

UNIT 10: AGRICULTURAL SYSTEMS AND CROPS

Pakistan is an agricultural country and is dominated by subsistence farming with production of food crops accounting for 65 to 70 per cent of the total cropped area. Although agriculture continues to be the largest contributor to GNP, its relative share has dropped from 52 per cent in 1950–51 to 25.1 per cent in 1999–2000, and 21.2 per cent in 2009–10, next to services and industry. The agricultural sector employed 66 per cent of the labour force in 1950–51, which dropped to 43.3 per cent in 1999–2000, and to 45 per cent in 2009–10. This shift is also due to the introduction of mechanized farming.

The three main types of farming are subsistence (small scale) farming, commercial (cash crop) farming, and livestock (cattle and dairy) farming.



Figure 10.1: (a) Manual farming and (b) Mechanized farming

Manual farming, i.e. use of wooden ploughs and sickles for ploughing and harvesting, is practised on smaller farms, but tractors and combines have increasingly become a part of the rural scene and farmers who cannot afford to purchase tractors prefer to hire them. Chemical pesticides and insecticides, for long unknown to Pakistani farmers, are now used all over the country.

Milk, once a product of subsistence farming, is now being produced on a commercial scale in dairy farms developed around large cities. Pakistan is ranked among the top five milk producers of the world hence multinationals have also entered the scene for production and marketing of dairy products. Poultry products, eggs, and meat also came under

subsistence farming but now there are large poultry farms, some of which are mechanized and air-conditioned, and their products are available in urban areas.

Thus agriculture in Pakistan is going through a period of rapid transition as will be evident from the study of some farms located mainly in the Bahawalpur District in Punjab.

Farm A (small farm: 3 hectares)

Farm A is a small farm; the farmer has 3 hectares and rents another 3 hectares. He prepares the land himself, renting a tractor and some agricultural implements. He practises double cropping by growing *rabi* crops (wheat) in winter and *kharif* crops (cotton) in summer, and leaves a part of the land for vegetables. He keeps the wheat for his own use and sells the cotton. He has no livestock except for two young goats which will be sold when they mature.

Farm B (medium-sized farm: 15 hectares)

Farm B is a medium-sized farm covering 12 hectares. Orchards where mangoes and citrus fruits are grown cover 2 hectares. Sugar cane is planted on 2 hectares; on 6 hectares the farmer grows cotton and then wheat, while 2 hectares are left fallow every year. This farm

Asia's second-largest milk processing factory has been established in Pakistan by Nestle.

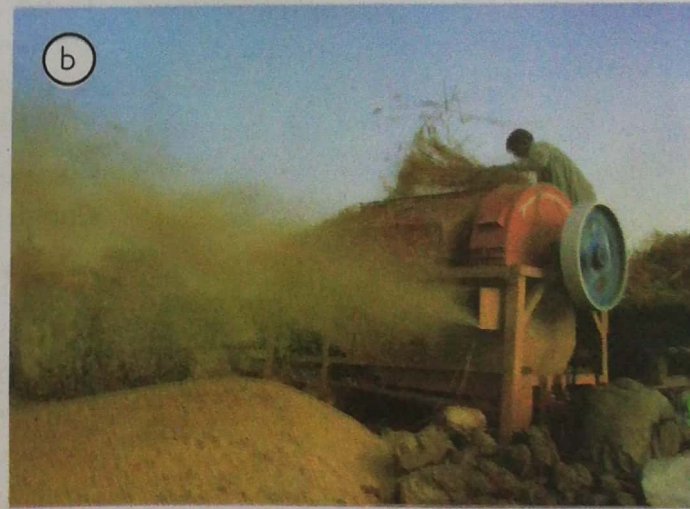


Figure 10.2: (a) Crops being harvested manually and (b) mechanically

is fully mechanized, hence there are no farm animals other than two cows which provide milk for the family. The farmer keeps 2000 kg of wheat for himself and sells the rest of the farm produce and cotton.

