WORLD MAIZE OUTLOOK

Maize originated in central Mexico in around 5,000 BC. The crop was introduced to Europe in the sixteenth century, from where it spread to Africa and Asia. It is now one of the most widely-grown crops around the world in both temperate and tropical regions. Maize is grown both for human consumption and for other uses such as animal feed and biofuels. Worldwide, only around 15% of maize production is used for food consumption with most production going to animal feed. However, the proportion of maize production for food production in developing countries is higher at 25% and even higher in regions such as South East Asia where it is an estimated 30-40%, whilst in parts of Sub-Saharan Africa it can be as high as 70-80%.

Globally it covered 177.73 million hectares with a production of 961.85 million tons during 2015-16. It showed a negative trend for production as well as area over previous year. Although its area and production is supposed to increase during 2016-17. Major share to maize production comes from Asia which contributes 36.8% in world production while North America contributes 30.9% in world production. Major maize producing countries include USA, China and Brazil with total production of 345.51, 224.63 and 67 million tonnes, respectively during 2015-16. China contributed maximum area of 38.12 mha followed by USA (32.68 mha) and Brazil (16 mha). USA showed maximum productivity with average yield of 10.57 tonnes/ ha followed by Canada (10.33) and turkey (10). Global area, production and average yield of maize crop is presented in Table-1. Contribution of various regions in global maize production is presented in Fig.1.

