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NCoMM SPECIAL REPORT

MAIZE

LUCKY WINNER OF NCoMM REPORT OF PREVIOUS WEEK

National Collateral Management Services Limited

Introduction

Maize, also known as corn, is a cereal grain that was first grown by people in Central America. It is now the third most important cereal crop in the world and is called the **'Queen of Cereals'**. Maize is a leafy stalk whose kernels have seeds inside.

The importance of corn is due to its wide diversity of uses. It is used both as food for human and feed for animals. Corn is nearly directly consumed as feed. Corn is converted in to a variety of foods such as popped snack food and staple alkali-cooked "Mexican" foods. It is also fractionated by either dry or wet milling into food and industrial ingredients. The starch, the major constituent of the corn kernel, is used in foods and industrial products. The starch is also converted into glucose/ fructose for use as food sweetness. Glucose can be fermented in to ethanol for fuel or beverages. Maize has a nutritional value for both animals and humans. Table 1 gives the nutritional details of corn.

Table 1: Nutrition Value of Maize

Content	Percentage dry matter basis
Starch	71 - 72
Protein	9 - 10
Fat	4 - 45
Fibre	9 - 10
Sugar	2 - 3
Minerals (Ash)	1.4

Source: Agmarknet

Global Maize Producers

The United States produces more than 35% of the world's maize harvest. Other top producing countries are China, Brazil, Mexico, Argentina & India. Table 2 shows Maize vital statistics of the all world, as well as the top producers.

The world's maize production has been growing at a CAGR of about 3% since 2005. The area has been grown at a CAGR of 1.8% and the yield has grown at a CAGR of 1.2% since 2005.

The world produced around 1065 million metric tonnes of corn in 2016-17; while the global consumption was about 1032 million metric tonnes. USDA has forecasted a slightly lower corn area, yield and production in world in 2017-18.

Fig 1. Corn Production 2016-17

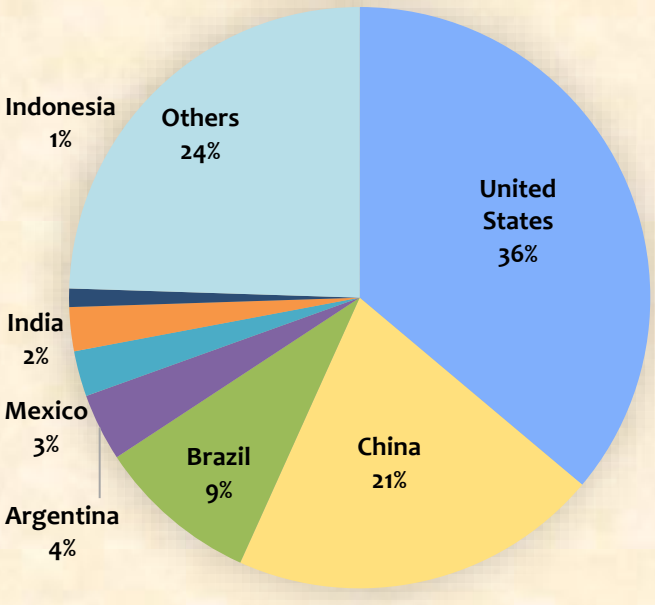
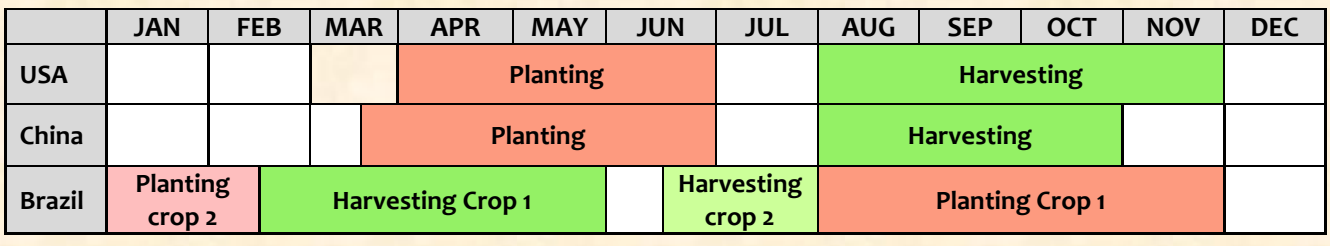