Farm C (large farm: 100 hectares)

Farm C is a large farm covering 100 hectares. Wheat is grown on 50 hectares and cotton on 30 hectares. Sugarcane grows on 5 hectares, while citrus orchards occupy 10 hectares. Salinity affects 3 hectares. Farm buildings for keeping farming implements and machinery, and offices for managing the farm occupy 2 hectares. The farm is mechanized and workers

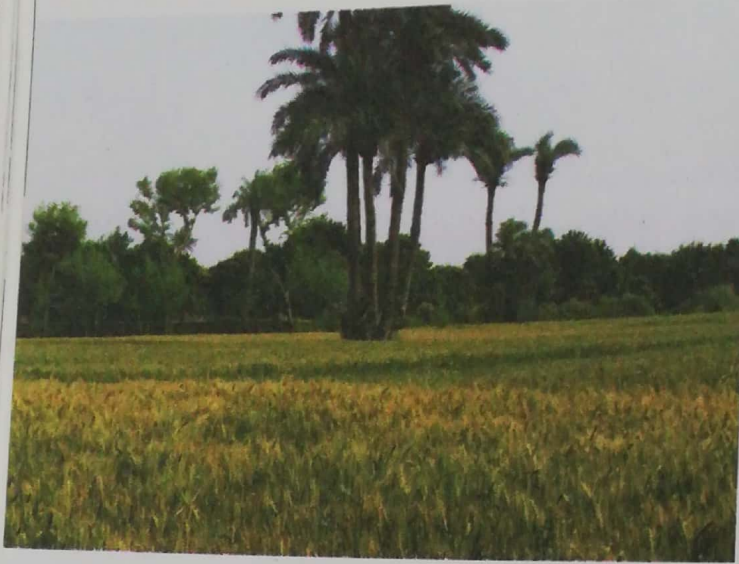


Figure 10.3: A large farm with fields and orchards

are employed. The farm is looked after by a manager; the owner lives in the city and comes to the farm occasionally, particularly when the produce is being sold.

This study reveals how the agricultural system works. On small scale farms, the farmer and his family are employed in the process; women also take an active part during the harvest seasons. Small scale farmers depend on subsistence farming and most of the produce, other than cash crops, if any, are consumed by the farmer and his family. The waste products resulting from the processes are used as fodder, fuel, and manure.

Medium-sized and large farms are mechanized and employ workers. The crops are grown using irrigation and tube wells; apart from grain, vegetables, and fruit kept for their own consumption, the rest is marketed along with the cash crops.

FACTS AND FIGURES

Pakistan is one of the world's largest producers and suppliers of the following crops according to Food and Agriculture Organisation of the United Nations and FAOSTAT (2006) data given here with ranking:

- Chickpea (2nd)
- Apricot (6th)
- Cotton (4th)
- Milk (5th)
- Dates (5th)
- Sugar cane (5th)
- Onion (7th)
- Potato (7th)
- Kinnow, Clementine and Mandarin oranges (6th)
- Mango (4th)
- Wheat (7th)
- Rice (14th)

Crops

Changes in agricultural practice are taking place in Pakistan. With growing emphasis on cash crops there is greater interest in the introduction of new varieties, new techniques for crop and harvest protection, irrigation methods, storage, and transportation of the produce to markets.

There are two cropping seasons in Pakistan: *rabi* (winter) and *kharif* (summer). Wheat, gram, *masoor*, rape-seed, and mustard are important *rabi* crops. Cotton, rice, maize, *jowar*, *bajra*, and tobacco are some of the important *kharif* crops.

Pakistan ranks eighth in world agricultural output according to the List of Countries by GDP sector composition.

Wheat

Wheat is the staple food of the country and dominates all other crops in acreage and production. It is a *rabi* crop that requires mild temperatures, low rainfall and alluvial, loamy soil; wheat is sown in October-November and harvested in April-May.

Area and production

The area under wheat production increased from 4 million hectares in 1947-48 to 8.1 million hectares in 2000-01, and to 9.1 million hectares in 2009-10, the highest increase being in Punjab. The two primary factors for this extension are

- i) increase in irrigated area;
- ii) increase in area sown more than once.

Wheat production increased from 11.5 million tonnes in 1980 to 19 million tonnes in 2000-01, and to 23.3 million tonnes in 2009-10. The increase was achieved through;

- i) increase in wheat-growing area;
- ii) increase in yield per hectare (from 1217 kg per hectare in 1971–75 to 2325 kg in 2000–01, and 2553 kg in 2010–11);
- iii) use of High Yielding Varieties (HYV) seed of wheat and use of fertilizer and insecticides; today more than 90 per cent of the wheat-growing regions produce HYV crops;
- iv) wheat grown under irrigation produces 1.7 times more than that grown by rains alone; in Pakistan, more than 88.5 per cent of the wheat-growing areas are irrigated.

Wheat-growing regions

Wheat is grown all over Pakistan. The sowing period for wheat is from October to November and the crop is harvested in April and May.



Figure 10.4: A healthy wheat crop

Province-wise, Punjab dominates both in area and production as shown in the table below.

