Maharashtra, East Madhya Pradesh, Tamil Nadu, and Karnataka.
23	Hrishi	Century Seeds Pvt. Ltd., New Delhi	Fruits are round, thick and early ripen having medium size with average weight 70 gram. It is short duration and equally ripens variety of 115 days, average yield 40 tonne per acre. Plants resistant to verticilium and fusarium. These are suitable for hot season region and suitable for distant market.
24	Supriya	Century Seeds Pvt. Ltd., New Delhi	Fruits are oval, medium size thick having average weight 70 gram. It is high yielding variety having fruits of attractive deep red and popular for preparing dishes.
25	Arti	Century Seeds Pvt. Ltd., New Delhi	Fruits are best for market and processing and available for long time. Fruits are ready within 120-125 days. Fruits are medium size, round shape

			and suitable for distant market.
26	Arth-4	Ankur Seed Pvt. Ltd., Nagpur	Fruits are deep red flat-round with red pulp having TSS 4.0-4.5 brix. Fruits starts 80-85 days after transplanting and lasts upto 170-190 days. Average yield 1000-1100 quintal per hectare and recommended for Punjab, Bihar Plains of U.P., Karnataka, Tamil Nadu and Kerala.
27	Madhuri	Bejo Sheetal Seed Pvt. Ltd., Jalana	Fruits are deep red, square rounded with thick skin having average weight 100 gram. resistant to fruit cracking, and average yield 500-700 quintal/ha.
28	Minakshi	Bejo Sheetal Seeds Pvt. Ltd., Jalana	Fruits are deep red with average weight 80 gram, resistant to fusarium wilt, average yield 600-1000 quintal per hectare.
29	Manisha	Bejo Sheetal Seeds Pvt. Ltd., Jalana	Fruits having thick skin, storage capacity is good, average yield 800-1000 quintal per hectare.
30	Hybrid Chuhara	Bejo Sheetal Seeds Pvt. Ltd., Jalana	Fruits are medium size long with attractive colour having 75 gram average weight. It is a short duration and high yielding variety withstand against hot season.
31	Nath Amrut-110	Nath Seeds Ltd., Aurangabad	Average weight of fruit is 80-100 gram. Fruit bearing per plant is 62. Average yields 110-120 tonne per hectare.
32	Nath Amrut-601	Nath Seeds Ltd., Aurangabad	Average weight of fruit is 80-85 gram per plant fruit bearing is 50. Fruits are ready for picking 120 days after transplanting.
33	Nath Amrut-901	Nath Seeds Ltd., Aurangabad	Average weight of fruit is 100 gram. Average fruit per plant are 33, average yield 110-120 tonnes per hectare.
34	Avinash-2	Sandoze India Ltd., Pune	Fruits are round, deep red with thick skin having average weight 80-100 gram. resistant to tomato yellow virus and susceptible to mosaic virus. Average yield 120 tonnes per hectare.

35	Rasika	Sandoze India Ltd., Pune	Fruits are round, deep red colour having average weight 60-125 gram, fruits appear in bunch. Average yields 100 tonne per hectare.
36	Lirika	Sandoze India Ltd., Pune	Fruits are oval thick, having thick skin, with attractive red colour. Fruits are appearing in bunch having average weight 80-100 gram. Fruit picking 60-65 days after transplanting and can be transport distant market.
37	Ratna	Sandoze India Ltd., Pune	Fruits are pricked 60-65 days after transplanting. Fruits are round, bright with deep red colour having average weight 60-125 gram and appear in bunch.
38	Kuber Gita	Unicorn seeds Pvt. Ltd., Sceundarbad	Fruits are round, red in colour and tolerate in hot season. Average weight of fruit is 60-80 gram.
39	H.T.M.185	Unicorn seeds Pvt. Ltd., Sceundarbad	Plants are irregular bearers. Fruits have good test, average weight of fruit is 110-125 gram, suitable for local market as a fresh fruit.
40	H.T.M 108	Unicorn seeds Pvt. Ltd., Sceundarbad	Plants are regular bearers, fruits have attractive red colour, having 80-100 gram average weight. Due to good storage capacity suitable for distant marketing.
41	Nath Amrut-101	Nath Seed Ltd., Aurangabad	Fruits are oval round, deep red having average weight 80-100 gram, no of fruits per plant is 50. It has duration of 120 days, average yield 110-120 tonneper hectare.
42	Nath Amrut-210	Nath Seed Ltd., Aurangabad	Average yield of fruit per plant is 60 gram, average yield of this variety can be obtain 110-120 tonne per hectare within 125 days.
43	Ankur-128	Ankur seeds ltd.	Plants are semi-spreading with bushy appearance having 110-120 cm height. Fruits are around, red in colour having average weight 60-80 gram. First picking of fruit 100-115 days after transplanting, suitable for distant market.

44	811	JK Seeds	Determinate. Oval shaped fruit, firm with thick skin suitable for distant transpiration. Deep red color after ripening. Weight 90-100 gms. First harvesting starts 68-70 days after transplanting. Highly tolerant to TCLV. Best suited for summer season of Central & South India.
45	Akshay	J K Seeds	Determinate. Oval-square shaped fruit, firm with thick skin suitable for distant transportation. Deep red color after ripening. Weight 85-95 gms. First harvesting starts 65-68 days after transplanting. Tolerant to TCLV.
46	Lakshmi	Nunhems	Large determinate plants. Maturity of 55-60 days after transplanting. Flat round firm fruits of 80- 90 gms with sour taste. Good heat set and resistance to TLCV.
47	Raina	Raasi Seeds	Semi determinate plants with good foliage cover. First harvest 60-65 days after transplanting. Fruit is rectangular square oval red with 2-3 locules. Weight 90-100 gms. Fruits are firm and good for transportation. Intermediate resistance for BW and TLCV.
48	Ayushman	Seminis	Determinate. Fruit is square round and deep red. Weight 95 to 100 gms.
49	1057	Syngenta	Determinate, bushy, medium foliage cover. Fruit are firm, square oval, medium size. Weight 80-100 gms. Fruit harvesting starts 55-60 days after transplanting. Ripe fruits are uniform red and glossy. Farmers in Maharashtra encountered serious tospovirus with this variety during 2016.
50	2048 Meghdoot	Syngenta	Determinate. New rainy season variety. Vigorous with profuse branching. Fruit - firm, square, medium size. Weight 70-90 gms. Fruit harvesting starts 55-60 days after transplanting. Ripe fruits are red and glossy.

54	Abhinav	Syngenta	Semi-determinate. Plant with vigorous plant habit. Broad leaves with good foliage cover. Firm fruit with good keeping quality. Square shape and medium size; weight of 80 -100gms. Fruit harvesting starts 60-65 days after transplanting. Uniform fruit ripening with ripe fruits deep red & glossy.
55	US 440	US Agriseeds	Determinate, 60-65 day maturity, Fruit size 80 – 100 gms, Shape is flat round with good firmness. TLCV and heat tolerant and high shelf life.
56	US3140	US Agriseeds	Determinate, 60-65 day maturity, Fruit size 80 – 100 gms, Shape is flat round. TLCV and heat tolerant.
Public Sector Hybrids/Varieties			
57	Pusa Hybrid 1	ICAR, New Delhi	Fruits are round with thick skin and less juicy. Average weight is 60 gram. It is very suitable under the high temperature of U.P. that is 40^0C of day and 28^0 C during night. Where other varieties cannot with stand under these conditions. Average yield is 32 tonnes per hectare.
58	Pusa Hybrid 2	ICAR, New Delhi	Fruits are flat round having thick skin and average weight 80 gram. Average yield is 55 tonnes hectare and suitable for distant market without damage. It is resistant to nematode.
59	Pusa Hybrid 4	ICAR, New Delhi	Fruits are attractive round having thick skin and riped equally. Average weight is 70-80 gram this is suitable for the areas having problem of rootknot nematode.
60	Bhagyshree	M.P.K.V., Rahuri	Height of plant is 60-65 cm. first picking of fruit 63-68 days after transplanting, fruits are medium big having average weight 80 gram, fruits are deep red in colour having more pulp and medium stout suitable for kharif and rabi season.

61	Dhanashree	M.P.K.V., Rahuri	Height of plant is 65-70 cm. first picking of fruit 65-70 days after transplanting, fruits are medium round having average weight 60 gram, fruits are orange red in colour having more pulp and thick suitable for kharif and rabi season.
62	Rajashree	M.P.K.V., Rahuri	Height of plant is 70-75 cm. first picking of fruit 65-68 days after transplanting, fruits are oval round having average weight 85 gram, fruits are orange red and more stout, suitable for kharif and rabi season.
63	Pusa Ruby	IARI New, Delhi	It is an early growing cultivar, fruits and have yellow stem end, slightly furrowed with uniform ripening. Variety is suitable for sowing both in spring-summer and autumn-winter seasons. Average yield is 32.5 t/ha. It is suitable for table as well as processing purpose.
64	Pusa Early Dwarf	IARI New, Delhi	It is an early ripening cultivar of determinate type; fruits are flattish round, medium-large with yellow stem end. Fruits are ready for harvesting 75-80 days after transplanting. Average yield is 35 t/ha. It is suitable for table as well as processing purpose.
65	Pusa 120	IARI New, Delhi	Fruits are medium-large with yellow stem end, smooth, attractive, uniform ripening. It is a heavy yielder and resistant to nematode
66	Co 1	TNAU	Variety is suitable for growing in Southern India. Fruits are round with yellow stem end, determinate and ripen uniformly.
67	Sioux	IARI, New Delhi	Variety is suitable for growing in the hills. Friuts are medium large, round with yellow stem end. Suitable for short distance market.
68	Best of All	IARI, New Delhi	Variety is of indeterminate type and suitable for growing in the hills. Fruits are borne in clusters, round, firm with green stem end.
69	Marglobe	IARI New Delhi	Crop matures late in the season. Fruits are large,

			round, smooth, juicy with green stem end. Variety is of indeterminate type and suitable for growing in the hills.
70	Roma	IARI New Delhi	Fruits are elliptical in shape with yellow and thick stem end. Variety is a prolific bearer, determinate with good foliage cover and suitable for processing.
71	Punjab Chuhra	PAU, Ludhiana	Variety is of determinate type. Fruit are elliptical in shape with yellow stem end. Suitable for processing.
72	S-152	IARI New, Delhi	Fruits are egg-shaped with yellow stem end. Variety is of determinate type. Suitable for canning purpose.
73	ArkaShreshta	Indian institute of Horticultural Research, Bangalore	Fruits are round, thick with deep red colour having average weight 75 gram and pulp is red and can be stored upto a week suitable for distant market. Resistant to bacteria wilt average yield is 700 quintal per hectare.
74	ArkaVardan	Indian Institute of Horticultural Research, Bangalore	Fruits are flat-round, thick deep red having average weight 140 gram, resistant to rootknot nematode. It is recommended for hill regions of Jammu Kashmir, Himachal Pradesh, Uttar Pradesh and Kerala.
75	Arka Vishal	Indian institute of Horticultural Research, Bangalore	Plant is irregular bearing, fruits are round, thick, deep red having average weight 140 gram. Tolerant to fruit cracking. Recommended for Punjab, Bihar, and Uttar Pradesh. Average yield 750 quintal per hectare.
76	Arka Abhijeet	Indian Institute of Horticulture Research, Bangalore	Fruits are round thick, deep red having average weight 60 gram. For room temperature fruits can be stored upto 17 days. Plants are resistant to bacterial wilt. First picking 55-60 days after transplanting and lasts for 140 days. Average yields 400 quintal per/hectare.

