Bihar Agriculture: Scenario Pertaining to the Principal Crops [1]

Bihar is one of the fastest growing states in India, with its Gross State Domestic Product (GSDP) growing at a Compound Annual Growth Rate (CAGR) of 12.14 per cent between 2011–12 and 2016–17, and the per capita GSDP increasing from US$ 365.1 in 2011–12 to US$ 598.3 in 2016–17. With agriculture being one of its strongest sectors, the state also achieves significantly high agricultural production. About 80 per cent of the state's population is employed in agriculture, which is much higher than the corresponding average figure for India as a whole. Some of the rapidly growing industries in the state are food processing, dairy, sugar, manufacturing, and healthcare. Bihar is an ideal destination for such a wide range of industries because of its large labour market, which makes investments cost-friendly. The state also enjoys an advantage over the other states because of its unique location, characterised by close proximity to the vast eastern and northern Indian markets, raw materials and mineral reserves from the neighbouring states. Although largely service-oriented, the economy of Bihar also has a significant agricultural base. As of 2016, the shares of agriculture, industry, and services in the state economy are 23 per cent, 17 per cent, and 60 per cent, respectively. The strong foundation of Bihar's agriculture lies in its fertile soil and abundant water resources, particularly groundwater. Its favourable agro-climatic conditions also help the state produce a variety of crops, vegetables and fruits. Recently, there has been a large-scale increase in the production of flowers in Bihar, enabling it to cater to both its domestic and external markets. The state government is stressing the need for higher agricultural growth with a variety of interventions for technological change. The rise in productivity has also led to a higher rate of growth of GSDP during the last decade. Further, there has been an increase in the generation of agricultural surplus during recent years, which has been invested in the secondary and tertiary sectors, thereby helping them to grow at high rates.

Bihar Krishi Roadmap

Agriculture is the prime source of wealth in Bihar and is the key to the overall development of the state economy. The state government has accorded top priority to agriculture and has prepared a road map for agriculture sector. The *Agriculture Road Map* aims at Food and Nutritional Security of state population, increase in farmer's income, gainful employment to agriculturist and check on migration, equitable agricultural growth with focus on gender and human aspects and sustainable use of natural resources for sustainability of production system.

The first Agriculture Road Map was started in 2008 to bring rainbow revolution, an integral development programme of agriculture, horticulture, forestry, sugarcane, fishery, poultry and animal husbandry as shown in *Table 1*. It concluded with a *Krishi Karman Award* to the state for ever highest rice

[1] Prepared by Garima Nain, Gokhale Institute of Economics and Politics. She was working as Summer Intern at NCAER during this work.

production at 81 lakh MT in 2011-12. This also led to commendable progress in seed sector and agriculture extension. It was followed by the launch of its second phase by the then President Pranab Mukherjee in October 2012 in Patna. The main objective of this road map was to ensure safety of food grains and nutrition and to increase the income of farmers. It paid special attention to road connectivity to help rural population reach wholesale markets to directly sell their produce. The third road map was unveiled by the president, Ram Nath Kovind for the period 2017-2022 in November 2017. The emphasis has been put on organic farming under this road map. Funds to the tune of Rs 1.54 lakh crore have been allocated for the third phase. Details of the three agricultural roadmaps for Bihar have been summarised in Table 1.

Table 1: Bihar Agriculture Roadmaps

Year of Launch	**2008**	**2012 (*Phase I*)**	**2017 (*Phase II*)**
Objective			
• Rainbow Revolution	✓	✓	✓
Focus			
• Seed Sector	✓	✓	×
• Road Connectivity	×	✓	×
• Food Security	✓	✓	×
• Organic Farming	✓	×	✓
• Power Sector	×	✓	✓
Funds Allocated (₹ in crore)	**6135.79**	**1.49 lakh**	**1.54 lakh**
Schemes Launched			
• Seed Extension Scheme	✓	×	×
• Seed Gram Scheme	✓	×	×
• A 1500 MW Power Network	×	✓	✓
• Agriculture Research University	×	✓	
• Development of Organic Corridors	×	×	✓
• An 11 kV Agriculture Feeder	×	×	✓
• Three-layer Bihar Vegetable Processing and Distribution Cooperation	×	×	✓
• Expenditure on Mid-day Meal Scheme	×	×	✓
Awards			
• *Krishi Karman Award*	✓	×	×