Table 2: Maize statistics across the world					
MAIZE: WORLD					
	2013/2014	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018(F)**
Area Harvested ('000 Ha)	**1,80,720**	**1,79,793**	**1,78,022**	**1,83,055**	**1,80,639**
Yield (MT/Ha)	**5.5**	**5.67**	**5.44**	**5.82**	**5.72**
Production ('000 MT)	**9,93,748**	**10,18,534**	**9,68,064**	**10,65,114**	**10,33,664**
Domestic Consumption ('000 MT)	**9,46,128**	**9,67,018**	**9,85,718**	**10,32,939**	**10,55,172**
MAIZE: UNITED STATES					
	2013/2014	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018(F)**
Area Harvested ('000 Ha)	**35,390**	**33,644**	**32,680**	**35,106**	**33,346**
Yield (MT/Ha)	**9.93**	**10.73**	**10.57**	**10.96**	**10.71**
Production ('000 MT)	**3,51,272**	**3,61,091**	**3,45,506**	**3,84,778**	**3,57,267**
Domestic Consumption ('000 MT)	**2,92,958**	**3,01,792**	**2,98,869**	**3,15,482**	**3,15,609**
Exports ('000 MT)	**48,790**	**47,421**	**48,202**	**56,518**	**47,627**
MAIZE: BRAZIL					
	2013/2014	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018(F)**
Area Harvested ('000 Ha)	**15,800**	**15,750**	**16,000**	**17,500**	**17,700**
Yield (MT/Ha)	**5.06**	**5.4**	**4.19**	**5.49**	**5.37**
Production ('000 MT)	**80,000**	**85,000**	**67,000**	**96,000**	**95,000**
Domestic Consumption ('000 MT)	**55,000**	**57,000**	**57,500**	**60,000**	**61,000**
Exports ('000 MT)	**20,967**	**34,461**	**13,996**	**34,000**	**34,000**
MAIZE: CHINA					
	2013/2014	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018(F)**
Area Harvested ('000 Ha)	**36,318**	**37,123**	**38,119**	**36,760**	**35,000**
Yield (MT/Ha)	**6.02**	**5.81**	**5.89**	**5.97**	**6.14**
Production ('000 MT)	**2,18,489**	**2,15,646**	**2,24,632**	**2,19,554**	**2,15,000**
Domestic Consumption ('000 MT)	**2,08,000**	**2,02,000**	**2,17,500**	**2,32,000**	**2,38,000**
Exports ('000 MT)	**22**	**13**	**4**	**20**	**20**
MAIZE: INDIA					
	2013/2014	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018(F)**
Area Harvested ('000 Ha)	**9,066**	**9,185**	**8,806**	**9,600**	**9,500**
Yield (MT/Ha)	**2.68**	**2.63**	**2.56**	**2.71**	**2.63**
Production ('000 MT)	**24,259**	**24,170**	**22,570**	**26,000**	**25,000**
Domestic Consumption ('000 MT)	**19,600**	**22,350**	**23,550**	**24,600**	**25,800**
Exports ('000 MT)	**3,873**	**1,162**	**512**	**600**	**500**
Imports ('000 MT)	**9**	**29**	**246**	**100**	**400**
SOURCE: USDA					

Fig 2: Corn Crop Calendar



Maize in India

Production distribution: India produces about 2% the world's maize produce. Karnataka is the leading producer of maize in India producing around 16% of India's total Maize production. Karnataka is followed by Telangana & Bihar which together contribute 20% to India's maize production basket. Maharashtra, Madhya Pradesh, Tamil Nadu, Andhra Pradesh, Rajasthan and Uttar Pradesh are other maize producing states of India.

About 71% of maize in India is produced in the Kharif season (fig 3 crop calendar). Karnataka, Madhya Pradesh, Tamil Nadu, Maharashtra, Telangana, UP & Rajasthan produce Kharif Maize, with Karnataka being the leader.

Bihar, Andhra Pradesh & Tamil Nadu are states which produce rabi maize crop. Rabi is the primary crop of Bihar and Andhra Pradesh. Tamil Nadu produces 40% crop in rabi.

Fig 3: India Maize Production Shares
based on 2012-2016 data

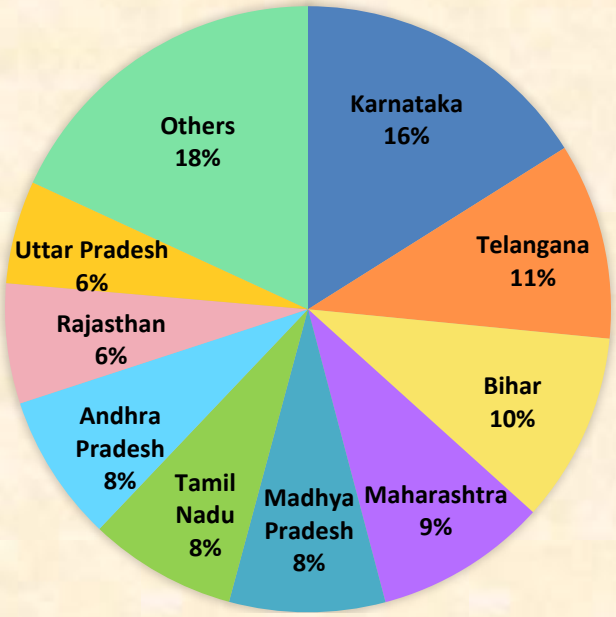


Table 3: SEASON-WISE MAIZE PRODUCTION IN INDIA: 2015-16 ('000 MT)

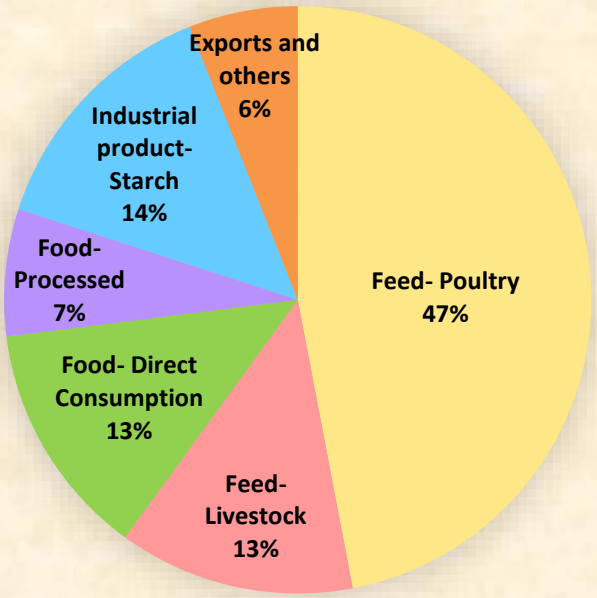
	KHARIF		RABI		Total
STATE	**Production**	**% of total Prod**	**Production**	**% of total Prod**	
Karnataka	2,983.00	90.12	327	9.88	3310
Bihar	692.7	27.52	1824.4	72.48	2517.1
Madhya Pradesh	2,580.30	100.00	-		2580.3
Andhra Pradesh	276.00	19.56	1135	80.44	1411
Tamil Nadu	1,433.30	57.58	1056	42.42	2489.3
Maharashtra	1,326.50	72.63	500	27.37	1826.5
Telangana	1,161.00	66.30	590	33.70	1751
Uttar Pradesh	1,119.00	85.68	187	14.32	1306
Rajasthan	1,141.70	98.06	22.6	1.94	1164.3
India	**16,052.90**	**71.13**	**6,514.60**	**28.87**	**22,567.50**

