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Punjab-Haryana Region: Cropping Pattern

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The Punjab-Haryana region constitutes one of the most intensively cultivated and agriculturally productive parts of the north-western Indo-Gangetic Plain. The region is characterized by a very high proportion of cultivated land, intensive irrigation and a high degree of multiple cropping. The dominant cropping pattern is essentially wheat-rice cultivation, particularly in the alluvial plains of Punjab and northern and central parts of Haryana. Wheat occupies the principal position during the *Rabi* season, while rice is the dominant *Kharif* crop in the better-irrigated eastern and central parts. The expansion of assured irrigation, high-yielding varieties of seed, chemical fertilizers, mechanization and, particularly, assured procurement at remunerative prices has resulted in a remarkable degree of specialization in these two crops.

Despite this overwhelming dominance, the Punjab-Haryana region is not purely a paddy-rice belt. A variety of other crops continue to be cultivated, although the area under some of them is much smaller than that under wheat and rice. The other main cultivated crops in the region include cotton, maize and bajra during the *Kharif* season and mustard during the *Rabi* season. Sugarcane, an annual crop, also covers significant area in certain pockets of the region. Being a predominantly semi-arid area, the region has traditionally been supporting the cultivation of pulse crops

during both *Kharif* and *Rabi* seasons. However, these crops have been largely wiped out since the initiations of Green Revolution in the mid-1960s. Gram remained a significant pulse crop until about a decade ago in south-western Haryana, but in the recent period it has been largely replaced by mustard and wheat. The cultivation of horticultural crops, particularly vegetables and fruits, have also gained significance during the last two decades.

Spatial Dimensions of the Cropping Pattern

It is evident from Fig. 1 that the cropping pattern of the Punjab-Haryana region is dominated by rice during the *Kharif* season and wheat during the *Rabi* season. In Punjab, the central and eastern districts like Amritsar, Gurdaspur, Tarn Taran, Ludhiana, Moga, Sangrur, Patiala, Fatehgarh Sahib, Jalandhar and Kapurthala constitute the core of the rice-wheat belt. This region has fertile alluvial soils and rich groundwater resources. The rice-wheat combination becomes progressively diluted in the *Kandi* area along the Shiwalik foothills. Besides rice, this area also supports maize, sugarcane and other locally important crops.

The south-western Punjab plain, comprising the districts of Bathinda, Mansa, Fazilka, Muktsar and parts of Faridkot and Ferozepur districts, have a distinctive crop combination. Relatively drier climatic