Table 24: 5-year average for wheat acreage and production by province (2005-10)

Province	Area ('000 hectares)	%	Production ('000 tonnes)	%
Punjab	6613.6	76	17,315.0	77
Sindh	1005.8	11	3,362.8	15
Khyber Pakhtunkhwa	750.2	9	1,138.0	5
Balochistan	381.2	4	759.0	3
Pakistan	8750.8	100	22,574.8	100

Source: Agricultural Statistics of Pakistan 2010–11, Federal Bureau of Statistics

In Punjab, Sindh, and Balochistan more than 90 per cent of the wheat area is irrigated, while it drops to 43 per cent in Khyber Pakhtunkhwa. The Indus Plains dominate both in irrigation and area, as shown below.

The main wheat-growing regions are in Punjab, from Sialkot in the north to Rahimyar Khan in the south, and from Okara in the east to Leiah in the west, and in the well-irrigated alluvial plains in central Sindh, covering Sanghar, Khairpur, and Naushehro Feroze districts.

The secondary wheat-growing regions are in northern and south-western Punjab other than Lahore, Jhelum, and Khushab; in Sindh, wheat is grown in Ghotki and Nawabshah to the north and Hyderabad and Mirpur Khas in the centre.

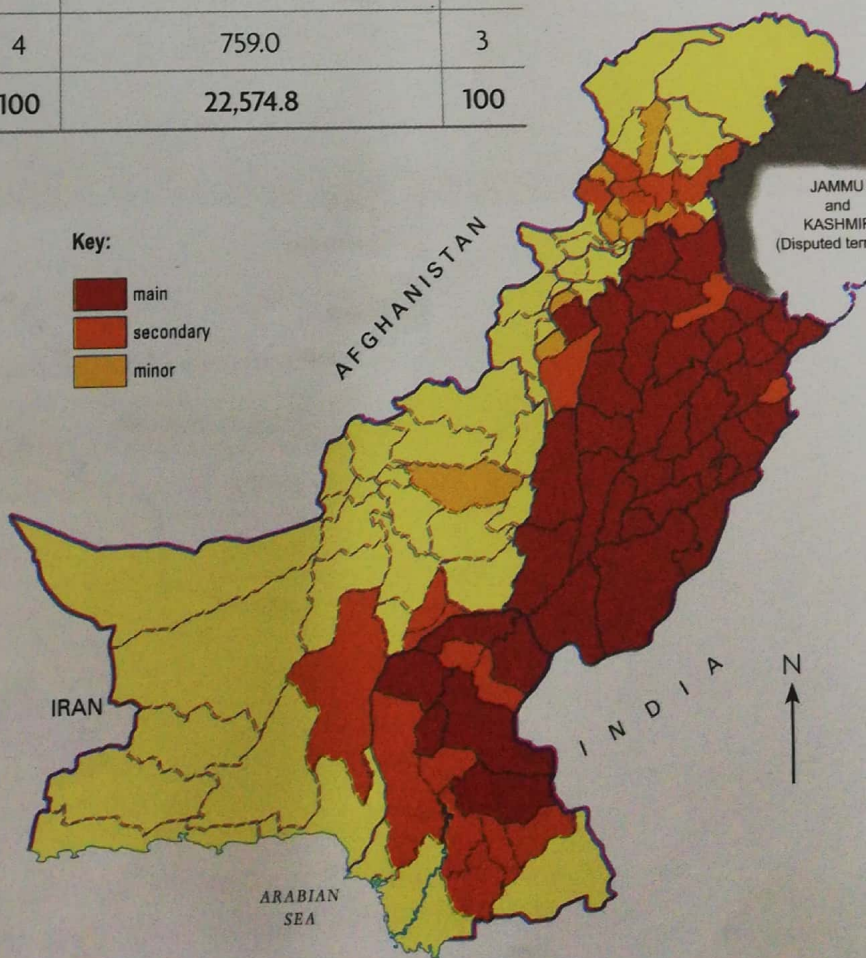


Figure 10.5: Wheat growing regions in Pakistan

Nasirabad and Jaffarabad, the only wheat-growing districts of Balochistan, are secondary regions; they are served by canal irrigation.

Self-sufficiency in wheat

Although the wheat-growing areas have been steadily increasing over the years, Pakistan is still not self-sufficient in wheat production and has had to import wheat when required.

Rice

Rice has been grown in the subcontinent since antiquity. Excavations at Mohenjo-Daro have revealed rice grains in earthenware vessels. Among cereal crops in Pakistan today, rice follows wheat in acreage and production.