Source: Compiled from official documents of Government of Bihar

Key Sectors:

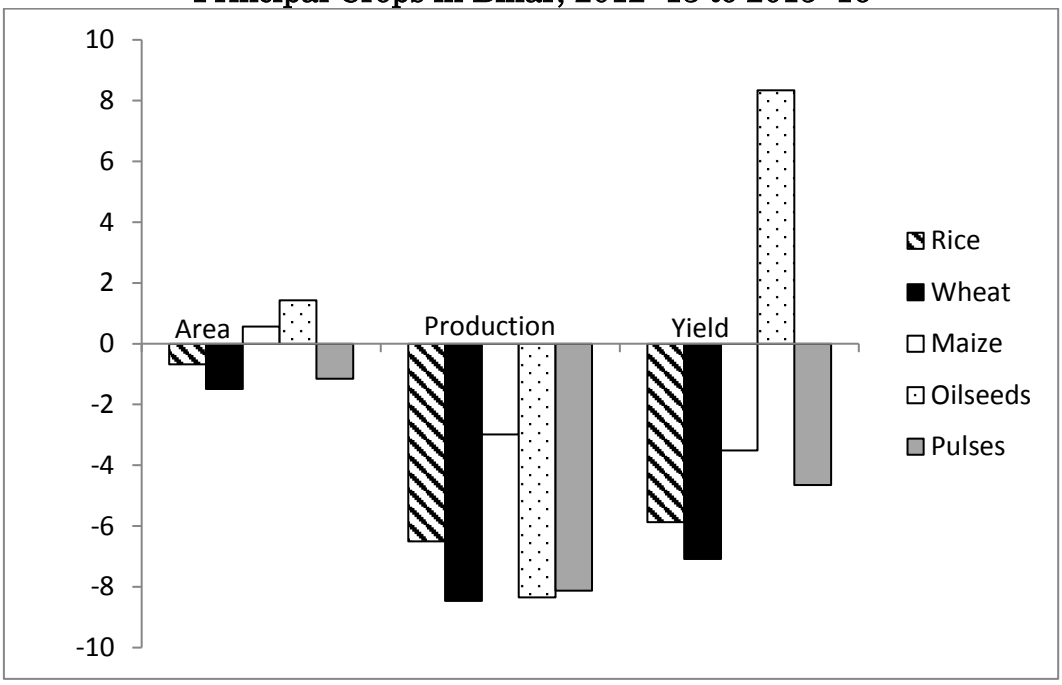
- *Food Processing and Dairy*: In 2016–17, the total fruit production in Bihar was 4.27 million tonnes, while the total production of major vegetables was 14.23 million tonnes. Bihar is the sixth largest producer of fruits and the third largest producer of vegetables in India.
- In 2017–18, the total horticulture production in the state stood at 18,881.16 thousand metric tonnes (MT), with 1,176.68 thousand hectares of area under production.

- The state produced 7,296.4 thousand MT of rice and 340.9 thousand MT of pulses in 2017–18.
- In 2016-17, Bihar produced 18.24 million tonnes of sugarcane.
- In keeping with its plans to promote the state's tourism sector, the Bihar Government has identified a total of 900 locations that are to be developed as tourist spots.

District-wise Growth Trends in the Area, Production and Yield of Principal Crops (2012–13 to 2015–16):

The fertile soil, along with the availability of abundant groundwater resources in the state, help farmers in Bihar produce a variety of both food and non-food crops. Apart from major cereals and pulses, cultivators also show an immense interest in growing fibres, oilseeds, fruits and vegetables. Recently, the state has also increased its production of flowers on a large scale for both the domestic and external markets. Figure 1 depicts the CAGRs of the area, production and yield of principal crops in Bihar between the years 2012–13 and 2015–16:

Figure 1: CAGRs for the Area, Production and Yield of Principal Crops in Bihar, 2012–13 to 2015–16



Source: Computed from data of Government of Bihar

Area, Production, and Yield of Rice: The area, production, and yield of rice fell by 0.68 per cent, 6.50 per cent and 5.87 per cent, respectively, over the years 2012–13 to 2015–16. However, the 17. 15 and 12 districts recorded an increase in the area, production, and yield of rice, respectively, during the corresponding period. The leading district in the state in terms of productivity of rice is Kisangunj, with a CAGR of 8.69 per cent.