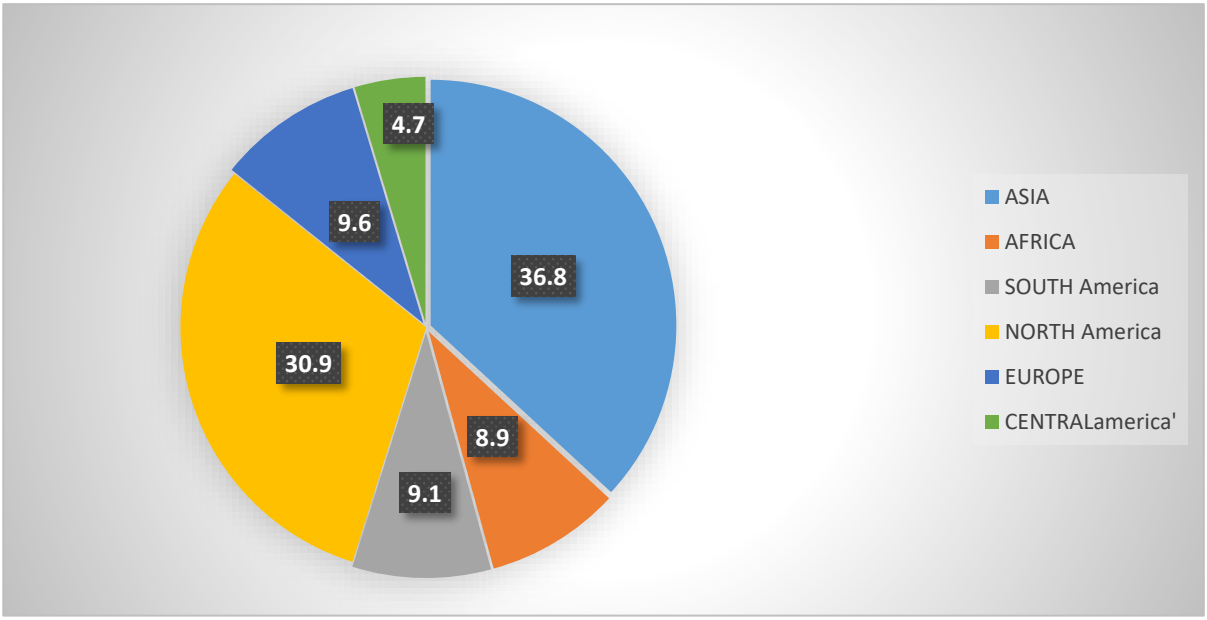

Fig. 1. Contribution of various regions in global maize production

Table. 1. Area, Yield and Production of Maize in various countries

Country	Area (million hectares)				Yield (tons / hectare)				Production(Million metric tons)			
	2014-15	2015-16	2016-17		2014-15	2015-16	2016-17		2014-15	2015-16	2016-17	
			Feb	March			Feb	March			Feb	March
World	179.82	177.73	181.3	181.8	5.65	5.41	5.73	5.77	1015.	961.85	1040.2	1049.2
United states	33.64	32.68	35.11	35.11	10.73	10.57	10.9	10.96	361.0	345.51	384.78	384.78
China	37.12	38.12	36.76	36.76	5.81	5.89	5.97	5.97	215.6	224.63	219.55	219.55
Brazil	15.75	16.00	16.70	17.00	5.40	4.19	5.18	5.38	85.00	67.00	86.50	91.50
Argentina	3.50	3.50	4.50	4.60	8.50	8.29	8.11	8.15	29.75	29.00	36.50	37.50
Bolivia	0.32	0.32	0.09	0.09	2.30	2.31	1.38	1.38	0.73	0.73	0.12	0.12
European union	9.56	9.46	8.68	8.67	7.92	6.18	6.95	6.95	75.73	58.41	60.31	60.30
South africa	3.05	2.21	3.10	3.10	3.49	3.71	4.19	4.71	10.63	8.21	13.00	14.60
Nigeria	4.15	3.80	4.00	4.00	1.81	1.84	1.80	1.80	7.52	7.00	7.20	7.20
Ethiopia	2.12	2.15	2.20	2.20	3.42	2.35	2.86	2.86	7.24	5.05	6.30	6.30
Egypt	0.75	0.75	0.75	0.75	8.00	8.00	8.00	8.00	5.96	6.00	6.00	6.00
Tanzania	4.20	4.00	4.20	4.20	1.60	1.50	1.31	1.31	6.74	6.00	5.50	5.50
Malawi	1.70	1.75	1.65	1.65	2.31	1.59	1.44	1.44	3.93	2.78	2.37	2.37
Zambia	1.21	0.96	1.16	1.16	2.78	2.78	2.48	2.48	3.35	2.68	2.87	2.87
Kenya	1.65	1.70	1.70	1.70	1.61	1.65	1.68	1.68	2.65	2.80	2.85	2.85
Uganda	1.11	1.10	1.10	1.10	2.50	2.36	2.36	2.36	2.76	2.60	2.60	2.60
Zimbabwe	1.50	1.53	0.80	0.80	0.97	0.48	0.64	0.64	1.46	0.74	0.51	0.51
Ukraine	4.63	4.09	4.25	4.25	6.15	5.71	6.59	6.59	28.45	23.33	28.00	28.00
Russia	2.60	2.67	2.80	2.80	4.36	4.93	5.54	5.54	11.33	13.17	15.50	15.50
India	9.19	8.81	9.50	9.60	2.63	2.56	2.58	2.71	24.17	22.57	24.50	26.00
Pakistan	1.14	1.15	1.15	1.15	4.29	4.36	4.52	4.52	4.90	5.00	5.20	5.20
Nepal	0.91	0.90	0.90	0.90	2.54	2.22	2.22	2.22	2.30	2.00	2.00	2.00
Indonesia	3.10	3.50	3.45	3.45	2.90	3.00	2.96	2.96	9.00	10.50	10.20	10.20
Philippine	2.56	2.42	2.60	2.60	3.00	2.88	3.04	3.04	7.67	6.97	7.90	7.90
Vietnam	1.18	1.18	1.10	1.10	4.40	4.48	4.50	4.50	5.19	5.28	4.95	4.95
Thailand	1.10	1.09	1.17	1.17	4.36	4.31	4.44	4.44	4.80	4.70	5.20	5.20
Mexico	7.33	7.21	7.50	7.50	3.48	3.60	3.47	3.47	25.48	25.97	26.00	26.00
Canada	1.23	1.31	1.33	1.33	9.36	10.33	9.96	9.96	11.49	13.56	13.20	13.20
Turkey	0.55	0.62	0.57	0.57	8.73	10.00	9.65	9.65	4.80	6.20	5.50	5.50

Source: USDA, https://apps.fas.usda.gov/psdonline/circulars/production.pdf

Global Maize Trade

Major exporter and importers are listed in table-2 and 3. During 2015-16, Brazil exported 35,382 tonnes of maize followed by Argentine (21,672) and Ukraine (16,595) while South

Africa was at bottom of major exporters with an export of 759 tones. Japan remained major importer of maize grain during 2015-16 with an import of 15,194 tonnes followed by Mexico (14,011) and South Korea (10,121) while Turkey showed minimum import (567) among major importers. Maximum amount of (289.86 million tons) was consumed by USA followed by

Country	2012-13	2031-14	2014-15	2015-16	2016-17	
					Feb	March
Brazil	26,044	22,041	21,909	35,382	22,000	22,500
Argentina	22,789	12,846	18,448	21,672	25,500	26,000
Ukraine	12,726	20,004	19,661	16,595	18,700	18,700
Russia	1,917	4,194	3,213	4,691	5,300	5,300
Paraguay	2,858	2,714	3,012	2,661	2,300	2,300
European Union	2,194	2,404	4,027	1,949	2,000	2,000
Canada	1,813	1,939	395	1,764	1,000	1,000
Serbia	578	1,780	2,964	1,513	2,500	2,500
Burma	750	1,100	1,250	1,000	1,100	1,100
South Africa	2,398	2,104	746	759	1,300	1,800

China (217.50 million tonnes) and Brazil (57.50 million tonnes).

