Chapter 2
An Overview of Rice Economy

2.1 Introduction

This chapter will provide an overview of Asian rice economy with a special emphasis on Indian rice economy. This chapter will highlight the recent performance of India by discussing the trends in rice production and productivity of rice in the states selected for the purpose of analysis. A detailed district-wise analysis of cropping pattern, irrigation status, etc., is also provided to get clarity on the study area. This chapter will also discuss the trends in rice trade and the export potential of Indian rice.

2.2 Asian Rice Scenario

Rice is the world's most important crop, and the food security in Asia has traditionally been defined as having stable prices for rice in the major urban markets of a country. Therefore, food security is essentially a reflection of rice security in this region. One-third of the economy in the Asian region is dependent on rice production, marketing and consumption. Rice is the staple food for more than 50% of the population in Asia, and for South Asia alone, the figure is around 70% (Bishwajit et al. 2013). Rice is the cheapest and most effective staple food crop available in this region that is likely to eradicate acute undernutrition. Additionally, more than half of the daily caloric intake in some countries comes from rice. Asia is the largest producer of rice contributing around 91% of total world rice production (see Fig. 2.1). The remaining rice production is divided between Africa and Latin America. However, rice is gaining importance in these regions with a 40% increase in annual per capita consumption of rice in Africa and 46% increase in annual per

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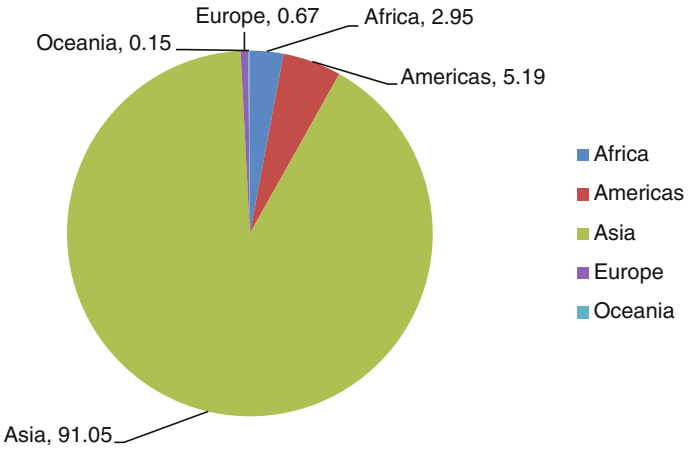

Fig. 2.1 Rice cultivation in the world. *Source* FAOSTAT (average of 1980–2014)

capita consumption of rice in Latin America (Yamano et al. 2016). The rice consumption in Africa increased from 16.7 kg in 1990 to 23.3 kg in 2011. Similarly, the rice consumption in Latin America increased from 7.1 kg in 1990 to 10.4 kg in 2011. This shift in consumption pattern also indicates that the global rice production will need to increase by 116 million tons (26%) by 2035, from the 2010 production level, to meet the rising demand (Yamano et al. 2016).

Several studies have revealed that there is a great potential to further increase the rice production mainly in South Asian countries (Bishwajit et al. 2013). The introduction of modern breeding strategies, which has proved to be much more efficient than conventional techniques and environmental stress-tolerant varieties, offers considerable scope for the increase in rice production in the South Asian region. In South Asia, Bangladesh has had the highest rice yield since 1992. India's rice yield remains lower than that of Bangladesh and Sri Lanka and higher than that of Pakistan and Nepal. Despite having high production rate, Bangladesh imports rice as it is the major consumer of rice in the South Asian region. India is the largest exporter and the fourth largest rice-consuming nation in the South Asian region (Bishwajit et al. 2013).

Among the South Asian countries, rice occupies special position in the Indian economy. Rice is one of the most important food crops of India. India is the second largest producer of rice after China (see Fig. 2.2). It plays a major role in India's diet and is central to food security. Rice is the staple food crop for more than 70% of the Indian people. Ninety per cent of the rice produced is consumed within the country. Major share of rice is cultivated during Kharif season. A small share of rice is grown in Rabi/summer season with assured irrigation.

Rice plays a special role in Indian tradition. For Indians, rice is more than mere livelihood; it has shaped the history, culture, art and lifestyle of its population in many ways.

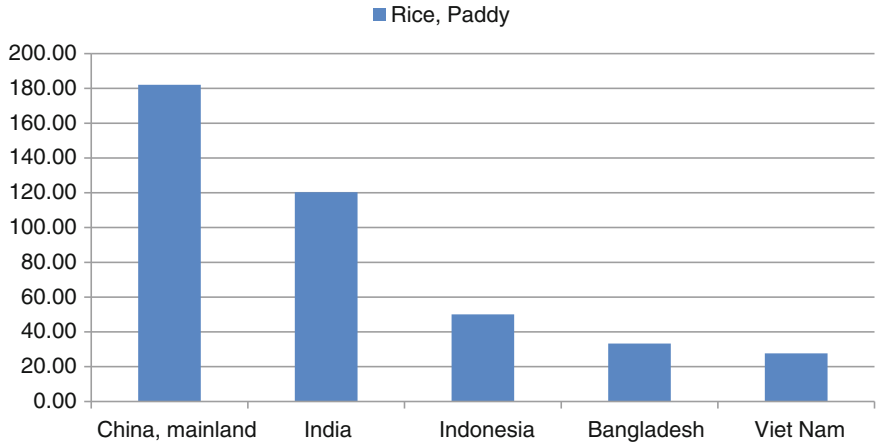

Fig. 2.2 Major rice-producing countries (in million tonnes). *Source* FAOSTAT (average of 1980–2014)

2.3 Rice Scenario in India

Rice production in India increased from around 80 million tonnes in 1980 to around 157 million tonnes in the year 2014 (see Fig. 2.3). Productivity also improved from around 20 hg per ha to around 36 hg per ha during 1980–2014 (see Fig. 2.4). Nonetheless, the area under cultivation has not increased much; it was around 40 million ha in 1980 and 43 million ha in the year 2014 (see Fig. 2.5). Although the area under cultivation has increased marginally, the trends in area show that the future production of rice may face some challenges.

As per the FAO estimates the annual growth rates of area under cultivation, production and yield were −0.17, 2.04 and 2.2, respectively (see Fig. 2.6). The negative growth rates for area under cultivation indicate that any further increase in production of rice is possible only through methods that enhance rice yield substantially. Although India's rice yield was showing a marginal improvement over the years, the current rice yield is much lower than other countries (see Fig. 2.7). As mentioned earlier, India's rice yield remains lower than other South Asian counties such as Bangladesh and Sri Lanka as well (see Fig. 2.8).

