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Tracking the performance of Indian agriculture

SURENDRA SINGH[1], RAMESH CHAND[2], R SENDHIL[3] and RANDHIR SINGH[4]

Directorate of Extension, Ministry of Agriculture, Pusa, New Delhi 110 012

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ABSTRACT

Despite technological innovations and interventions since Green Revolution, the productivity in food crops is much lower than their benchmarks causing a serious concern. The paper has examined the trends in productivity and trade coupled with efficiency gaps in Indian agriculture for major food commodities (1995-96 to 2015-16). Analysis indicated the overwhelming performance of staple commodities like rice and wheat, but it also highlighted for prioritization of production deficient commodity groups like pulses and oilseeds owing to the increasing demand. Regional differences in productivity led to variation in the estimated efficiency across crops. Efforts should be taken to increase the yield on par with the benchmark states followed by devising strategies to enhance the acreage under crops for a major quantum jump. Despite surplus production in staple commodities, their supply along with other essential food items have to be ensured on sustainable basis for increasing the overall performance of Indian agriculture.

Key words: Cereals, Efficiency gap, Net trade, Oilseeds, Production, Productivity, Pulses, Yield gap

Producing sufficient food and ensuring its security for a large and growing population is always a challenge and utmost priority for India, especially when the productive resources like land and water getting shrunk (Sharma *et al.* 2013). Enhancing the productivity level becomes crucial not only from the viewpoint of rising demand but also to demonstrate the agriculture progress globally viable. Despite the existing agrarian stress, Indian agriculture is reasonably remunerative which marked an increase in the output by 2.65 times and income by three times in nominal terms between 2004-05 and 2011-12 (Chand *et al.* 2015). It is expected that increased productivity in the long-run shall facilitate for agricultural as well as economic development.

India achieved its self-sufficiency, a *sine qua non* status in food production decades back and has increased its ability to manage the inter-year fluctuations in production. Foodgrains accounts for about four-fifth of calorie intake (Nasurudeen *et al.* 2006) and its sustainable supply requires adequate production of nutritious cereals like rice, wheat, maize, sorghum and bajra along with pulses and oilseeds. India holds the status of second largest producer in rice, wheat as well as other cereals commodity group (FAOSTAT 2014). The production of major cereals like rice, wheat, maize and bajra in 2016-17 has been estimated at 110.15, 98.38, 26.26 and 9.80 million tonnes (mt) respectively (DES 2017). India produces surplus cereals and its huge demand in the global market paves way for export earnings.

In the case of pulses, the production in India is not substantial to fulfill the domestic demand. Despite accounting for about 36% of the world acreage in pulses, the country produce only 26 per cent of the global production comprising largely chickpea, pigeonpea, lentil, moongbean, urdbean and fieldpea. About 80% of the global acreage in pigeonpea, 71% of chickpea and 40% of lentil falls in India, resulting respectively 67%, 72% and 23% of the global production (FAOSTAT 2014). The total pulses production in India was 22.95 mt comprising 9.33 mt of gram, 4.78 mt of tur and the rest under other pulses (DES 2017). Despite being the largest producer, it imports a significant level as the consumption exceeds domestic production. The increased quantum of consumption over years due to burgeoning population led to a decline in the per capita availability from 60.70g per day in 1951 to 47.20 g per day in 2014 (PIB 2016). The apprehension here is the realized low productivity at farmers' field, *inter alia,* the irrigated area under pulses which is hovering around 13 per cent of the total (Bantilan and Parthasarathy 1998) has to be increased.

Oilseeds hold the maximum acreage next to cereals, occupying about 15 per cent of the gross cropped area. Again, India is the largest producer with 32.10 mt from 26.21 mha in 2016-17 (DES 2017). Despite the global leader status, India imports around 56 per cent of its total requirement attributed to several economic factors (Jha *et al.* 2012). Regional disparity in efficiency, yield gaps, management practices along with production constraints shall be attributed to the varying performance in agriculture

[1]Economic Officer, Commission for Agricultural Costs and Prices (CACP), New Delhi. [2]Joint Director (Extension), Krishi Vistar Bhavan, Directorate of Extension, New Delhi. [3]Scientist, ICAR-Indian Institute of Wheat and Barley Research, Karnal. [4]Assistant Director General (Extension), ICAR, New Delhi.

production. Among alternatives available with the existing resource levels, increasing the use efficiency and bridging yield gaps will augment the overall production (Sendhil *et al.* 2013). The concern here is the existing yield levels and its growth are insufficient to match the projected demand by 2050 (Ray *et al.* 2013). In the context, the present study is an attempt to analyze the performance of agriculture for the past three decades, specifically in cereals, pulses and oilseeds.