77	Arka Vikas (Sel 22)	IIHR, Bengaluru	Plants semi-determinate with dark green foliage. Fruits oblate, medium large (80-90 g.) with light green shoulder. Suitable for table purpose. Tolerant to heat and moisture stress. Crop is cultivated in Kharif/Rabi season and matures in 140 days. Average yield is 35-40 t/ha.
78	Arka Saurabh (Sel - 4)	IIHR, Bengaluru	Plants semi-determinate with light green foliage. Fruits medium large (70-75 g.) round nipple tipped with light green shoulder. Suitable for table purpose & processing. Crop is cultivated in Kharif/Rabi season and matures in 140 days. Average yield is 30-35 t/ha.
79	ArkaMeghali	IIHR, Bengaluru	Plants semi-determinate with dark green foliage. Fruits oblate with light green shoulder, Suitable for table purpose. Crop is cultivated in Kharif season and matures in 125 days. Average yield is 16-18 t/ha.
80	ArkaAhuti (Sel 11)	IIHR, Bengaluru	Plants are semi-determinate fruits oblong with 2-3 locules. Suitable for processing. Crop is cultivated in Kharif/Rabi season and matures in 140 days. Average yield is 42 t/ha.
81	Arka Ashish (IIHR - 674)	IIHR, Bengaluru	Plants semi-determinate with dark green foliage. Fruits are square round, very firm thick fleshed. Develops deep red colour with TSS 48%. Concentrate fruit maturity with very good vine storability. Tolerant to powdery mildew. Suitable for processing. Crop is cultivated in Kharif/Rabi season and matures in 130 days. Average yield is 38 t/ha.
82	ArkaAbha (BWR 1)	IIHR, Bengaluru	Plants semi-determinate. Fruits oblate with light green shoulder. Fruits are medium large (75 g). Suitable for table purpose. Resistant to bacterial wilt. Crop is cultivated in Kharif/Rabi season and matures in 140 days Average yield is 43 t/ha.
83	Arka Alok (BER - 5)	IIHR, Bengaluru	Plants determinate. Fruits large (120g) square round with light green shoulder. Suitable for table purpose. Resistant to bacterial wilt. Crop is cultivated in Kharif/Rabi season and matures in

			130 days. Average yield is 46 t/ha.
84	Arka Abhijit (BRH 2):	IIHR, Bengaluru	Plants semi - determinate with dark green foliage. Fruits round, medium large (65-70 g) with green shoulder. Thick fleshed, fruits have good keeping quality (17 days) and long transportability. Suitable for table purpose. Resistance to bacterial wilt. Crop is cultivated in Kharif/Rabi season and matures in 140 days. Average yield is 65 t/ha.
85	Arkarakshak	IIHR, Bengaluru	First F1 hybrid with triple disease resistance to ToLCV, BW and early blight. Fruits square round, large (90-100g), deep red colored and firm. Suitable for fresh market and processing. Yield: 75-80 t/ha.in 140 days.
86	Arka Samrat	IIHR, Bengaluru	First F1 Hybrid with triple disease resistance to ToLCV, BW and early blight. Fruits oblate to high round, large (90-110g), deep red and firm. Suitable for fresh market. Yields:80-85 t/ha. in 140 days.
87	ArkaAbhed	IIHR, Bengaluru	High yielding F1 hybrid with multiple disease resistance to Tomato Leaf Curl Disease (Ty2+Ty3), Bacterial wilt, Early blight and Late blight (Ph2+ Ph3). Plants are semi-determinate with dark green foliage. Fruits are firm, oblate round & medium large (90-100g). Suitable for summer, kharif & rabi cultivation. Bred for fresh market & yields 70-75 t/ha in 140-150 days.
88	Kashi Aman	IIVR, Varanasi	Resistant to ToLCVD. Variety carries an allele of Ty-3 gene. It has shown high level of resistance in field tests and to infection by both monopartite and bipartite viruses in agro inoculation experiments. Average yield of 50-60 tonnes/ha could be realised with the cultivation of Kashi Aman. The fruits of this variety are round and very firm with a pericarp thickness of 0.52-0.57cm. Average fruit weight of this variety ranges from 80-110 g with an average locule number of 3-4. The fruits are attractive red in colour with an average total soluble solid

			content of 4.6 ^{o}Brix at red ripe stage. Recommended for cultivation in Punjab, Uttar Pradesh, Bihar and Jharkhand.
89	Kashi Adharsh	IIVR, Varanasi	Resistant to tomato leaf curl virus disease. Variety carries an allele of Ty-3 gene. It has shown high level of resistance in field tests and artificial screening conducted by agro inoculation. Variety has an average yield potential of 60 tonnes/ha. The fruits of this variety are round and very firm with a pericarp thickness of 6 mm. Average fruit weight ranges from 80-115 g with 3-4 locules. The fruits are attractive red in colour. Recommended for cultivation in Madhya Pradesh and Maharashtra.
90	Kashi Amrit	IIVR, Varanasi	This is a determinate variety derived from inter-specific cross L. esculentum (cv. Sel. 7) x L. hirsutum f. glabratum (acc. B6013') through backcross pedigree method. Fruits are round, attractive red and fleshy with an average weight of 108 g. Suitable for cultivation during TLCV infested period. Gives an average yield of 620 q/ha.
91	Kashi Anupama	IIVR, Varanasi	This is also developed by hybridization between L. esculentum cv. 'Sel-7' and L. hirsutum f. glabratum 'B6013', following backcross-pedigree selection. Plants are determinate, fruits large, flatish round (slightly indented at blossom end of fruit), attractive red with 5-6 locules, medium maturity (75-80 days after transplanting); yield 500-600 q/ha. Recommended for release and cultivation in the states of U.P., Bihar, Delhi, Rajasthan, Gujrat and Haryana.
92	Kashi Hemanth	IIVR, Varanasi	This has been developed through pedigree selection from a cross Sel-18 x Flora Dade. The plants are determinate, fruits attractive red and

			round, weight varies from 80 to 85 g; yield 400-420 q/ha.
93	Kashi Sharad	IIVR, Varanasi	This is developed through pedigree selection from a cross MTH-6 x Kalyani Eunish. Plants are indeterminate, leaves broad, fruits attractive red, slightly oval, firm, thick pericarp, longer shelf life, weight 90 to 95 g; yield 400-500 q/ha.
94	Kashi Vishesh	IIVR, Varanasi	This variety is resistant to TLCV and has been developed using L. hirsutum f glabratum B'6013' as donor parent following backcross pedigree selection method. Plants are determinate, dark green, fruits red, spherical, size medium to large, weight of 80 g, first harvest at 70-75 days after transplanting; yield 400-450 q/ha. Recommended for release and cultivation in the states of J&K, Uttaranchal, Punjab, U.P., Bihar, Jharkhand, Chhattisgarh, Orissa, A.P., Karnataka, Tamil Nadu and Kerala.
95	Kashi Abhiman	IIVR, Varanasi	It is an ideal tomato hybrid for cultivation in Zone I (States: J&K, HP, Uttaranchal) and Zone IV (States: Punjab, UP, Bihar, and Jharkand) during mid September – March. High yield potential of 87 t/ha and 93 t/ha has been recorded at HARP, Ranchi and CITH, Srinagar respectively. Fruits are deep red in colour and mature uniformly. The fruits are firm (pericarp thickness of 0.6cm) and are ideal for long distance transportation. Recommended for release and cultivation in the states of J&K, H.P., Uttaranchal, Punjab, U.P., Bihar and Jharkhand.

Table 6 B: Tomato cultivars suitable for different zones

Zone	Recommended cultivar
All over India	Arka Saurabh, Arka Vikas, Arka Ahuti, Arka Ashish, Arka Abha , Arka Alok, HS101, HS102, HS110, Hisar Arun, Hisar Lalima, Hisar Lalit, Hisar Anmol, KS.2, Narendra Tomato 1, Narendra Tomato 2, Pusa Red Plum, Pusa Early Dwarf, Pusa

	Ruby, Co-1, CO 2, CO 3, S-12, Punjab Chhuhara, PKM 1, Pusa Ruby, Paiyur-1, Shakthi, SL 120, Pusa Gaurav, S 12, Pant Bahar, Pant T3, Solan Gola and Arka Meghali
South, East and Central India	Ustava
East and South India	Amogh
East and North India	N.S.-816
Plains of South and East	N.S.-815
Uttar Pradesh	Pusa Hybrid 1
Jammu Kashmir, Himachal Pradesh, Uttar Pradesh and Kerala.	ArkaVardan,KashiVishesh
Punjab, Bihar, and Uttar Pradesh	Vishal Arka
hill regions	Abhiman,Sioux
Assam, West Bengal, Maharashtra, East Madhya Pradesh, Tamil Nadu, and Karnataka	Arth-3
Punjab, Bihar Plains of U.P., Karnataka, Tamil Nadu and Kerala.	Arth-4
winter season for Northern plains	HS-101

2.4 National and international price trends

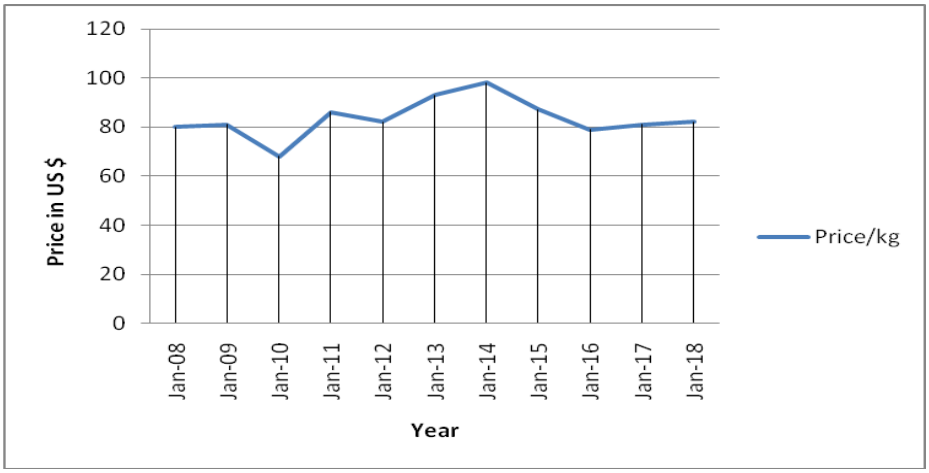
The global tomato market revenue amounted to $190.4B in 2018, rising by 6.5% against the previous year. This figure reflects the total revenues of producers and importers (excluding logistics costs, retail marketing costs, and retailers' margins, which will be included in the final consumer price). The market value increased at an average annual rate of +3.1% from 2007 to 2018; the trend pattern indicated some noticeable fluctuations being recorded in certain years. The pace of growth was the most pronounced in 2011, when the market value increased by 9.6% y-o-y. Over the period under review, the global tomato market reached its peak figure level at $196.1B in 2014; however, from 2015 to 2018, consumption remained at a lower figure.

Exports by Country

In 2018, Mexico (1.8M tonnes), distantly followed by the Netherlands (1.1M tonnes), Spain (797K tonnes), Morocco (550K tonnes) and Turkey (364K tonnes) represented the largest

exporters of tomatoes, together constituting 63% of total exports. France (287K tonnes), Belgium (220K tonnes), the U.S. (216K tonnes), Canada (191K tonnes), Azerbaijan (172K tonnes), Lithuania (157K tonnes) and China (143K tonnes) followed a long way behind the leaders.