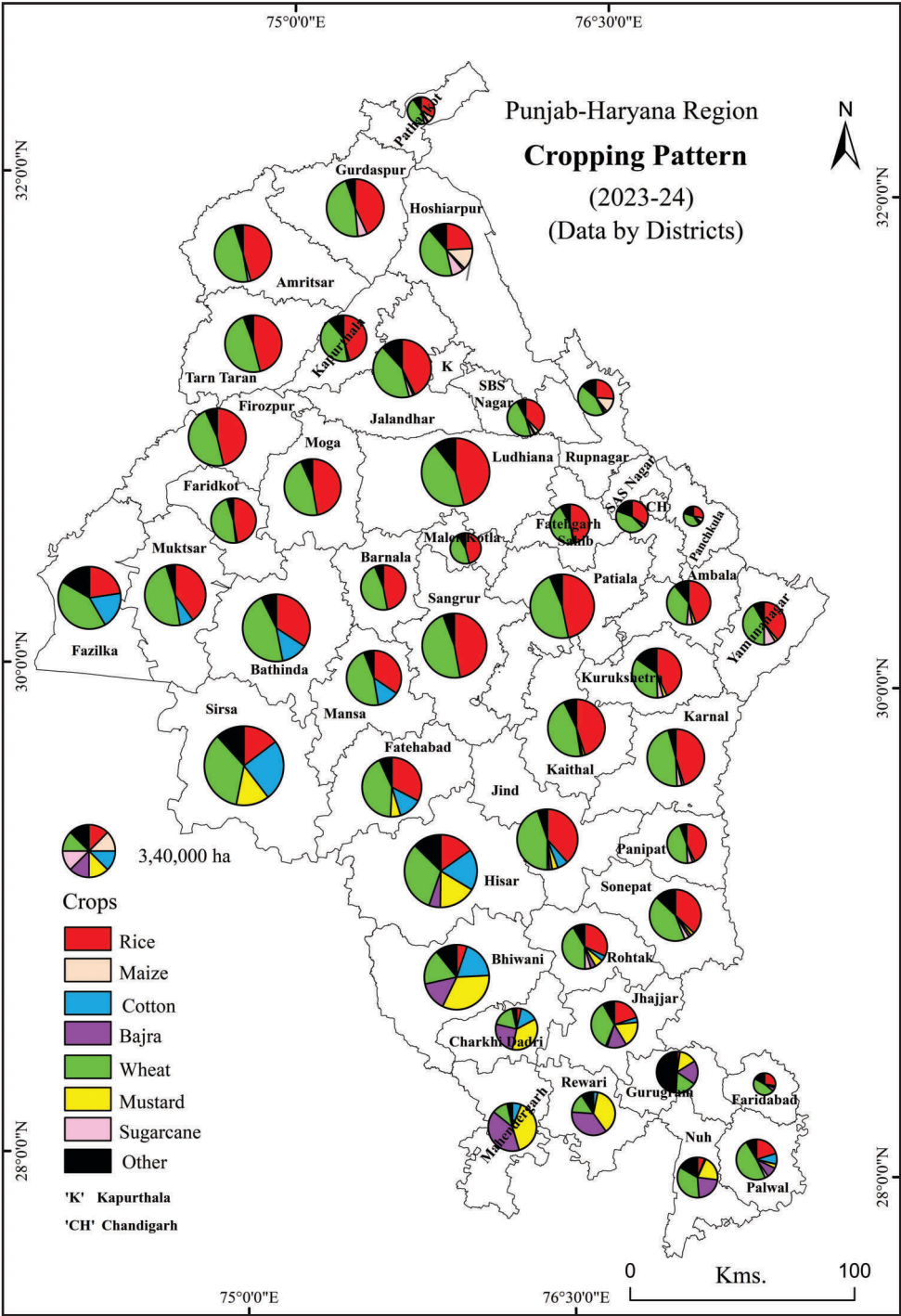


Fig. 1

conditions, sandy and loamy soils and greater dependence on canal irrigation, has favoured the cultivation of cotton, wheat, rice, pulses and fodder crops. Cotton has assumed much greater importance in this area than in central Punjab. Thus, the south-western region is known as cotton belt of the state, whereas the central districts constitute the strongest rice-wheat core. However, the area under rice has progressively increased in this area during recent years, partly as a result of pest infestation in cotton. Cotton has been almost replaced by rice in Firozpur and Faridkot districts. Rice is a water-intensive crop compared to cotton, which requires relatively light irrigation, low humidity and sunny weather. This shift in cropping pattern has serious environmental implications, particularly in the form of groundwater-resource depletion.

In Haryana, the north-eastern and central plains are dominated by wheat and rice cultivation. This area is almost 100 per cent irrigated, with an overwhelming dominance of tube well irrigation. The districts of Karnal, Kurukshetra, Ambala, Yamunanagar, Kaithal, Panipat, Jind and Sonapat constitute the core of the rice-wheat belt of the state. Karnal and Kurukshetra districts, in particular, represent highly specialized rice-farming areas associated with intensive irrigation and well-established procurement and marketing infrastructure. The rice-wheat belt of north-eastern and central Haryana is contiguous with the rice-wheat belt of Punjab. Wheat is the dominant *Rabi* crop in all the districts of the state except the south-western parts. However, area under rice declines progressively towards the south-western parts of the state.

A significant geographical transition in cropping pattern has occurred in the western and south-western parts of Haryana. Relatively

lower rainfall, higher evapotranspiration and increasing aridity in this area favour the cultivation of bajra, cotton, guar and mustard crops. South-western Haryana is essentially a mixed-crop region. The irrigated tracts grow cotton during the *Kharif* season and wheat or mustard during the *Rabi* season. Rice is also grown in the northern districts of the state, but comparatively on smaller areas. The region also supports rainfed crops such as bajra, guar, mustard and gram on unirrigated lands. In the recent past, however, mustard has replaced gram in unirrigated areas.

Sirsa, Fatehabad and Hisar districts constitute the wheat-cotton-rice belt of Haryana, which has contiguity with the similar cropping pattern of south-western Punjab. But this contiguous wheat-cotton belt across the border of the two states has weakened due to declining area under cotton because of falling yields. The cultivation of cotton is increasingly being replaced by rice cultivation, particularly in the tube well irrigated areas of the Ghaggar basin. The extreme south-eastern Faridabad and Palwal districts of Haryana have witnessed the emergence of wheat and rice as important crops, although their dominance is not comparable with that of the rice-wheat belt of the eastern and central parts of Haryana.

Spatial Dimensions of Area under Different Crops

Rice

Rice has not traditionally been a staple food crop of the Punjab-Haryana region. Its cultivation has been confined to a few wetland pockets until the initiation of Green Revolution. However, its cultivation expanded very sharply in the irrigated areas of the region after the mid-1960s. Rice soon emerged as the most remunerative *Kharif* crop, and area under

it continued to expand with the extension of irrigation and diffusion of package technology in both states. The expansion of rice took place particularly at the expense of area under maize and bajra crops. In addition, rice has also displaced several other *Kharif* crops, including sugarcane and pulses.

According to 2023-24 data, rice occupies about one-third of the total cropped area in the Punjab-Haryana region. It occupies a larger area (41 per cent) in Punjab than (24.20 per cent) in Haryana. Fig. 2 reveals that rice cultivation is presently carried out in all the districts of Punjab and Haryana except Mahendergarh and Rewari districts. The main rice belt runs across the two states. The core of this belt, extends from Gurdaspur-Amritsar-Tarn Taran districts in Punjab to Karnal-Panipat districts in Haryana where rice occupies more than two-fifths of the total cropped area. This belt comprises 15 districts in central Punjab and 5 districts of north-eastern Haryana and runs in a north-west to south-west direction across the Punjab-Haryana region.