MATERIALS AND METHODS

The present study sourced secondary data (1995-96 to 2015-16) from various authenticated publications and records from the Government of India. The following six parameters were considered for analyzing the decadal performance of Indian agriculture: production, area under cultivation, yield per hectare, growth rate, efficiency gap and net trade. First, we ascertained the performance of foodgrains in aggregate, then analyzed for individual commodities as well as commodity groups. Conventional analytical tools like tabular analysis, averages and percentages were utilized to arrive for valid conclusions.

Efficiency gap measures the difference between the best performing state (benchmark state) in relation to others and it has been estimated using the approach of the FAO and DWFI (2015).

$$\text{Efficiency gap} = \left[1-\left(\frac{\textit{Actual Yield}}{\textit{Benchmark Yield}}\right)\right] \times 100$$

where, benchmark yield represents the highest yield of the selected commodity registered in a state.

RESULTS AND DISCUSSION

Perusal of Table 1 indicates that the area, production and productivity under foodgrains in quantum terms have been increasing in the past four decades (Triennium ending 1985-86 to 2015-16) for a majority of the crops. The positive change was more pronounced in productivity variable followed by crop acreage which led to overall increased production of the cereals, pulses and oilseeds. However, in the case of total foodgrains, the acreage has witnessed a decline by 3.4 per cent due to substantial decrease in area under sorghum (63%), followed by ragi (50%) and bajra (33%) during the study period. In the case of area under total oilseeds, a gargantuan increase in soybean acreage by nine times has offset the decrease in other oilseed crops. Despite the crop acreage decline in a few of the foodgrains, the production has exhibited a massive change owing the increased productivity in the past four decades. Barring sorghum, ragi and niger seed, the rest of the selected crops have shown a positive change in the production. The change was more discernible in the case of soybean (10 fold increase), followed by maize (208%) and wheat

Table 1 Area, production and productivity of foodgrains in India

Crop	Area in mha				Production in mt				Productivity in kg/ha			
	TE 1985-86	TE 1995-96	TE 2005-06	TE 2015-16	TE 1985-86	TE 1995-96	TE 2005-06	TE 2015-16	TE 1985-86	TE 1995-96	TE 2005-06	TE 2015-16
Total foodgrains	128.6	122.5	121.7	124.2	149.5	185.4	206.7	256.4	1162	1513	1698	2065
Cereals	105.1	100.0	98.8	99.2	136.7	172.2	192.9	238.0	1301	1721	1952	2399
Wheat	23.7	25.3	26.5	30.8	45.5	62.6	70.0	91.6	1918	2474	2645	2974
Paddy	41.2	42.7	42.7	43.9	60.8	79.7	87.8	105.5	1475	1865	2056	2403
Bajra	11.0	9.7	9.8	7.4	5.8	5.8	9.2	8.8	527	602	942	1185
Maize	5.8	6.0	7.5	9.0	7.7	9.3	14.6	23.7	1318	1547	1962	2624
Sorghum	16.2	11.9	9.0	6.0	11.2	9.9	7.2	5.1	692	836	796	844
Ragi	2.4	1.8	1.6	1.2	2.6	2.5	2.3	2.0	1073	1372	1421	1657
Pulses	23.6	22.5	22.9	24.6	12.7	13.2	13.8	17.6	541	587	604	716
Gram	7.3	7.0	6.9	8.9	5.0	5.5	5.6	8.0	690	780	811	900
Tur	3.2	3.4	3.5	3.9	2.5	2.4	2.5	2.8	795	694	701	729
Moong	3.0	2.9	3.3	3.4	1.2	1.1	1.2	1.6	404	387	371	459
Urad	3.0	2.9	3.2	3.3	1.2	1.3	1.3	1.8	395	447	423	554
Oilseeds	18.9	26.1	26.3	26.6	12.2	21.6	25.8	28.5	644	831	981	1072
Groundnut	7.3	7.9	6.5	4.9	6.2	7.8	7.6	7.7	854	991	1182	1556
Soybean	1.1	4.6	7.3	11.5	0.9	4.6	7.7	10.3	758	1004	1052	900
Sesamum	2.2	2.0	1.8	1.8	0.5	0.6	0.7	0.8	242	280	398	439
Sunflower	0.8	2.3	2.2	0.6	0.3	1.3	1.2	0.4	447	561	547	711
Niger seed	0.6	0.6	0.4	0.3	0.2	0.2	0.1	0.1	283	321	258	312
Rapeseed and Mustard	3.9	6.3	6.7	5.1	2.8	5.7	7.3	5.4	706	904	1100	1052

Source: Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare

(101%) during the period under consideration. In the case of productivity, with the exception of tur, the rest have shown a positive change. It was highest in the case of bajra (125%), followed by maize (99%) and groundnut (82%).

