

## Onion Supply Chain Analysis: Constraints and Way Forward

Dr Sohan Premi<sup>1</sup> and Dr B R Premi<sup>2</sup>

**Onion is one of the closely monitored agricultural commodities produced in India. Prices of onion have direct bearing on the common man's consumption basket. Therefore, this commodity is always in focus of the Government. Though there is always a surplus production, fluctuating domestic and export demand often creates demand supply mismatch leading to spiral effect on the prices of onion. The prices sometimes fall below cost of production making it uneconomical for the farmers. Govt. of India uses Minimum Export Price (MEP) as a tool to ensure regulated exports so that there is an adequate supply of onion in the domestic market. Effective crop planning and creation of post-harvest management infrastructure for onion will go a long way to solve the issues related to onion supply chain.**

### Introduction

India is the second largest producer of onion in the world after China with an annual production of 20.93 million metric tonne (MMT) from an area of 1.32 million hectare (2015-16). The country is also the major consumer of onion with an annual demand of 16.50 - 18.00 MMT. Onion is grown and consumed all over the country and is an important constituent of Indian daily diet. We export its considerable quantity to countries like Malaysia, Singapore, Sri Lanka, Bangladesh, Pakistan, Indonesia, UK, Gulf countries, etc. Our exports generally hover around 1.00 MMT per annum. But spiralling price of onion is always a cause for concern. The prices rise sky high in years of deficit production and nose dip when there is glut. Therefore, onion is generally referred as a high risk, high return crop for the farmers and traders. Onion prices have direct bearing on the common man's consumption basket. This article is an attempt to analyse issues afflicted with supply chain of onion and possible measures to address them.

### Volume of Production, Price and Value

India produced 20.93 MMT of onion worth ₹3,7235.62 crore during 2015-16. Maharashtra is the leader in production, followed by Madhya Pradesh, Karnataka and other states. These three states contribute around 58 per cent of onion production of the country.

The production of onion was only 1.20 MMT in 1961, which went up to 5.20 MMT in 2001, scaling 4 times growth in 4 decades. After slump in 2002 (4.2 MMT), there was spurt in growth and the production climbed up to 20.93 MMT scaling around 5 times growth only

**Table 1. Production and value of onion in India during 2015-16**

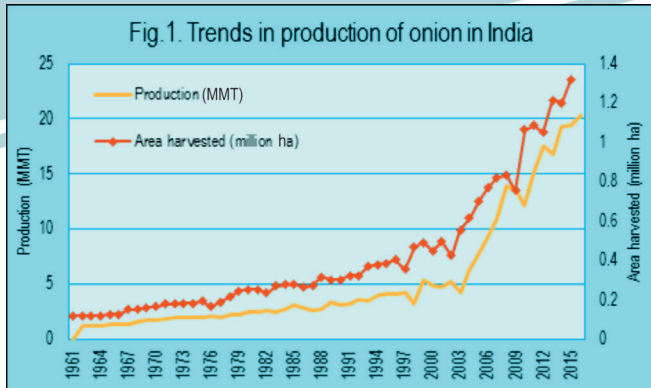
State	Area ('000 ha)	Production ('000 MT)	Yield (MT/ha)	Average Price (₹/MT)	Value (₹ crore)
Maharashtra	522.35	6529.34	12.50	17797.00	11620.27
Madhya Pradesh	118.20	2848.00	24.09	10939.00	3115.43
Karnataka	190.21	2695.99	14.17	17133.00	4619.04
Rajasthan	86.31	1435.11	16.63	17734.00	2545.02
Gujarat	53.20	1355.78	25.48	16321.00	2212.77
Bihar	54.03	1247.34	23.09	30572.00	3813.37
Andhra Pradesh	45.02	885.42	19.67	19248.00	1704.29
Haryana	30.65	705.80	23.03	20116.00	1419.79
Uttar Pradesh	24.96	422.75	16.94	20510.00	867.06
Telangana	20.87	395.96	18.97	14777.00	585.11
Tamil Nadu	36.73	380.95	10.37	15343.00	584.49
Odisha	33.45	378.58	11.32	26970.00	1021.03
Others	104.15	1650.22	15.84	18955.00	3127.95
Total	1320.13	20931.25	15.86		37235.62