On the trade front, from being a rice importer in the initial years of the 1980s, India transformed itself with a production of 157 million tonnes and exports around 11 million tonnes (see Fig. 2.9). India is the largest exporter of rice in the world market since 2011. From the 1960s to the 1980s, the USA was the largest exporter of rice with Thailand occasionally shipping more than the USA (Lakkakula et al. 2015). Gradually, Thailand became the largest exporter in 1981 and in the mid-1990s; Vietnam began to register large rice trade surpluses as a result of market and trade reforms (Lakkakula et al. 2015). India emerged as one of the major players in the world rice market in the recent years (Varma and Issar 2016). India's

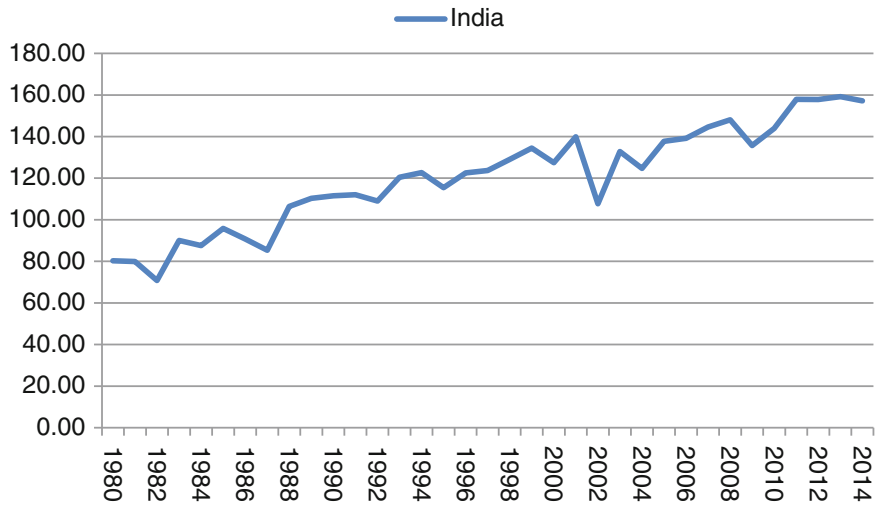

Fig. 2.3 Trends in rice production in India, in million tonnes. *Source* FAOSTAT (average of 1980–2014)

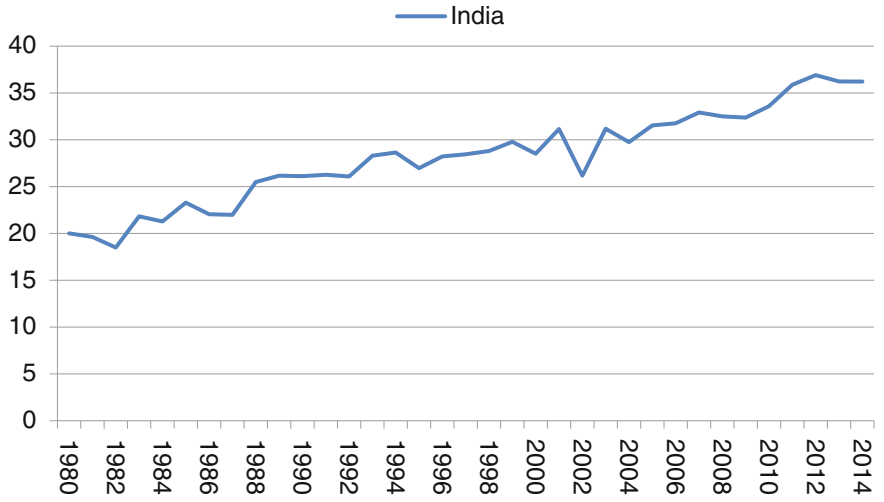

Fig. 2.4 The trends in yield of rice in India (in hg/ha). *Source* FAOSTAT (average of 1980–2014)

share in total world rice exports was around 26% in 2011–12 but marginally declined to 22% in 2013–14 (see Table 2.1). In 2011–12, Thailand's share was only 18%, but in 2013–14, the share increased to 22%. So in 2013–14, both India and Thailand had the same share of rice exports in the world market showing the severe competition between the two countries. Pakistan and China are the two other major rice players in the world market.

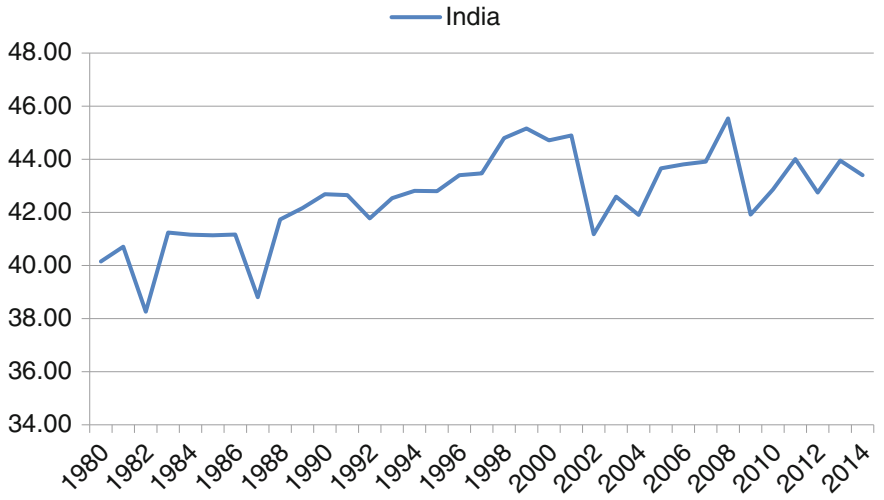

Fig. 2.5 Area under rice in India (in million ha). *Source* FAOSTAT (average of 1980 to 2014)

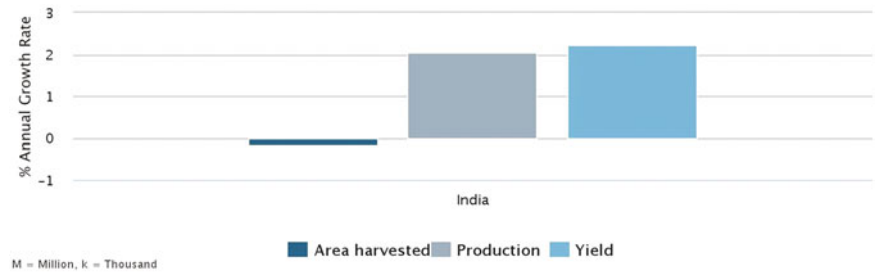

Fig. 2.6 Annual growth rates for area, production and yield of rice in India. *Source* FAOSTAT

India exports two varieties (basmati and non-basmati) of rice to the world market. The major importing countries for these two varieties of rice are also different. Basmati rice is exported to Iran, Saudi Arabia, Iraq, etc. whereas non-basmati rice is exported to Benin, Senegal and Bangladesh (see Tables 2.2 and 2.3). Among the two varieties of rice, the performance of non-basmati rice is remarkable as it almost doubled between 2011–12 and 2013–14 from 3.9 million tonnes to 7.13 million tonnes (Varma and Issar 2016). The global norms of the Food and Agriculture Organisation (FAO) are also beneficial to the Indian rice exporters. According to the Codex standard, the maximum acceptable level of arsenic in rice is less than 0.2 mg/kg in rice. Since the arsenic level in countries like the USA is more than 0.3 mg/kg of arsenic, India has an advantage in the world market in terms of meeting the Codex standard (Jha 2014).