Fig. 2: Annual Level Global Average Price of Tomato (USD/mT)



Source : *IndexBox AI Platform*

Table 7: Price of Tomato in different importing countries from India

Importing Country	Price/ton in US $			
	2016	2017	2018	2019
USA	1322.74	1479.64	1339.33	1300.35
France	1180.76	1390.00	1527.11	1364.86
U K	1524.69	1686.44	1675.18	1598.85
Russia	1062.96	1083.14	1091.47	1144.60
Canada	1610.75	2326.28	1408.71	1621.35
Netherland	1308.92	1528.13	1393.94	1363.96
Poland	1210.80	1486.21	1579.94	1539.78
Sweden	1776.41	2052.17	1980.93	1888.72
Italy	1008.69	1183.74	1128.40	1176.93
Spain	782.21	710.49	927.79	862.20
Belarus	1166.88	1293.89	1346.31	1348.52
Belgium	1604.22	1639.77	1574.63	1298.37

Source : APEDA

Table 8: State-wise Arrivals and Price trends for Tomato

State	Sept 2018 to Aug 2019		Sept 2019 to Aug 2020		Sept 2020 to Aug 2021	
	Arrivals (Tonnes)	Weighted Avg. Modal Price (Rs./Qtl.)	Arrivals (Tonnes)	Weighted Avg. Modal Price (Rs./Qtl.)	Arrivals (Tonnes)	Weighted Avg. Modal Price (Rs./Qtl.)
Karnataka	478339	1172	707196	1222	1230421	994
Maharashtra	671435	950	579894	1568	738806	1484
Uttar Pradesh	497987	1291	414165	1542	385071	1393
Gujarat	282484	1444	240821	1495	310015	1412
NCT of Delhi	247516	1385	193057	1768	215885	1514
Andhra Pradesh	134402	1166	132248	1101	134909	1261
Rajasthan	128847	1259	123450	1553	113156	1583
Chattisgarh	115822	1366	121845	1496	149644	1436
Haryana	114400	1484	105434	1594	19248	1327
Telangana	95406	1578	101172	1316	129753	1058
Odisha	86343	2220	100578	2470	58203	2427
Punjab	127609	1319	82520	1402	94814	1433
Madhya Pradesh	79911	815	79533	1146	42291	1379
Himachal Pradesh	35225	1854	74471	2219	30253	1707
West Bengal	73609	2234	63507	2583	63373	2204
Kerala	54006	2399	47057	2175	53149	2039
Uttrakhand	45555	742	42253	1403	43147	1230
Jammu and Kashmir	23740	2176	40146	2148	56065	2442
All India	3344776	1293	3270055	1526	3890099	1336

Source: Data provided by DMI

Table 9: All India monthly arrivals of tomato

Arrivals in '000 Tonnes

Month	All India Arrivals				
	2016	2017	2018	2019	2020
January	234.60	235.33	315.69	239.64	242.25
February	219.81	198.81	277.57	209.22	212.93
March	241.82	213.84	273.20	211.17	199.04
April	237.94	270.25	239.62	209.77	169.06
May	338.76	325.09	303.30	207.96	
June	291.48	277.8	338.44	228.46	
July	288.92	219.84	392.71	264.80	
August	391.04	235.16	417.35	303.75	
September	411.59	365.19	450.24	357.98	
October	385.85	327.06	443.29	351.01	
November	362.09	231.20	300.57	319.28	
December	281.27	274.73	275.37	299.16	

Table 10 : All India monthly average wholesale prices of tomato

(Prices in Rs/Quintal)

Month	2016	2017	2018	2019	2020
January	1742.0	1294.4	1705.9	1811.5	1522.2
February	1331.5	1177.5	1293.1	1552.2	1306.3
March	979.1	1279.0	1160.0	1986.2	1207.6
April	1246.9	1440.5	1140.5	2112.1	1291.9
May	2297.3	1427.5	1266.1	2747.6	
June	2995.3	2026.1	1764.2	2812.9	
July	2658.4	3983.7	2044.5	3074.8	
August	1876.0	3927.0	1750.6	2718.8	
September	1797.8	2543.5	1588.6	2236.7	
October	1839.8	2712.1	1568.5	2861.6	
November	1682.2	3537.1	1639.5	2647.1	
December	1181.1	2147.8	1399.2	1557.7	

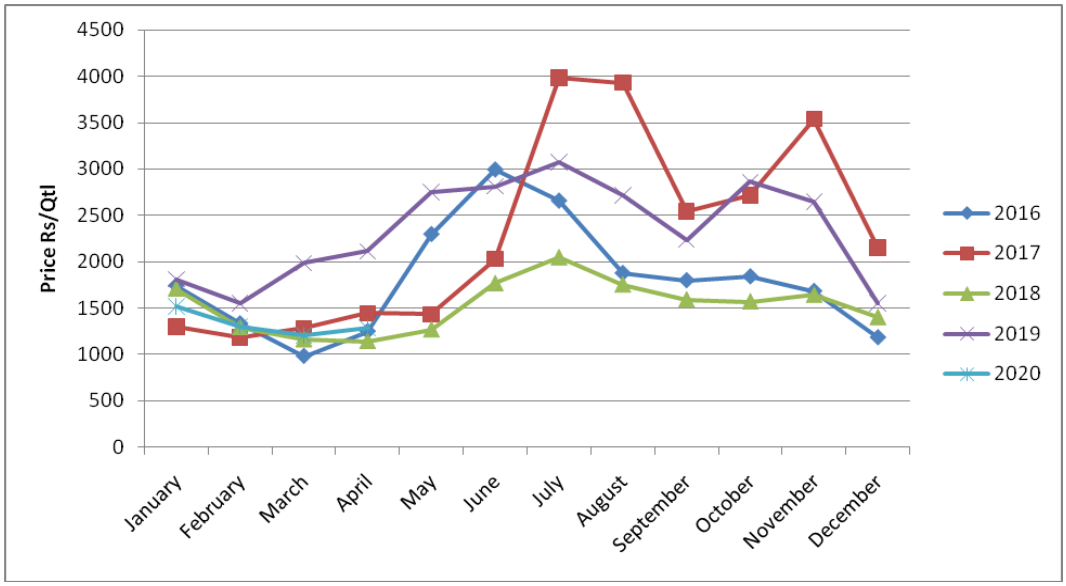


Fig. 3: All India monthly average wholesale prices of tomato

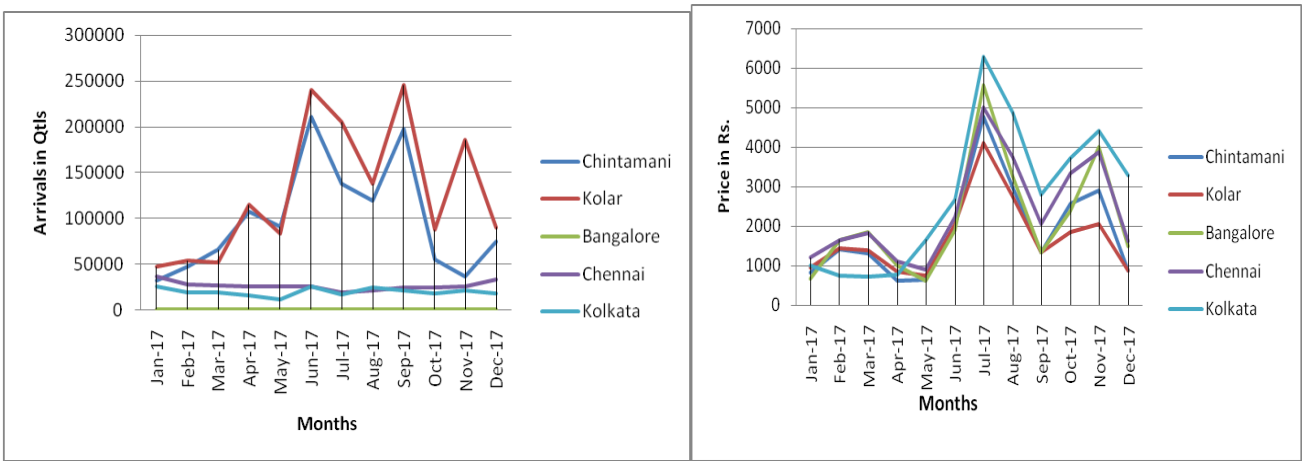


Fig 4 : Arrivals and prices of tomato in different markets during 2017

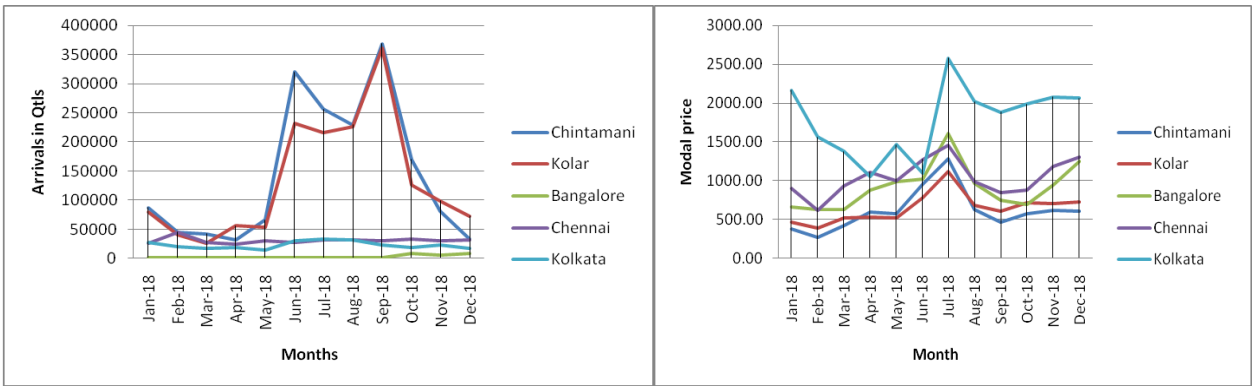
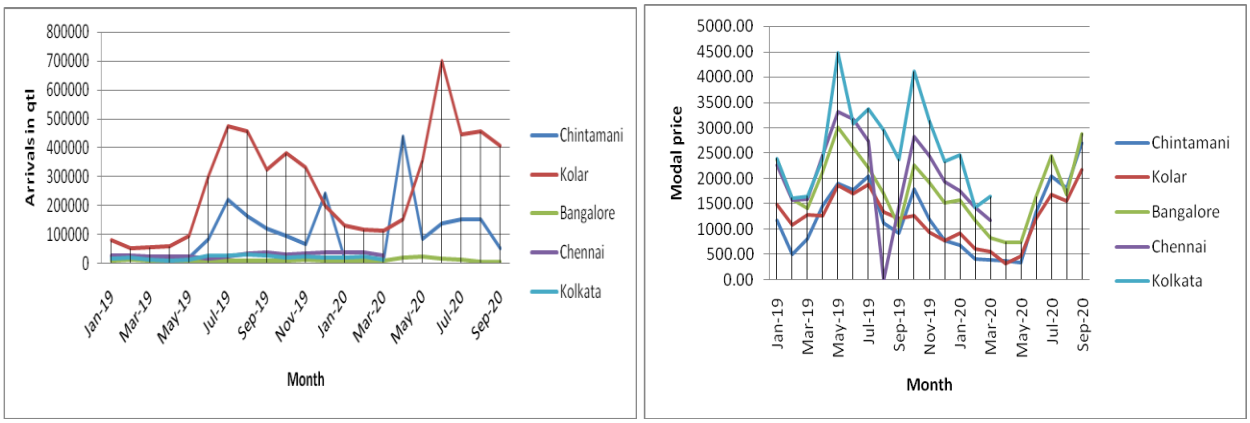


Fig 5 : Arrivals and prices of tomato in different markets during 2018



**** arrivals and prices of kolkata and chennai markets are not available after march**

Fig 6 : Arrivals and prices of tomato in different markets during 2019 and 2020

Kolar and Chintamani are the producing markets while Bengaluru, Chennai and Kolkata are the conumption markets. June and July months recoded the peak prices while September, Janruary and Februvary registered the dip in prices. Granjer causality test indicated co-integration among the markets.

3.0 POST HARVEST MANAGEMENT

3.1 Post harvest losses

Post harvest losses associated with handling of tomatoes were assessed at different levels. The levels include field, market and retailers level. At the field level, after harvest the tomatoes were sorted which includes cracks, diseased, pest damaged, rotten etc., were weighted and these losses were referred as farm level losses. The losses occurred during the transportation, handling, packaging and storage were classified, weighted and these losses considered as market level loss. Another set of segment is loss at the retailers' level, here loss occurred during loading and unloading of the tomatoes, cleaning, grading, unspent/ leftover commodity.

Total losses were observed to be 16.63 per cent consisting of 7.42 per cent at the field level, 4.32 per cent at the market level and 4.89 per cent at the retail level. In distant market (Chennai Market) a total of 7.75 per cent of fruits are lost as an act of crushing while transit.

Table11 : Post harvest losses in tomato at different stages of handling

Sl. No.	Particulars	Losses (%)	Causes of loss
1	Field level	7.42	Diseased, pests (yellowing & borer) and over ripe fruits
2	Market level	4.32	Mechanical injury, over ripe and diseased,
3	Retailers level	4.89	Mechanical injury, rotten & over ripe
Total		**16.63**	

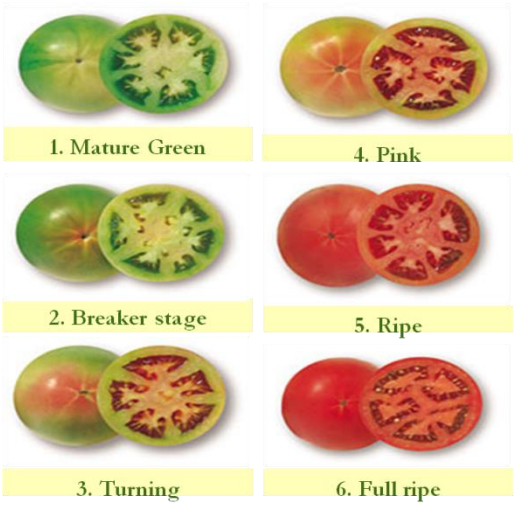
Source: Field Survey, 2019

3.2 Harvesting care

The first harvesting of plants usually starts in 75 to 90 days from planting. While considering the market distance and transport mode, tomato fruits should be harvest as follows.