Table. 2. Major maize exporting countries for various years (000 tonnes)
Source: United States Department of Agriculture)
https://apps.fas.usda.gov/psdonline/circulars/grain-corn-coarsegrains.pdf

Table. 3. Major maize importing countries for various years (000 tonnes)

Country	2012-13	2031-14	2014-15	2015-16	2015-16	
					Feb	March
Japan	14,411	15,121	14,657	15,194	15,000	15,000
Mexico	5,676	10,949	11,341	14,011	13,800	13,800
European Union	11,362	16,014	8,908	13,768	13,100	13,100
Korea, South	8,174	10,406	10,168	10,121	9,800	9,800
Egypt	5,059	8,726	7,841	8,776	9,000	9,000
Vietnam	1,600	4,300	6,700	8,600	8,000	8,500
Iran	3,700	5,500	6,100	6,600	7,500	8,500
Taiwan	4,241	4,179	3,810	4,656	4,600	4,600
Colombia	3,266	4,436	4,496	4,458	4,800	4,800
Malaysia	3,048	3,485	3,238	4,134	3,800	3,800
Saudi Arabia	2,063	2,684	2,904	3,583	3,700	3,700
China	2,702	3,277	5,516	3,174	3,000	3,000
Peru	2,254	2,232	2,741	2,954	2,900	2,900
South Africa	0	79	469	2,579	2,500	1,800
Morocco	1,684	2,349	1,941	2,224	2,300	2,300

Venezuela	2,154	2,626	2,433	1,800	2,200	2,200
Chile	844	1,456	1,516	1,600	1,800	1,800
Brazil	869	846	534	1,566	1,800	2,200
Dominican Republic	1,046	1,011	1,202	1,351	1,350	1,350
Israel	1,224	1,652	1,296	1,152	1,500	1,500
Tunisia	846	993	1,042	1,017	1,200	1,200
Canada	492	678	1,536	949	1,000	1,000
Zimbabwe	700	600	700	800	1,400	1,400
Turkey	1,656	1,381	2,377	567	1,500	1,500

Source: United States Department of Agriculture)
https://apps.fas.usda.gov/psdonline/circulars/grain-corn-coarsegrains.pdf

Table. 4. Consumption of maize grain for major consumer (000 tonnes)

Country	2012-13	2031-14	2014-15	2015-16	2016-17	
					Feb	March
United States	262,973	292,958	301,792	298,869	314,847	314,847
China	200,000	208,000	202,000	217,500	231,000	231,000
Others	144,032	153,268	158,428	158,029	160,986	161,056
European Union	69,846	76,796	77,880	73,200	73,300	73,000
Brazil	52,500	55,000	57,000	57,500	58,500	59,500
Mexico	27,000	31,700	34,550	37,300	38,600	38,600
India	17,500	19,600	22,350	23,500	23,400	24,600
Japan	14,300	15,000	14,600	15,200	15,100	15,100
Egypt	12,000	13,200	13,900	14,850	15,100	15,100
Canada	11,604	12,675	12,820	12,354	12,900	12,900
Indonesia	10,900	11,900	12,200	12,100	12,300	12,300
Vietnam	6,200	7,700	9,400	12,000	12,900	12,900
South Africa	11,000	11,500	11,650	11,200	11,300	11,700
South Korea	8,481	9,891	10,250	10,123	9,900	9,900
Argentina	7,900	8,800	9,300	9,150	10,500	10,500
Iran	6,200	6,800	7,400	8,800	10,600	11,100
Russia	6,400	7,500	8,100	8,700	9,600	9,600
World Total	864,570	948,753	980,657	960,686	1,033,034	1,039,434

(Source: United States Department of Agriculture)
https://apps.fas.usda.gov/psdonline/circulars/grain-corn-coarsegrains.pdf

Table. 5. Ending stocks of maize crop for various countries (000 tonnes)

Argentina	1,308	1,408	2,898	1,053	2,058	2,558
Brazil	9,150	13,972	7,842	6,542	6,442	7,842
Canada	1,549	1,600	1,402	2,243	2,543	2,543
China	67,579	81,323	100,472	110,774	102,308	102,308
European	5,146	6,891	9,626	6,655	4,748	5,050
Iran	3,236	4,476	5,716	6,056	5,496	5,996
Mexico	975	2,603	4,090	5,213	5,613	5,613
Others	23,346	31,210	33,682	28,211	29,421	29,835
Subtotal	112,289	143,483	165,728	166,747	158,629	161,745
United States	20,859	31,292	43,974	44,123	58,933	58,933
World Total	133,148	174,775	209,702	210,870	217,562	220,678

Source: United States Department of Agriculture)
https://apps.fas.usda.gov/psdonline/circulars/grain-corn-coarsegrains.pdf

In Asian continent major contributor to maize area and production is China with 59.62% area and 70.60% production of Asia (Fig. 2). It is followed by India with respect to area (13.78%) while by Ukraine with respect to production (7.33%).