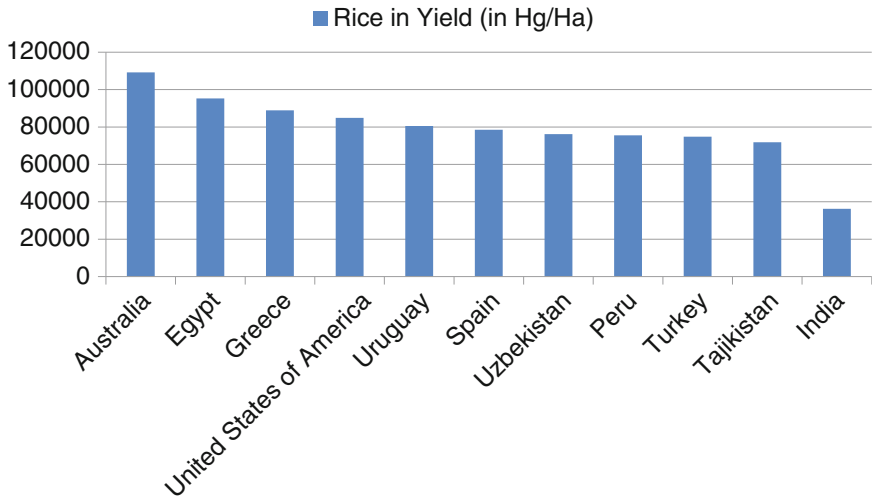

Fig. 2.7 India's position in yield of rice (paddy) in the world in 2014 (in hg/ha). *Source* FAOSTAT

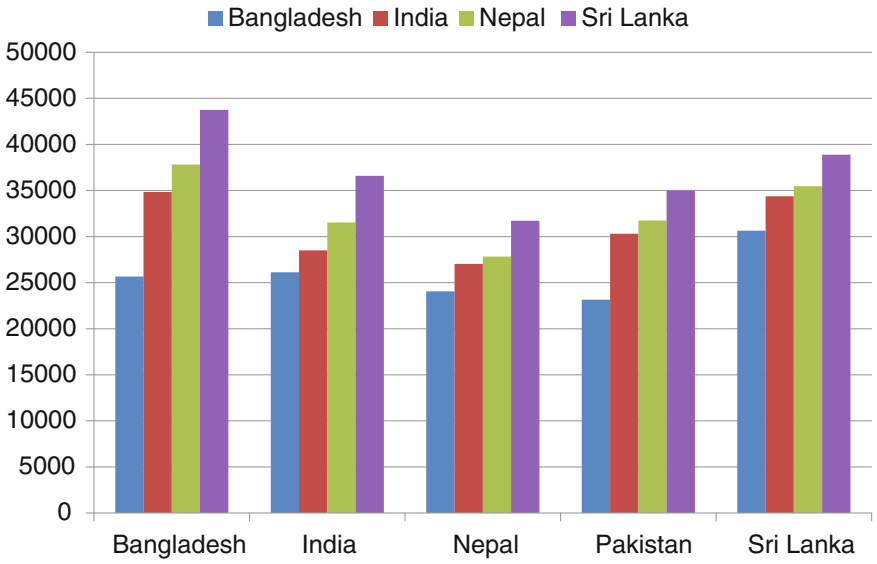

Fig. 2.8 India's rice yield in comparison with selected South Asian countries (in hg/ha). *Source* FAOSTAT

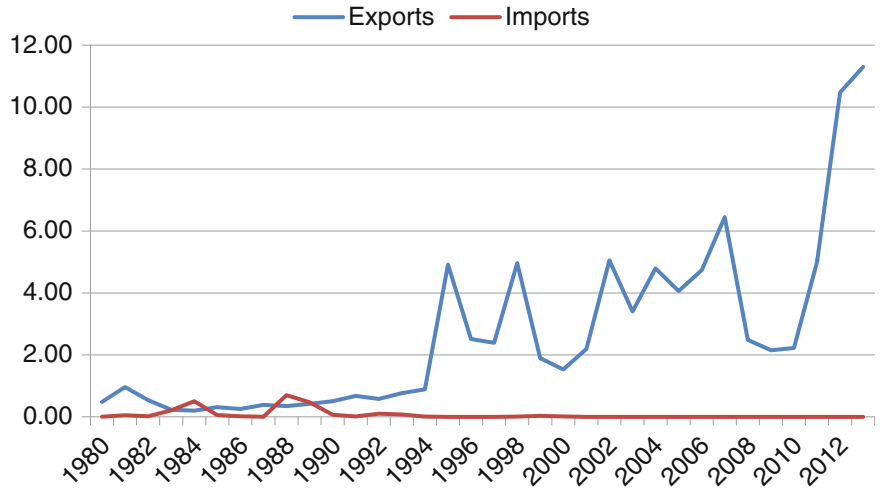

Fig. 2.9 Rice exports and imports in India (in million tonnes). *Source* FAOSTAT

Table 2.1 Rice trade and its potential (% share in total world exports)

Countries	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Argentina	2.02	1.48	2.02	1.55	1.55	1.62
Australia	0.06	0.17	0.86	1.15	1.30	1.35
Brazil	2.01	1.36	3.58	2.82	2.20	2.20
Burma	3.58	1.41	2.15	1.76	1.94	1.94
Cambodia	2.79	2.38	2.37	2.04	2.53	2.59
China	2.66	1.96	1.34	0.68	0.78	0.52
Egypt	1.96	1.81	0.88	1.53	2.20	2.20
Guyana	0.82	0.94	0.71	0.73	0.78	0.84
India	7.31	7.06	12.79	26.18	23.31	22.00
Pakistan	10.84	12.67	9.42	8.68	8.29	8.28
Paraguay	0.42	0.43	0.57	0.67	0.65	0.65
Russia	0.31	0.49	0.39	0.72	0.54	0.60
Thailand	29.15	28.66	29.37	17.74	20.72	22.00
Uruguay	3.15	2.56	2.32	2.70	2.33	2.33
Vietnam	20.24	21.33	19.31	19.71	19.17	19.93
Others	2.42	3.04	2.95	2.84	2.89	2.68
USA	10.26	12.25	8.96	8.50	8.81	8.28

Source FAOSTAT

Table 2.2 India's basmati rice exports to major destination markets (in %), 2008–09 to 2014–15