A. Green stage: If you are sending tomato fruit for long distant market, then harvest at Maturity stage with green colour.
B. pink stage: The tomato should be harvested by changing the color of the green color to the pinkish appeared. It is better to send such fruits to nearby markets.
C. Maturity stage: To sell tomato in the local market, harvest after the fruit is reddish on the tree.
D. Full maturity: In this state, the fruit is fully reddish and slightly red on the tree. Such fruits are useful to make durable materials such as ketchup, sauce, soup, chutney, etc.

Provision concerning colour for Tomato fruit (AGMARK)



a. **Mature Green:** Suitable for sending to distant market
b. **Breaker stage:**<10% of the area turn pink or red
c. **Turning stage:** 10-30% area turn pink or red
d. **Pink stage:** Not fully ripe, .30 &<60 % of surface shows pink or red colour & suitable for local market.
e. **Ripe stage:** major portion of the fruit is red and the softening begins. > 60% &< 90 % surface is pink or red. It may be picked up for home or table use.
f. **Full Ripe stage:** fruit develops >90% surface colour and turns soft. It is suited for processing purposes

3.3 Grading

Grades of fruits are mostly based on the various quality attributes and not specifically on their size. For local market retailers normally do grading on the basis of size. At the producers' level, tomato is graded as Large, Medium and Small (Goli). Internal urban markets, have differential prices for size grades as against ungraded fruit. In India sorting and grading is generally done manually

During grading of fruits, damaged, rotten and cracked fruits should be removed. Only healthy, attractive, clean and bright fruits should be selected. The grades are mostly based on the condition and the quality of the fruits and not specifically on their size. However, on the basis of the size of the fruits three grades are formed: small (255 g). Retailers normally do size grading for the local market. Internal urban markets, have differential prices for size grades as against ungraded fruit. Bureau of Indian Standards has specified 4 grades viz., Super A, Super, Fancy and Commercial for tomato crop.

3.4 Common grades of tomato

Table 12 : Grade specifications

Grade	Fruit weight (g)
Small	< 100
Medium	100-255
Large	>255

3.5 Grading at producers' level and under AGMARK

Grade Designation & Quality of Tomato (AGMARK)

A. (i) Tomatoes shall be fruits obtained from varieties of *Lycopersicumesculentum* Mill of the Solanaceae family.

(ii) Tomatoes may be classified into four commercial types: Round, Ribbed, Oblong or elongated, Cherry tomatoes (including cocktail tomatoes)

B. Minimum Requirements

Tomatoes shall be

(i) (a) whole, sound and fresh in appearance;

(b) clean, free of any visible foreign matter;

(c) free of pests affecting the general appearance of the produce;

(d) free of damage caused by pests;

(e) free of abnormal moisture excluding condensation following removal from cold storage;

(f) free of any foreign smell and/or taste;

(ii) In the case of trusses of tomatoes, the stalk must be fresh, healthy, clean and free from all leaves and any visible foreign matter.

(iii) Tomatoes shall comply with the residue levels of heavy metals, Pesticides and other food safety parameters as laid down by the Codex Alimentarius Commission for exports.

Table 13 : Details of grade designation and sizing of Tomato as per AGMARK standard

Grade Designation	Grade Requirements	Provision concerning sizing	Grade Tolerances
1	2	3	4
Extra class	Tomatoes shall be of superior quality. They shall have firm flesh and must be characteristics of the variety as regards shape, appearance of the produce, the quality, the keeping quality and presentation in the package.	As per table A	5% by number or weight of tomatoes not satisfying the requirement of the grade, but meeting those of class I or exceptionally, coming within the tolerances of that grade.
Class I	Tomatoes shall be of good quality. They shall have reasonably firm flesh and shall be characteristics of the variety as regards shape, appearance and development. They must free of cracks and visible green back. The following slight defects may be there provided these do not affect the general appearance of the produce, the quality, the keeping quality and the presentation in the package. -a slight defect in shape and development. -a slight defect in colouring. -slight skin defects. -very slight bruises "ribbed" tomatoes may show. -no excessive protuberances. -small nonlignified umbilical scars.	As per table A	10% by number or weight of tomatoes not satisfying the requirements of the grade, but meeting those of class II or, exceptionally, coming within the tolerances of that grade.

	-Suberization of the stigma upto 1 sq. cm. -no more than 1 headed scar. -umbilical lignified scars not greater than 1 sq.cm or linear scar no longer than 2/3 rd of the greatest diameter of the fruit.		
Class II	Tomatoes shall be reasonably firm flesh and shall be characteristic of the variety(but may be slightly less firm than in class I) and must not show unhealed cracks. Following defects may be there provided the tomatoes retain their essential characteristics as regards the quality, the keeping quality and presentation. -defects in shape, development and colouring. - skin defects or bruises, provided the fruit is not seriously affected; - healed cracks not more than 3 cm in length. "ribbed" tomatoes may show: -more pronounced protuberances but without being misshapen. - one umbilicus. -umbilical lignified scars not greater than 2 sq. cm. - fine blossom scar in elongated form.	As per table A	10% by number or weight of tomatoes not satisfying the requirements of the grade, but meeting the minimum requirements. In case of trusses of tomatoes, 10%by number or weight of tomatoes detached from the stalk.

Grading at producers level

Year	Qty (MT)	Value (Lac)
2018-19	140.70	22.92
2019-20	8675.00	2549.68
2020-21	4640	1672

Provision concerning sizing

Sizing is determined by the maximum diameter of the equatorial section in accordance with following table. The provision shall not apply to “cherry” tomatoes. The minimum size is set at 35 mm for “round” and “ribbed” tomatoes and 30 mm for “oblong” tomatoes:

Table 14 : Details of sizing in Tomato

Size code	Diameter in mm (minimum - maximum)
1	30-34
2	35-39
3	40-46
4	47-56
5	57-66
6	67-81
7	82-101

Codex standard for processed tomato concentrates (CODEX STAN 57-1981)

A. Scope

This Standard applies to the product as defined in Section 2 below, and offered for direct consumption, including for catering purposes or for repacking if required. This Standard also applies to the product when indicated as being intended for further processing. The Standard does not include products that contain seeds and skins such as “pizza toppings” and other “homestyle” products as well as products commonly known as tomato sauce, chilli sauce, and ketchup, or similar products which are highly seasoned products of varying concentrations containing characterising ingredients such as pepper, onions, vinegar, etc., in quantity that materially alter the flavour, aroma and taste of the tomato component.

B Description

B.1 Product definition

Processed tomato concentrate is the product:
(a) prepared by concentrating the juice or pulp obtained from substantially sound, mature red tomatoes (Lycopersicon/Lycopersicum esculentum P. Mill) strained or otherwise prepared to exclude the majority of skins, seeds and other coarse or hard substances in the finished product; and
(b) preserved by physical means.
The tomato concentration shall be 7% or more of natural total soluble solids, but not dehydrated to a dry powder or flake form.

B.2 Product designation

Tomato concentrate may be considered “Tomato Puree” or “Tomato Paste” when the concentrate meets these requirements:

B.2.1 “Tomato Puree” – Tomato concentrate that contains no less than 7% but less than 24% of natural total soluble solids.

B.2.2 “Tomato Paste” – Tomato concentrate that contains at least 24% of natural total soluble solids.

C.1 Essential composition and quality factors

C.1 Composition

C.1.1 Basic Ingredients

Processed tomato concentrate as defined in Section 2.1.

C.1.2 Other Permitted Ingredients

(a) salt (sodium chloride) in accordance with the Standard for Food Grade Salt (CODEX STAN 150-1985);

(b) spices and aromatic herbs (such as basil leaf, etc.) and their natural extracts;

(c) lemon juice (single strength or concentrated) used as an acidulant; and

(d) water.

C.2 Quality criteria

Processed tomato concentrates shall have good flavour and odour, fairly good red colour, and shall possess a homogeneous (evenly divided) texture, characteristic of the product.

C.2.1 Definition of Defects

Processed tomato concentrates shall be prepared in accordance with good manufacturing practices (GMP), from such materials and under such practices that the product is substantially free of extraneous plant materials, this including other objectionable material and shall be practically free of mineral impurities. Consistent with its intended use, these conditions are fulfilled when:

(a) the product is practically free of objectionable tomato peel;

(b) the product is practically free of seeds or particles of seeds;

(c) the presence of any extraneous plant material other than seed and peel and other than those used as seasonings cannot be detected by the naked eye, and can only be seen under microscope; and

(d) the product is practically free of dark specks or scale-like particles.

C.2.2 Defects and Allowances

C.2.2.1 Mineral impurities3

The mineral impurity content does not exceed 0.1% of the natural total soluble solids content.

C.2.2.2 Lactic Acid

The content of lactic acid (total) does not exceed 1% of the natural total soluble solids content.

C.2.2.3 Mould Count

Mould count for processed tomato concentrates to be set according to the legislation of the country of retail sale.

C.2.2.4 pH

The pH must be below 4.6.

C.3 Classification of "defectives"

A container that fails to meet the natural total soluble solids requirements, as set out in Section 2.2, and/or one or more of the applicable quality requirements, as set out in Section 3.2, should be considered as a "defective".

C.4 Lot acceptance

A lot should be considered as meeting the applicable quality requirements referred to in Section C.2 when:

(a) the number of "defectives", as defined in Section 3.3, does not exceed the acceptance number of the appropriate sampling plan with an AQL of 6.5; and 3 Sand, soil and any other impurities insoluble in hydrochloric acid.

(b) the maximum allowance for mould count is not exceeded (see Section 3.2.2.3).

These acceptance criteria do not apply to non-retail containers.

D Food additives

Table 16 : D.1 Acidity regulators

INS No.	Name of the Food Additive	Maximum Level
300	Ascorbic acid, L-	GMP
330	Citric acid	GMP
331 (i)	Sodium dihydrogen citrate	GMP
331(i)	Trisodium citrate	GMP
332(i)	Potassium dihydrogen citrate	GMP
323(ii)	Tripotassium citrate	GMP
333(iii)	Tricalcium citrate	GMP
380	Triammonium citrate	GMP

507	Hydrochloric acid	GMP
514 (i)	Sodium sulfate	GMP
515 (i)	Potassium sulfate	GMP
575	Glucono delta-lactone	GMP
577	Potassium gluconate	GMP
578	Calcium gluconate	GMP
580	Magnesium gluconate	

E Contaminants

E.1 The products covered by this Standard shall comply with the maximum levels of the General Standard for Contaminants and Toxins in Food and Feed (CODEX STAN 193-1995).

E.2 In order to consider the concentration of the product, the determination of the maximum levels for contaminants shall take into account the natural total soluble solids, the reference value being 4.5 for fresh fruit.

E.3 The products covered by this Standard shall comply with the maximum residue limits for pesticides established by the Codex Alimentarius Commission.

E.4 In order to consider the concentration of the product, the determination of the maximum pesticide residue limits shall take into account the natural total soluble solids, the reference value being 4.5 for fresh fruit.

F Hygiene

F.1 It is recommended that the products covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of the Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969), and other relevant Codex texts such as codes of hygienic practice and codes of practice.

F.2 The products should comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

G Weights and Measures

G.1 Fill of container

G.1.1 Minimum Fill

The container should be well filled with the product which should occupy not less than 90% (minus any necessary head space according to good manufacturing practices) of the water capacity of the container. The water capacity of the container is the volume of distilled water at 20^{o} C which the sealed container will hold when completely filled.

G.1.2 Classification of "Defectives"

A container that fails to meet the requirement for minimum fill of Section 7.1.1 should be considered as a "defective".

G.1.3 Lot Acceptance

A lot should be considered as meeting the requirement of Section 7.1.1 when the number of "defectives", as defined in Section 7.1.2, does not exceed the acceptance number (c) of the appropriate sampling plan with an AQL of 6.5.