Fig 4: Maize India - Crop Calendar

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
					Kharif sowing		Kharif growth		Kharif harvest		
Rabi growth		Rabi harvest							Rabi sowing		

Consumption: Maize consumption in India can broadly be divided into three categories viz. Feed, food and Industrial non-food products (mainly starch). Feed accounts for about 60% of the maize consumption in India. The most important use and demand driver of maize is poultry feed which accounts 47% of total maize consumption. Livestock feed accounts for 13%. The food consumption accounts for 20% of Maize consumption, with direct consumption being 13% and that in form of processed food being 7%.

Fig 5. Corn Consumption- India

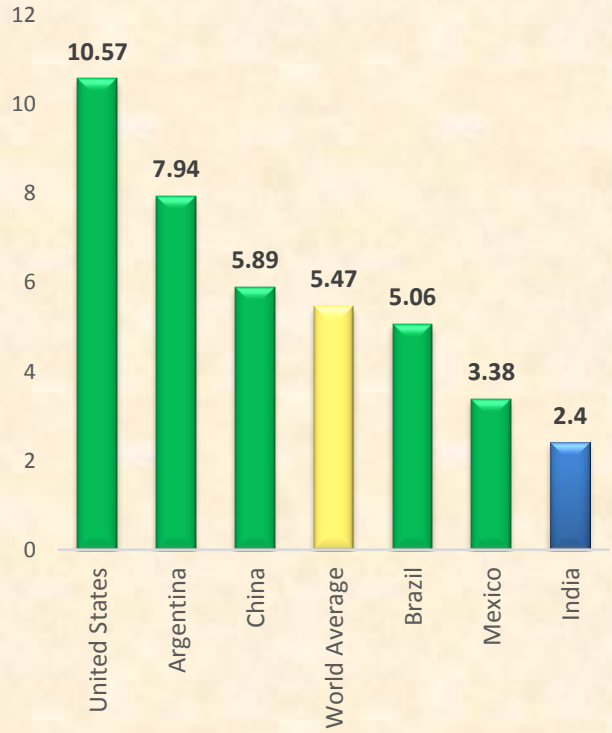


The non-food industrial products account for the remaining 20% of India's maize consumption. Starch is the most important in this category accounting for 14% of the total maize consumption. The remaining 7% is accounted for by exports and other industrial non-food products, for instance, Maize is used as a feedstock for the production of ethanol fuel.

Productivity: If we compare India's productivity with the world (Fig. 5), India's corn productivity is about half the world's average, 1/5th of the productivity of the US and less than half of China. Constraints for low productivity include:

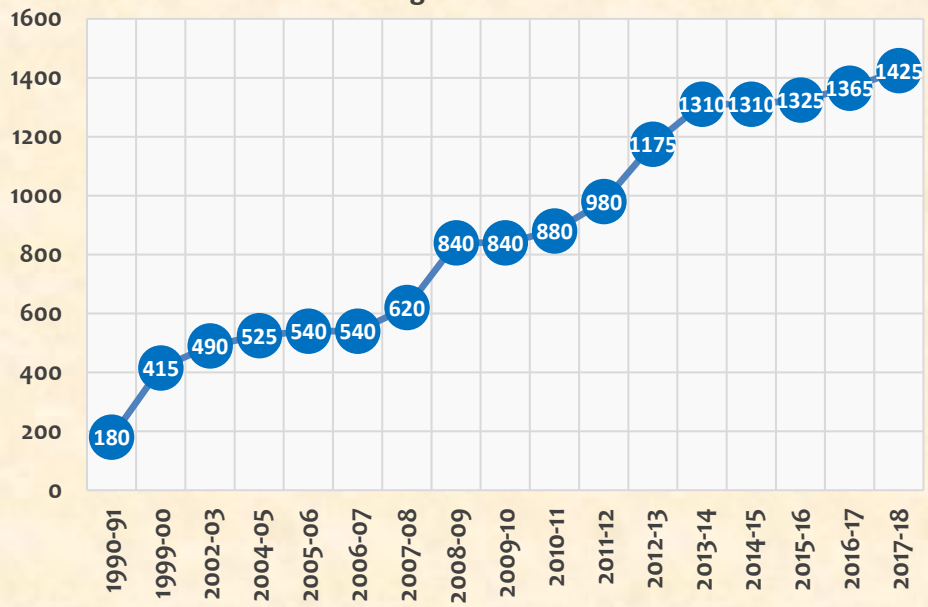
- Climatic conditions resulting in drought/excess water associated with increased pressure of disease/pets.
- Cultivation is mainly in rain-fed conditions on marginal lands with inadequate irrigation.
- Only about 30 percent of area is under Hybrid. Lack of development of single cross hybrid technology, which is key to higher productivity gains in USA, china and other countries.
- Limited adoption of improved production–protection technology.
- Deficiencies in the production and distribution system of quality seed.
- Small farm holdings and limited resource availability with farmers.