Rice growing regions

Rice is a *kharif* crop that requires high temperatures and plenty of rainfall; it is sown in May-June and harvested in September-October. In Pakistan the north-eastern areas, which receive comparatively more rain, are suitable for rice cultivation. However, irrigation is still required. About 90 per cent of the rice acreage and production is in Punjab and Sindh (see Table 25). In Punjab the main rice-growing regions are Sialkot, Gujranwala, and Sheikhupura districts, and Larkana, Shikarpur, and Jacobabad districts in Sindh. Jaffarabad in Balochistan also falls in the main region category.

The secondary rice-growing regions are Narowal, Hafizabad, Jhang, and Okara in Punjab, Dadu, Thatta, and Badin Districts in Sindh, and Nasirabad in Balochistan. Balochistan and Khyber Pakhtunkhwa together account for about 9 per cent of acreage and just over 10 per cent of the rice production in Pakistan.

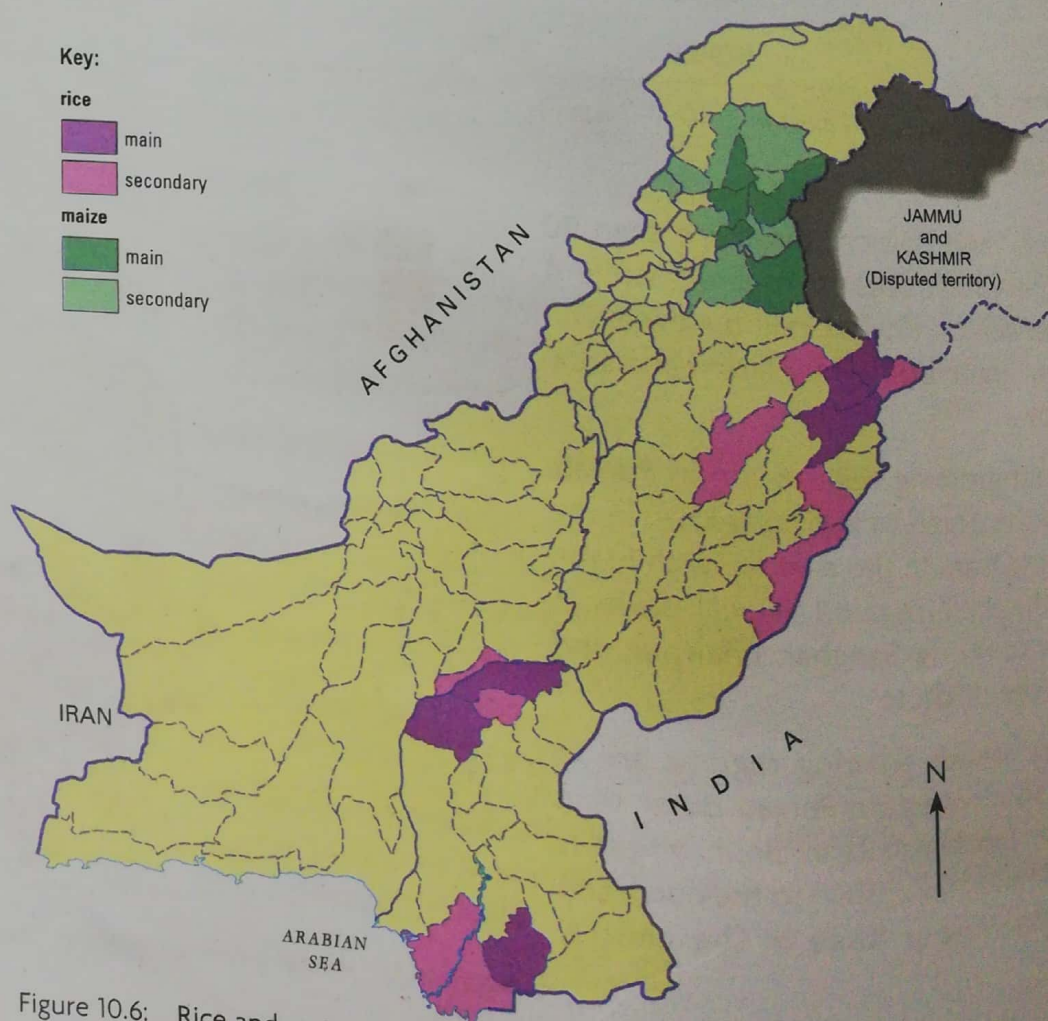


Figure 10.6: Rice and maize growing regions in Pakistan

All the rice growing regions in Pakistan have excellent irrigational facilities and north-eastern Punjab also receives heavy monsoon rainfall. Rice is not grown in purely *barani* areas as it requires large amounts of water.