Source: National Horticulture Research and Development Foundation, Nashik ([www.nhrdf.com](http://www.nhrdf.com))

within 15 years period. Frequent slump in production (Fig.1.) was witnessed during 1997, 2000, 2002, 2009, 2012 & 2014, mainly because of reduction in sowing area, unseasonal rains, drought, etc. There was a good growth in area and production after 1990 with very high growth after 2002. The high production was primarily due to area expansion. However, productivity remained almost stagnant during the last 50 years. The main reason for fluctuation in production can be attributed to unplanned sowing of crop in the subsequent season after realising better prices in a particular season. Therefore, crop planning and demand driven cultivation may help in ensuring uniform growth in production of onion.

<sup>1</sup>Assistant General Manager, Department of Economic Analysis and Research, NABARD, Mumbai.

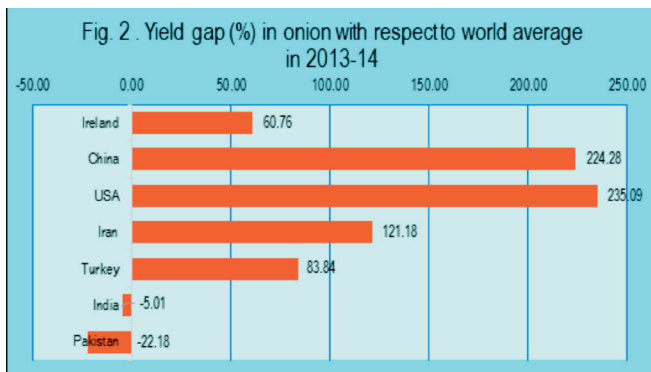
<sup>2</sup>Vice President, NABARD Consultancy Services (NABCONS), Mumbai, Views are personal.



Source: FAOSTAT

## Yield Gap

India has the potential to overtake China in production of onion, but its low productivity is a cause for concern. Our productivity (15.86 MT/ha) is nearing world average of 16.69 MT/ha, but it is low in comparison to the leaders in productivity like USA (55.94 MT/ha), China (54.14 MT/ha), Iran (36.93 MT/ha), Turkey (30.70 MT/ha) and Ireland (26.84 MT/ha). Fig. 2 depicts percentage gap in productivity vis-a-vis world average. The main reasons for low productivity in India are low mechanisation, low irrigation, unseasonal rains and occurrence of other natural calamities like drought. The yield gap is also due to poor adoption of technology and variation in cultivars.

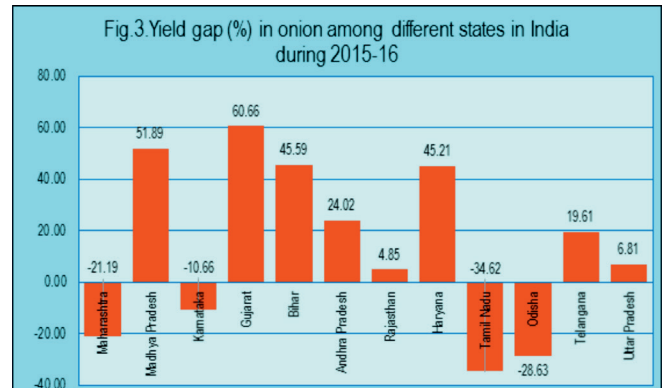


Source: Agmarknet

There is also a large variation in productivity of onion across the states in India. Maharashtra (12.50 MT/ha) has productivity lower than the national average. The states like Gujarat (25.48 MT/ha), Madhya Pradesh (24.09 MT/ha), Bihar (23.09 MT/ha), Haryana (23.03 MT/ha), Andhra Pradesh (19.67 MT/ha), Telangana (18.97 MT/ha), Uttar Pradesh (16.94 MT/ha), etc., have higher than national average productivity (Table 1). Fig.3 reveals that the productivity of onion in states like Maharashtra, Karnataka, Tamil Nadu and Odisha is much below the national average (15.86 MT/ha).