H Labeling

H.1 The product covered by the provisions of this Standard shall be labeled in accordance with the General Standard for the Labeling of Prepackaged Foods (CODEX STAN 1-1985). In addition, the following specific provisions apply:

H.2 Name of the product

The name of the product shall be:

(a) "Tomato Puree" if the food contains not less than 7% but less than 24% natural total soluble solids;
(b) "Tomato Paste" if the food contains not less than 24% natural total soluble solids;
(c) Another denomination usually employed in the country accompanied by the declaration of the percentage of the natural total soluble solids; or
(d) If an added ingredient, as defined in Section 3.1.2, alters the flavour characteristic of the product, the name of the food shall be accompanied by the term "flavoured with X" or "X flavoured" as appropriate.

H.3 declaration of the percentage of natural total soluble solids
The percentage solids may be included on the label in either of the following manners:

(a) The minimum percentage of natural total soluble solids (example: "Minimum Solids - 20%").

(b) A range within 2% of the natural total soluble solids (example: "Solids - 20% to 22%").

The provisions in this Section do not apply to non-retail containers.

H.4 Labeling of non-retail containers

Information for non-retail containers shall be given either on the container or in accompanying documents, except that the name of the product, lot identification, and the name and address of the manufacturer, packer, distributor or importer, as well as storage instructions, shall appear on the container. However, lot identification, and the name and address of the manufacturer, packer, distributor or importer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

I Methods of analysis and sampling

Table 17: Methods of analysis and sampling

Provision	**Method**	**Principle**	**Type**
Fill of containers	CAC/RM 46-1972 (for glass containers) (Codex general method for processed fruit and vegetables) and ISO 90.1:1999 (for metal containers) (Codex general method for processed fruit and vegetables)	Weighing	**I**
Lactic acid	EN 2631:1999	Enzymatic determination	**II**
Mineral impurities (sand)	AOAC 971.33 (Codex General Method for processed fruits and vegetables)	Gravimetry	**I**
Mould count	AOAC 965.41	Howard mould count	**I**
pH	NMKL 179:2005	Potentiometry	**II**
	AOAC 981.12		**III**
Sodium Chloride	ISO 3634:1979 expressed as sodium chloride (Codex General Method)	Potentiometry	**III**
Tomato soluble solids	AOAC 970.59	Refractometry	**I**

Determination of water capacity of containers (CAC/RM 46-1972)

1 Scope

This method applies to glass containers.

2 Definition

The water capacity of a container is the volume of distilled water at 20°C which the sealed container will hold when completely filled.

3 Procedure

3.1 Select a container which is undamaged in all respects.

3.2 Wash, dry and weigh the empty container.

3.3 Fill the container with distilled water at 20°C to the level of the top thereof, and weigh the container thus filled.

4 Calculation and expression of results

Subtract the weight found in 3.2 from the weight found in 3.3. The difference shall be considered to be the weight of water required to fill the container. Results are expressed as ml of water.

3.6 A Packaging & its details

For export purpose, tomato is first packed in consumer packs of LDPE or PP (polypropylene). Twenty consumer packs of 250 gm are placed in a 5 Kg CFB box.

Table 15: Specification details for Corrugated Fiber Board (CFB) Boxes for packing Tomato for Exports

Sl. No.	Specification	Slide Type	Ring *Flap Tuck-In-Type	RSC(REGULAR SLOTTED CONTAINER)	Tray with LID
1.	Material for construction	5-ply CFB	5-ply CFB	5-ply CFB	5-ply CFB
2.	Grammage (g/m sq.) (outer to inner)	*230X140 X140X140	*230X140 X140X140	*230X140 X140X140	*230X140 X140X140
3.	Bursting strength kg/cm sq.	Min. 10.00	Min. 10.00	Min. 10.00	Min. 10.00
4.	Puncture resistance inches/teat inch	Min..250	Min..250	Min..250	Min..250
5.	Compression strength Kg.	Min.350	Min.350	Min.350	Min.350
6.	Cobb (30 minutes g/m sq.)	Max.130	Max.130	Max.130	Max.130

*Outer ply of white duplex board

Source: Post- Harvest Manuals on Export of Fruits, APEDA, New Delhi.

3.6 B Packaging

For local markets, the fruits are packed in plastic crates. Plastic crates can be conveniently stacked one on the other and a contoured rim keeps the product safe and natural and allows sufficient air circulation. The packing should ensure careful handling i.e. rigid enough to protect the fruits from being crushed.

For exports, the fruits are packed in cardboard telescopic boxes with capacities of not more than 15 kg, should be used. Size graded tomatoes are pattern packed in layers to make best use of the box.

3.7 Transportation

Tomatoes are highly perishable in nature hence quick means of transportation is necessary. Tomatoes are transported by road through tractors, trucks and also by rail and air to distant markets. Village produce is transported to the near by towns and city market only by road.

3.8 Storage facilities

The main objective in storage after harvest is to control the rate of ripening to extend the marketing period. As the tomatoes are chilling sensitive, the recommended storage temperatures differ depending on the fruit maturity. A storage temperature of13^0 C with 90-95% relative humidity is recommended for slow ripening. At this temperature, most varieties keep in good condition for 2-3 weeks and change colour very slowly. In cold storage, unripe tomatoes can be stored for 4 weeks at a temperature of 8-10 ^{0}C with 85-90 % relative humidity. Fully ripe fruits are stored at 7^0 C with 90% relative humidity for 1 week.

<u>Rural godowns</u>

In India where small and marginal farmers constitute major farming community, do not have the facility to retain the farm products with themselves till the market prices are favourable. It is very much essential to provide them with facilities for scientific storage so that to avoid produce deterioration and enable them to meet their credit requirement. An establishment of rural godowns will enable small and marginal farmers to increase their holding capacity which will make them to sell their produce at remunerative prices and avoid distress sales. Accordingly, Gramin Bhandaran Yojana, a Capital Investment Subsidy Scheme for Construction / Renovation / Expansion of Rural Godowns has been introduced by Govt. of India.

The project for construction of rural godowns can be taken up by individuals, farmers, group of farmers/Growers, Partnership/ Proprietary firms, Non-Government Organizations (NGO's), Self Help Groups(SHGs), Companies, Corporations, Co-operatives, Agricultural Produce Marketing Committees, Marketing Boards and Agro Processing Corporations in the

entire country. Assistance for renovation/ expansion of rural godowns will however, be restricted to the godowns constructed by cooperatives only.

State wise distribution of Cold Storage capacity

Top potato producers of Uttar Pradesh and West Bengal make up 55-56 per cent of the overall domestic cold storage capacity (Table 18). Currently, 95% of the cold storages are owned by the private sector, 3% by cooperatives and the remaining 2% by the public sector undertakings. There is need to develop system to gather information regarding stock position on real time basis for efficient utilisation of capacity.

Table 18: State wise distribution of cold storage as on 31.08.2020

S. No.	State	No. of Cold Storage	Capacity (million Tonnes)	Percent Capacity
1.	Uttar Pradesh	2406	14.71	39.32
2.	West Bengal	514	5.95	15.89
3.	Gujarat	969	3.82	10.21
4.	Punjab	697	2.32	6.19
5.	Andhra Pradesh & Telangana	405	1.57	4.19
6.	Bihar	311	1.48	3.95
7.	Madhya Pradesh	302	1.29	3.46
8.	Maharashtra	619	1.01	2.70
9.	Haryana	359	0.82	2.19
10.	Karnataka	223	0.68	1.81
11.	Rajasthan	180	0.61	1.63
12.	Others	1201	3.17	8.46
	Total	**8186**	**37.43**	**100.00**

Source: National Horticulture Board (NHB), National Horticulture Mission (NHM), Horticulture Mission for North East & Himalayan (HMNEH) & Ministry of Food Processing Industries (MoFPI)

Pledge Finance

The farmers keeping their produce in the storage structure will be eligible to avail pledge loan on hypothecation of their produce. the terms and condition governing pledge loans viz. margin, rate of interest, period of pledge, amount etc. will be as per the guidelines issued by RBI / NBARD and as per normal banking practices followed by the financial institutions.

In order to discourage distress sale by farmers and to encourage them to store their produce in warehouses against warehouse receipts, benefit of applicable interest subvention will be available to banks for extending credit support to small and marginal farmers having Kisan Credit Card against negotiable warehouse receipt for keeping their produce in warehouses.

4.0 MARKETING PRACTICES AND CONSTRAINTS

4.1 Assembling: Assembling is the first step in marketing of farm produce. It involves collection of small surpluses from number of small farms scattered over large areas and bulking the same for subsequent distribution in volume.

The agencies involved in the assembling of tomato are as follows:

a. Farmers
b. Commission agents
c. Wholesalers
d. Retailers
e. Processors
f. Exporters

Most of the tomatoes are produced in Andhra Pradesh, Orissa, Karnataka and Maharashtra.

- The major markets of tomatoes are Kurnool, Prakasam, Bangalore, Belgaum, Nasik, Pune, Sangli and Nagpur.
- From above markets tomatoes reach markets of Mumbai, Bhopal, Lucknow, Delhi etc for further distribution.

4.2 Export and Import

Table 18 :Export of tomato and tomato products

	(Tomatoes, Fresh/Chilled)		Tomato Seeds		Tomatoes, Prepared/Preserved Otherwise Than By Vinegar		Tomatoes Whole Or In Pieces	
Triennium	**Quantity (MT)**	**Value (in Lakh rupees)**	**Quantity (MT)**	**Value (in Lakh rupees)**	**Quantity (MT)**	**Value (in Lakh rupees)**	**Quantity (MT)**	**Value (in Lakh rupees)**
TE 2003-04	8541.24	668.83	0.00	0.00	98.12	46.43	155.82	45.28
TE 2007-08	60060.49	6595.68	38.15	1095.06	95.36	47.68	154.06	49.86
TE 2010-11	98783.70	11533.72	49.19	1646.71	135.74	110.97	238.84	71.32
TE 2013-14	345737.81	62142.37	72.40	4501.01	306.56	284.49	759.48	244.25
TE 2016-17	304635.76	64835.08	84.43	10593.98	478.21	240.36	624.98	284.50
TE 2020-21	93957.30	24241.56	207.65	16910.36	427.53	412.41	-	-
CAGR (2001-2017)	**38.71**	**50.12**	**12.62**	**29.58**	**12.31**	**16.94**	**14.07**	**16.35**

Table 19 : Export of Tomato Ketchup/Sauces

Year	Quantity (t)	Value (Rs. Lakh)	Remarks
2016-17	3573.74	4167.21	Steady export
2017-18	3242.41	3446.18	
2018-19	3308.25	3182.91	
2019-20	3467.61	3438.21	
2020-21	4277.27	5902.32	

Table 20: Import of Tomato Ketchup/Sauces

Year	**Quantity (t)**	**Value (Rs. Lakh)**	**Remarks**
2016-17	3036.65	1885.52	Import has come down
2017-18	995.55	703.52	
2018-19	574.38	495.65	
2019-20	640.94	498.50	
2020-21	662.19	773.29	

Table 21: Monthly export of Tomato

Month	**2018**		**2019**		**2020**	
	Value in Rs. Crore	**Qty in Tons**	**Value in Rs. Crore**	**Qty in Tons**	**Value in Rs. Crore**	**Qty in Tons**
January	5.32	3042	7.89	3095	19.24	9683
February	3.73	2330	4.45	1723	10.25	6379
March	4.25	2451	3.52	2593	6.36	4364
April	3.83	2747	2.61	2026	3.67	2837
May	4.11	2863	3.07	1764	2.04	756
June	6.18	2798	4.39	2216	7.73	2678
July	17.16	6134	16.18	6273		
August	23.99	8973	18.8	7493		
September	40.82	15922	28.26	11019		
October	76.2	24163	21.93	8197		
November	57.21	22835	53	17947		
December	16.38	5954	37.97	15638		
Total	**259.18**	**100212**	**202.07**	**79984**	**49.29**	**26698**

Source: DGCI&S

4.3 Sanitary and Phytosanitary Requirements

Sanitary and phytosanitary (SPS) measures are measures to protect humans, animals, and plants from diseases, pests, or contaminants.

Efficient quality control and food safety is most important in improving the export potential in India. These efforts will help in achieving the quality standards of foreign countries comprising of European and other developed countries.

WTO provided an International framework by adopting Sanitary and Phytosanitary Measures (SPS). Sanitary and Phytosanitary standards, as covered under the SPS agreement include health, hygiene standards or regulations to avoid the spread of animal and plant diseases and epidemics. These have been adopted by the Codex Alimentarius Commission (CAC) of Food and Agriculture Organization (F.A.O.) and World Health Organization (W.H.O.)