Country/year	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15[a]
Canada	1.15	0.46	0.72	0.90	0.80	0.77	0.53
Iran	10.98	18.10	19.26	19.35	31.31	38.34	23.18
Kuwait	7.17	6.92	7.31	6.29	4.72	4.67	4.42
Netherland	0.72	0.22	0.99	1.17	1.74	1.16	1.59
Oman	1.61	0.29	0.25	0.58	1.16	1.15	1.27
Saudi Arabia	33.69	31.79	26.27	22.69	19.70	21.99	29.90
United Arab Emirates	29.31	30.58	27.99	22.93	6.77	3.97	4.16
UK	4.02	1.83	3.28	4.46	5.56	3.16	3.78
USA	2.55	1.29	1.93	2.89	2.64	2.75	3.05
Yemen Republic	2.02	3.07	2.85	2.90	4.98	3.91	4.54
Total	93.22	94.54	90.84	84.15	79.38	81.87	76.41

Source Own calculation based on APEDA data
Notes [a]Data is till June 2014

Table 2.3 India's non-basmati rice exports to major destination markets (in %), 2011–12 to 2014–15

Country/year	2011–12	2012–13	2013–14
Benin	5.35	8.62	16.35
Bangladesh	3.62	0.47	9.14
Senegal	8.35	12.78	9.14
South Africa	4.81	6.44	5.53
Liberia	0.78	2.49	4.53
Nepal	3.52	5.93	5.67
United Arab Emirates	5.19	3.92	3.15
Coast of Ivory	7.06	8.92	3.67
Madagascar	0.87	1.53	3.52
Guinea	0.38	4.21	3.11
Saudi Arabia	2.57	2.14	1.95
Cameroon	1.39	3.11	3.06
Nigeria	20.36	12.16	2.70
Singapore	1.47	2.01	1.87
Indonesia	5.76	2.03	1.69
Total (%)	71.48	76.77	75.07

Source Own calculation based on APEDA data

2.4 Area, Production and Yield of Rice—Selected States

Orissa

Orissa is a major rice-producing state of India. Rice covers around 69% of the total cultivated area and about 63% of the total area under food grains (Das 2012). Rice is the staple food of almost the entire population of the state, and therefore, the state economy is directly linked with improvements in production and productivity of

rice in the state (Das 2012). Although Orissa was doing well in terms of rice production in the 1950s by supplying major portion of the rice grain in the central pool of food stocks, its situation was strongly reversed in the post-high-yielding variety period. The state's rice area has stagnated and its share in the country's production of rice declined from 11% in the pre-HYV period to 7.9% in the post pre-HYV period (Das 2012). In fact, the introduction of high-yielding varieties did not have any perceptible impact on rice production and productivity for over two decades: per hectare yield fluctuated between 800 and 977 kg (Das 2012). The comparison of average yield in three different time periods shows that the yield increased substantially from 1372 kg per hectare in the first period (2001–02 to 2005–06) to 1591 kg per hectare in the second period (2006–07 to 2010–11), while the yield remained almost stagnant in the latter two periods (2006–07 to 2010–11 and 2008–09 to 2012–13). The all India average rice yield increased from 2001 kg per hectare in the first period to 2175 in the second period and to 2279 in the third period. Although the average rice yield marginally increased for India, the rate of increase does not appear to be satisfactory. The average rice yield in Orissa was much lower than the average yield of India in all the three periods analysed (see Fig. 2.10).

In Orissa, rice is cultivated in an area of 4.45 million hectares (Das 2012). The rice cultivation can be classified into six different ecosystems, namely irrigated

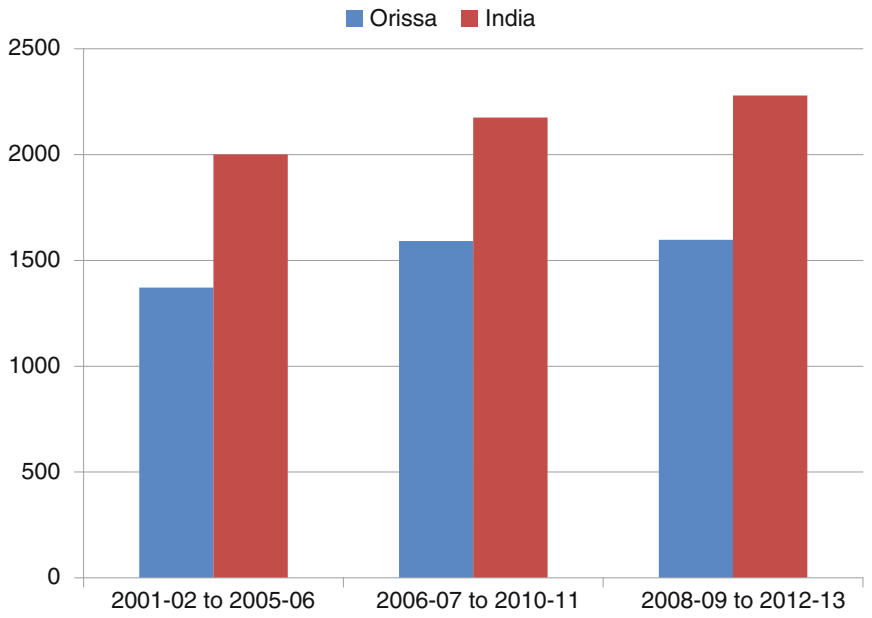

Fig. 2.10 Average rice yield in Orissa and India for different periods (in kg/ha). *Source* Directorate of Economics and Statistics, Ministry of Agriculture

Kharif (27.4%), rain-fed upland (19.1%), medium land (12.4%), shallow lowland (22.5%), semi-deep (7.9%), deep (3.4%) and irrigated Rabi (7.4%) (Das 2012).

Rice is grown during winter, summer and autumn seasons. Winter rice or Kharif rice is the dominant crop accounting for 77% of total rice produced in the state (Pandey et al. 2012). During Kharif season planting starts in June–August and harvest occurs in December–January. Autumn rice which is also known as pre-Kharif rice is cultivated during May–June to September–October. This accounts for around 11% of the total rice produced in the state and is usually cultivated in the rain-fed upland areas (Pandey et al. 2012).

The production of rice in the state increased from 3853 million tonnes in 1981–82 to 7613 million tonnes in 2013–14. Although there was an increase in production throughout the period, the data shows that the production fluctuated highly (see Table 2.4). During the same period, the all India production of rice was steadily increasing (see Table 2.4). All India production of rice increased from 53,250 million tonnes in 1981–82 to 106,540 million tonnes in 2013–14. Orissa's share in India's rice production remained stagnant during the period of 1980–81 to 2013–14. The area under rice also remained stagnant during the same period (see Table 2.5). The same was the case with the share of Orissa's rice area in total rice area; in fact, there was a marginal decline in the share of Orissa's rice area in total area.