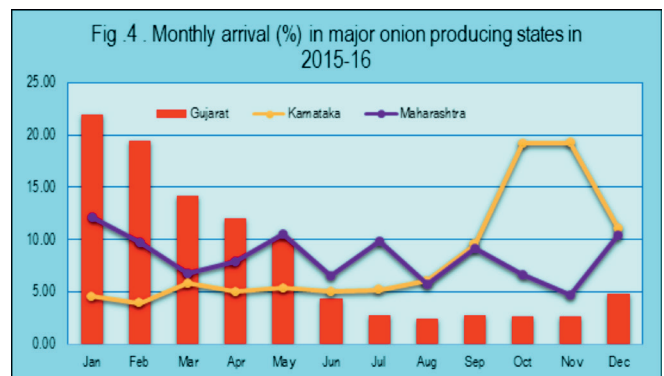
## Seasonality vs. Demand Supply Mismatch

Onion is harvested round the year, however, more than 60 per cent of the production comes from Rabi season. The major part is harvested during March to



Source: National Horticulture Research and Development Foundation, Nashik ([www.nhrdf.com](http://www.nhrdf.com))

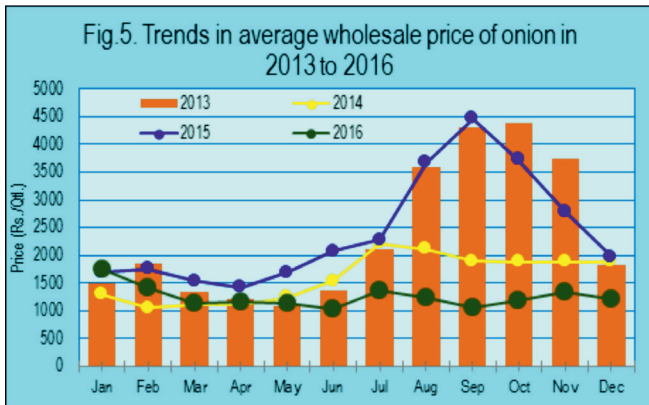
May in Maharashtra and Gujarat. Fig.4 depicts monthly arrival trends in major markets of three major states, viz., Maharashtra, Karnataka and Gujarat. It may be seen that the share of arrivals was maximum during January - March in Gujarat. The arrival in Maharashtra has shown lots of fluctuation. The Kharif harvest starts from September till December. The maximum arrival in Karnataka was reported during September to December. There was a lean season during June - July - August, when storability of onion was poor. Though surplus production is stored in temporary onion storage structures, it is generally sold off quickly by the farmers to realise immediate income. Therefore, the stock of onion starts declining after June, resulting in price rise. The problem is aggravated due to increased spoilage under high humidity conditions after onset of monsoon. It forces farmers to sell off onion due to fear of spoilage during rainy season.



Source: Agmarknet

## Price Fluctuation

Onion is one of the closely monitored commodities in India. Due to its highly volatile prices, GoI during May 2014 brought onion under the Essential Commodities Act, 1955 imposing stock holding limits. Fig.5 depicts wide variation in average wholesale prices during last 4 years. The prices remained quite high in 2013 & 2015, especially during July to December. Average wholesale prices fell sharply during 2014 below ₹1500/Qt. After some improvement during 2015, the onion prices