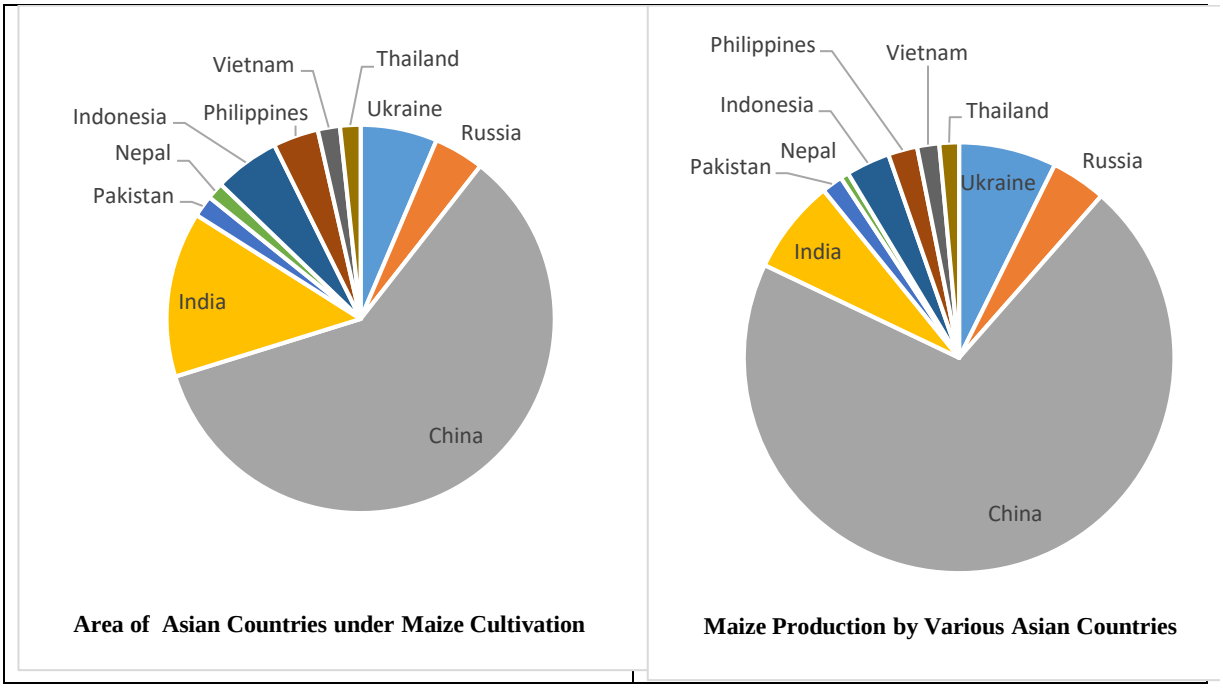

Fig. 3. Contribution of various countries to maize area and production of Asia

China is at top of list with respect to yield of maize in Asia and is followed by Ukraine and Russia. Minimum yield is reported for Nepal and India (Fig. 4.).

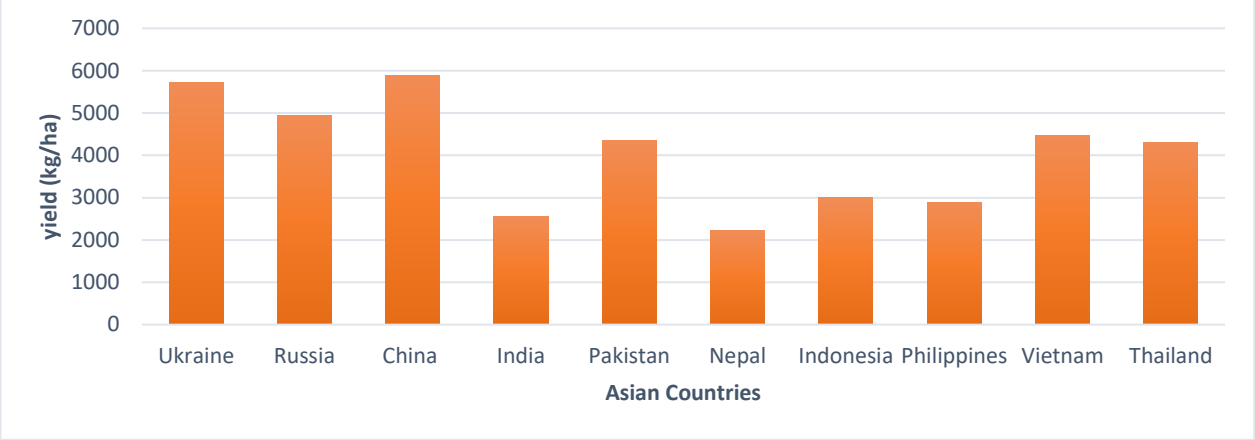

Fig. 4. Comparison of Asian Countries for Per Hectare Yield of Maize (2015-16)

Pakistan

Maize is the third most important crop in Pakistan after Wheat and Rice. Pakistan ranks 20th in the world with respect to area under maize cultivation while it ranks 21th with respect to maize production. Pakistan stands at 11th position in the world regarding average yield of maize. In Asia, Pakistan is at 8th position with respect to area and production of maize while it stands 5th with respect to per hectare yield. A comparison of Pakistan and other Asian countries is presented in Fig. 4. Maize kernel consists of an endosperm, embryo and a pericarp. It contains carbohydrates 84%, protein 10.9%, fat 4.5 and minerals 1.3%. It is highly evolved and very versatile crop with respect to its uses. It is used as feed, food and forage. It is used in food industry in multiple ways like making breads, custards and jellies, snack, confectionery and noodles. Corn syrup acts as sweetener and retains moisture when added to certain foods. In Pakistan it is utilized by feed industry (65%) for poultry and animal feed, wet milling industry (20%), dairy sector (10%) for fodder/silage and 5% for seed purposes.