Area, Production, and Yield of Wheat: The area, production, and yield of wheat fell by 1.49 per cent, 8.46 per cent, and 7.08 per cent, respectively, over the years 2012–13 to 2015–16. However, 17, 10, and 8 districts recorded an increase in the area,

production, and yield of wheat, respectively, during the corresponding period. The leading district in terms of productivity of wheat in the state is Kisangunj, with a CAGR of 11.46 per cent.

Area, Production, and Yield of Maize: The production and yield of maize fell by 2.98 per cent and 3.51 per cent, respectively, over the years 2012–13 to 2015–16. However, there was an increase of 0.56 per cent in the area under maize. Besides, 12, 17, and 16 districts in the state recorded an increase in the area, production, and yield of maize, respectively, during the corresponding period. The leading district in terms of productivity of maize in the state is Jamui, with a CAGR of 24.85 per cent.

Area, Production, and Yield of Oilseeds: The area and yield of maize increased by 1.43 per cent and 8.34 per cent, respectively, over the years 2012–13 to 2015–16, but there was an overall a decline of 8.35 per cent in the production of maize. However, 20, 18, and 19 districts in the state recorded an increase in the area, production, and yield of oilseeds, respectively, during the corresponding period. The leading district in terms of productivity of oilseeds in the state is Saran, with a CAGR of 47.32 per cent.

Area, Production and Yield of Pulses: The area, production, and yield of maize declined by 1.15 per cent, 8.13 per cent, and 4.65 per cent, respectively over the years 2012–13 to 2015–16. However, 19, 10, and 6 districts in the state recorded an increase in the area, production, and yield of pulses, respectively, during the corresponding period. The leading district in terms of productivity of pulses in the state is Muzaffarpur, with a CAGR of 10.37 per cent.
Table 2 delineates the production and productivity of principal crops achieved by the top and bottom three districts of Bihar based on their respective CAGRs.

Table 2: Top and Bottom Three Districts for the Production and Productivity of Principal Crops
(in terms of the CAGR over the Years 2012–13 and 2015–16)

Crops	Production/ Productivity	Top Three Districts	Bottom Three Districts
Rice	Production	Sheikhpura, Lakhisarai, Jamui	Sheohar, Gopalgunj, East Champaran
	Productivity	Sheikhpura, Jamui, Kisangunj	Sheohar, Gopalgunj, East Champaran
Wheat	Production	Kisangunj, Bhagalpur, Jamui	Araria, Muzaffarpur, East Champaran
	Productivity	Bhagalpur, Purnia, Kisangunj	East Champaran, Muzaffarpur, Sheohar
Maize	Production	Sheikhpura, Araria, Jamui	Buxar, Jahanabad, East Champaran
	Productivity	Katihar, Lakhisarai, Jamui	East Champaran, Buxar, Madhepura
Oilseeds	Production	Madhepura, Bhojpur, Jamui	Muzaffarpur, Darbhanga, Araria
	Productivity	Bhojpur, Sheikhpura, Saran	Darbhanga, Gopalgunj, Jahanabad
Pulses	Production	Saharsa, Darbhanga, Jamui	Sheohar, Lakhisarai, Bhojpur
	Productivity	Saran, Madhepura, Muzaffarpur	Araria, Bhojpur, Bhabhua

Area and Production of Fruits and Vegetables: The area and production of fruits rose by 0.57 per cent and 1.42 per cent, respectively, between the years 2011–12 and 2016–17, as depicted in Table 3. There was a significant rise of 11.46 per cent and 6.06 per cent, in the production of honey and aromatics, respectively, over the corresponding period. However, during the same period, there was a decline of 0.35 per cent and 1.36 per cent in the area and production of vegetables, respectively. The area under spices also fell significantly by 7.35 per cent during the period under study.