On both sides of the core belt, the adjoining 11 districts, six in Punjab and five in Haryana, form a substantial peripheral rice-growing area where the crop accounts for 20 to 40 per cent of the total cropped area. The *Kandi* area of the two states and a few western and south-western districts of Haryana devote 10 to 20 per cent of their total cropped area to rice. Rice is a marginal crop in the south-western districts of Haryana. The spatial distribution of rice cultivation in the Punjab-Haryana region can largely be explained in association with the availability of irrigation facilities.

Maize

Maize has been a coarse cereal crop,

particularly in Punjab before the initiation of Green Revolution. Unlike the present situation, it has been a prominent cereal crop during the *Kharif* season, while rice occupied only 4 to 5 per cent of the total cropped area in the state. At the time of the inception of Green Revolution in 1966, maize cultivation also extended into the north-eastern parts of Haryana. However, the Punjab-Haryana region has witnessed a continuous decline in area under maize because of the progressive diffusion and expansion of rice cultivation since the 1960s.

Once an important crop, maize is now (2023-24) a minor crop, occupying only 0.67 per cent of the total cropped area in the Punjab-Haryana region. The area under it is 1.2 per cent of the total cropped area in Punjab, while its cultivation is negligible in Haryana. Fig. 3 shows that maize cultivation is presently confined to only 8 districts of the Punjab-Haryana region. Furthermore, it is largely concentrated in the *Kandi* area, in Punjab. In this area, Hoshiarpur and Rupnagar districts still devote more than 10 per cent of their total cropped area to maize. Panchkula district of Haryana forms a contiguous piedmont with Punjab and is the only district of Haryana where maize is grown as a second ranking cereal in *Kharif* season. Pathankot, Amritsar and Mukatsar districts of Punjab also devote 5 to 10 per cent of their total cropped area to maize. The area under it is less than 5 per cent of the total cropped area in SAS Nagar and SBS Nagar districts of Punjab.

Bajra

Bajra or pearl millet has historically occupied a distinctive position in the agriculture of the Punjab-Haryana region. More precisely, it has been grown in the dry areas of the region and has been widely grown in the