WTO member countries are encouraged to use International standards by framing their own laws, regulations, etc. India being member of W.T.O, is also adopting these regulations.

The SPS measure is applied in various ways to protect animal and plant life or health within the territory of the member countries from risk arising from --

- The entry, establishment or spread of pest, disease or any disease causal organisms.
- The additives, contaminants, toxins or disease causing organisms on food stuffs.
- The disease carried by animals, plants or their products.

By Sanitary and Phytosanitary (SPS) Agreement, the signatory country can lay down rules and regulations for the protection of life and health of human beings. The signatory country is allowed to maintain a higher level of SPS protection than the international standards provided it conforms to the following basic principles:-

I. The SPS measure should not lead distortion in trade.
II. The SPS measure should not create any barrier in trade.
III. The SPS measure should also conform to scientific principles and standards accepted internationally.

Under SPS measure, the standard should be applied in such a way that a minimum level of protection can be achieved by importing country.

During export, in order to make the plant/seeds free from any quarantine pests and diseases, the exporter should give a dis-infection treatment by keeping the viability of the plant/seeds unaffected.

The dis-infection treatment before shipment should be carried out by authorized expert/technical personnel since the above process is hazardous. To assure the pest free product, the dis-infection treatment should be done just before shipment of produce.

In this process, the exporter has to apply to the officer in-charge for Phyto-Sanitary Certificate (PSC) in the prescribed form at least 7–10 days in advance of the export. Before submitting the application for PSC, it is to be ensured that the cargo is treated properly by any licensed PCO to avoid any last minute detention by the P.Q. authority who is authorized to issue P.S.C.

During import, no consignment of agricultural products is permitted to be imported without Phytosanitary Certificate, issued by authorized officer in-charge of Department of Agriculture and Co-operation.

4.4 Export procedure

Exporters should seriously consider having the freight forwarder handle the formidable amount of documentation that exporting requires; freight forwarders are specialists in this process. The following documents are commonly used in exporting; which of them are actually used in each case depends on the requirements of both our government and the government of the importing country.

1. Commercial invoice

2. Bill of lading

3. Consular invoice

4. Certificate of origin

5. Inspection certification

6. Dock receipt and warehouse receipt

7. Destination control statement

8. Insurance certificate

9. Export license

10. Export packing list

STEP1: Enquiry:

The starting point for any Export Transaction is an enquiry.

An enquiry for product should, inter alia, specify the following details or provide the following data

Size details - Std. or oversize or undersize

Drawing, if available

Sample, if possible

Quantity required

Delivery schedule

Is the price required on FOB or C& F or CIF basis

Mode of Dispatch - Sea, air or Sea/air

Mode of Packing

Terms of Payment that would be acceptable to the Buyer - If the buyer proposes to open any Letter of Credit, any specific requirement to be complied with by the Exporter

Is there any requirement of Pre-shipment inspection and if so, by which agency

Any Certificate of Origin required - If so, from what agency.

STEP 2: - Proforma generation:

After studying the enquiry in detail, the exporter - be it Manufacturer Exporter or Merchant Exporter - will provide a Proforma Invoice to the Buyer.

STEP 3: Order placement:

If the offer is acceptable to the Buyer in terms of price, delivery and payment terms, the Buyer will then place an order on the Exporter, giving as much data as possible in terms of specifications, Part No. Quantity etc. (No standard format is required for such a purchase order)

STEP 4: Order acceptance:

It is advisable that the Exporter immediately acknowledges receipt of the order, giving a schedule for the delivery committed.

STEP 5: Goods readiness & documentation:

Once the goods are ready duly packed in Export worthy cases/cartons (depending upon the mode of despatch), the Invoice is prepared by the Exporter.

If the number of packages is more than one, a packing list is a must.

Even If the goods to be exported are excisable, no excise duty need be charged at the time of Export, as export goods are exempt from Central Excise, but the AR4 procedure is to be followed for claiming such an exemption.

Similarly, no Sales Tax also is payable for export of goods.

STEP 6: Goods removal from works:

There are different procedures for removing Export consignments to the Port, following the AR4 procedure, but it would be advisable to get the consignment sealed by the Central Excise authorities at the factory premises itself, so that open inspection by Customs authorities at the Port can be avoided.

If export consignments are removed from the factory of manufacture, following the AR4 procedure, claiming exemption of excise duty, there is an obligation cast on the exporter to provide proof of export to the Central Excise authorities

STEP 7: Documents for C & F agent:

The Exporter is expected to provide the following documents to the Clearing & Forwarding Agents, who are entrusted with the task of shipping the consignments, either by air or by sea.

- Invoice
- Packing List
- Declaration in Form SDF (to meet the requirements as per FERA) in duplicate.
- AR4 - first and the second copy
- Any other declarations, as required by Customs

On account of the introduction of Electronic Data Interchange (EDI) system for processing shipping bills electronically at most of the locations - both for air or sea consignments - the C&F Agents are required to file with Customs the shipping documents, through a particular format, which will vary depending on the nature of the shipment. Broad categories of export shipments are:

Under claim of Drawback of duty

Without claim of Drawback

Export by a 100% EOU

Under DEPB Scheme

STEP 8: Customs Clearance:

After assessment of the shipping bill and examination of the cargo by Customs (where required), the export consignments are permitted by Customs for ultimate Export. This is what the concerned Customs officials call the ‘LET EXPORT’ endorsement on the shipping bill.

STEP 9: Document Forwarding: After completing the shipment formalities, the C & F Agents are expected to forward to the Exporter the following documents:

Customs signed Export Invoice & Packing List

Duplicate of Form SDF

Exchange control copy of the Shipping Bill, processed electronically

AR4 (original duplicate) duly endorsed by Customs for having effected the Export

Bill of Lading or Airway bill, as the case may be.

STEP 10: Bills negotiation:

With these authenticated shipping documents, the Exporter will have to negotiate the relevant export bill through authorized dealers of Reserve Bank, viz., Banks.

Under the Generalized System of Preference, imports from developing countries enjoy certain duty concessions, for which the exporters in the developing countries are expected to furnish the GSP Certificate of Origin to the Bankers, along with other shipping documents.

Broadly, payment terms can be:

DP Terms or DA Terms

Letter of Credit, payable at sight or payable at... days.

STEP 11: Bank to bank documents forwarding:

The negotiating Bank will scrutinize the shipping documents and forward them to the Banker of the importer, to enable him clear the consignment.
It is expected of such authorized dealers of Reserve Bank to ensure receipt of export proceeds, which factor has to be intimated to the Reserve Bank by means of periodical Returns.

STEP 12: Customs obligation discharge:
As indicated above, Exporters are also expected to provide proof of export to the Central Excise authorities, on the basis of the Customs endorsements made on the reverse of AR4s and get their obligation, on this score, discharged.

STEP 13: Receipt of Bank certificate:

Authorized dealers will issue Bank Certificates to the exporter, once the payment is received and only with the issuance of the Bank Certificate, the export transaction becomes complete.

It is mandatory on the part of the Exporters to negotiate the shipping documents only through authorized dealers of Reserve Bank, as only through such a system Reserve Bank can ensure receipt of export proceeds for goods shipped out of this country.

Agri export zones

The policy for setting up of Agri Export Zones was announced by the Ministry of Commerce, Govt. of India on the 31st March, 2001 with the primary objective of boosting agri exports from the country. The Agricultural and Processed Food Export Development Authority (APEDA) under Ministry of Commerce, Govt. of India was appointed as the nodal agency to promote the setting up of such zones. The zones are a block / group of blocks or a district / group of districts. Agri export zones are specific geographical areas that have their own competitive advantages in production, processing or marketing of a specific agricultural produce including tomato.

In an AEZ (Agri Export Zone), there is no physical demarcation of boundaries and it provides a focused approach on agricultural export completely. It is primarily based on the principles of 'convergence', 'partnership' and 'focus'.

Table 22: AEZ for Tomato

Product	State	Districts covered
Tomato	Punjab	Fatehgarh Sahib, Patiala, Sangrur, Ludhiana and Ropar, Abohar, Bhatinda, Muktsar & Hoshiarpur

4.5 Marketing constraints and suggestions

Following are the constraints faced by the tomato growers:

- Lower price during harvesting time
- Lack of storage facility
- Lack of transportation facility
- Absence of assured marketing at remunerative price and insurance facility
- Problems of marketing in remote areas
- Manipulation by merchants

5.0 MARKETING CHANNELS, COSTS AND MARGINS

5.1 Marketing channels

I. Producer ⟶ Commission Agent/Wholesaler ⟶ Retailer ⟶ Consumer (Local Market)

II. Producer ⟶ Wholesaler/Commission Agent ⟶ Retailer ⟶ Consumer (Distant market)

5.2 Marketing Costs and Margins

Table 23 : Input use pattern in cultivation of tomato (Rs/acre)

Inputs	Hybrids
Seedlings	3763.914
Mulching	2643.75
Stakes	2450.298
Threads	2863.244
FYM	2931.101
Chemical fertilizers	9631.696
Bio-fertilizers	2257.113
Weedicide	4017.634
PPC	10522.32
Fertigation cost	3484.375
TOTAL	44565.45

Table 24: Operation wise-labour use pattern in tomato cultivation (Per acre)

Operations	Hybrids	
	No.	Rs
Ploughing	1.27	355.77
FYM	9.82	2482.98
Fertilizer application	11.59	2566.47
Land preparation for irrigation	6.46	1933.60
Transplanting	16.74	3647.22
Staking	15.30	4171.36
Threading	18.31	3419.77
Mulching	17.29	5305.36
Interculturing and weeding	20.43	3986.76
PPC	21.08	4224.63
Harvesting	28.47	5990.33
Others	3.17	762.61
Total	**169.93**	**38846.86**

Table 25: Cost of cultivation structure of tomato growers (Rs/ ac)

SL. No.	Cost	Hybrids
A	Material input cost	44565.45
B	Labour cost	42226.32
C	Marketing cost (Commission charges, transportation cost and others)	52473.55
D(A+B+C)	Total variable cost	139265.32
E	Total fixed cost (Depreciation, land revenue, amortized drip cost)	25285.55
F (D+E)	TOTAL COST OF CULTIVATION	164550.87

Table 26: Yield and returns from tomato cultivation

Yield and Returns	Other Hybrids
Yield (Kg/ac)	17474.93
Gross returns (Rs/ac)	226115.91
Total cost (Rs/ac)	164550.87
Net returns (Rs/ac)	61565.04
Cost of Production (Rs/kg)	9.42
Price received (Rs/kg)	13.15
BC Ratio	1.37

6.0 ALTERNATE SYSTEM OF MARKETING

Market reform initiatives

Agriculture Produce Market Committee (APMC)Act

Agricultural marketing reforms were introduced through the APMC Act 2003. The Act:

- provides for direct sale of farm produce to contract farming sponsors;
- provides for setting up "Special Markets" for "Specified Agricultural Commodities" – mostly perishables;
- permits private persons, farmers and consumers to establish new markets for agricultural produce in any area;
- requires a single levy of market fee on the sale of notified agricultural commodities in any market area;
- replaces licensing with registrations of market functionaries which would allow them to operate in one or more different market areas;
- provides for the establishment of consumers' and farmers' markets to facilitate direct sale of agricultural produce to consumers, and
- provides for the creation of marketing infrastructure from the revenue earned by the APMC

Realizing the need for reforms in the Agri-marketing sector, the Government has been playing an advocacy role and actively pursuing with the States and UTs to amend their marketing laws on lines of the Model APMC Act, 2003/ Rules, 2007 and of many subsequent advisories in order to promote, inter-alia, competition and transparency in sale transactions of agricultural produce by enhancing the number of active traders and reducing middlemen/ traders monopoly and cartels, so as to enhance farmer's share in consumer's rupee.