Compound annual growth rate has been estimated to track the average year-to-year change in the variables, viz. area, production and productivity. The analysis indicated that the area under total foodgrains has been increasing from period 1: TE 1985-86 to TE 1995-96 (-0.54 %) to period 2: TE 2005-06 to TE 2015-16 (0.19 %) but in production (2.42 to 2.18 %) and productivity (2.98 to 1.99 %), a declining trend was observed (Table 2). Among different commodities and commodity groups, a mixed trend prevailed in the growth rate.

Growth in cereals production has declined in period 2 (1.27%) from period 1 (2.60%) and then revived in period 3 (2.13%). The increased growth in the recent decade is attributed to the yield growth (2.12%) since area under cereals remained almost stagnant. In pulses, the total production has witnessed a consistent increasing trend during the past three decades but in oilseeds, despite positive growth the production has drastically reduced to 0.99 per cent (Period 3) from 6.62 per cent (Period 1) showing a dismal picture. Among the commodity groups, pulses witnessed the highest growth in production in period 3 and it is credited to the growth in productivity (1.70%) followed by acreage increase (0.77%).

Commodity wise growth analysis indicated a different picture for all the economic variables with varying magnitude. Maize, gram and soybean exhibited the highest production growth during the recent decade respectively in cereals, pulses and oilseeds category. A high growth in maize was driven by the demand for poultry feed due to the structural changes in agriculture industry and dietary patterns. Availability of high yielding varieties adapted to diverse agro-climatic conditions, less cost of cultivation and choice of maize in regions wherein water table has been declining particularly in the rice belts have contributed to the increase in acreage (India Maize Summit 2014). All pulses have shown an increased trend in production during period 3 owing to positive growth in yield and acreage (Table 2). In the case sunflower (oilseeds), the production has declined drastically due to a huge fall in the acreage (-12.57%) despite a positive growth in yield (3.02%). Similar kind of trend prevailed for niger and rapeseed and mustard. The overall period growth analysis supported the results of Table 1

Table 2 Growth rates in area, production and productivity of foodgrains in India

Crop	Area (%)				Production (%)				Productivity (%)			
	Period 1	Period 2	Period 3	Overall	Period 1	Period 2	Period 3	Overall	Period 1	Period 2	Period 3	Overall
Total foodgrains	-0.54	-0.08	0.19	-0.12	2.42	1.22	2.18	1.88	2.98	1.29	1.99	2.00
Cereals	-0.54	-0.13	0.01	-0.20	2.60	1.27	2.13	1.93	3.16	1.41	2.12	2.13
Wheat	0.70	0.52	1.49	0.90	3.59	1.26	2.76	2.44	2.87	0.74	1.25	1.52
Paddy	0.41	0.00	0.27	0.22	3.06	1.08	1.85	1.92	2.64	1.09	1.58	1.70
Bajra	-1.43	0.13	-2.82	-1.36	0.05	5.24	-0.50	1.44	1.50	5.10	2.38	2.83
Maize	0.41	2.37	1.88	1.52	2.21	5.11	4.82	3.96	1.80	2.67	2.88	2.90
Sorghum	-3.39	-2.97	-4.22	-3.35	-1.33	-3.50	-3.31	-2.68	2.13	-0.54	0.95	0.69
Ragi	-3.32	-1.45	-2.58	-2.49	-0.63	-1.07	-1.44	-1.01	2.78	0.38	1.16	1.51
Pulses	-0.50	0.17	0.77	0.14	0.41	0.48	2.48	1.12	0.92	0.31	1.16	1.51
Gram	-0.44	-0.19	2.53	0.67	0.92	0.25	3.67	1.60	1.37	0.44	1.11	0.92
Tur	0.83	0.34	0.81	0.71	-0.69	0.45	1.27	0.40	-1.50	0.11	0.46	-0.30
Moong	-0.44	1.74	0.27	0.49	-0.91	1.26	2.44	0.93	-0.48	-0.47	2.17	0.44
Urad	-0.55	1.12	0.80	0.31	0.82	0.49	3.62	1.49	1.37	-0.62	2.79	1.17
Oilseeds	3.65	0.12	0.09	1.19	6.62	1.99	0.99	2.98	2.87	1.86	0.90	1.77
Groundnut	0.91	-2.22	-2.69	-1.33	2..59	-0.28	0.06	0.73	1.66	1.99	2.83	2.09
Soybean	16.70	5.29	4.67	8.29	20.39	5.85	3.04	8.93	3.6	0.53	-1.56	0.59
Sesamum	-0.92	-1,46	0.26	-0.65	0.69	2.48	1.32	1.42	1.63	4.00	1.06	2.08
Sunflower	12.88	-0.48	-12.57	-0.99	15.78	-0.77	-9.93	0.61	2.57	-0.29	3.02	1.61
Niger seed	-0.20	-3.70	-4.74	-2.87	1.23	-6.03	-2.80	-2.54	1.43	-2.42	2.03	0.34
Rapeseed and Mustard	5.33	0.64	-2.55	0.92	8.26	2.86	-2.97	2.32	2.78	2.20	-0.44	1.38