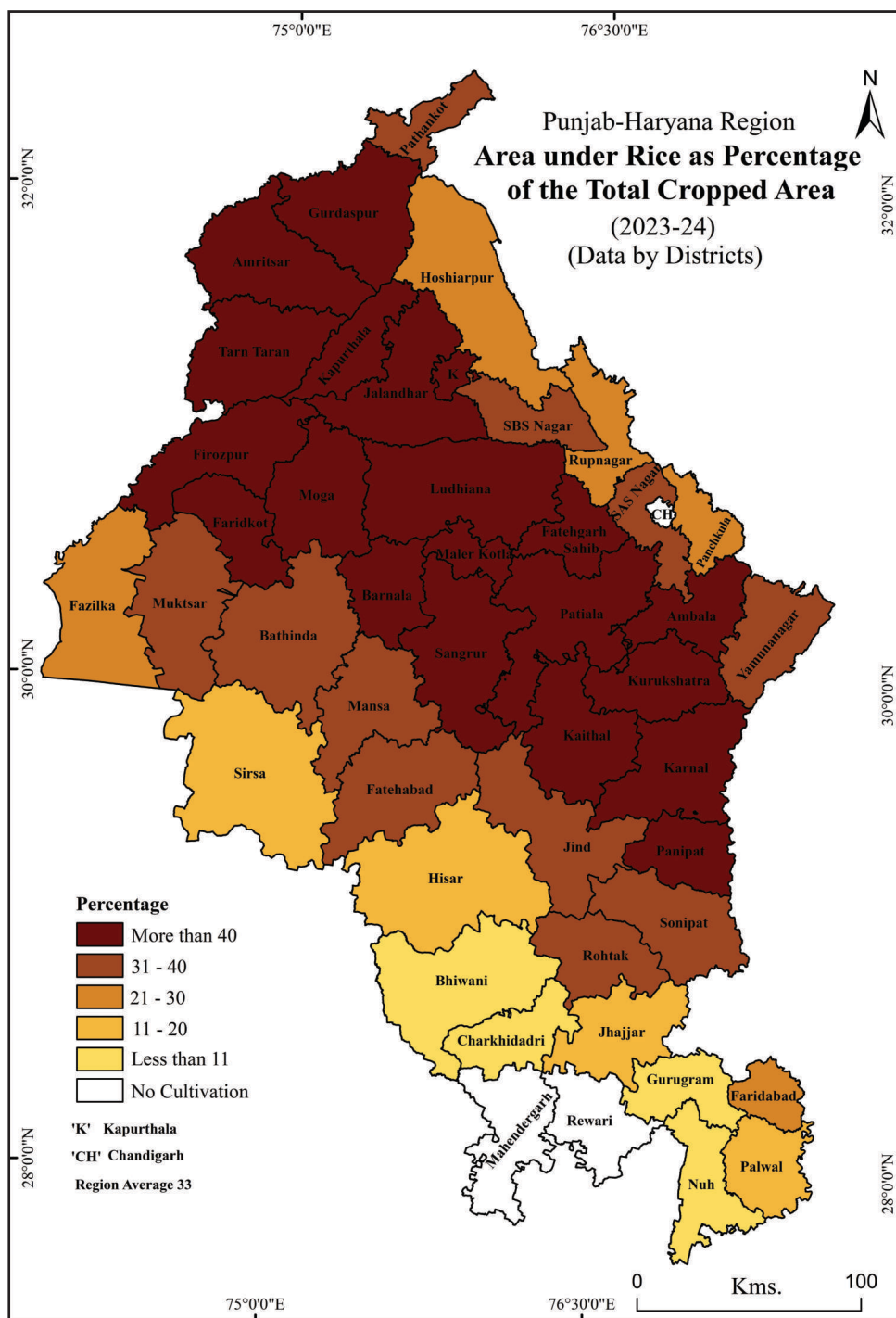


Fig. 2

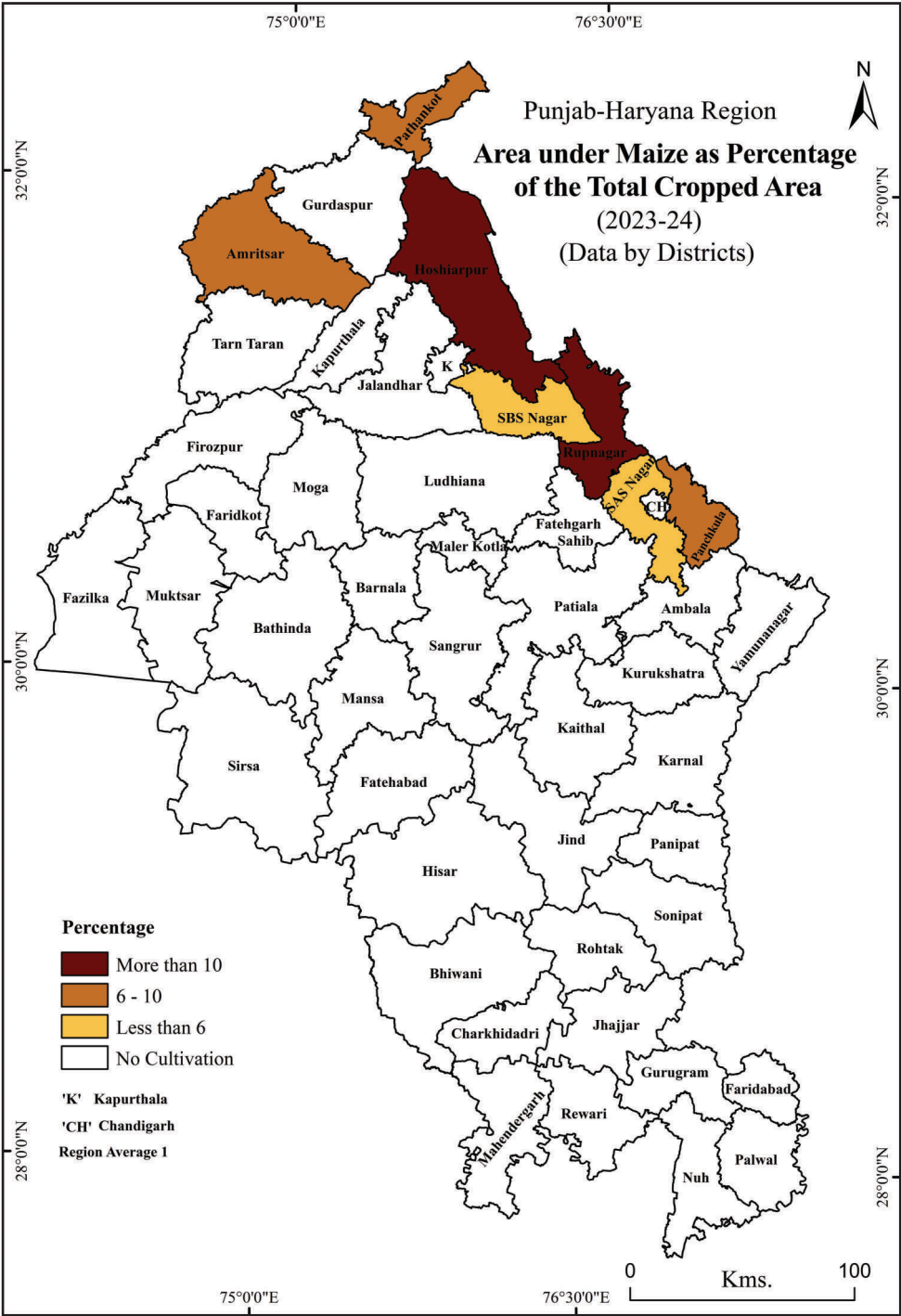


Fig. 3

semi-arid south-western and southern parts of Haryana and the south-western part of Punjab, where relatively low and erratic rainfall, high summer temperatures, sandy soils make it better adapted than water-intensive crops.