Fig. 6 Corn Yield (MT/HA) comparison, (2015-16)



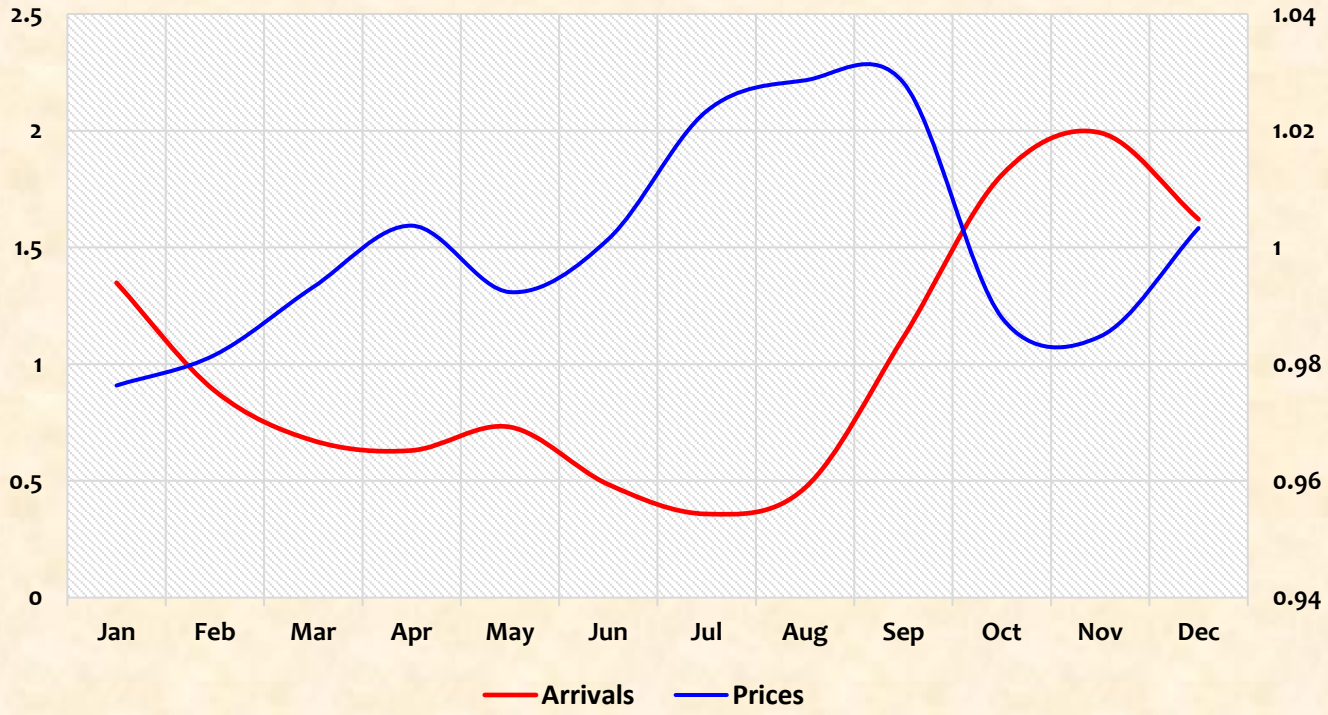
Maize MSP: Between 2007 and 2017, the MSP of maize increased by almost 130% (from Rs 620 to Rs 1425/qtl). A sharp increase was seen in 2008-09, and then in years 2012 & 2013. For the 2017-18 season, the minimum support price of maize has been increased by a meagre Rs 60 to Rs 1,425 per quintal from Rs 1365 per quintal in 2016-17. The increase has been meagre.

Fig 7. Maize MSP



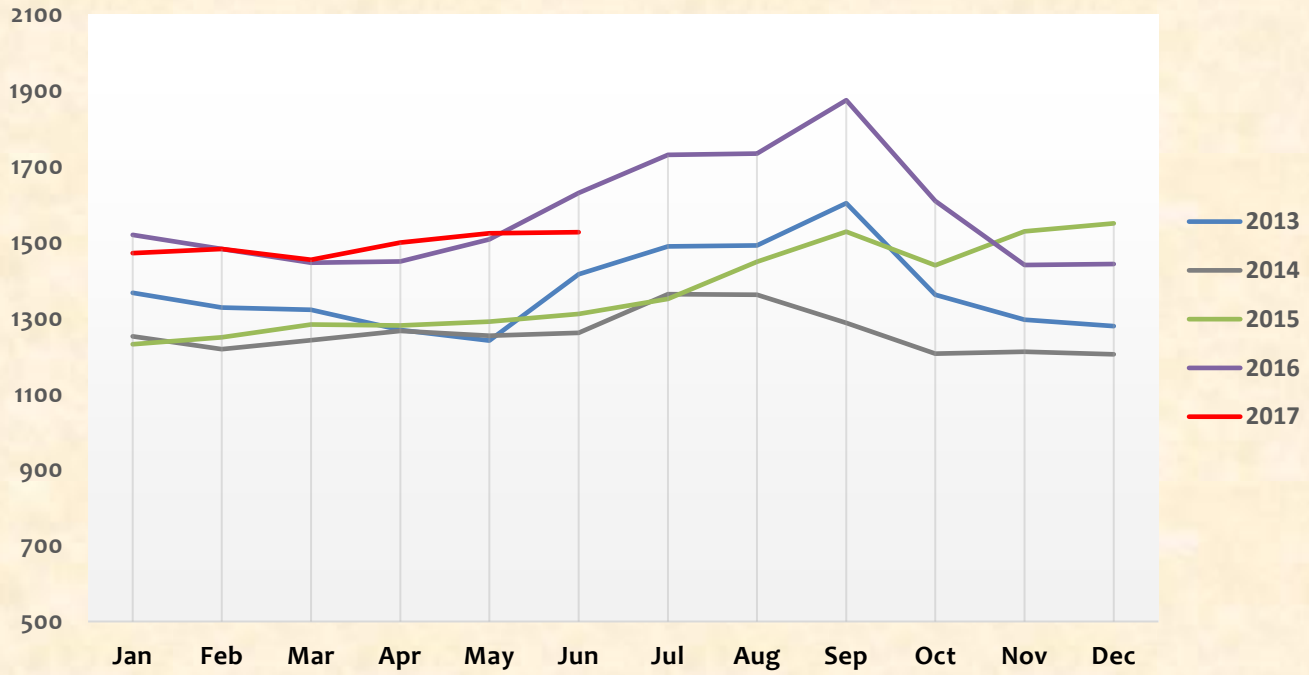
Seasonality of prices and arrivals: Fig 6 shows the graph seasonality of seasonality indices of prices and arrivals of maize in India. The indices have been calculated from 5-year data. The arrivals peak in between October-November, the time when the Kharif maize crop hits the market. A smaller peak is seen in May, the time when the smaller rabi crop comes in. The price trend can be seen mirroring the arrivals line.