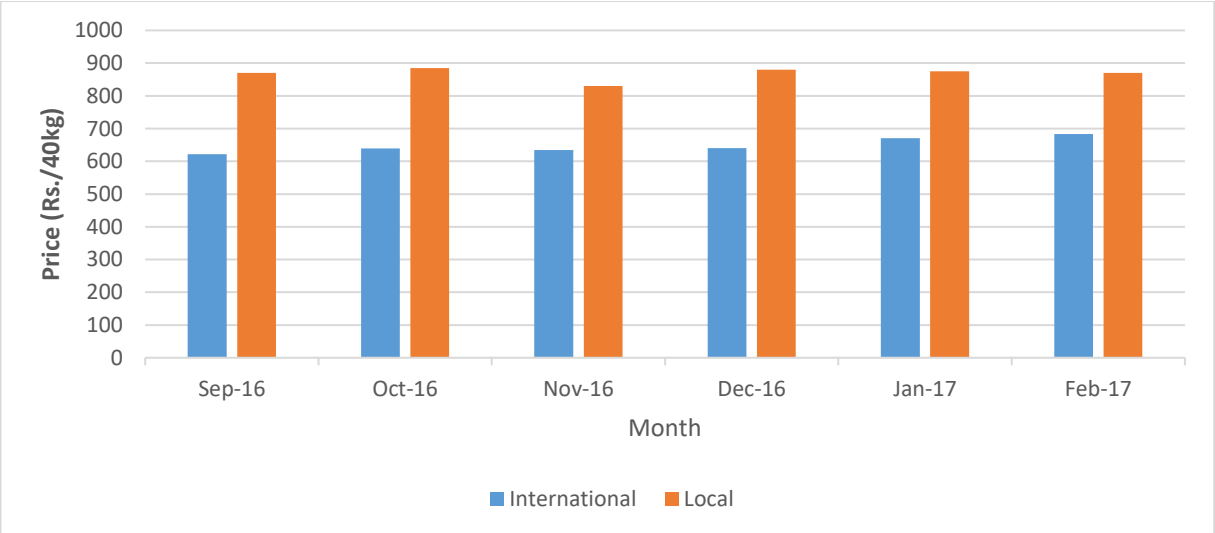

Fig. 5. Comparison of International and Local (Pakistan) price of Maize Grain

During 2015-16, cultivated area under maize crop was increased to 1144 thousand hectares, showing an increase of 0.2 percent over last year's area of 1142 thousand hectares. Maize crop production stood at 4.920 million tonnes during 2015-16 showing a decrease of 0.3 percent over the last year's production of 4.937 million tonnes. Maize contributes 2.2 percent to the

value added in agriculture and 0.4 percent to GDP. A comparison of area, production and yield of maize for various years is presented in Fig. 7.

Fig. 6. Current situation of maize crop at Maize & Millets Research Institute Sahiwal