The APMC Act provides some freedom to the farmers to sell their produce directly to the contract-sponsors or in the market set up by the private entities. But it has two limitations. First, the contract-sponsors or the private entities setting up markets are required to pay the market fees to the notified APMCs, even if they provide no service. Second, though the model APMC Act

provides for the creation of markets by private sector, it is inadequate to create competition. The owner of the private market still collects the APMC fees- taxes, for and on behalf of the APMC, in addition to the fee that he might charge for providing trading platform and other services, like loading unloading, weighing etc

Table 27: Status of market Reforms

Sl. No.	Area of Reform	States which have amended their APMC Act in this area	States which have notified the necessary Rules in this area
1.	Establishment of private market yards/ private markets managed by a person other than Market Committee.	Andhra Pradesh, Arunachal Pradesh, Assam, Gujarat, Goa, Himachal Pradesh, Karnataka, Maharashtra, Mizoram ,Nagaland, Odisha (excluding for paddy / rice), Rajasthan, Sikkim, Tripura, Punjab, UT of Chandigarh, Jharkhand and Uttarakhand. Total-18 States/UT	Andhra Pradesh, Gujarat, Goa, Himachal Pradesh, Karnataka, Maharashtra, Mizoram, Odisha, Rajasthan and Jharkhand. Total-10 States/UT
2.	Direct purchase of agricultural produce from agriculturist by Processor/ Bulk buyer/ Bulk retailer/ exporter, etc	Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Gujarat, Goa, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Nagaland, Rajasthan, Sikkim, Tripura, Punjab (only in Rule), UT of Chandigarh (only in Rule), Jharkhand and Uttarakhand. Total-19 States/UT U.P. (Only for bulk purchase under executive order issued time to time)	Andhra Pradesh, Goa, Chhattisgarh, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Punjab, Maharashtra, Mizoram, Rajasthan, UT of Chandigarh, Jharkhand and Uttarakhand. Total-14 States/UT
3.	To promote and permit e-trading,	Andhra Pradesh, Gujarat, Jharkhand, Haryana, H.P., Karnataka, Rajasthan, Sikkim, Goa, Madhya Pradesh, Maharashtra (under Rule 5) (Direct Marketing license granted to Commodity Exchanges registered under FMC), Mizoram, Odisha (Under private market provision) and Uttarakhand. Total-14 States	Andhra Pradesh, Gujarat, Jharkhand, H.P., Karnataka, Rajasthan, Goa, Madhya Pradesh, Maharashtra and Odisha. Total-10 States
4.	Establishment of farmers/ consumers	Arunachal Pradesh, Assam, Gujarat, Goa, Himachal Pradesh,	Gujarat, Goa, Himachal Pradesh, Karnataka,

	market managed by a person other than a market committee (Direct sale by the producer)	Karnataka, Maharashtra, Mizoram, Nagaland, Rajasthan, Sikkim, Tripura, Jharkhand and Uttarakhand. Total-13 States	Maharashtra, Mizoram, Rajasthan, and Jharkhand. Total-07 States
5.	Contract Farming Provision	Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Madhya Pradesh, Mizoram, Nagaland, Odisha, Punjab (separate Act), Rajasthan, Sikkim, Tripura and Uttarakhand. Total-20 States	Andhra Pradesh, Odisha, Goa, Gujarat, Chhattisgarh, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Madhya Pradesh and Rajasthan. Total- 12 States
6.	Single point levy of market fee	Andhra Pradesh, Rajasthan, Gujarat (for processor, grader, packer, value addition and exporter), Goa, Himachal Pradesh, Karnataka, Madhya Pradesh, Nagaland, Sikkim, UT of Chandigarh, Punjab, Mizoram, Jharkhand and Uttarakhand. Total-14 States/UT	Andhra Pradesh, Rajasthan, Gujarat, Goa, Himachal Pradesh, Karnataka, Madhya Pradesh, UT of Chandigarh, Punjab, Mizoram and Jharkhand. Total-11 States/UT
7.	Single registration/ license for trade / transaction in more than one market	Andhra Pradesh (in Rules only), Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka (in Rules only), Rajasthan, Madhya Pradesh, Maharashtra, Mizoram Nagaland, Sikkim and Jharkhand. Total-13 States/UT	Andhra Pradesh, Goa, Chhattisgarh, Gujarat, Himachal Pradesh, Karnataka, Rajasthan, Madhya Pradesh, Maharashtra, Jharkhand. Total-10 States/UT

Unified National Agricultural Market

The Agricultural Produce Market Committee Act has been restrictive regarding trading of produce within the state. Under APMC Act, states are divided and local markets are created (mandis), with farmers selling their produce through auction in the mandi. To operate in the mandi, the trader needs a license. Wholesalers, traders and food processing companies cannot buy the produce directly from the farmers and they have to go through the mandi.

Recently, Department of Agriculture and Cooperation under the Ministry of Agriculture emphasized on creating a Unified Market that is well-integrated across the nation to increase the

net returns of the farmer. The budget speech of Finance Minister for 2015 announced the establishment of a "Unified National Agriculture Market." This prompted Department of Agriculture and Cooperation (DAC) to formulate the Central Sector Scheme for Promotion of National Agriculture Market through Agri-Tech Infrastructure fund (ATIF) via provision of common e-platform. This e-platform will be deployed in 585 regulated wholesale markets in States/Union Territories (UTs) which will be implemented by Small Farmers Agribusiness Consortium (SFAC), and a budgetary provision of approximately 31.5 million USD will be spent over the next three years (2015-16 to 2017-18).

The States/UTs need to undertake intra-state reforms- (i) a single license to be valid across the state, (ii) single-point market fee, and (iii) electronic auction for price discovery, to be eligible for being part of this scheme. Successful formulation and implementation of this market will require active participation of the State Governments. If this happens, it is expected to serve the interest of the farmers and the agricultural sector by creating greater direct participation at the farmer level as middle agent involvement will be eliminated from the supply chains.

Karnataka is the first state which has taken steps in this direction and around 51 market yards/sub yards (mandi), among 155 main market yards and 354 sub-yards, have been integrated with single-licensing system. It offers modern facilities for grading, dissemination of prices for different grades of the commodities in different market yards along with electronic auction platform. There is further possibility of reducing intra-state price differences by expanding the single registration to the remaining yards/ sub-yards.

Status of implementation of e-NAM

- So far 1000 markets in 18 states and 3 UTs have implemented e-NAM through e-platform trading at APMC/state level
- Among th130 commodities approved, Banana, Pomegranate, Apple, Mandarin, Sweet oranges, **Tomato**, Onion, Potato and some vegetables are included under e-NAM
- In the two selected APMCs-Palamner and Madanapalle in Andhra Pradesh where tomato is traded in e-NAM Platform, the recommended practices for e-NAM trading are partially implemented
- Farmers are benefited by the slightly higher price (Rs.4-5/q), reduced commission (4% compared to 10%) and subsidy on crates

- The net returns for the farmers were significantly higher (32%) due to significant reduction in marketing cost (34.15%).
- Traders are benefited by the reduced market fee (0.75% against 1%)
- Non-awareness of e-NAM Platform, non-implementation of online payment, lack of market intelligence are the major constraints in adoption of e-NAM by the farmers as well as the traders

Marketing Information and Extension

The prices of tomato are published in the leading newspapers of each state and also are being covered in radio and television programmes. The concerned state agricultural marketing department collects the information on arrivals and prices of tomato on daily basis in all major markets where the commodity is being traded. The information so collected is being regularly uploaded on the website "https://agmarknet.gov.in" and also on the website of respective state agricultural marketing department/ board. For example, krishimaratavahini.kar.ic.in publishes price and arrival information on agricultural/horticultural crops including tomato.

ICAR-Indian Institute of Horticultural Research, Bengaluru, Karnataka, is the national level research institute under Indian Council of Agricultural Research, working on fruits, vegetables, flowers, medicinal crops and mushrooms. The tomato production technology is disseminated by ICAR-IIHR to state agricultural departments, state agricultural universities, KVKs, and other stakeholders engaged in agricultural extension. The institute also conducts training of state government agriculture/horticulture officers, farmers on production technology vegetables in general and tomato in particular, post harvest technology of fruit and vegetable products and entrepreneurship development programmes (EDP) for different stakeholders. Agricultural Technology Information Cenres (ATIC) at different ICAR Institutes and SAU provide solutions to the problems of the farmers pertaining to cultivation, marketing and processing of agricultural/horticultural crops including tomato. Further, ATIC in ICAR and SAUs also provide seed and planting materials required by the stakeholders.

7.0 INSTITUTIONAL FACILITIES

Marketing related schemes of Govt. and Public sector organizations:

Some of the schemes of Central Govt. and public sector organizations which are in operation for benefit of farmers and others are given as under:

Table 28 : Schemes of Central Govt. and public sector organizations which are in operation for benefit of farmers and others

Sl. No.	Scheme	Name of the organization	Facilities of scheme
1.	Capital Investment Subsidy for Construction / modernization expansion of cold storage and Storage's for Horticulture produce subsidy	NATIONAL HORTICULTURE BOARD, Ministry of Agriculture, Govt of India, 85, Institutional Area, Sector – 18, Gurgoan - 122015 (Haryana)	►To promote setting up of cold storages / storages in the country for reducing post harvest losses. ► Creation of Cold chain infrastructure for farm to the consumers and modernization/rehabilitation of cold storages.
2.	AGMARK Grading and Standardization	DIRECTORATE OF MARKETING AND INSPECTION (DMI), Head Office, CGO Complex , H-IV. Faridabad –121 001.	► Grading of agricultural commodities.
3.	Scheme for Development / Strengthening of Agricultural Marketing Infrastructure, Grading & Standardization	- do -	► To provide additional agricultural marketing infrastructure to cope up with the large expected marketable surpluses of agricultural and allied commodities including dairy, poultry, fishery, livestock and minor forest produce. ►To promote competitive alternatives in agricultural marketing infrastructure by inducement of private and cooperative sector investments that sustain incentives for quality and enhanced productivity thereby improving farmers' income. ►To strengthen existing agricultural

			marketing infrastructure to enhance efficiency. ► To promote direct marketing so as to increase market efficiency through reduction in intermediaries and handling channels, thus enhancing farmers' income. ►To provide infrastructure facilities for grading, standardization and quality certification of agricultural produce so as to ensure price to the farmers commensurate with the quality of the produce. ►To promote grading, standardization and quality certification system for giving a major thrust for promotion of pledge financing and marketing credit, introduction of negotiable warehousing receipt system and promotion of forward and future markets so as to stabilize market system and increase farmers' income. ►To promote direct integration of processing units with producers. ►To create general awareness and provide education and training to farmers, entrepreneurs and market functionaries on agricultural marketing including grading, standardization and quality certification.
4.	Schemes for Market Development	AGRICULTURAL & PROCESSED FOOD PRODUCTS EXPORT DEVELOPMENT AUTHORITY (Ministry of Commerce, Govt. of India), NCUI Building 3, Siri Institutional Area, August Kranti Marg,	►Provide development of packaging, standards and design. ►Assistance to exporters for use of packaging material as per standards and specifications developed or adopted by APEDA. ►Assistance to Exporters, Producers, Growers, service providers, Co-operative Organizations etc. For purchase of "Intermediate Packaging Material" for domestic transportation of produce. ►Development and dissemination of market information data base on products,

		New Delhi - 110 016	infrastructure, markets and pre-feasibility surveys / study etc. ►Assistance to exporters, growers organizations, trade associations for conducting surveys, feasibility studies etc. ►Assistance to Semi Government, State Government, Public Sector Undertakings for Conducting surveys, feasibility studies etc. ►Supply of material, samples, product literature, development of website, advertisement etc, for publicity and market promotion for fairs / events organised / sponsored by APEDA. ►Publicity & promotion through preparation of product literature, Publicity material, advertisement, film etc by APEDA. ►Brand publicity through advertisement etc. ►Export promotion by APEDA undertake activities like buyer-seller meet, Product promotion, exchange of delegations, participation in Exhibitions / Fairs / Events etc.
5.	Scheme for Infrastructure Development	MINISTRY OF FOOD PROCESSING INDUSTRIES Panchsheel Bhawan, August Kranti Marg New Delhi -110049	► Food Park, Packaging Centre, Modernized Abattoirs, Integrated Cold Chain Facilities, Value Added Centre, Irradiation Facilities.