Fig. 8 Seasonality of maize in India

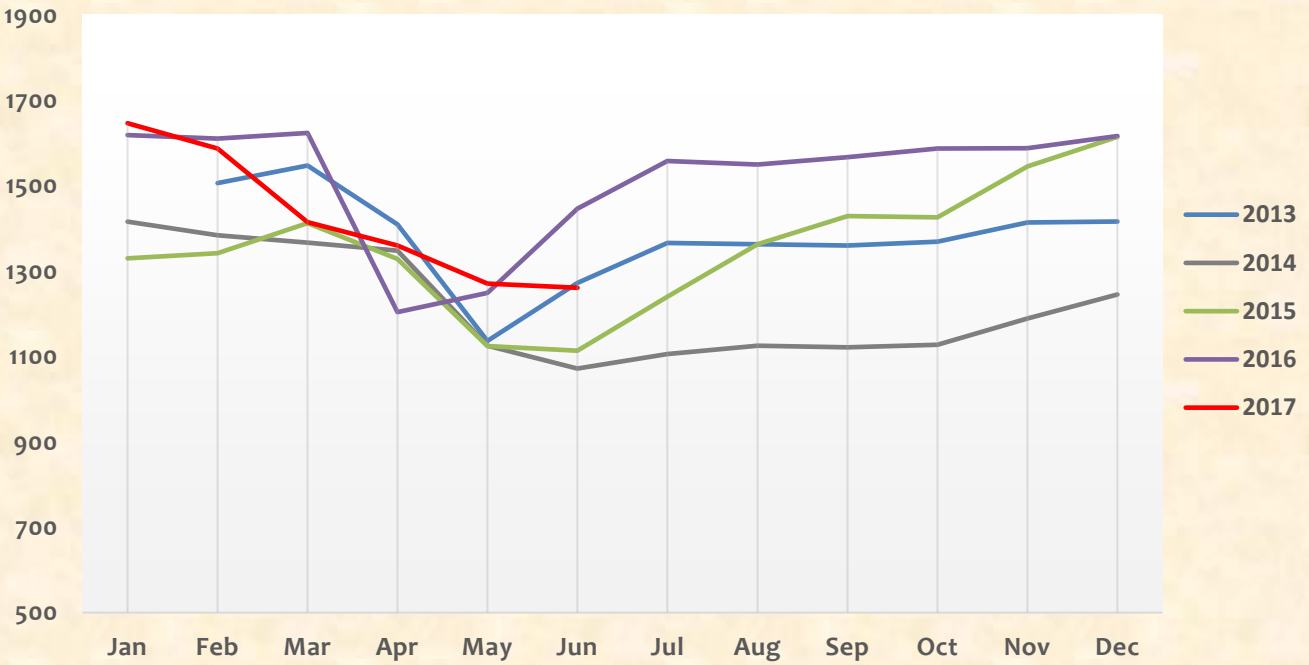


Price trends over last 5 years: The charts below capture the price trends of two major mandis of maize, Gulabbagh from the rabi maize producing state of Bihar and Nizamabad from kharif maize producing state of Telangana. We can observe that the prices show a fall during month of October-November in the Nizamabad mandi, the months when Kharif arrivals hit the market. In Gulab bagh, the fall can be seen in March-April, the time when rabi crop comes in.

Maize - Feed/Industrial Grade : Nizamabad : Monthly prices (Rs/Qtl)



Maize - Feed/Industrial Grade : Gulab Bagh : Monthly prices (Rs/Qtl)



Maize agronomy: As maize has wide adaptability & compatibility under diverse soil & climatic conditions, it is cultivated in sequence with different crops under various agro-ecologies of the country. Maize is generally cultivated in a two or three crop rotation.