Period 1: TE 1985-86 to TE 1995-96, Period 2: TE 1995-96 to TE 2005-06 and Period 3: TE 2005-06 to TE 2015-16. *Source*: Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare

trends identified for the area, production and productivity of selected crops. Production has increased in a majority of the crops indicating a good performance of the agriculture sector. The National Food Security Mission (NFSM) has played a major role in the increased production of wheat (Sendhil *et al.* 2012), rice and pulses (Singh and Grover 2015, Roy 2014). Similarly, Technology Mission on Oilseeds (TMO) implemented during 1986 played a major role in increased oilseeds production (Jha *et al.* 2012).

Yield and efficiency gap (Benchmark state vis-à-vis other major producing states)

In the competitive productive environment, it is important not only to improve the productivity levels over time (temporal) but also in relation to other states (cross-sectional). It is, therefore, imperative to envision state's position vis-à-vis other major producing states in India on productivity scale. This would enable the country to gain greater competitiveness by setting out the targets in benchmarking productivity standards of those crops. In this analysis, state wise triennium productivity of cereals, pulses and oilseeds are compared with those of benchmarking or leading state in the respective category to decipher the productivity or efficiency gap (Fig 1).

Analysis on efficiency gap indicated that the benchmark productivity of paddy was 5.89 t/ha as compared to the