The production and productivity growth rate trends of rice in Orissa indicated that the introduction of high-yielding varieties did not have any perceptible impact over two decades since their introduction during the mid-1960s and productivity remained below 1 tons/ha (Das 2012). During 2008–09, 77% of the total rice area (3.43 million hectares) was under high-yielding varieties whereas 75% (3.09 million hectares) was covered by high-yielding varieties during the Kharif season and the rest was under local and improved varieties (Das 2012) (Table 2.6).

Madhya Pradesh

The area under rice in Madhya Pradesh declined drastically from 4850 thousand hectares to 1930 thousand hectares in the period of 1981–82 to 2013–14. It was only Madhya Pradesh that witnessed a sharp decline in the area under rice cultivation; the area under rice cultivation in the other two states was almost stagnant. The increase in area under rice cultivation was very negligible at the all India level as well (see Table 2.5). The production of rice also declined from 3830 million tonnes in 1981–82 to 2845 million tonnes in 2013–14. In contrast, the production showed an increase both at the national level and in the other two states (see Table 2.4). But what is really striking here is that although the production of rice in Orissa and Karnataka showed an increase in a highly fluctuating manner, the national production showed a steady and consistent increase.

The increase in the rice yield was the highest in Madhya Pradesh. The yield increased from 790 kg per hectares in 1981–82 to 2666 kg per hectares in 2013–14. Interestingly, the increase in rice yield was mainly due to the reduction in area rather than an increase in production. The rice yield in Madhya Pradesh was much lower than the national average as well (see Fig. 2.11). Although rice was

Table 2.4 State-wise production of rice in million tonnes

States	1981–82	1985–86	1990–91	1995–96	2000–01	2005–06	2010–11	2011–12	2012–13	2013–14
Karnataka	2364	1943	2415	3024	3847	5744	4188	3955	3364	3573
Madhya Pradesh	3830	5418	5738	5839	982	1656	1772	2227	2775	2845
Orissa	3853	5226	5275	6226	4614	6859	6828	5807	7296	7613
Total of 3 states	10,047	12,587	13,428	15,089	9443	14,259	12,788	11,989	13,435	14,031
All India	53,250	63,830	74,290	76,980	84,980	91,790	95,980	105,300	105,240	106,540

Source Directorate of Economics and Statistics, Ministry of Agriculture

Table 2.5 State-wise area under rice in 1000 ha

States	1981–82	1985–86	1990–91	1995–96	2000–01	2005–06	2010–11	2011–12	2012–13	2013–14
Karnataka	1168	1096	1173	1265	1483	1485	1540	1416	1278	1340
Madhya Pradesh	4850	5032	5118	5344	1708	1658	1603	1662	1883	1930
Orissa	4159	4402	4404	4529	4434	4479	4226	4005	4023	4180
Total of 3 states	10,177	10,530	10,695	11,139	7625	7622	7369	7083	7183	7450
All India	40,710	41,140	42,690	42,840	44,710	43,660	42,860	44,010	42,750	43,950

Source Directorate of Economics and Statistics, Ministry of Agriculture

Table 2.6 State-wise yield of rice in kg per ha

States	1981–82	1985–86	1990–91	1995–96	2000–01	2005–06	2010–11	2011–12	2012–13	2013–14
Karnataka	2025	1772	2059	2390	2593	3868	2719	2793	2632	2666
Madhya Pradesh	790	1077	1121	1093	575	999	1106	1340	1474	1474
Orissa	926	1187	1198	1375	1041	1531	1616	1450	1814	1821
All India	1308	1552	1740	1797	1901	2102	2239	2393	2462	2424

Source Directorate of Economics and Statistics, Ministry of Agriculture

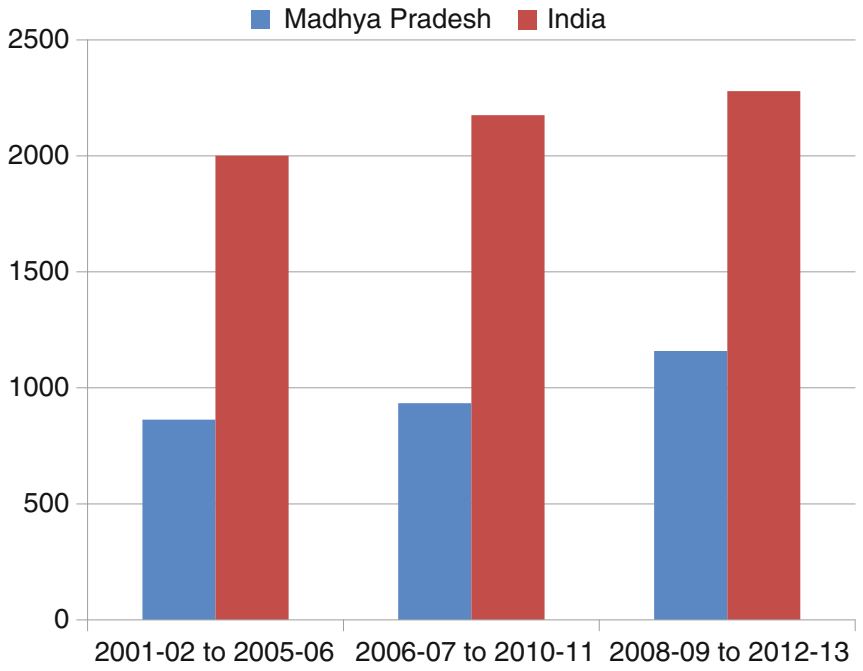

Fig. 2.11 Average rice yield in Madhya Pradesh and India for different periods (in kg/ha). *Source* Directorate of Economics and Statistics, Ministry of Agriculture

incorporated under the government of India's National Food Security Mission (NFSM) to improve the rice production, the productivity of rice was found to be higher in non-NFSM districts of Madhya Pradesh as compared to NFSM districts (Agro Economic Research Centre for Madhya Pradesh and Chhattisgarh Report 2013).

Karnataka

Karnataka is a major rice-producing state of India and rice is grown under a variety of soils and wide range of rainfall and temperature. Rice production in Karnataka depends heavily on monsoon and only 44% of the total rice acreage is under irrigation (Rajanna 2010). The unique feature of rice cultivation in the state is that either sowing or transplanting is seen in all seasons of the year (Rajanna 2010). The duration of the rice varieties cultivated in the state varies from 100 to 180 days depending on season and agro-climatic location, and the rice-growing ecosystems of the state can be broadly divided into six categories (Rajanna 2010). They are coastal area, hilly area, transitional area, tank-fed area, irrigated maidan area (south) and irrigated maidan area (north). In our analysis, we have selected Hassan and Chikmagalur districts from Karnataka. Hassan belongs to irrigated maidan (south) area whereas Chikmagalur is a hilly area.