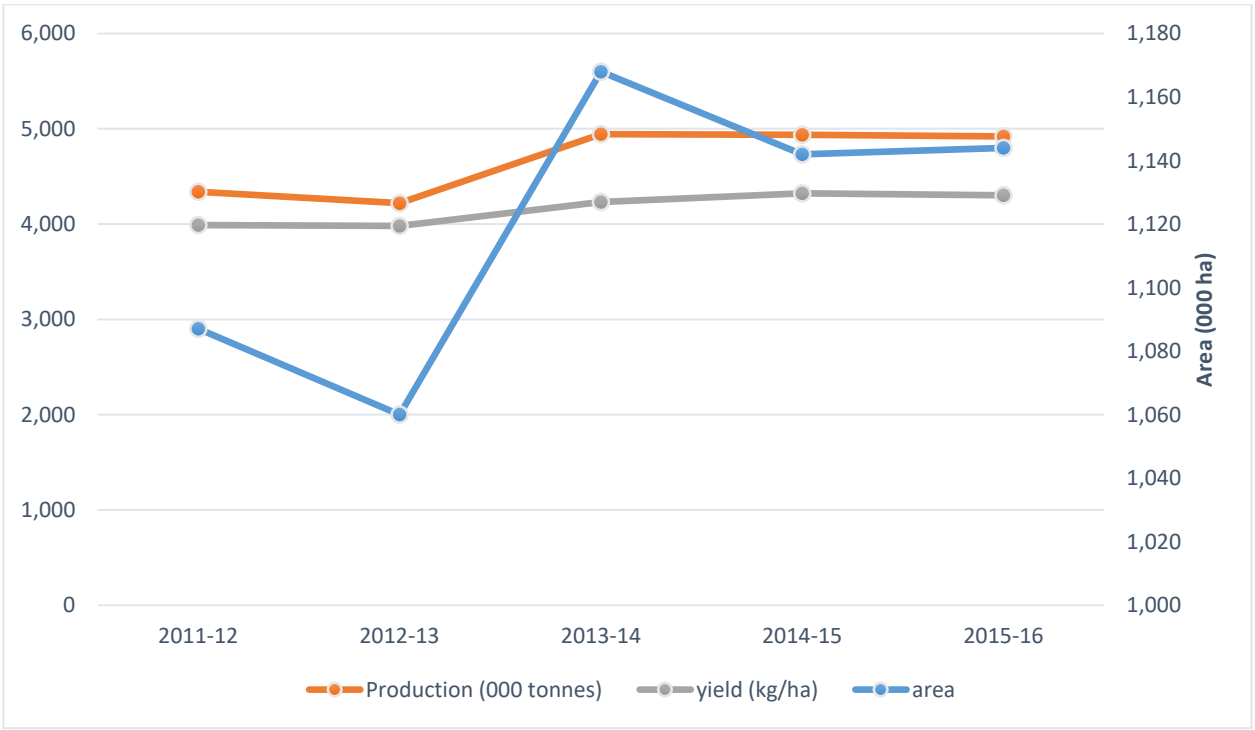

Fig. 7. Outlook of area, production and per hectare yield of maize in Pakistan

Provincial contribution in maize Area and Production

Punjab is major contributor of maize area and production followed by KPK and Baluchistan. Punjab shares 62% of total area 89% of total production which implies that per acre yield of Punjab is higher than other provinces. Khyber Pakhtunkhwa contributes 37% in area and 10% in production. Remaining 1% area and production is shared by Baluchistan while maize cultivation has just started in Sindh.

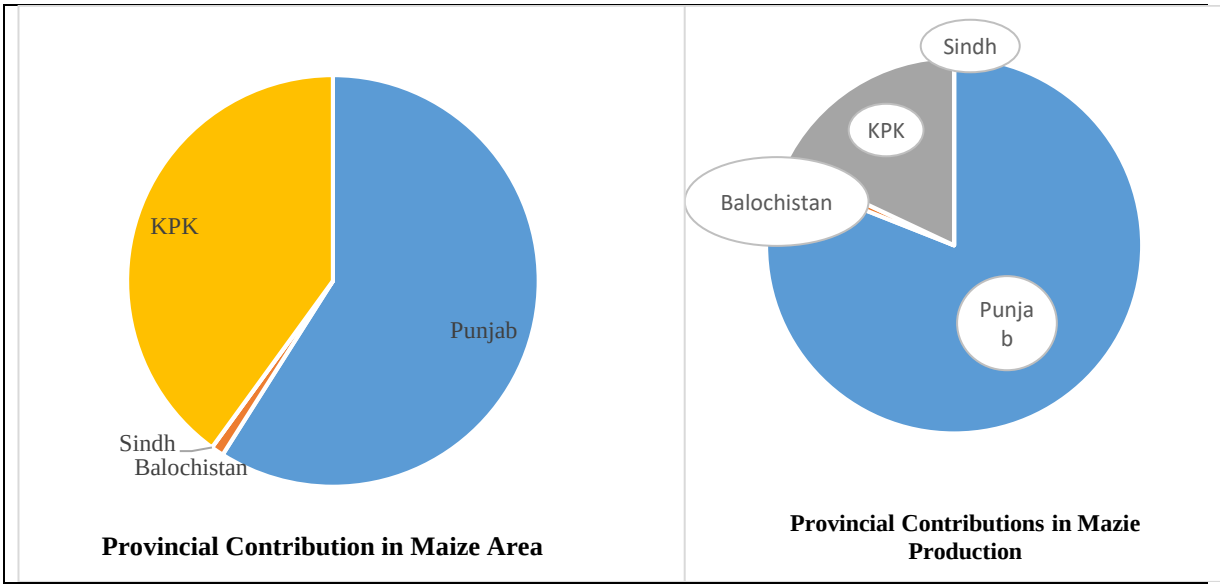

Fig. 6. Share of Provinces in area and production of maize crop in Pakistan

Punjab, being major maize producing province, contributes 89% of maize production. Maize is grown in Pakistan during two seasons; spring and autumn. Yield potential of spring crop is higher than that of autumn crop. In Punjab, autumn crop accounts for 67% area and 57% production while spring crop accounts for 32% area and 42% production. It is almost grown in all districts of Punjab during autumn season while during spring season, D.G. Khan and Rawalpindi Divisions are found to be free of maize (Table. 6).

Maize was grown on an area of 0.72 million hectares with a production of 4.40 million tonnes during 2015-16. Districts wise area and production of maize crop is presented in Table. 6. Comparison of various divisions is presented in fig… It is evident from the figures that major share in area and production is contributed by Division Sahiwal which accounts almost for 42% area and 52% production in Punjab. Sahiwal is followed by Faisalabad and Multan with respect to area and production. It is also important to note that area of spring maize approaches to area of autumn maize in Division Sahiwal, which is main reason of its high productivity and share in overall production. A comparison of area and production in various divisions of Punjab regarding maize crop is presented in Fig. 7.