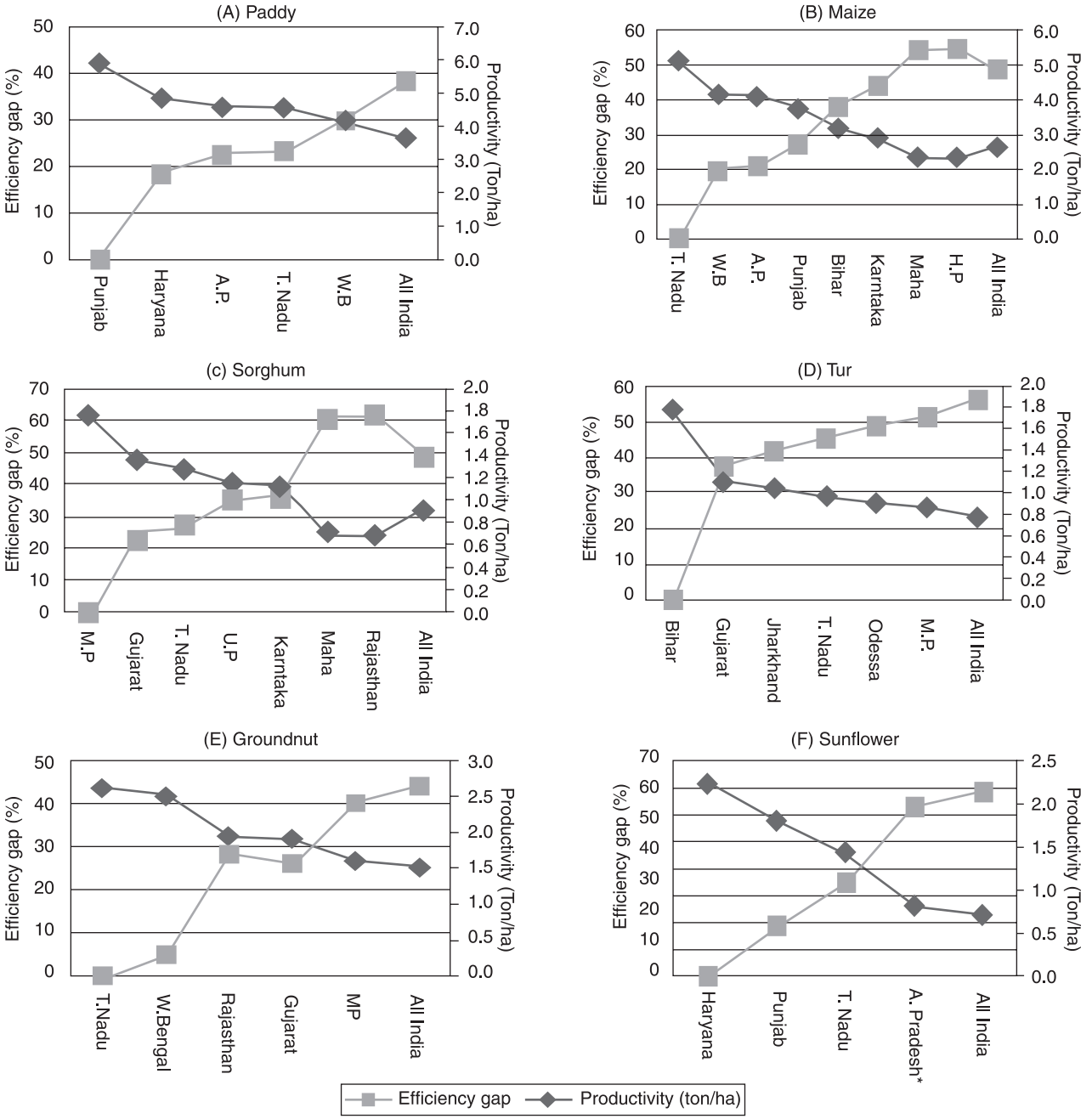

Fig 1 Benchmarking productivity of major *kharif* crops for leading states (TE 2014-15). *Source*: Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare

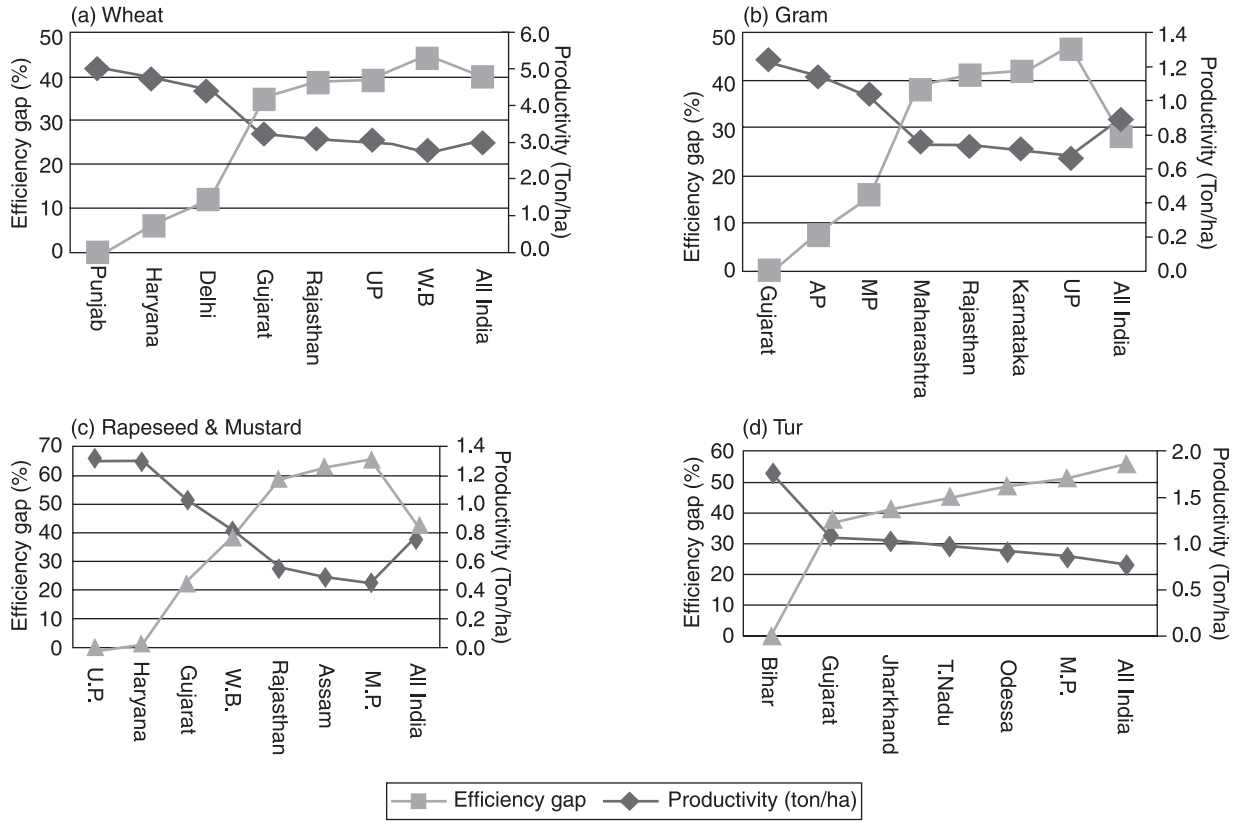

Fig 2 Benchmarking productivity of major *rabi* crops for leading states (TE 2014-15).

average national productivity of 3.63 t/ha (Fig 1). The productivity gap in paddy (38.34 %) has to be reduced by exploring the constraints impeding in enhancing the productivity and production and by judicious management of critical inputs like seed and water. The efficiency gaps in the productivity levels were highest in the case of sunflower (68 %), followed by sorghum (62 %), tur (56 %), maize (52%), and groundnut (44 %).