Kharif (June–July) and summer (January–February) are the two main rice seasons of the state. There are six rice-growing ecosystems in Karnataka. Out of this, Kharif sowing is more common. In summer, rice is cultivated mainly in the irrigated maidan areas of north and south. In coastal area, crop is sown in September–October and harvested in January–February and then another crop sowing season is in December–January and the harvesting is in March–April. In the tank-fed areas, the crop cultivation is in the months of August–September depending upon the arrival of monsoon. In each district around 60–80% of the total area is devoted for Kharif while the remaining is devoted for late Kharif and summer seasons (Rajanna 2010). The state also has plenty of traditional rice varieties cultivated. The most popular traditional varieties cultivated are Rajaboga, Rajamudi, Kayame, Ratnachudi and Jerasanna.

Among the three states, rice productivity was the highest in Karnataka—higher even than the national average (see Fig. 2.12). But the average yield showed a marginal decline in the later period. The average yield was 2712 kg per hectares during 2001–02 to 2005–06 and declined to 2626 kg per hectare during 2008–09 to 2012–03 (see Fig. 2.11). During this period, the all India average yield showed a marginal improvement.

The production of rice increased from 2364 million tonnes in 1981–82 to 5744 million tonnes in 2005–06 but thereafter witnessed a decline to 3573 million

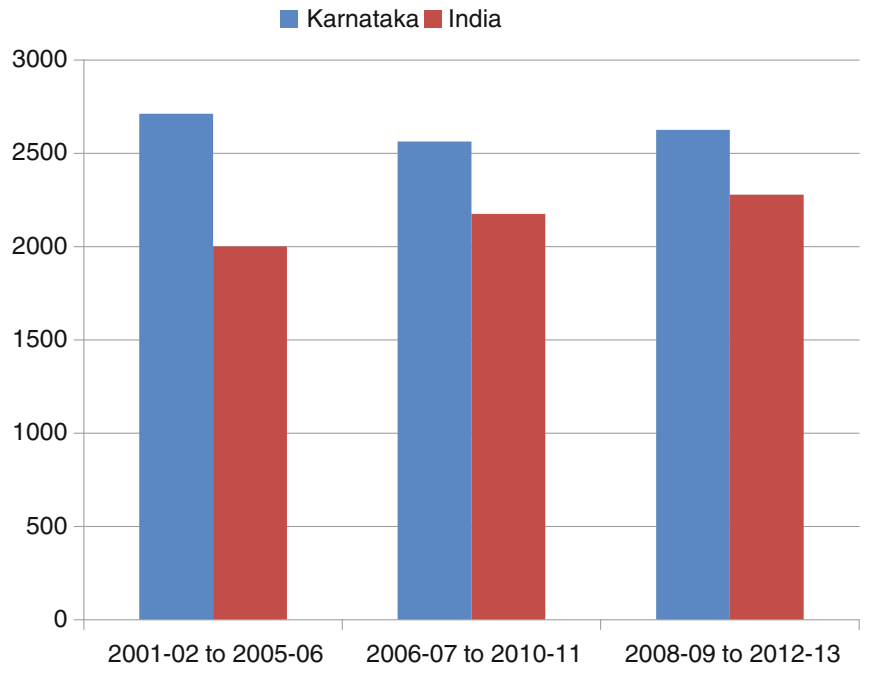

Fig. 2.12 Average rice yield in Karnataka and India for different periods (in kg/ha). *Source* Directorate of Economics and Statistics, Ministry of Agriculture

tonnes in 2013–14 (see Table 2.3). The area under rice cultivation increased marginally from 1168 thousand hectares in 1981–82 to 1340 thousand hectares in 2013–14 (see Table 2.4).

2.5 District-Wise Profiles

Karnataka

Hassan belongs to southern dry agro-climatic zone and has red sandy loams in major areas and pockets of black soil in remaining areas. On the other hand, Chikmagalur belongs to the hilly zone with red clay loamy soils in major areas. Rainfall in Hassan district ranges from 671 to 889 mm and from 904 to 3695 mm in Chikmagalur district of Karnataka. Important Kharif crops in Hassan district include paddy, ragi, jowar, maize, tur, H gram, cowpea, avare, groundnut, sesamum, sunflower, castor, niger, cotton, tobacco and sugar cane. Important Rabi crops in Hassan district are ragi, maize, H gram and cowpea. In Chikmagalur, paddy, cotton and sugar cane are important Kharif crops whereas paddy, black gram and green gram are important Rabi crops in the district.

Hassan accounts for 2.40 area in lakh hectares under Kharif crops and 0.46 lakh hectares of area under Rabi crops. On the other hand, Chikmagalur accounts for 1.53 lakh hectares of area under Kharif crops and 0.22 lakh hectares of area under Rabi crops.

The data on number and area of operational land holders in Karnataka shows that the selected districts—Chikmagalur and Hassan—had high number of marginal farmers (30,056 in Chikmagalur and 52,968 in Hassan) (see Table 2.7). As a result, the percentage share of small farmers in total farmers was also the highest in Hassan (72.4%) (see Figs. 2.13 and 2.14). Although the number of small farmers was higher in Hassan, in percentage terms Chikmagalur had highest share of small farmers (22.4%); in Chikmagalur, it was 20.7%. The percentage shares of semi-medium, medium and large farmers were also the highest in Chikmagalur.

The area irrigated by canals, tanks, wells, tube wells and lift irrigation was the highest in Hassan as compared to Chikmagalur. The total net irrigated area under cultivation was the highest in Hassan as compared to Chikmagalur (see Table 2.8).

Table 2.7 Number and area of operational land holders in study districts of Karnataka (holdings in no. of farmers, area in hectares)

District	Marginal farmers		Small farmers		Semi-med farmers		Medium farmers		Large farmers	
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Chikmagalur	30,056	13,346	10,838	14,575	4655	12,135	2079	12,035	692	16,401
Hassan	52,968	26,346	15,136	20,894	4249	10,969	733	3876	41	726

Source Agricultural census 2010–11, Directorate of Economics and Statistics, Bangalore