Table 3: Compound Annual Growth Rates (2011–12 to 2016–17)

	Area (%)	Production (%)
Fruits	0.57	1.42
Vegetables	-0.35	-1.36
Flowers (loose)	-6.04	-1.81
Aromatics	4.83	6.06
Spices	-7.35	-3.36
Plantations	-0.45	-0.05
Honey	NA	11.46

Data Source: Department of Agricultural Cooperation and Farmers Welfare.

Land Utilisation and Cropping Pattern

The proportion of the total land put to agricultural use in Bihar is high, as compared to the other states of India, which can be attributed to the topographical nature of the state, as it falls in the riverine plains of the Ganga basin. The land-use pattern in the state from 2009–10 to 2013–14 remained nearly the same over the years. However, there was an increase in the gross sown area from 7295.81 thousand hectares to 7580.14 thousand hectares between 2009–10 and 2013–14. The cropping intensity increased marginally from 1.37 in 2009-10 to 1.44 in 2013-14. However, agricultural productivity in Bihar declined substantially for its principal crops between the years 2012–13 and 2015–16 despite the launch of various schemes under the Krishi Roadmaps by the state government. According to the study, *Unleashing Bihar's Agriculture Potential: Sources and Drivers of Agriculture Growth,* poor public investment in power, all-weather roads and marketing infrastructure has constrained the growth of agriculture in Bihar (Hoda, A., Rajkhowa, P., & Gulati, A. (2017)).

The data on cropping pattern in Bihar for the period 2009–10 to 2014–15 (as shown in Table 4) reveals that the agricultural economy of Bihar is highly tilted in favour of the subsistence sector, since the acreage under foodgrains was more than 92 per cent during all the years under study. During the last few years, the acreage under pulses has shown a decline of 2.18 per cent, leading to both a shortage in the production and rise in prices of pulses. The area under fibre crops has also fallen substantially while the area under cultivation of oilseeds too has shown a marginal fall of 2.26 per cent.

One of the reasons for the decline in the net sown area in Bihar during the period 2009-10 to 2014-15 over the decade could be the rise in the area put to non-agricultural uses, in the land under trees and groves as well as in the area under current fallow. Table 4 depicts the total cultivated area under different principal crops in Bihar for the period 2009–10 to 2014–15.

Table 4: Area under Principal Crops (in '000 ha)

Crops	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	CAGR*
Rice	3214	2833	3324	3299	3130.81	3268	0.33%
Wheat	2193	2104	2142	2208	2009.00	2188	-0.05%
Maize	632	646	675	686	732.34	714	2.47%
Cereals	6069	5624	6172	6220	5896.01	-	-0.72%
Pulses	565	612	524	516	499.96	506	-2.18%
Foodgrains	6634	6236	6696	6736	6395.97	6701	0.20%
Oilseeds	139	130	133	128	122.92	124	-2.26%
Jute	123	128	129	123	104.88	95	-5.03%
Mesta	17	17	20	18	16.19	16	-1.21%
Banana	32	32	32	33	34.31	-	1.76%
Sugarcane	116	248	218	250	258.07	256	17.15%
Tobacco		11	10	11	12.11	-	3.26%
Potato	314	314	315	322	318.45	-	0.35%

Source: data.gov.in

However, the acreage under the cash crops in Bihar shows a positive growth trend. The sugarcane industry is an important component of the agro-based industry in the state. It not only provides cash benefits to the farmers producing the crop but also creates substantial direct and indirect employment. The vast scope of the sugar industry and the encouragement it receives from the state government boosted the area under sugarcane cultivation by as much as 17 per cent between 2009–12 and 2014–15. The area under other cash crops such as tobacco and potato also rose by 3.26 per cent and 0.35 per cent, respectively. This indicates that agriculture in Bihar is gradually moving away from subsistence farming, reflected in the increase in the area and consequently production of cash crops, especially sugarcane.