The area under bajra has shrunk significantly since the inception of Green Revolution as it has to face competition from rice and cotton in the irrigated areas. Consequently, its cultivation has almost vanished in Punjab, although it has retained an important position in the rainfed areas of south-western and western Haryana. The introduction of high-yielding seeds has made it a more remunerative crop in the rainfed areas of the state during the recent past. At present, bajra has also gained importance in the diet as millet. Its significance has further increased in view of the growing adverse impacts of climate change on crops. It is a climate-resilient crop capable of bearing moisture and thermal stress much better than its competing irrigated and water-intensive crops.

In 2023-24, bajra covered only 3.6 per cent of the total cropped area in the Punjab-Haryana region. Bajra cultivation is confined to Haryana alone, where it occupies about 7.7 per cent of the total cropped area. Fig. 4 depicts that bajra cultivation is largely concentrated in southern Haryana. The cultivation of bajra is missing in north-eastern Haryana and the whole of Punjab. Bajra is cultivated in 13 districts of Haryana. Mahendergarh and Rewari districts, each are devoting more than one-fourth of their total cropped area to bajra, and form the core of the bajra-growing region. In fact, in Mahendergarh district, this crop occupies more than 35 per cent of total cropped area. In the Charkhi Dadri, Gurugram and Nuh districts adjoining the core bajra region, this coarse cereal accounts for 15

to 25 per cent of the total cropped area. The districts of Jind, Hisar, Rohtak and Faridabad are devoting less than 5 per cent of their total cropped area to bajra cultivation.

Cotton

The Punjab-Haryana region has historically been a major cotton-growing area of north India. In fact, extending from south-western Punjab to western Haryana and further across the canal-irrigated lands of north Rajasthan, it forms a contiguous agro-climatic zone suitable for cotton cultivation. Unlike the wetter central and eastern parts of Punjab and Haryana, the south-western and western parts receive lower rainfall and is, therefore less suited to water-intensive rice cultivation. Cotton requires less irrigation than rice and is comparatively better adapted to the heat and moisture regime of the region.

However, there has been a persistent decline in the area under cotton during the recent past. There are various causes for this decline, but two are particularly important. Firstly, the pest and insect attacks including whitefly, pink bollworm and cotton leaf-curl virus which have seriously damaged the profitability of cotton. Secondly, assured procurement of rice, relatively predictable returns and increasingly reliable irrigation have made paddy attractive even in the semi-arid cotton-growing area traditionally considered unsuitable or less suitable for it. As a result, in 2023-24 the area under cotton declined to 5.7 per cent of the total cropped area in the Punjab-Haryana region. The area under cotton is relatively higher in Haryana (8.6 per cent of the total cropped area) than in Punjab (3.2 per cent of the total cropped area). It is evident from Fig. 5 that Sirsa district of Haryana currently forms the core of the cotton