Yield gap in paddy: The productivity of paddy in major producing states, viz. Punjab, Haryana, Andhra Pradesh, Tamil Nadu and West Bengal was 5.8, 4.8, 4.57 4.53 and 4.14 t/ha respectively while the national average was 3.63 t/ha (Fig 1). It indicates a gap of 2.26 t/ha between the highest productive state, *i.e.* Punjab and the national productivity. The efficiency gap in paddy ranged from 18.25 to 38.34 per cent in India.

Yield gap in maize: The productivity of maize was highest in Tamil Nadu (5.15 t/ha), followed by West Bengal (4.14 t/ha) and Andhra Pradesh (4.05 t/ha) as furnished in Fig 1. The average productivity of maize in India was 2.73 t/ha which was very less than the benchmark productivity (5.15 t/ha). The efficiency gap among states ranged from 19.51 to 54.76 per cent, which was very high while the national efficiency gap has estimated at 49 per cent. The productivity gap between the country and Tamil Nadu was 2.52 t/ha which is almost closer the national productivity, i.e. 2.63 t/ha.

Yield gap in sorghum: In sorghum, the productivity in Madhya Pradesh (1.74 t/ha) was highest and hence designated as the benchmark (Fig 1). The productivity of others major sorghum growing states, viz. Gujarat, Tamil Nadu, Uttar Pradesh, Karnataka and Maharashtra was 1.67, 1.35, 1.27, 1.14 and 1.11 t/ha respectively. The national average productivity was 0.9 t/ha and found to be very less than the benchmark productivity (1.74 t/ha). The efficiency gap was highest in the state of Rajasthan (67.71 %), followed by Maharashtra (60.24 %), Karnataka (36.08%), and Uttar Pradesh (34.67%). The national efficiency gap in sorghum was estimated at 48.61 per cent.

Yield gap in sunflower: In sunflower the productivity was highest in Haryana (2.2 t/ha) and the national average was 0.71 t/ha (Fig 1). The productivity in Punjab, Tamil Nadu and Andhra Pradesh respectively was 1.80, 1.43, and 0.73 tonnes per hectare which was highest than the national average. The yield gap efficiency was highest in sunflower (68.1 %) between the benchmark productivity (2.22 t/ha) and all India productivity (0.71 t/ha). The range of yield gap among the different states was 18.8 to 62.8 per cent.

Yield gap in groundnut: For groundnut, a *kharif* crop, the national productivity was 1.5 t/ha which was quite low than the benchmark productivity of Tamil Nadu (2.6 t/ha). The groundnut productivity of West Bengal (2.5 t/ha) was slightly lower than the benchmark productivity (Fig 1). The productivity in Rajasthan (1.92 t/ha) and Gujarat (1.92 t/ha) was higher than the national productivity (1.5 t/ha). The national efficiency gap was 44 per cent. Among the states, it was highest in Madhya Pradesh (39.8 %), followed by Rajasthan (28.4 %) and Gujarat (26.1%).

Yield gap in wheat: Punjab, Haryana, Delhi, Gujarat, Rajasthan, Uttar Pradesh and West Bengal were the high yielding states in the case of wheat. The wheat productivity in Punjab (5.02 t/ha) was the highest to be the benchmark, followed by Haryana (4.72 t/ha), Delhi (4.42 t/ha), Gujarat (3.26 t/ha), Rajasthan (3.08 t/ha), Uttar Pradesh (3.04 t/ha) and West Bengal (2.79 t/ha). The national average productivity was 3 t/ha and the national efficiency yield gap was 40.19 per cent. The efficiency gap among the states ranged from 5.88 percent to 44.38 percent.

Yield gap in rapeseed and mustard: The productivity of rapeseed and mustard was highest in Uttar Pradesh (1.31 t/ha), followed by Haryana (1.29 t/ha) and Gujarat (1.02 t/ha). The national productivity of rapeseed & mustard (0.76 t/ha) was quite lower than the benchmark productivity (1.31 t/ha). The efficiency gap ranged from as low as 1.5 per cent to as high as 65.40 per cent among the states. The yield gap efficiency was highest in the case of Madhya Pradesh (65.40%), followed by Assam (62.83%) which was quite higher than the nation's efficiency gap (42.19 %).