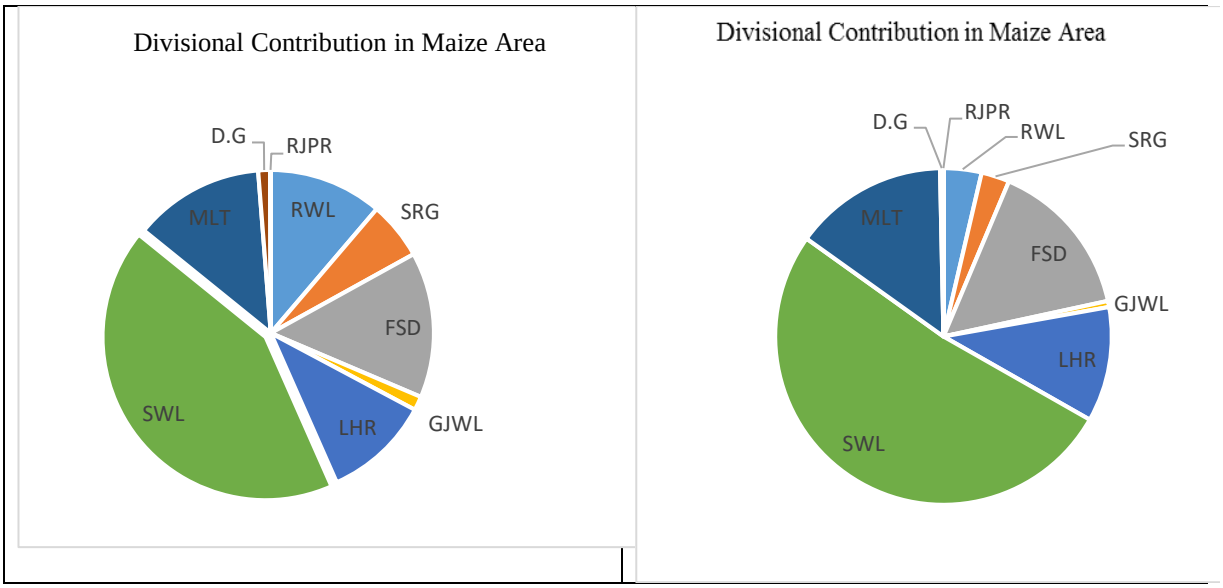

Fig.7. Share of various division in area and production of maize

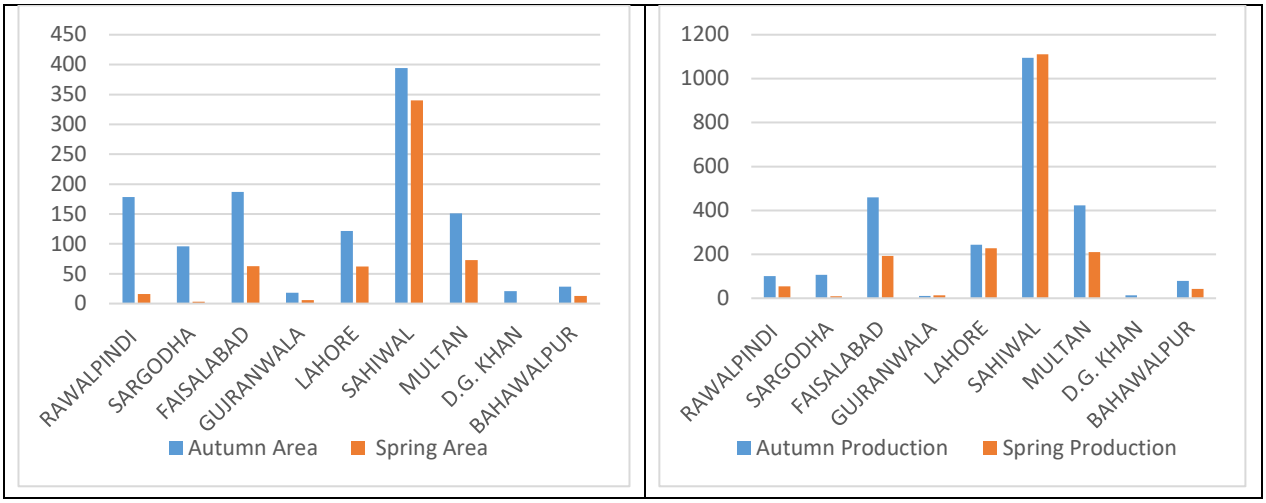

Fig. 6 Comparison of spring and autumn crop regarding area and production

Table. 6. District Wise Area and Production of Punjab for the Year 2015-16

DIVISIONS / DISTRICTS	Area (000 Acres)			Production (000 tonnes)		
	Autumn	Spring	Total	Autumn	Spring	Total
THE PUNJAB	**1194.8**	**574.771**	**1769.571**	**2531.4**	**1859.771**	**4391.171**
RAWALPINDI DIV:	**178.5**	**16**	**194.5**	**101**	**54.852**	**155.852**
Attock	31.4	0	31.4	25.3	0	25.3
Rawalpindi	113.2	0	113.2	55.3	0	55.3
Islamabad	23.3	0	23.3	11	0	11
Jehlum	5.9	16	21.9	7.9	54.852	62.752
Chakwal	4.7	0	4.7	1.5	0	1.5
SARGODHA DIV:	**95.9**	**3.03**	**98.93**	**107.2**	**8.438**	**115.638**
Sargodha	85.4	2.94	88.34	102	8.23	110.23
Khushab	3.6	0	3.6	2.1	0	2.1
Mianwali	1.9	0.09	1.99	0.8	0.208	1.008
Bhakkar	5	0	5	2.3	0	2.3
FAISALABAD DIV:	**187**	**62.7**	**249.7**	**458.9**	**192.46**	**651.36**
Faisalabad	49	9	58	117.8	20.827	138.627
T.T.Singh	53	15	68	133.3	47.533	180.833
Jhang	20.5	2.9	23.4	47.8	7.902	55.702
Chiniot	64.5	35.8	100.3	160	116.198	276.198
GUJRANWALA DIV:	**18.3**	**5.691**	**23.991**	**11**	**13.837**	**24.837**
Gujrat	5.1	0.12	5.22	3.3	0.224	3.524
M.B.Din	6.5	0.6	7.1	3.8	1.12	4.92
Sialkot	1.5	3.6	5.1	0.9	8.331	9.231
Narowal	0.1	0.07	0.17		0.105	0.105
Gujranwala	2.2	1.301	3.501	1.2	4.057	5.257
Hafizabad	2.9	0	2.9	1.8	0	1.8
LAHORE DIV:	**121.3**	**61.85**	**183.15**	**243.5**	**227.901**	**471.401**
Sheikhupura	13.7	0.72	14.42	10.2	1.451	11.651
Nankana Sahib	13.7	0.12	13.82	9.7	0.202	9.902

Lahore	15.8	0.46	16.26	11.1	0.79	11.89
Kasur	78.1	60.55	138.65	212.5	225.458	437.958
SAHIWAL DIV:	**394.1**	**340**	**734.1**	**1095.4**	**1110.167**	**2205.567**
Okara	160	115	275	467.4	392.962	860.362
Sahiwal	99.1	103	202.1	245	320.587	565.587
Pakpattan	135	122	257	383	396.618	779.618
MULTAN DIV:	**151**	**72.7**	**223.7**	**422.4**	**209.522**	**631.922**
Multan	16.1	5.7	21.8	26.8	11.965	38.765
Lodhran	12.6	11	23.6	35.9	21.292	57.192
Khanewal	20.8	16	36.8	58.2	49.794	107.994
Vehari	101.5	40	141.5	301.5	126.471	427.971
D.G. KHAN DIV:	**20.6**	**0**	**20.6**	**13.5**	**0**	**13.5**
Muzaffargarh	8.7	0	8.7	5.9	0	5.9