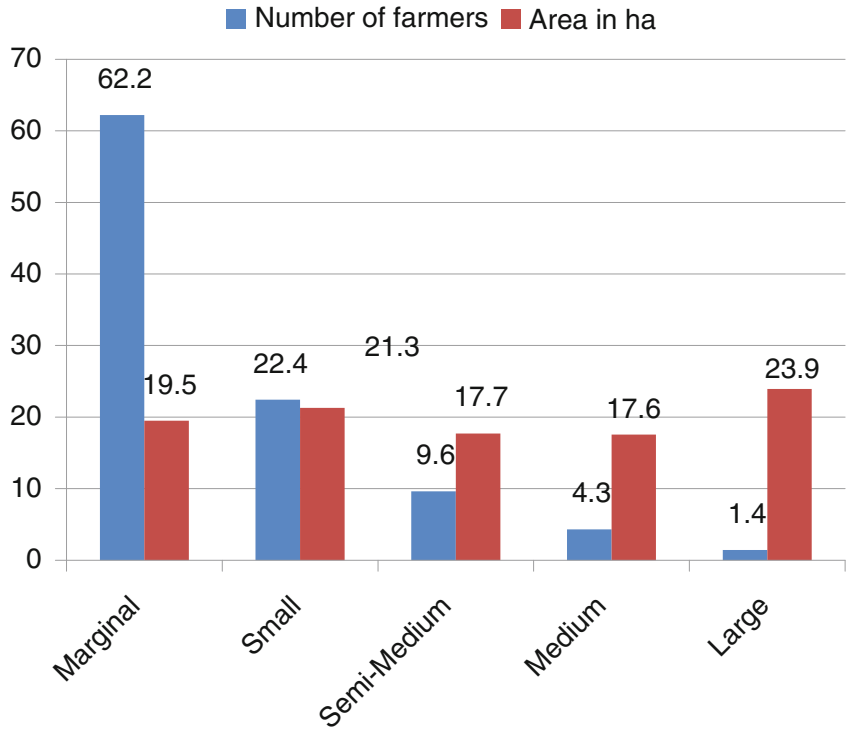

Fig. 2.13 Percentage of number and area of operational land holders in Chikmagalur. *Source* Agricultural census 2010–11, Directorate of Economics and Statistics, Bangalore

In Hassan district, the total area sown during Kharif was 2.38 lakh hectares out of which 1.97 lakh hectares was rain-fed, and irrigated area accounted for 0.41 lakh hectares. However, area affected by dry spell accounted for 0.61 lakh hectares. Total area sown and area affected by dry spell in Chikmagalur district during Kharif was relatively less compared to the respective areas in Hassan (see Table 2.9).

Madhya Pradesh

Madhya Pradesh is endowed with 11 agro-climatic zones, 5 crop zones and 7 soil types. The Sidhi district has red and yellow soil type whereas the Shahdol district has red and yellow medium black soil type. As far as the area under cultivation is concerned food grain cultivation is more prominent with 60% of the total cropped area. The remaining area is devoted for the cultivation of oilseeds, fibre crops and other cash crops. The main crops cultivated in the state are rice, wheat, maize and jowar and cereals, gram and lentil in pulses and soya bean and mustard in oilseeds. Around 63% of the total cropped area is devoted for Kharif crops and 37% is devoted for Rabi crops. Out of the total cropped area, 38% is under cereals, 22% is under pulses, 31% is under oilseeds and the remaining is under vegetables, fruits and other crops.

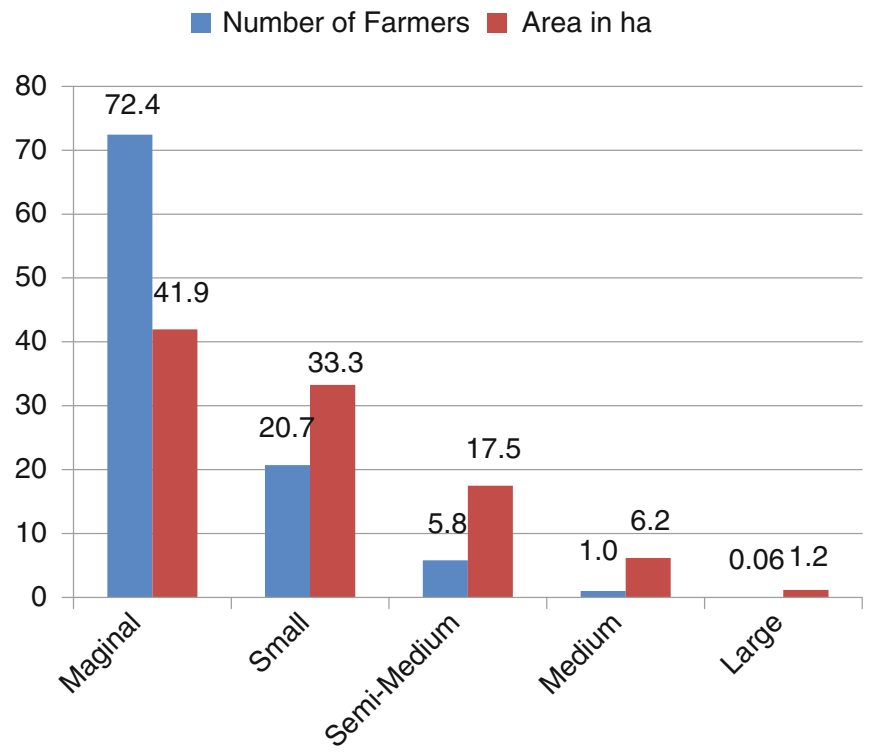

Fig. 2.14 Percentage of number and area of operational land holders in Hassan. *Source* Agricultural census 2010–11, Directorate of Economics and Statistics, Bangalore

Table 2.8 Source-wise net irrigated area in study districts of Karnataka, 2010–11 (area in hectare)

District	Canals	Tanks	Wells	Tube/borewells	Lift irrigation	Other sources	Total
Chikmagalur	4666	10,822	637	10,977	192	11,945	39,239
Hassan	45,398	30,140	1719	47,294	325	1657	126,533

Source Annual season and crop statistics report 2010–11 of DE&S, Bangalore

Table 2.9 Targeted area and area sown in study districts of Karnataka, Kharif 2012–13 (area in lakh hectare)

District	Targeted area	Area sown			% coverage	Unsown area	Area affected by dry spell
		Irrigated	Rain-fed	total			
Hassan	2.55	0.41	1.97	2.38	93	0.17	0.61
Chikmagalur	1.62	0.1	1.28	1.37	85	0.24	0.28
State	74.7	17.25	45.63	62.88	84	11.81	16.21

Source Karnataka state statement-II http://raitamitra.kar.nic.in/imp_agri_stat.html)

There has been a considerable change in the cropping pattern of Madhya Pradesh in the past two to three decades. Area under cereals has declined over time. While area under wheat and maize has gone up, area under jowar and other cereals has declined. In pulses, area under gram has gone up by nearly 65%, and Madhya Pradesh today is the largest producer of gram in the country. Area under soya bean observed an enormous growth between 1978 and 2006–07, a rise by almost 23 times.

The total production of crops in both Kharif and Rabi season was slightly higher in Sidhi as compared to Shahdol (see Table 2.9). Although Kharif yield was much higher in Sidhi district, the Rabi yield was slightly higher in Shahdol district. Paddy and wheat were the main crops cultivated in Shahdol, whereas paddy, wheat, maize, tur, sesamum, barley, gram, etc., were the main crops cultivated in Sidhi district (see Table 2.10).