Yield gap in gram: In gram, the productivity was highest in Gujarat (1.24 t/ha), followed by Andhra Pradesh (1.14 t/ha) and Madhya Pradesh (1.04 t/ha). The national productivity was 0.89 t/ha and the gap from benchmark productivity was 1.24 t/ha. The range of efficiency gap within states was 7.5 to 46.68 per cent while the national efficiency gap was 28.10 per cent (Fig.2).

Yield gap in tur: In the case of tur, the productivity was highest in Bihar (1.76 t/ha), followed by Gujarat (1.10 t/ha), Jharkhand (1.03 t/ha) and Tamil Nadu (0.97 t/ha). The average productivity of tur in India was 0.77 t/ha which was lower than the benchmark productivity of Bihar. The efficiency gap between states in tur ranged from 37 to 54 per cent.

Export performance

Performance of the agriculture sector has been ascertained in this section in terms of revenue generated through exports. India is not only the largest producer of cereals in the world but largest exporter as well. India's export in cereals has been estimated at ₹ 401 billion during 2014-15 with the base year price of 2011-12. Rice comprising basmati and non-basmati varieties occupy the major share in India's total cereals export. Iran, Saudi Arabia, Indonesia, UAE and Bangladesh were the major cereal importing countries from India.

Exports from kharif season produced crops: Perusal of Table 3 reveals that export in *kharif* crops has increased significantly but with inter-year fluctuations. In 2004-05, rice and maize were exported to the tune of ₹ 16040 and ₹ 1450 crores (at 2011-12 base year price) respectively which has increased to ₹ 22520 and ₹ 8430 crores in 2015-16 respectively. Despite the increased total consumption quantity, surplus production in rice and maize shows its relative performance over other *kharif* crops. The foreign exchange from groundnut and soybean has also increased during the period (Table 3) but not to the extent of rice and maize. The total real value of exports (at 2011-12 base year prices) from selected *kharif* crops in India has increased to ₹ 34830 crores in 2015-16 from ₹ 22980 crores in 2004-05 witnessing almost 52 per cent increase. Overall, the analysis indicated the self-sufficiency in foodgrains production (*kharif* crops) as well as implies the relative performance within *kharif* crops.

Exports from rabi season produced crops: Wheat, barley, gram and rapeseed and mustard were the major commodities exported from *Rabi* season production (Table 4). Total exports during 2004-05 was to the tune of ₹ 2897 crores and has declined to ₹ 2404 crores in 2015-16 with 2011-12 as base year prices. In the case of wheat, the country which exported around 2 mt valued at ₹ 2780 crores during 2004-05 has increased to a maximum of 6.5 mt in 2012-13 and then reduced to 0.7 million tonnes in 2015-16. The

Table 3 Export of major commodities produced in *kharif*

Year	Rice		Maize		Groundnut		Soybean meal	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
2004-05	47.80	16.04	10.80	1.45	1.80	1.13	23.10	4.36
2005-06	40.90	13.73	4.20	0.57	1.90	1.19	47.80	9.01
2006-07	47.50	15.94	6.40	0.86	2.50	1.57	46.00	8.67
2007-08	64.70	21.72	27.30	3.68	2.70	1.69	49.10	9.26
2008-09	24.90	8.36	35.40	4.77	3.00	1.88	51.50	9.71
2009-10	21.60	7.25	26.00	3.50	3.40	2.13	31.50	5.94
2010-11	24.70	8.29	30.10	4.05	4.30	2.69	52.10	9.82
2011-12	71.80	24.10	38.60	5.20	8.30	5.20	52.50	9.90
2012-13	101.50	34.07	47.90	6.45	5.40	3.38	44.80	8.45
2013-14	109.00	36.59	39.80	5.36	5.10	3.20	39.20	7.39
2014-15	143.80	48.27	28.30	3.81	6.80	4.26	13.70	2.58
2015-16	67.10	22.52	62.60	8.43	5.10	3.20	3.60	0.68

Quantity in lakh tonnes and value (base year price = 2011-12) in ₹ '000 crores

Table 4 Export of major commodities produced in *rabi*

Year	Wheat		Barley		Gram		Rapeseed and mustard	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
2004-05	20.100	2.780	0.047	0.007	0.100	0.059	0.160	0.052
2005-06	7.500	1.037	0.002	0.001	0.400	0.235	0.110	0.036
2006-07	0.500	0.069	0.008	0.001	0.600	0.353	0.110	0.036
2007-08			3.478	0.494	1.600	0.941	0.280	0.091
2008-09			1.668	0.237	1.300	0.765	0.440	0.143
2009-10			0.512	0.073	1.000	0.588	0.150	0.049
2010-11			0.100	0.014	2.000	1.176	0.140	0.045
2011-12	7.400	1.023	0.451	0.064	1.700	1.000	0.370	0.120
2012-13	65.100	9.002	2.669	0.379	1.900	1.118	0.320	0.104
2013-14	55.700	7.702	4.416	0.627	3.300	1.941	0.390	0.126
2014-15	29.200	4.038	4.303	0.611	1.900	1.118	0.320	0.104
2015-16	6.900	0.954	0.800	0.114	2.200	1.294	0.130	0.042