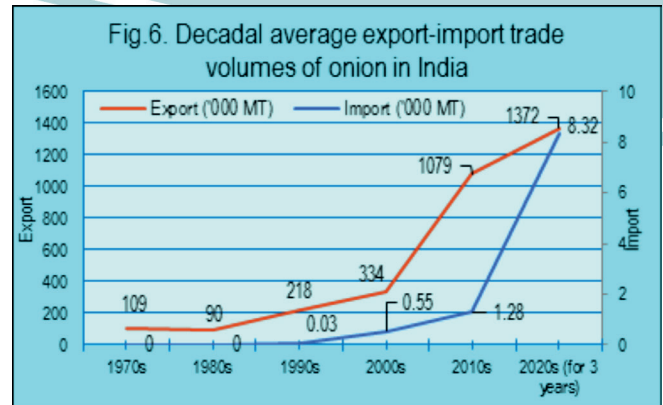
Source: Agmarknet

crashed in 2016 below 2014 prices. This spiral effect of onion prices led to heavy losses to the farmers. While the middlemen take advantage of price movements, it affects farmers and consumers badly. Efforts need to be made to ensure smooth movement of prices in onion to protect farmers from losses. The high fluctuation in prices of onion can be attributed to hoarding by traders with expectation of price rise, higher retailers' mark up, changes in MEP by Government and lack of proper forecasting system.

### Export - Import Trade and Government Regulation

Fig.6 represents export-import trade of onion in India. The export of onion has gone up from 0.3 MMT during 2000<sup>th</sup> to 1.3 MMT in 2010<sup>th</sup> decade. Though import of onion had gone up, the quantum is very small about 8000 MT. Therefore, India is a net exporter of onion. In order to stabilise the prices in the domestic market, Department of Commerce, Ministry of Commerce & Industry regulates export of onion under Foreign Trade (Regulation & Development) Act, 1992. During December 2010, the export of onion from India was totally banned; the ban was, however, lifted in February 2011, when supply stabilised. Thereafter, the export of onion was permitted and the Department of Commerce introduced the mechanism of "Minimum Export Price (MEP)" for onion. Whenever, the exports need to be brought down, the Government prescribes MEP, below which no exports can take place. The MEP is increased, decreased or lifted by Government from time to time to make sure that the price in the domestic market remains under control. During 2015, the Government increased MEP from \$250 Free on Board (FOB) per MT in April to \$425 FOB per MT in June, which was increased to \$700 FOB per MT in August and reduced to \$400 FOB in December. The MEP was finally lifted in the last week of December 2015 and since then onion is being exported freely.

The GoI has also created a Price Stabilisation Fund (PSF) with corpus of ₹500 crore. PSF is utilised by GoI to procure onion through its nodal agencies National



Source: FAOSTAT

Agricultural Cooperative Marketing Federation of India Ltd. (NAFED) and Small Farmers' Agribusiness Consortium (SFAC) for market intervention, when the prices rise due to short supply. During 2014-15 the Govt. had procured 8000 MT through these agencies.

### Demand and Supply in India

During 2015-16, the total demand for onion went upto 18.01 MMT (13.89 MMT direct consumption both in rural and urban areas based on NSSO 2013 household consumption expenditure & 30% indirect use) from a mere 15.71 MMT in 2009-10. India produced enough onion, leaving a record surplus of about 2.92 MMT. Surplus onion was exported to a number of other countries.

Sr. No.	Particulars	Rural	Urban	Total
A	Estimated Population (million)	948.24	365.11	1313.35
B	Direct consumption			
	Per capita (Kg/month)	0.842	0.951	
	Monthly requirement (MMT)	0.80	0.35	1.15
	Annual Requirement (MMT)	9.68	4.21	13.89
C	Indirect use			4.12
	Total domestic demand (MMT)			18.01
D	Total Supply (MMT)			20.93
E	Surplus (MMT)			2.92

Source: NSSO 2013 Household Consumer Exp. Survey & Census of India 2011

### Supply Chain Constraints

- There is a poor post-harvest management at farm level. The storage structures popularly known as "Kanda Chawl" promoted by Maharashtra State Agricultural Marketing Board jointly with NABARD and NRC, Onion & Garlic are not adequate. Storage structures for 3.9 MMT onion are available in Maharashtra as against production of 6.52 MMT.
- Sprouting of onion during storage in high humidity and low light conditions is a major constraint leading to huge losses to the farmers/ traders. Irradiation, a cold preservation method is highly effective in controlling sprouting of onion. Govt. of India had approved irradiation of onion, potato and spices



in 1994 for internal marketing and consumption. Department of Atomic Energy (DAE) has set up two 500 kg/hr capacity demonstration plants at Lasalgaon and Navi Mumbai. Commercial units have also been set up in Karnataka and Rajasthan. More such facilities need to be created to arrest large spoilage of onion in the country.