Area and production

Among the cereal crops in Pakistan rice ranks next to wheat in acreage and production. The 5-year average from 1995 to 1999 for rice in acreage and production was 2333.8 thousand hectares and 4486.7 thousand tonnes respectively, as compared to 2712.7 thousand hectares and 6076.7 thousand tonnes from 2005 to 2010 (see Table 27). However, due to natural conditions such as drought or floods, as with other crops, there is fluctuation in rice acreage, production, and yield per hectare.



Figure 10.7: Rice seedlings being transplanted in the fields

Table 25: 5-year average for rice acreage and production by province, 2005–10

Province	Area ('000 hectares)	%	Production ('000 tonnes)	%
Punjab	1824.7	67.2	3379.4	55.6
Sindh	645.3	23.8	2052.0	33.8
Khyber Pakhtunkhwa	59.4	2.2	119.9	2.0
Balochistan	183.3	6.8	525.5	8.6
Pakistan	2712.7	100	6076.8	100

Source: Agricultural Statistics of Pakistan 2010–11, Federal Bureau of Statistics

The varieties of rice grown are mainly Irri, Basmati and Desi (indigenous). The high yielding Irri strain was developed at the International Rice Research Institute (IRRI) in the Philippines and is grown mainly in Sindh. The best variety of rice grown in Pakistan is Basmati which is

in great demand at home and abroad because of its long grain and flavour. Its highest acreage is in north-eastern Punjab; its yield, however, is less than that of Irri rice. Indigenous varieties of rice are also grown but their yield is low, and they generally do not fetch high prices in the market.

The export of rice recorded a phenomenal increase from Rs 274 million in 1971–72 to Rs 1136 million in 1972–73. This sudden rise in rice exports was due to the secession of East Pakistan, which used to consume the surplus rice produced by West Pakistan. Henceforth, rice became Pakistan's leading export and continues to compete with cotton yarn and cloth. Basmati rice is exported mostly to the Middle East and other varieties to various Asian countries. The quantity and export value of rice from 2007 to 2011 can be seen in the graphs below.

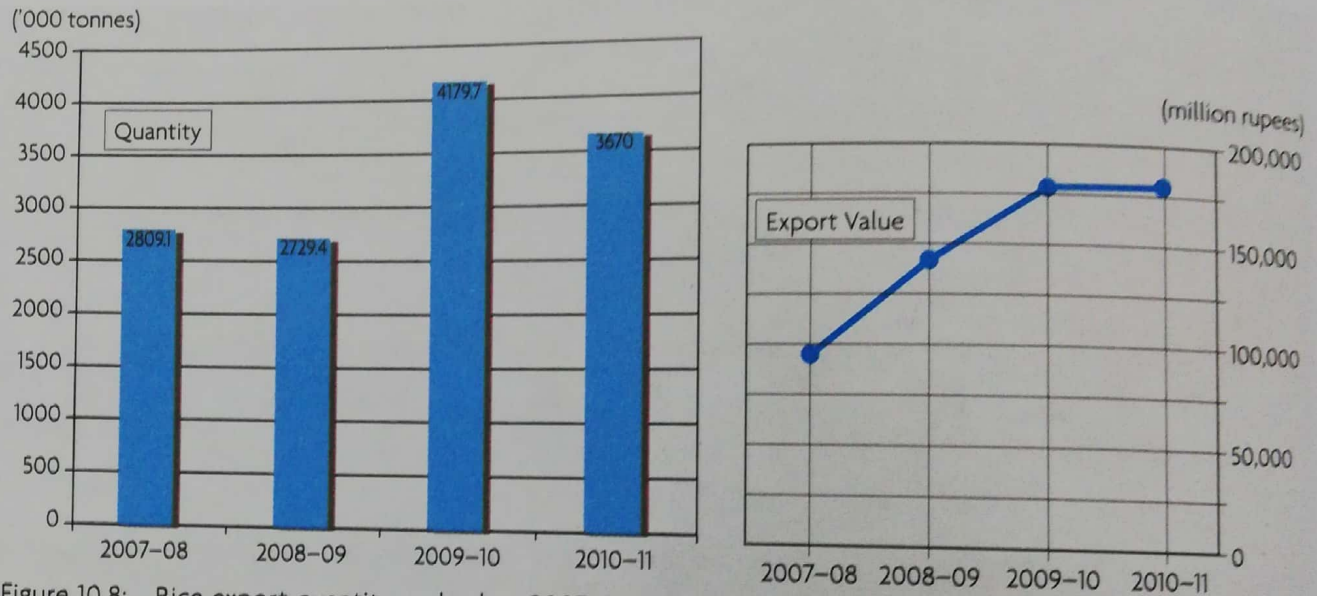


Figure 10.8: Rice export quantity and value, 2007–11

Source: Agricultural Statistics of Pakistan 2010–11, Federal Bureau of Statistics