Fig. 7 Maize Growth stages

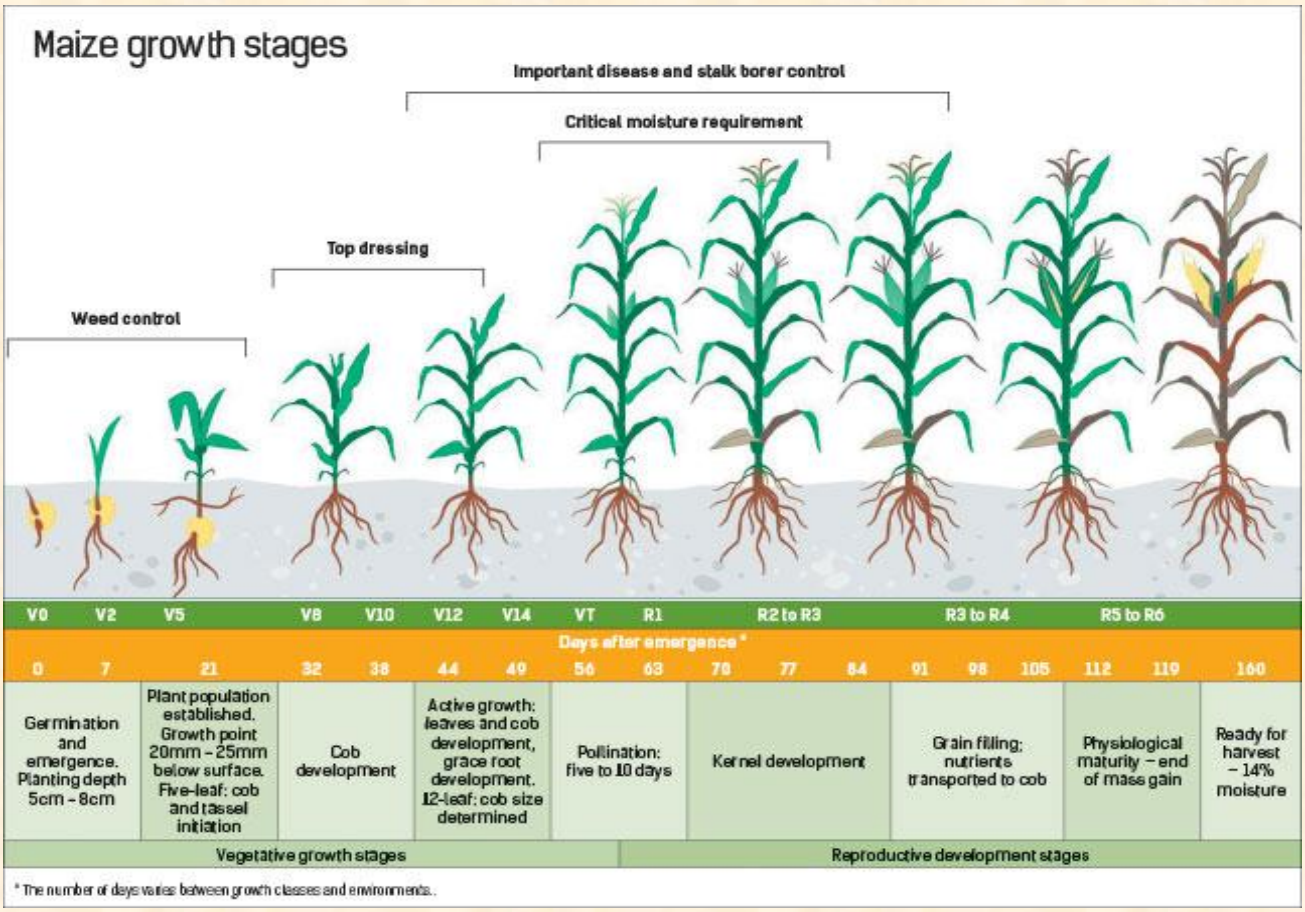


Figure 7 shows the growth stages. To simplify, cultivation of maize mainly involves the following steps-

- **Planting** – Planting of the crop is when the crop is planted.
- **Silking** – Silking is the most crucial stage in the crop cultivation. It means pollination of the crop. A soil temperature above 15°C is favourable for uniform and quick germination, provided sufficient moisture is available.
- **Doughing** – When the maize crop starts to show a thick substance, the crop is said to be doughed. This is a critical stage for yield determination.
- **Denting** – During the process of doughing, the plant spends all its resources in the formation of those dough like substance and this causes the plant to reduce and a 'dent' starts to show, on the end of the substance. This is called denting.
- **Maturing** – When the green foliage is gone and maize appears from the opening of the foliage, the crop is said to be matured.
- **Harvesting** – The crop is harvested once mature.

Cost of Cultivation in India: Due to varied topography and market structures, the cost of maize cultivation varies across different states. The latest state wise data on cost of production of maize as given by the Commission on agricultural costs and prices is given below in table 4.

Table 4: Cost of cultivation/production of Maize in India (2013-14)		
State	**Cost of Cultivation (Rs./Hectare)**	**Cost of Production (Rs./Qtl)**
Andhra Pradesh	40967.29	904.44
Bihar	24852.41	814.68
Chhatisgarh	17345.21	1149.8
Gujarat	32658.08	1621.82
Himachal Pradesh	22624.6	1296.57
Karnataka	33345.75	811.97
Madhya Pradesh	22070.77	880.3
Rajasthan	37493.73	1661.51
Tamil Nadu	55386.84	1069.08
Uttar Pradesh	27539.88	1229.15
		Source: CACP (Costs upto C1: Link)

Major maize trading centers in India:

In India, maize is majorly traded at:

- **Andhra Pradesh**: Hanuman Junction, Vijaywada
- **Bihar:** Gulabbagh, Mansi, Khagaria, Begusarai
- **Gujarat:** Dohad
- **Karnataka:** Davangere, Bangalore, Ranibennore, Haveri, Shimoga
- **Maharashtra:** Sangli, Nashik, Jalgaon
- **Madhya Pradesh:** Khandwa
- **NCR: Delhi**
- **Tamil Nadu:** Erode, Coimbatore, Namakkal
- **Telangana:** Nizamabad, Karimnagar
- **Uttar Pradesh:** Etah, Kasganj, Kanpur
- **West Bengal:** Malda, Dhalkola, Kolkata

Maize derivatives are traded in **National Commodity and Derivatives Exchange** (NCDEX) ltd.