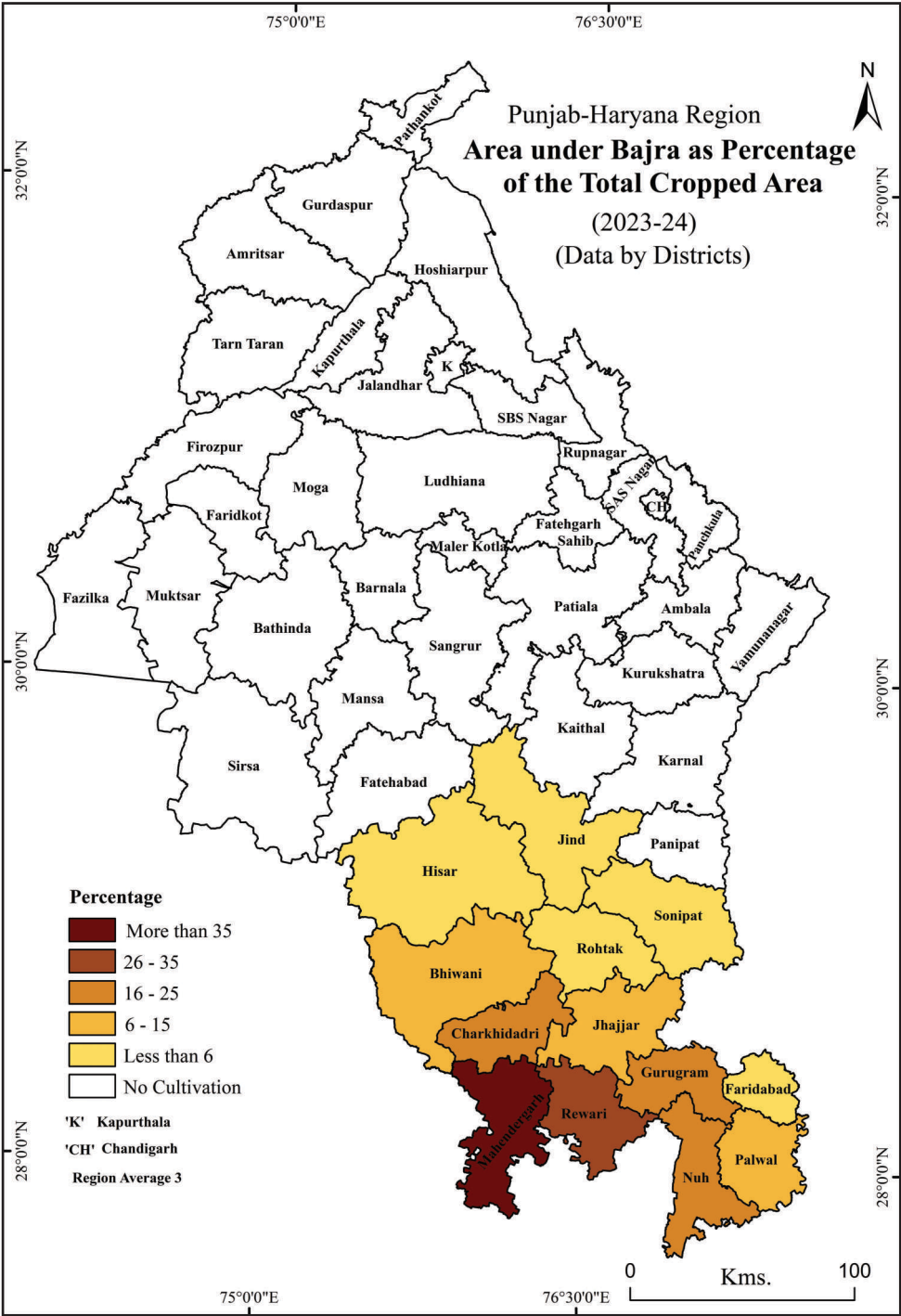


Fig. 4

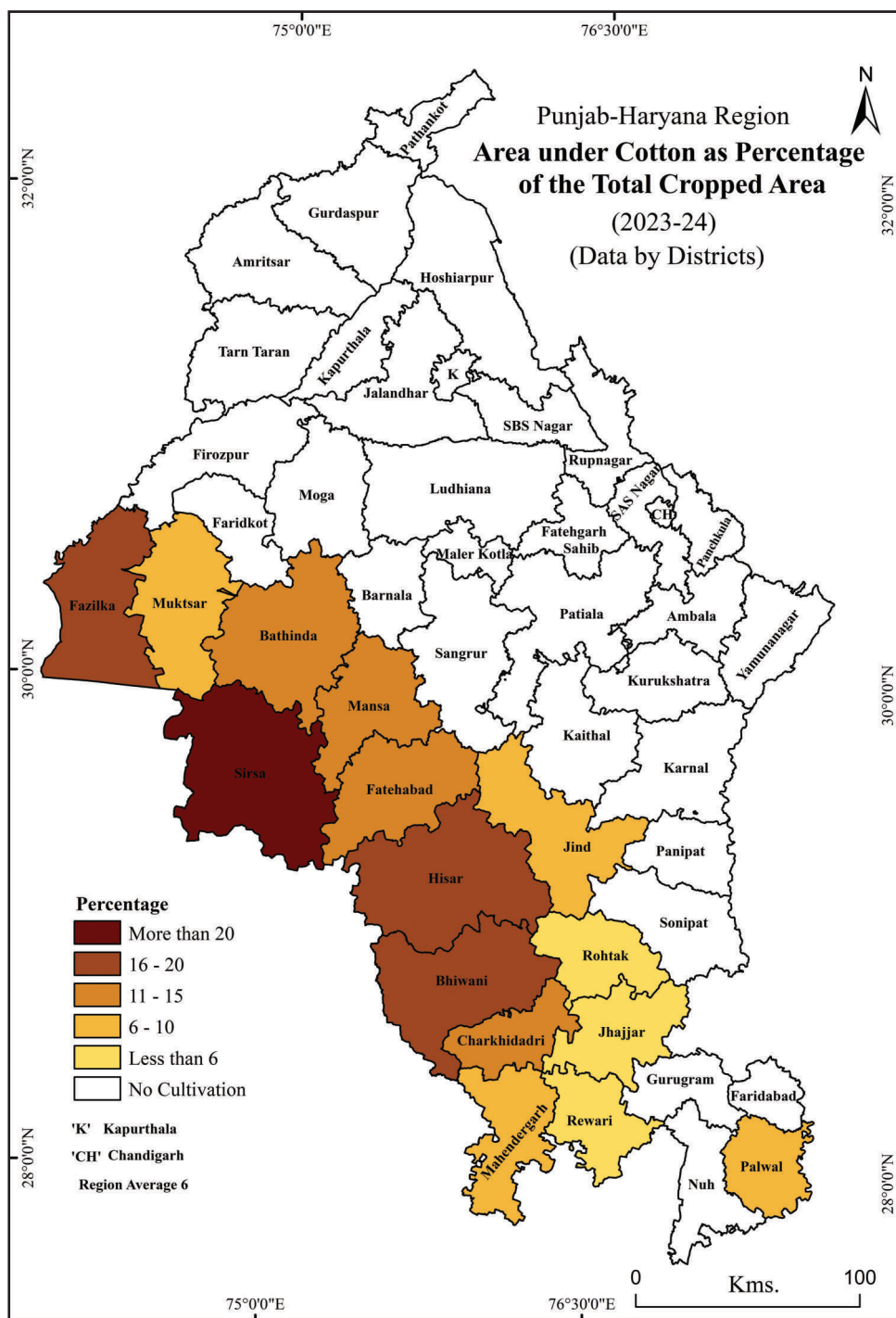


Fig. 5

belt extending from south-western Punjab through north-western and western Haryana. Cotton occupies more than 20 per cent of the total cropped area in Sirsa district. In the districts of Hisar, Bhiwani and Fazilka, the area under cotton accounts for 15 to 20 per cent of the total cropped area. Cotton occupies 10 to 15 per cent of the total cropped area in the other adjoining four districts of Bathinda, Mansa, Fatehabad, and Charkhi Dadri. The peripheral cotton-growing area extends from Jind district in central Haryana to Mahendergarh district in the south-west. The shrinkage of cotton cultivation is more pronounced in Punjab than in Haryana. This may be attributed to better irrigation facilities available in the cotton belt of south-western Punjab than in western Haryana.

Wheat

Wheat occupies a pre-eminent position in the agricultural landscape of the Punjab-Haryana region. It is the most important *Rabi* crop and is cultivated extensively across virtually all areas where assured irrigation, suitable soils and relatively favourable winter temperature is available. The crop has traditionally been associated with the fertile alluvial plains of Punjab and Haryana, but its geographical spread and intensity increased enormously following the Green Revolution of the late 1960s and 1970s. The introduction of high-yielding varieties of seeds, assured irrigation, chemical fertilizers, pesticides, mechanization and an effective system of government procurement has transformed the cultivation of wheat from an important food crop to the principal component of the region's highly commercialized cereal economy.

The expansion of wheat has been particularly rapid in the irrigated tracts of Punjab and Haryana, where the development of