Sugar cane

Next to cotton, sugar cane is Pakistan's most important cash crop. It is used primarily for making white sugar and *gur*, but it also has numerous valuable by products such as alcohol used by the pharmaceutical industry, bagasse used for paper and chipboard manufacturing, and press mud which is a rich source of organic matter and nutrients for crop production as well as animal feed.

Sugar cane growing regions

Sugar cane is a tropical crop that can also tolerate short periods of frost and is grown widely throughout Pakistan. Sugar cane cultivation depends on the type of soil and water availability; it is heavily irrigated and does well in canal colonies. Rainfall is beneficial, but its variability can adversely affect the crop. Sugar cane requires soils rich in essential nutrients, i.e. a good balance of nitrogen, phosphorus, and a heavy dose of potash per hectare produces a good sugar cane crop. The sowing period of sugar cane is March to April and the harvest is from October to November.

Sugar cane is grown extensively in Punjab and Sindh, a limited area in Khyber Pakhtunkhwa, and nominally in Balochistan. The three main sugar cane growing regions are Faisalabad, Sargodha, and Kasur districts in Punjab, Hyderabad and Badin districts in Sindh, and Charsadda District in Khyber Pakhtunkhwa, which have excellent irrigation facilities and rich alluvial

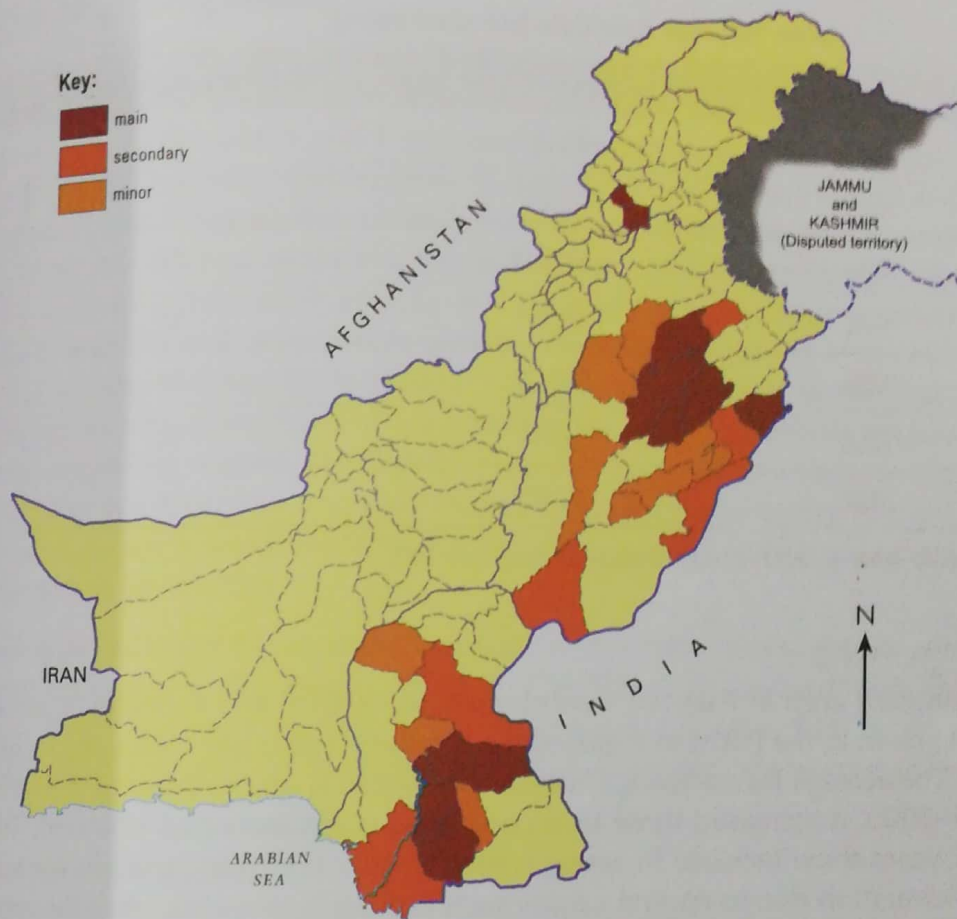


Figure 10.9: Sugar cane growing regions in Pakistan

The per capita consumption of sugar per annum in Pakistan rose from 3 kg in 1947 to an average of 22 kg in 2000–10. (Gur consumption is 3 kg per person.) The corresponding world average is 23.5 kg, while the highest figures, 51 kg and 47.9 kg are for South America and Oceania, respectively.