Layyah	4.6	0	4.6	2.9	0	2.9
D.G. Khan	6.4	0	6.4	4.3	0	4.3
Rajan Pur	0.9	0	0.9	0.4	0	0.4
BAHAWALPUR DIV:	**28.1**	**12.8**	**40.9**	**78.5**	**42.594**	**121.094**
Bahawalpur	9.5	5	14.5	26.2	15.544	41.744
R.Y. Khan	4.1	0.3	4.4	7.5	0.75	8.25
Bahawalnagar	14.5	7.5	22	44.8	26.3	71.1

Govt. Policies

Government is serious about the agriculture sector and is working hard for benefit of farmer community, Agricultural Departments and Private industry. Proper importance and consideration is being given to maize crop by Provincial government. Price of maize grain was monitored and regulated by The Govt. throughout the season strictly. Government has imposed regulatory (30%) and import duty (10%) on maize grain to protect local maize market. Provision of fertilizer on subsidized rates is another admirable project of Punjab Government. Another initiative has been taken by the government to modernize the agricultural markets through pavement of markets' floors and provision of dryers. Constitution of Research and Development Boards to bridge the gap between farmers and Research Institute is self-speaking effort of Punjab government. In addition to Research and Development Board, Punjab Maize Advisory Board has already been constituted and is working actively for solving problem and issues regarding maize crop.

Problems and Suggestions

1. High cost of production
2. Unavailability of pure and quality seed
3. Very high cost of maize seed

We recommend to reduce the input prices in order to reduce cost of production. Our current cost of production is 834 Rs. / 40 kg which is higher than international price of maize grain. Therefore in present circumstances we cannot compete international markets and have to

impose import duties to restrict import of maize grain. Second important issue is to develop local seed system to cut down the import of maize seed which is very costly and accounts for 6.5 billion rupees annually. Although we have good yielding hybrids but our seed multiplication system through Punjab Seed Corporation is not sufficient to disseminate our good quality and cheaper seed throughout Punjab. So it is need of time to strengthen Punjab Seed Corporation to produce sufficient quantity of maize seed along with its proper marketing.