canal irrigation and, subsequently, widespread tube well irrigation substantially reduced the dependence on winter rainfall. The rapid expansion of wheat has a significant effect on the traditional cropping pattern. In many parts of the region, wheat replaced several competing *Rabi* crops, including gram, barley and mustard. The rise of wheat signifies a broader structural transformation of agriculture in the Punjab-Haryana region, in which traditional and relatively diversified cropping systems gave way to an intensive, irrigated and increasingly market-oriented cereal economy.

About 38 per cent of the total cropped area of the Punjab-Haryana region has been under wheat in 2023-24. Wheat cultivation is more intensive in Punjab where 45.5 per cent of total cropped area is under wheat than in Haryana where 34.6 per cent of the total cropped area is under this crop. Since the inception of Green Revolution, wheat has emerged as the most dominant crop in the central and eastern plains of the Punjab-Haryana region, where fertile alluvial soils, extensive irrigation and high levels of agricultural mechanization provide highly favourable conditions.

Fig. 6 shows that as many as 13 districts of Punjab devote more than 45 per cent of their total cropped area to wheat, and the majority of these are in the Malwa region of the state. Wheat is also intensively and uniformly cultivated in the remaining districts of Punjab where it occupies 40-45 per cent of the total cropped area. In Haryana, a high proportion of area under wheat (more than 35 per cent of total cropped area) is found in 13 districts in the eastern and central parts of state (Fig. 6). Wheat occupies a very high proportion of the cropped area (more than 45 per cent) in Karnal, Palwal and Faridabad districts. In general, the