FACTS AND FIGURES

WHO = 18.5 kg/year
 World = 24 kg/year
 USA = 46 kg

soils. The secondary regions are adjacent to the main regions: Okara, Mandi Bahauddin, Bhakkar, and Bahawalnagar districts in Punjab; Rahimyar Khan in the south is the only one not adjacent to the main region. In Sindh, the secondary regions are Nawabshah, Naushehro Feroze, and Thatta districts, and Mardan and Peshawar in Khyber Pakhtunkhwa.

Area and production

Pakistan has progressed considerably in sugar cane cultivation, both in terms of area and production. Sugar cane acreage increased by five times and the production by seven times between 1947–48 and 2000, and has now reached saturation point in Punjab; other crops give better financial returns. Khyber Pakhtunkhwa and Balochistan are also reluctant to increase their sugar cane acreage. Sindh is the only province where sugar cane production is still increasing. On the average, Punjab accounts for just over 65 per cent, Sindh 24 per cent, Khyber Pakhtunkhwa 10 per cent and Balochistan less than 1 per cent of the total sugar cane-growing area.



Figure 10.10: Harvested sugar cane

Pakistan's average sugar cane yield per hectare, 50 tonnes, is low compared to the world average of 70.7 tonnes. The world's highest yield per hectare was 125.5 tonnes in Peru in 2010, while the highest output, 719,157,000 tonnes, was in Brazil which also uses sugar cane to produce the fuel ethanol.

Table 26: Sugar cane data (selected years)

Year	Area ('000 hectares)	Production ('000 tonnes)	Yield (tonnes per hectare)
1999–2000	1010	46,333	45
2003–04	1075	53,419	50
2007–08	1241	63,920	51
2009–10	943	49,373	52
2010–11	988	55,309	56
2011–12	1058	58,397	55
2012–13	1124	62,472	56

Source: Economic Survey 2010–11, 2012–13 and Statistical Yearbook 2011

Cotton

Cotton is the main cash crop in Pakistan, contributing to its GDP and economy. Cotton, like rice, has been grown in the Pakistan region since antiquity and it has been used locally as well as traded. The acreage for cotton cultivation in Pakistan is on the increase. Between 1947–50 and 1999–2000, it increased three times and production increased nine-fold. The figures for recent years show increase in acreage, total production, and yield per hectare with occasional fluctuation due to natural causes such as floods, droughts, plant diseases, and pest attacks.