Irrigation Status

Wells and tube wells are the major source of irrigation covering almost 66% of net irrigated area in Madhya Pradesh. The net area sown in Shahdol district of Madhya Pradesh is 179,700 ha, out of which the gross irrigated area is 21,000 ha. However, the rain-fed area accounts for 185,800 ha. In Sidhi district, out of 353,800 ha of net area sown, only 66,800 ha is gross irrigated and 413,500 ha is rain-fed area (see Table 2.11).

In Madhya Pradesh, the number of small and marginal farmers is about 62% of total land holders, but their share in area is only 22%.

Orissa

Orissa has a geographical area of 155,707 km^2 the state has 10 agro-climatic zones based on soil types, topography, rainfall and cropping pattern. Like the other two

Table 2.10 Crop production, productivity and cropping pattern in study districts of Madhya Pradesh

District	Name of crops	Kharif			Rabi		
		Area ('000 ha)	Average yield (kg per ha)	Production ('000 tonnes)	Area ('000 ha)	Average yield (kg) per ha	Production ('000 tonnes)
Shahdol	Paddy, kodokutki, wheat	165.9	80	114.6	34.5	646	22.3
Sidhi	Paddy, maize, kodokutki, tur, sesamum, wheat, barley, gram, linseed	297.3	670	200.1	178.6	629	112.3

Source Madhya Pradesh, Department of Land Resources

Table 2.11 Source-wise irrigation status in study districts of Madhya Pradesh (in hectare)

District	Canals	Tanks	Tube wells	Wells	Other sources	Gross irrigated area
Shahdol	4000	900	2600	1600	11,900	21,000
Sidhi	12,800	400	26,500	11,000	16,100	66,800
Madhya Pradesh	990,500	135,200	2,294,500	1,534,800	825,100	63,708

Source Madhya Pradesh, Department of Land Resources

Table 2.12 Number, area and average size of operational holdings in study district of Orissa, 2010–11

District	No. of holdings	Operated area (in ha)	Average size of holding
Keonjhar	256,477	253,167	0.99
Mayurbhanj	389,981	357,627	0.92
State total	4,667,466	4,852,014	1.04

Source Directorate of Economics and Statistics, Odisha

states, majority of farmers are small and marginal with low levels of literacy. The total number of operational holdings is 43.56 lakh. The operational area as per the agricultural census 2005–06 is 50.19 lakh hectares. The state has tropical climate with high temperature and humidity. The rainfall availability is medium and winter is very mild. The gross cropped area in the year 2011–12 was 88.01 lakh hectare, and the cropping intensity was 166%. The major crop cultivated during the Kharif season is rice whereas the major crop cultivated during the Rabi season is pulses and oilseeds (Directorate of Agriculture & Food Production, Odisha 2011–12).

There are couple of government schemes that are being implemented in the state. They include NFSM, System of Rice Intensification (SRI) and Rashtriya Krishi Vikas Yojana (RKVY). The main objective of all these programmes is to increase the crop production and the productivity of various crops.

Keonjhar and Mayurbhanj districts of Orissa lie in the North Central Plateau agro-climatic zone. The climate in Keonjhar district is dry subhumid, and in Mayurbhanj district, it is moist subhumid.

As per the Agricultural Census 2010–11, there were a total of 46.67 lakh operational holdings in the state. The operational holdings in the study districts—Keonjhar and Mayurbhanj—were around 2.56 lakh and 3.89 lakh, respectively (see Table 2.12). The operated area in hectare in the state was around 48 lakh hectare, and for Keonjhar and Mayurbhanj, the operated areas were 2.53 lakh hectares and 3.57 lakh hectare, respectively (see Table 2.12). The average size of holding in marginal, small, semi-medium, medium and large categories in 2010–11 was 0.57, 1.63, 2.95, 5.99 and 23.72 ha, respectively (Directorate of Economics and Statistics, Orissa, 2010–11).

In Madhya Pradesh, marginal farmers owned around 19.21 lakh hectares, small famers owned around 14.97 lakh hectares, semi-medium farmers owned 9.18 lakh

hectares, medium farmers owned 3.81 lakh hectares and large farmers owned 1.32 lakh hectares (see Table 2.13). The total area under all the categories of farmer groups was relatively higher in Mayurbhanj as compared to Keonjhar.

The agro-climatic characterisation of the two districts showed that annual rainfall was around 1484 mm in Keonjhar and 1553 mm in Mayurbhanj (see Table 2.13). The percentage share of net irrigated area in total area was 25% in Keonjhar whereas it was 29% in Mayurbhanj (see Table 2.14).

The gross cropping intensity in Madhya Pradesh was 166% whereas in Keonjhar and Mayurbhanj the same was 152 and 143%, respectively. The gross cropped area and the net sown area was relatively higher in Mayurbhanj as compared to Keonjhar (see Table 2.15).

The irrigation status of the state showed that the net irrigated area and gross irrigated area were marginally higher in Mayurbhanj as compared to Keonjhar. The total cropped area was also higher in Mayurbhanj (see Table 2.16).

Table 2.13 Size group wise distribution of number of operational holdings in study districts of Orissa

	Size groups (area in hectare)					
District	Marginal	Small	Semi-medium	Medium	Large	All sizes (total)
Keonjhar	124,703	81,364	31,290	11,704	4105	253,167
Mayurbhanj	173,331	106,723	54,586	18,665	4322	357,627
Sate total	1,921,842	1,497,752	918,947	381,272	132,201	4,852,014

Source Agricultural census 2010–11

Table 2.14 Agro-climatic characterisation and classification in study districts of Orissa

District	Annual rainfall (mm)	Climate (based on moisture index)	Net irrigated area (%)
Keonjhar	1484	Dry subhumid	25
Mayurbhanj	1553	Moist subhumid	29

Source ICAR-Central Research Institute for Dryland Agriculture

Table 2.15 District-wise cropping intensity in study districts of Orissa, 2011–12

District	Net sown area	Gross cropped area	Cropping intensity (%)
Keonjhar	259	395	152
Mayurbhanj	335	479	143
State total	5292	8801	166

Area in '000 hectare

Source Directorate of Agriculture & Food Production, Odisha (2011–12)

Table 2.16 Irrigation status in study districts of Orissa

District	Net irrigated area	Gross irrigated area	Total cropped area
Keonjhar	74.37	106.52	371.67
Mayurbhanj	112.78	164.03	449.5
Total	2078.9	3087.18	8267.75

Source Directorate of Agriculture & Food Production, Odisha (2011–12)

2.6 Conclusion

The aim of this chapter was to provide an overview of rice economy and the performance of India in terms of rice trade. This chapter also discussed the trends in rice production, area under cultivation and yield for rice in the states selected for the purpose of analysis. A detailed district-wise analysis of cropping pattern, irrigation status, etc., is also discussed. The next chapter will discuss the major rice production technologies and the need for sustainable rice production practices to ensure rice security and food security.

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