Quantity in lakh tonnes and value (base year price = 2011-12) in ₹ '000 crores

short fall in wheat exports was due to the decline in the production owing to weather anomalies. The rest of the *rabi* crops witnessed a miniscule share in the export earnings. Clearly, the *rabi* crops export from India during the past decade has not shown any significant change.

Imports scenario

Rabi crops import: The foodgrain imports were mainly found in pulses and oilseeds (*Rabi* crops) since the country attained the surplus production status in *kharif* crops, especially in cereals. Import of pulses has increased significantly both in quantity and value terms (Table 5). The import value at 2011-12 base year price has increased by 334 per cent in a span of ten years, i.e. from ₹ 3550 crores in 2004-05 to ₹ 15420 crores in 2015-16. In edible oil, the value of imports witnessed an increase from ₹ 26030 crores (2004-05) to ₹ 85700 crore (2015-16), a massive change to the tune of 229 per cent increase in a period of ten years. The edible oil import quantity was highest in India relative to other crops owing to the stagnation in production which led to the status of net importer (Sharma 2014).

As far as agricultural export-import is concerned, the net trade in nominal terms was maximum during 2013-14 (₹ 1449 billion), the benchmark of net trade in India. Thereafter, a decreasing trend has been noticed in the net trade. Further, in 2013-14 there was a substantial growth of 401 per cent in the net trade over the base year 2006-07. The agricultural exports in 2006-07 were only ₹ 586 billion which has increased up to ₹ 2687 billion during 2013-14, and then declined to ₹ 2455 and ₹ 2225 billion respectively in the subsequent years. Further, there was an increase in agricultural imports since 2006-07. The value has increased from ₹ 296 billion to ₹ 1853 billion (525%) in a span of eleven years. The comparative analysis of

Table 5 Import of major commodities produced in *rabi*

Year	Total pulses		Gram		Lentil		Edible oil		R and M Oil	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
2004-05	13.40	3.55	0.13	0.05	0.30	0.10	47.50	26.03		
2005-06	17.00	4.50	2.82	1.05	0.40	0.13	42.90	23.51		
2006-07	22.70	6.01	1.27	0.48	0.60	0.20	42.70	23.40		
2007-08	28.40	7.52	1.46	0.54	2.30	0.77	49.00	26.85		
2008-09	24.80	6.57	1.98	0.74	0.30	0.10	67.20	36.82	0.04	0.06
2009-10	35.10	9.30	3.38	1.27	2.90	0.97	80.30	44.00	0.18	0.26
2010-11	27.00	7.15	1.01	0.38	1.60	0.53	69.10	37.86		
2011-12	33.60	8.90	2.06	0.77	1.20	0.40	84.50	46.30	0.28	0.40
2012-13	38.40	10.17	6.98	2.61	5.10	1.70	110.10	60.33	0.56	0.80
2013-14	35.30	9.35	2.76	1.03	7.10	2.37	104.70	57.37	0.45	0.64
2014-15	45.70	12.11	4.19	1.57	8.20	2.73	127.30	69.75	1.71	2.44
2015-16	58.20	15.42	10.30	3.85	12.60	4.20	156.40	85.70	1.68	2.40

Quantity in lakh tonnes and value (base year price = 2011-12) in ₹ '000 crores

exports and imports in agriculture indicated a positive net trade, i.e. value of exports is greater than value of imports implying a good trade and earnings to exchequer.

India has achieved rapid strides in foodgrains production since green revolution resulting in self-sufficiency and surplus production with respect to the staple foods. The success of improved agricultural technologies at farmers' field has enabled the country to meet domestic demand from its own production and reduce dependence on imports. However, productivity/efficiency gaps are reported for all food commodities ranging from low to high across states as well as increasing imports particularly in pulses and oilseeds. The study calls for a pragmatic approach to increase the productivity of states which are shortfall from their benchmark states to narrow down the productivity and efficiency gaps which warrants for prioritization or effective region-specific research and extension programmes. For instance, more thrust should be given to oilseeds and pulses wherein imports have increased in the recent past. Alternatively, in cereals where surplus production has been observed, their supply has to be ensured on sustainable basis. Clearly, increasing the productivity of foodgrains will boost the overall performance of Indian agriculture and paves way to ensure food security for millions without any dependency on imports.

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