Institutional Credit Facilities

Agricultural credit is disbursed in the form of short term, medium term, long term loans through multi agency network consisting of –

- ✓ Commercial Banks (CBs)
- ✓ Regional Rural Banks (RRBs)
- ✓ Co-operatives

Table 29 : Institutional credit facilities which are available for marketing / post harvest operations of agro commodities

Name of scheme	Eligibility	Facility
Produce Marketing Loan Scheme	All the categories of farmers i.e., small / marginal / others are eligible	This type of loan is given upto 1 lakh against pledge/ hypothecation of agricultural produce (including warehouse receipts) for a period not exceeding 6 months.
Kissan Credit Card Scheme	All types of agricultural clients having good track record for last two years are eligible.	Kissan credit card is valid for 3 years through which the barrower / farmer can meet his production and other contingency needs by using easy convenient withdrawal slips. The minimum credit limit is Rs.3000/- and based on operational land holding, cropping pattern and scale of finance
Crop Loan	All categories of farmers i.e, Small / Marginal and others are eligible	Provides financial assistance to meet cultivation expenditure for various crops
Agricultural Term Loans	All categories of farmers and agricultural labourers are eligible for this loan provided they should possess the necessary experience in this activity.	It is provided to the activities i.e., land development, minor irrigation, farm mechanization, horticulture, dairying, etc.
Self-help Groups (SHGs) Linkage Credit Programme	S.H.Gs are the self managed homogeneous groups of economically backward people who promote savings among themselves and can pool their agricultural activities	Self-help groups are supplemented by bank credit when these groups gain experience
National Agricultural Insurance Scheme (NAIS)	**On compulsory basis:** All farmers producing notified crops and availing Seasonal Agricultural Operations (SAO) loans from financial institutions i.e. loanee farmers.	Provides insurance coverage and financial support to the farmers in case of failure of any notified crop due to any natural calamities, pests and diseases.

	On voluntary basis: All other farmers (Non loanee farmers) producing notified crops.	It also encourages the farmers to adopt progressive farming high value inputs and high agricultural technology. Besides, it helps to stabilize the farm income during disaster years.

Organizations / Agencies Providing Marketing Services

Table30 : Govt., Semi-Govt. and State Govt. organizations provide and assist in marketing services.

Sl. No.	Organizations and its website	Service provided
1.	Directorate of Marketing and Inspection (DMI), Head Office, CGO Complex N.H.IV. Faridabad –121 001. Website: www.agmarknet.nic.in	►To promote grading of agricultural produce under the Agricultural Produce (Grading & Marking) Act, 1937. ►To facilitate the construction of marketing infrastructure of agricultural produce. ►To render advice on statutory regulation, development and management of agricultural markets by states / U.Ts. ►Marketing research, surveys and planning ►To train personnel in agricultural marketing
2.	Agricultural and Processed Food Export Development Authority (APEDA), Head Office, 4, Siri Institutional Area, Opp. Asiad Village, August Kranti Marg, New Delhi-110016 Website: www. apeda.com	►Promote export of agricultural commodities and it's products to foreign countries. ►Adopting standards and specifications for the purpose of export of schedule products
3.	National Horticulture Board, Plot No-85, Sector18, Institutional Area, Gurgaon-122015 Website: www. hortibizindia.nic.in	►To develop post harvest infrastructural facilities of horticultural commodities
4.	Ministry of Food Processing Industries(MOFPI), Panchsheel Bhawan, New Delhi. Website: www. mofpi.nic.in	►Grant and support for food park component which in turn also help in setting up of Agri Export Zone.

5.	National Agricultural Cooperative Marketing Federation of India Ltd.(NAFED) Head Office, 1, Siddarth Enclave, Ashram Chowk, Ring Road, New Delhi. Website: www.nafed-India.com	►To act as a nodal agency for implementing the market intervention scheme to avoid glut situation and price craze.
6.	State Marketing Boards at State Capitals.	►Regulation management and development of marketing in concerned state. ►To implement different schemes on agricultural marketing. ►To co-ordinate functioning of all market committees. ►Grading of agricultural produce. ►Publicity on regulated marketing of agro produce.
7.	Agricultural Produce Market Committees(APMCs) at different regulated markets of different states.	►For better marketing of agricultural produce the APMC provide the following facilities : ►Providing grading, weighing and storage facilities of produce, brought to APMC complexes.

8.0 UTILIZATION

8.1 Processing and uses: The India tomato processing market is currently experiencing strong growth. The majority of the tomatoes produced in the country are consumed fresh with the remaining being processed into products such as tomato paste, tomato juice, tomato sauce, tomato ketchup, etc. Driven by rising disposable incomes and westernization of food consumption patterns, the fast food industry has been witnessing strong growth in the country. Processed tomato products such as tomato ketchup are commonly served with food products such as burgers, sandwiches, pizza, fries, etc. Moreover, processed tomato products such as tomato paste and tomato sauce also have wide application in various Indian cuisines. Some of the other factors driving the tomato processing market in India include convenience, longer shelf life, urbanization, changing food habits, growth in the organized retail sector, etc. Other tomato products which are in the markets are: Tomato dried slices, tomato crush (ICAR-IIHR technology), tomato puree etc.

9.0 DO'S AND DON'TS

Do's	Don'ts
✓ **Use fully ripe tomatoes for processing**	χ **Don't use raw tomatoes for processing**
✓ **Aseptic packaging is preferred**	χ **Avoid transportation of ripe and over ripe fruits**
✓ **Harvesting of semi ripe/ breaker stage for long distance transport**	χ **Transportation of tomato in heaps should be avoided**
✓ **Transportation in crates**	χ **Avoid tomatoes with less than 4^0 brix and lower lycopene content**
✓ **Uniformly ripened fruits to be used for processing**	
✓ **Water washing before processing**	

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Appendices

State-wise Progress of AMI (Storage Infrastructure) including Erstwhile GBY

Since inception w.e.f. 01.04.2001& up to 31.03.2022

S. No.	State	No. of projects	Storage Capacity (in MT)	Subsidy Released (Rs. Lakh)
1	Andhra Pradesh	1444	5816670	29303.71
2	Arunachal Pradesh	1	945	6.30
3	Assam	346	1067157	6659.78
4	Bihar	1089	715539	3018.15
5	Chhattisgarh	600	1953611	7372.00
6	Goa	1	299	0.94
7	Gujarat	11970	4964855	27995.05
8	Haryana	2284	6818374	38871.69
9	Himachal Pradesh	88	30826	180.77
10	Jammu & Kashmir	15	88027	709.79
11	Jharkhand	37	183708	814.92
12	Karnataka	4674	3941516	19387.07
13	Kerala	209	105903	539.55
14	Madhya Pradesh	4617	13749757	71724.49
15	Maharashtra	3698	7035176	29225.43
16	Meghalaya	16	21012	186.75
17	Mizoram	1	302	2.52
18	Nagaland	36	32814	354.38
19	Odisha	695	1019830	4191.55
20	Punjab	1761	6814459	23516.33
21	Rajasthan	1594	3123742	10585.51
22	Tamilnadu	1202	1436730	5205.06
23	Telangana	857	5023442	25292.72
24	Tripura	5	28764	296.61
25	Uttar Pradesh	1182	5600154	18074.01
26	Uttarakhand	291	786272	3467.72
27	West Bengal	2565	1619834	5093.98
Total		**41278**	**71979718**	**332076.78**

State-wise Progress of AMI (Other than storage infrastructure) including Erstwhile AMIGS SchemeSince inception w.e.f. 20.10.2004 & upto 31.03.2022

S. No.	State	No. of projects	Subsidy Released (Rs. Lakh)
1.	Andhra Pradesh	379	7102.90
2.	Assam	13	573.52
3.	Chhattisgarh	339	6688.92
4.	Delhi	1	30.41
5.	Goa	1	50.00
6.	Gujarat	8815	22844.76
7.	Haryana	7	137.70
8.	Himachal Pradesh	62	1640.18
9.	Jharkhand	1	0.00
10.	Karnataka	835	8975.19
11.	Kerala	372	6254.84
12.	Madhya Pradesh	1264	33761.78
13.	Maharashtra	1568	43965.50
14.	Manipur	17	0.00
15.	Mizoram	1	2.52
16.	Nagaland	72	1422.33
17.	Odisha	20	852.13
18.	Punjab	2074	26920.31
19.	Rajasthan	557	9853.39
20.	Sikkim	1	15.52
21.	Tamil Nadu	1811	5361.95
22.	Telangana	711	11489.05
23.	Uttar Pradesh	3	872.00
24.	Uttarakhand	7	1002.26
Total		**18931**	**189817.16**

Details of mandis and traders registered on eNAM, in different States/UTs

State/ UT	*Mandies*	Traders	FPOs	Farmer	No. of Unified licenses issued by State
Andhra Pradesh	33	3483	177	1445806	3,483
Chandigarh	1	114	0	7106	0
Chhattisgarh	14	3126	22	135253	36
Gujarat	122	9444	110	869102	9,444
Haryana	81	14486	243	2725243	35
Himachal Pradesh	19	2015	56	124506	0
Jammu and Kashmir	2	237	4	957	0
Jharkhand	19	2315	120	247554	104
Karnataka	2	662	13	1455	662
Kerala	6	354	7	2792	35
Madhya Pradesh	80	22378	104	3007337	1,070
Maharashtra	118	21548	268	1217277	0
Odisha	41	7504	208	285380	7,504
Puducherry	2	181	2	13529	0
Punjab	37	2611	10	217427	1
Rajasthan	144	82924	189	1500993	82,924
Tamil Nadu	63	6375	108	312051	3,768
Telangana	57	5803	62	1823790	5,803
Uttar Pradesh	125	35157	271	3315390	90
Uttarakhand	16	4738	44	54329	4,738
West Bengal	18	3994	171	49819	33
Total	1000	229,449	2189	17,357,096	1,19,730

Source: https://enam.gov.in/

State wise progress of market reforms

State/ UT	Limiting regulation within APMC Yard	Separation of Powers between Dir(Mktg.) & MD, Mandi Board	Single unified trading license	Single Point levy of Market fee	Private Wholesale market	Direct marketing (Outside mandi)	Declaring warehouse, silos / cold storages, as deemed market	e-trading	Deregulation of marketing of F&V
Andhra Pradesh	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Arunachal Pradesh	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Assam	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bihar	No APMC Act								
Chhattisgarh	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Goa	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gujarat	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Haryana	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
HP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Jharkhand	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Karnataka	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kerala	No APMC Act								
MP	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Mah.	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Manipur	No APMC Act								
Meghalaya	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mizoram	No	No	Yes	Yes	Yes	Yes	No	Yes	No
Nagaland	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Odisha	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Punjab	No	No	Yes	Yes	Yes	Yes	No	Yes	No
Rajasthan	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Sikkim	No	No	Yes	Yes	Yes	Yes	No	Yes	No
Tamil Nadu	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Telangana	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Tripura	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
UP	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Uttarakhand	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
West Bengal	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes
Delhi	No	No	No	No	No	No	No	No	Yes
Chandigarh	No	No	Yes	Yes	Yes	Yes	No	Yes	No
Puducherry	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
J&K	No APMC Act								
Laddakh									
A&N Islands									
DNH									
Daman & Diu									
Lakshdeep									

Source: DMI (updated on 14.07.2020)

Export of tomato fresh or chilled

Country / Region	Values in Rs. Lacs		Quantity in thousands	
	2020-2021	2021-2022	2020-2021	2021-2022
BANGLADESH PR	12,425.81	12,858.91	42,722.67	45,509.27
NEPAL	2,707.44	3,847.59	24,013.20	36,215.44
U ARAB EMTS	5,185.61	1,448.57	12,386.76	3,953.60
BHUTAN	318.98	1,046.24	1,127.61	3,194.52
QATAR	1,323.72	1,006.99	3,089.73	2,381.62
MALDIVES	702.72	926	1,579.02	1,868.98
OMAN	1,325.66	236.95	2,956.90	870.56
SINGAPORE	10.75	7.13	36.39	20.71
BAHARAIN IS	55.1	5.19	133.35	23.02
Total	**24,298.13**	**21,387.88**	**88551.98**	**94042.0**

Source: Ministry of Commerce, GOI.

Export of Tomatoes whole or in pieces

Country / Region	Values in Rs. Lacs		Quantity in thousands	
	2020-2021	2021-2022	2020-2021	2021-2022
GERMANY		58.3		102.07
ESTONIA	2.5	7.59	1.2	14.88
BELARUS	1.22	6.62	1.2	11.85
GEORGIA		3.54		6.53
ISRAEL	2.72	1.74	3.6	3.08
BHUTAN	0.18	0.46	0.05	0.35
U S A	8.96	0.18	5.89	0.33
FRANCE	6.26		3.4	
NEPAL	16.4		24.11	
Total	**38.4**	**78.57**	**39.62**	**139.17**

Source: Ministry of Commerce, GOI.