Current Scenario

Global scenario: Fundamentals:

Global Balance sheet: In 1000 MT					
Particulars	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018 (P)**
Beginning Stocks	1,32,973	1,74,184	2,09,621	2,13,857	2,26,962
Production	9,95,366	10,20,023	9,69,623	10,71,230	**10,32,627**
Imports	1,24,844	1,25,129	1,39,440	1,36,277	1,47,305
Total Supply	12,53,183	13,19,336	13,18,684	14,21,364	14,06,894
Feed Dom. Consumption	5,75,099	5,87,340	6,01,627	6,30,517	6,50,281
FSI Consumption	3,72,484	3,80,023	3,83,512	3,98,628	4,03,571
Domestic Consumption	9,47,583	9,67,363	9,85,139	10,29,145	10,53,852
Exports	1,31,416	1,42,352	1,19,688	1,65,257	1,50,577
Total Consumption	10,78,999	11,09,715	11,04,827	11,94,402	12,04,429
Ending Stocks	1,74,184	2,09,621	2,13,857	2,26,962	2,02,465
					Source: USDA

- According to the latest USDA report, World corn production projection for 2017-18 is reported at 1032.6 MMT which is 3.60 per cent lower than last year production estimate of 1071.2 MMT.
- Global ending stocks are estimated to decline to 202.46 million tonnes as compared to 226.92 million tonnes in 2016-17.
- **According to the August 2017 report, IGC decreased its forecast for 2017/18** global corn production by 3 MMT to 1017 MMT compared to previous forecast.
- In U.S, 96% crop of corn is at dough stage as of 10th September 2017, lower by 3% compared to last year and 1% from last 5-year average period.

CBOT corn futures price movement

Indian scenario: Fundamentals

TABLE 5: Indian Balance sheet: In million tonnes								
Particulars	**2014/15**	**2015/16**	**2016/17**	**Oct-Dec**	**Jan-Mar**	**Apr-June**	**July- sept**	**2017-18**
Opening Stocks	1.5	2.2	1.3	1.3	12.8	5.6	6.4	1.9
Production	24.2	22.6	26	19.5		6.5		25
Imports	-	0.2	0.1	0	0.1	0	0	0.1
Total Availability	25.7	25	27.4	20.8	12.8	12.1	6.4	27
Consumption	22.5	23.3	24.9	7.9	7.1	5.5	4.4	25.1
Exports	1	0.4	0.6	0.1	0.2	0.2	0.1	0.55
Total Demand	23.5	23.7	25.5	8	7.3	5.7	4.5	25.65
Ending Stocks	2.2	1.3	1.9	12.8	5.6	6.4	1.9	1.35
Sources: DGFT, Trade sources, USDA								

Indian Maize production for 2016-17 is estimated at 26 million MT which is 11 per cent higher than 2015-16 production estimate of 22.6 million MT. Carry in stock for 2016-17 is 1.3 million MT which is 0.9 million MT lower than carry in stock of 2015-16.

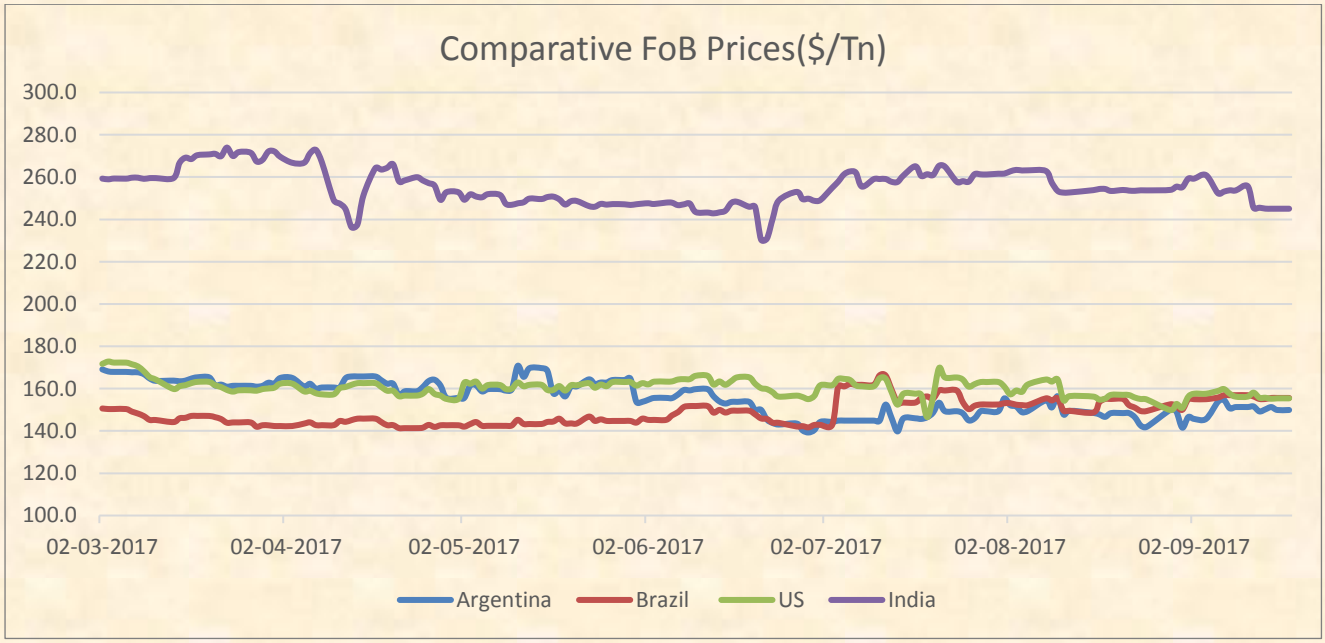
Progressive sowing under kharif 2017-18: Maize has been sown in around 79.68 lakh hectares as on 18th September 17, which is lower by 4% per cent from 83.03 lakh hectares covered during corresponding period last year, and but 3.7% higher than normal of 76.80 lakh hectares sown till date. Acreage of maize in major producing states like Karnataka, Madhya Pradesh, Uttar Pradesh, Rajasthan etc. has been recorded lower than the previous year due to crop shifting by farmers to other crops. However, in Karnataka, acreage has decreased due to lower rainfall this year too. Acreage of kharif maize this year is expected to be slightly lower than last year.