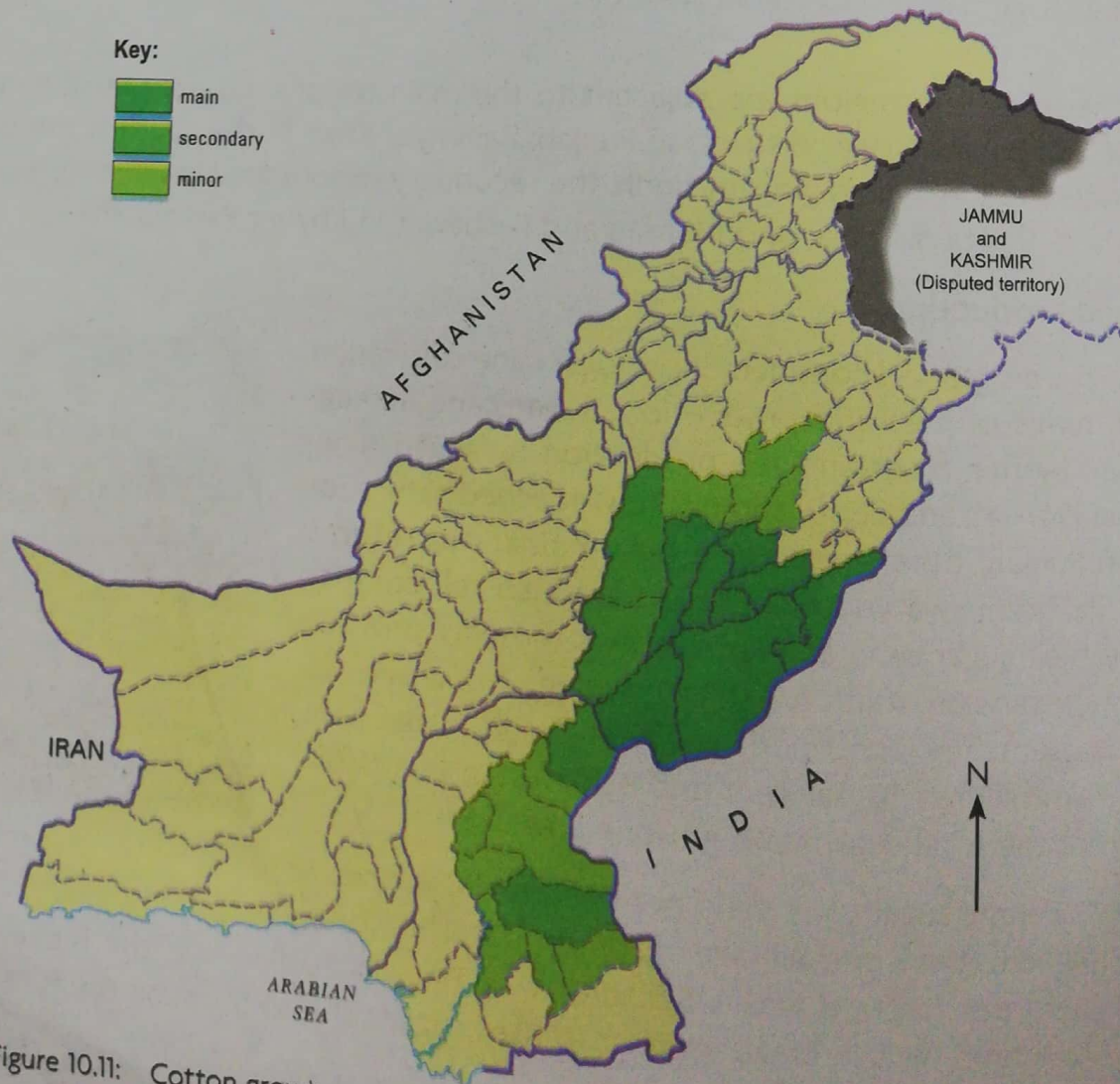


Figure 10.11: Cotton growing regions in Pakistan

Cotton growing regions

Cotton is a *kharif* crop that needs high temperatures and moderate rainfall; it grows best in alluvial soil. Cotton is sown from May in the south to June-July in the north and harvested from September to December accordingly. The main cotton-growing regions are in southern Punjab and central Sindh. Although the rainfall in these regions is less than the required 250 mm, there are adequate irrigational facilities. The arid conditions make the area safe from pest attacks and diseases. Hot summer weather (32°C/90°F in June) helps cotton growth. The nutrients lacking in the rich alluvium are supplied by fertilizers. The districts adjacent to the main cotton growing areas in both Punjab and Sindh constitute the secondary cotton growing regions. The highland regions are unsuitable because the humidity attracts pests and plant diseases; however, a humidity-tolerant strain is grown in western Khyber Pakhtunkhwa and in Loralai and Lasbela districts in Balochistan.



Figure 10.12 Cotton—Pakistan's main cash crop

Pak-Upland cotton (*Gossypium hirsutum*) is the main variety grown in the Indus Plains. It was introduced in this region in 1914 and by 1934–35 it covered more than 50 per cent of the cotton acreage in Punjab. Today it accounts for more than 97 per cent of the total cotton-growing area. The local cotton strain (*Gossypium arboreum*) is grown in the remaining area.

Area and production

Cotton production in Pakistan has increased steadily as noted in the early Five Year Plans, post-Independence, and recorded in the Economic Survey Reports and Statistical Yearbooks. In 2011, Pakistan ranked fourth in the world in terms of acreage as well as production of cotton.

Table 27: Area, production and yield per hectare of cotton (selected years)

Year	Area ('000 hectares)	Production ('000 bales x 170.1 kg)	Yield (kg per hectare)
1998–99	2293	8790	512
2001–02	2983	10732	624
2005–06	3103	13019	714
2009–10	3106	12913	707
2010–11	2689	11460	725
2011–12	2835	13595	816
2012–13	2879	13026	769

Source: Economic Survey 2010–11, 2012–13 and the Statistical Yearbook 2011

The overall increase in cotton production in Pakistan is the result of increase in acreage and yield. The cotton acreage went up from 11,000 sq km in 1947–50 to 30,000 sq km in 2000. The yield per hectare has more than tripled, mainly due to improved irrigation, use