- There is a dearth of cold chain infrastructure for onion. It should be stored at low temperature (2°C) and 75-80% RH condition. Onion requires special type of cold storage having facility for maintaining desired humidity during storage, drying of onion after off-loading at 20-25°C to avoid sweating (moisture accumulation on the surface) leading to faster decay. Onion can also be stored for a long period without any spoilage under ultra-low oxygen controlled atmosphere (CA) storages.
- Onion can be processed to paste and dried products like powder, flakes and grits. There are about 75 onion dehydration units in Gujarat (86% in Mahuva, Bhavnagar) and one large export oriented dehydration unit at Jalgaon. India produces about 65,000 MT of dehydrated onion, of which 85 per cent is exported. The local demand for processed onion is limited but is on rise. In export market, India competes with Turkey and China and they offer dehydrated onion at a very low rate (\$1700 -2500 per MT) as against the Indian rate of \$2600 per MT. Due to spiraling prices of onion, raw material prices go up, making onion processing unprofitable. During 2014-15, more than 75 per cent of onion dehydration units remained shut due to high raw material prices. Jain Irrigation Systems Ltd. has set up a modern dehydration unit at Jalgaon with full backward integration with farmers for producing processing quality white onion. The company has a total installed capacity of 14,000 MT/ annum, of which 9,500 MT/ annum is in Jalgaon. The company is connected to more than 6,000 farmers through contract farming for supply of onion in Maharashtra and Gujarat. Since the entire value chain of onion is addressed by the company, it has been able to become a market leader in dehydrated onion. As the domestic demand for dehydrated onion is very limited, growth of onion dehydration industry is moving at snail's pace.

## Way forward

Among short term strategies, all stakeholders of onion need to be vigilant. The farmers need to ensure that primary wastage / spoilage is reduced by careful handling. The mishandling at all levels during its post-harvest management such as storage, transportation and marketing need to be avoided. It needs to be stored at farm gate for long term to avoid fluctuation in prices during demand supply mismatch. A mechanism of providing pledge finance to farmers to hold onion at the farm for longer period will help in avoiding hoarding and undue shortage. The onion traders need to supply onion by following modern market intelligence systems to those markets where there is a genuine deficit. Well ventilated storage structures using wire-mesh may be created by wholesalers in onion markets and retailers in retail outlets to avoid spoilage during marketing.

Long term strategies need to be adopted for overall development of onion. Intensive crop planning using GIS techniques and drone-based area surveillance system may be used. The recently set up Mahalonobis National Crop Forecast Centre in the Ministry of Agriculture and Farmers' Welfare, GoI, to operationalise the use of space and geospatial technology for better agriculture assessment may take onion as its priority crop. Agencies like NAFED and SFAC may maintain a strong database and act before the crises arise. The State Agricultural Universities, ICAR Institutes, CSIR, etc. may direct their projects to increase the productivity to bridge the productivity gap. The area under onion in states like Tamil Nadu, Andhra Pradesh and Karnataka having early Rabi harvest of onion during July – August, and Punjab and Himachal Pradesh producing onion during May - June need to be increased. The breeding for early sowing and extending harvesting season need to be carried out. The private investors may seize the opportunity to set up onion cold storage and CA storage and work both on service and trading business model so that the stocking limits do not come on their way. Private sector may set up processing units for manufacturing onion paste and dehydrated products. However, they must integrate with the farmers to ensure regular supply of raw materials at reasonable cost. Multiple efforts need to be made to ensure that onions don't bring tears either to growers or consumers.

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**Publisher :- Shri M. V. Ashok, CGM, Department of Economic Analysis and Research (DEAR), NABARD, Head Office: Plot No. C-24, 'G' Block, Bandra-Kurla Complex, Bandra (E), Mumbai- 400051**

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email ID : [dear@nabard.org](mailto:dear@nabard.org)    [www.nabard.org](http://www.nabard.org).