Appendices

Appendix Table A-1: Compound Annual Growth Rates of the Area, Production and Yield of the Principal Crops (2012–13 to 2015–16)

Crops	Area (%)	Production (%)	Yield (%)
Rice	-0.68	-6.50	-5.87
Wheat	-1.49	-8.46	-7.08
Maize	0.56	-2.98	-3.51
Oilseeds	1.43	-8.35	8.34
Pulses	-1.15	-8.13	-4.65

Appendix Table A-2: % Changes in the Area under the Principal Crops (2012–13 to 2015–16)

Crops	Total	Average	Maximum	Minimum
Rice	-0.68	-0.74	12.10	-12.94
Wheat	-1.49	0.29	90.64	-24.03
Maize	0.56	-2.18	26.91	-30.17
Oilseeds	1.43	5.71	193.11	-39.23
Pulses	-1.15	-0.54	84.81	-32.02

Appendix Table A-3: % Changes in the Production of the Principal Crops (2012–13 to 2015–16)

Crops	Total	Average	Maximum	Minimum
Rice	-6.50	-6.79	21.72	38.23
Wheat	-8.46	-5.46	71.17	-32.81
Maize	-2.98	-3.81	58.16	-39.58
Oilseeds	-8.35	2.72	180.99	-46.95
Pulses	-8.13	-4.77	95.01	-44.67

Appendix Table A-4: % Changes in the Yield of the Principal Crops (2012–13 to 2015–16)

Crops	Total	Average	Maximum	Minimum
Rice	-5.87	-6.22	8.69	-36.40
Wheat	-7.08	-5.61	11.46	25.31
Maize	-3.51	-1.73	24.85	-25.02
Oilseeds	8.34	2.05	47.32	-20.01
Pulses	-4.65	-4.76	10.37	-21.80

Appendix Table A-5: Land Utilisation Pattern

(Area in '000 hectares)

Land Use	2009–10	2010–11	2011–12	2012–13	2013–14
Geographical Area	9359.57 (100.0)	9359.57 (100.0)	9359.57 (100)	9359.57 (100)	9359.57 (100)
(1) Forests	621.64 (6.6)	621.64 (6.6)	621.64 (6.6)	621.64 (6.6)	621.64 (6.6)
(2) Barren and Uncultivable Land	431.72 (4.6)	431.72 (4.6)	431.72 (4.6)	431.72 (4.6)	431.72 (4.6)
(3) Land Put to Non-agricultural Use	1689.72 (18.1)	1699.74 (18.2)	1702.54 (18.2)	1708.37 (18.3)	1712.29 (18.3)
Land Area	1332.51 (14.2)	1342.69 (14.3)	1345.57 (14.4)	1352.89 (14.5)	1356.8 (14.5)
Water Area	357.21 (3.8)	357.05 (3.8)	356.97 (3.8)	355.48 (3.8)	355.49 (3.8)
(4) Cultivable Waste	45.38 (0.5)	45.34 (0.5)	45.23 (0.5)	45.02 (0.5)	44.89 (0.5)
(5) Permanent Pastures	15.78 (0.2)	15.73 (0.2)	15.7 (0.2)	15.6 (0.2)	15.47 (0.2)
(6) Land under Tree Crops	243.98 (2.6)	244.56 (2.6)	244.57 (2.6)	246.34 (2.6)	247.36 (2.6)
(7) Fallow Land (excl. Current Fallow)	122.00 (1.3)	121.88 (1.3)	121.17 (1.3)	121.78 (1.3)	120.49 (1.3)
(8) Current Fallow	857.63 (9.2)	920.27 (9.8)	781.26 (8.3)	766.7 (8.2)	913.49 (9.8)
Total Uncultivable Land (1 to 8)	4027.84 (43.0)	4100.87 (43.8)	3963.83 (42.4)	3957.17 (42.3)	4107.32 (43.9)
Net Sown Area	5331.73 (57.0)	5258.70 (56.2)	5395.75 (57.6)	5402.39 (57.7)	5252.25 (56.1)
Gross Sown Area	7295.81	7194	7646.76	7777.52	7580.14
Cropping Intensity	1.37	1.37	1.42	1.44	1.44

Source: Economic Survey 2016–17, Government of Bihar.

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