TABLE 7: Acreage as on 18th September (In Lakh Ha)				
States	**Normal Area**	**2017**	**2016**	**% Change**
Karnataka	11.83	11.25	12.67	**-11.21**
Madhya Pradesh	9.61	13.17	12.63	**4.28**
Rajasthan	9.38	9.02	9.62	**-6.24**
Maharashtra	7.52	9.11	9.2	**-0.98**
Uttar Pradesh	6.77	7.26	7.81	**-7.04**
Others	28.23	29.87	31.1	**-3.95**
Total	**73.34**	**79.68**	**83.03**	**-4.03**
Source: PIB				

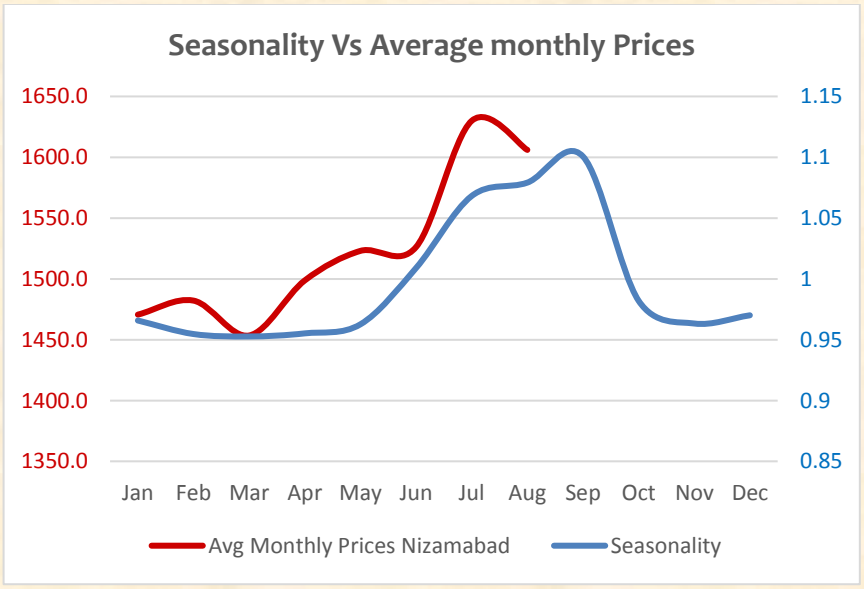
Maize export and import: Maize imports and exports in recent years are minimum as most of the produce is consumed within the country. Exports have continuously declined due to weak export demand which is due to relatively weak global prices on improved supplies from other competing locations. Most of the maize in India is used in the poultry feed industry. Poultry industry is heavily dependent on maize as it forms 50-60 per cent of the input required for broiler feed and 25-35 per cent of the input required for layer feed. Maize is the preferred source of energy in feed when compared with other substitutes due to availability,

higher energy and price economics. Poultry feed's share has remained around 45-50 per cent of the total demand for maize in the country over the past 4-5 years.

As shown in the graph, India fob prices are ruling very high as comparative to other exporting countries. Hence, export opportunity of corn from India is negligible.



Price Trend:



Maize prices follow a seasonal pattern. From seasonal indices graph we can infer that maize prices witness a decline during post-harvest period on arrival pressure in the market. i.e., particularly in the month of September and October. As the arrivals start sliding, prices show recovery from post the harvest decline during April to August months. The current 2017-18 spot maize prices at Nizamabad are at their last phase of seasonal consolidation. Subdued domestic demand and export disparity due to high world carryover stocks resulted in a minor downtrend in prices. However, with the arrivals hitting the fag end, the kharif acreage numbers showing a fall in area over last year and seasonal demand for poultry, the prices are expected to recover till the fresh arrivals start hitting the market in October.

Answers of NCoMM report dated 5 September 2017:

1. B., Soybean
2. Maize
3. 12 million tonnes

The following people gave correct answers:

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Anilkumar Parvathaneni
Manish kumar rohilla
ANJALI
Praveen Kumar Mundra
ABHIMANYU SINGH SHAKTAWAT
MUKESH BASETIA
Narendra Prajapati
Pankaj Sisodia
Basant Kumar Acharya
Babloo Kumar
ram kuma
K. Sankaranarayanan
Kalyana Chakravarthy Sonu Chauhan
Hareesh Kumar J
Dr. Raina Jain
Anurag Kushwaha
Som Dutt Sharma
Adarsh V N
Kuldip Yadav
Varsha jeena
Rohith Kumar
SUVANKAR GOSWAMI
Jwala Kumar
P Nagendra Sai
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Vijay Gupta
Surya Narayan Dash
Poulami Sarkar
Arun
Abhay Kumar Maurya
SHRIKANT PATIL
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Garima Joshi
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GAUTAM VASHISTHA
S R CHOWDARY
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