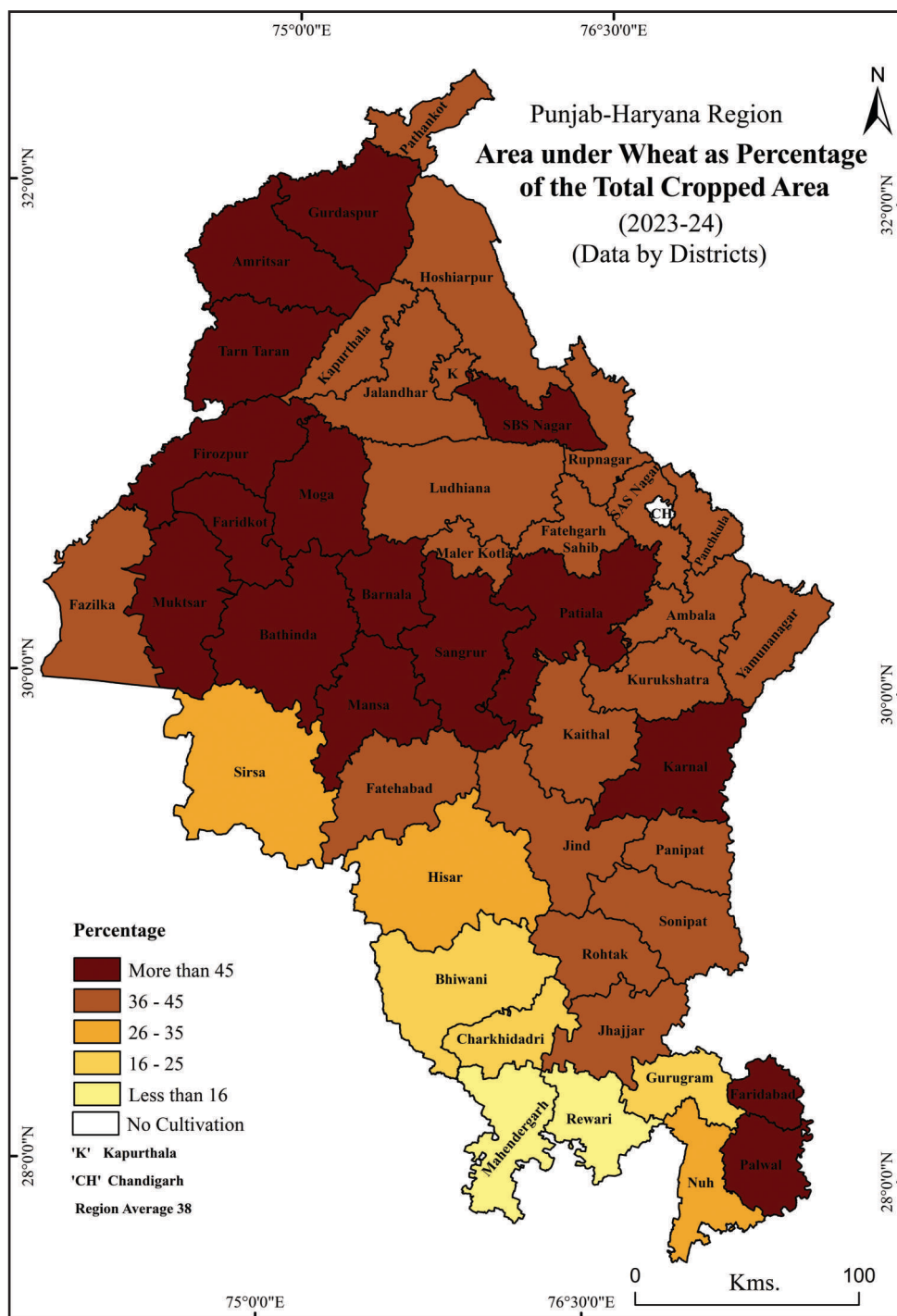


Fig. 6

area under wheat in Haryana declines towards the west and south-west. Its cultivation is lowest (less than 15 per cent of the total cropped area) in the extreme south-western part, particularly in Mahendergarh and Rewari districts, where it faces stiff competition from mustard.

Rapeseed and Mustard

Rapeseed and mustard have been important *Rabi* oilseeds grown in the semi-arid areas of Punjab and Haryana region. Mustard has been widely grown both as a pure crop and as an intercrop with wheat and gram in the rainfed western and south-western parts of the Punjab-Haryana region. It has been an important cash crop of the *Rabi* season and also served as a critical source of cooking oil, human nutrition and fodder. However, area under it has declined during the post-Green Revolution period as it has been increasingly replaced by wheat, which has benefitted from price guarantees under procurement at Minimum Support Price. The area under rapeseed and mustard also declined because of their greater vulnerability to pests, frost and fluctuating weather conditions.

About 6.3 per cent of the total cropped area in the Punjab-Haryana region in 2023-24 has been under rapeseed and mustard. However, cultivation of these oilseeds is much more pronounced in Haryana where these occupy 12.8 per cent of the total cropped area. It is only a minor crop in Punjab where it occupies only 0.5 per cent of the total cropped area. The cultivation of rapeseed and mustard is largely concentrated in the extreme south-western parts of Haryana. Rewari, Mahendergarh and Charkhi Dadri form the core of rapeseed and mustard cultivation, where more than 35 per cent of the total

cultivated area is under these oilseeds (Fig. 7). Bhiwani district falls in the category of 25 to 35 per cent, whereas Hisar, Jhajjar and Nuh districts fall in the category of 15 to 25 per cent of total cropped area under rapeseeds and mustard. Sirsa, Rohtak and Gurugram districts also grow these oilseeds and fall in the category of 5 to 10 per cent of total cropped area under these crops. It is a minor crop in other districts of Haryana, except Karnal and Kaithal districts, where area under its cultivation is negligible. In Punjab, mustard is a minor crop in Muktsar and Rupnagar districts and is not cultivated in other districts of the state.

Sugarcane

Before the Green Revolution, sugarcane occupied a significant place in the diversified agricultural system of the Punjab-Haryana region. The introduction of high-yielding varieties of wheat and rice, dramatically increased the area under these crops, production and the profitability. The expansion of these two crops has led to a progressive decline in the area under sugarcane in the region. Sugarcane has now become a minor crop in the Punjab-Haryana region, occupying only 1.4 per cent of the total cropped area of the region in 2023-24. There is not much difference in area under sugarcane between the two states. At present, sugarcane cultivation is confined to two separate pockets in the two states. In Haryana, sugarcane cultivation is largely confined to the Yamuna *Khadar* and adjoining plains extending from Ambala-Yamunanagar in the north to Palwal district in the south (Fig. 8). Within this belt, only Yamunanagar district devotes more than 8 per cent of the total cultivated area to sugarcane cultivation. The remaining 7 districts devote only 2 to 4 per cent of their total cultivated area

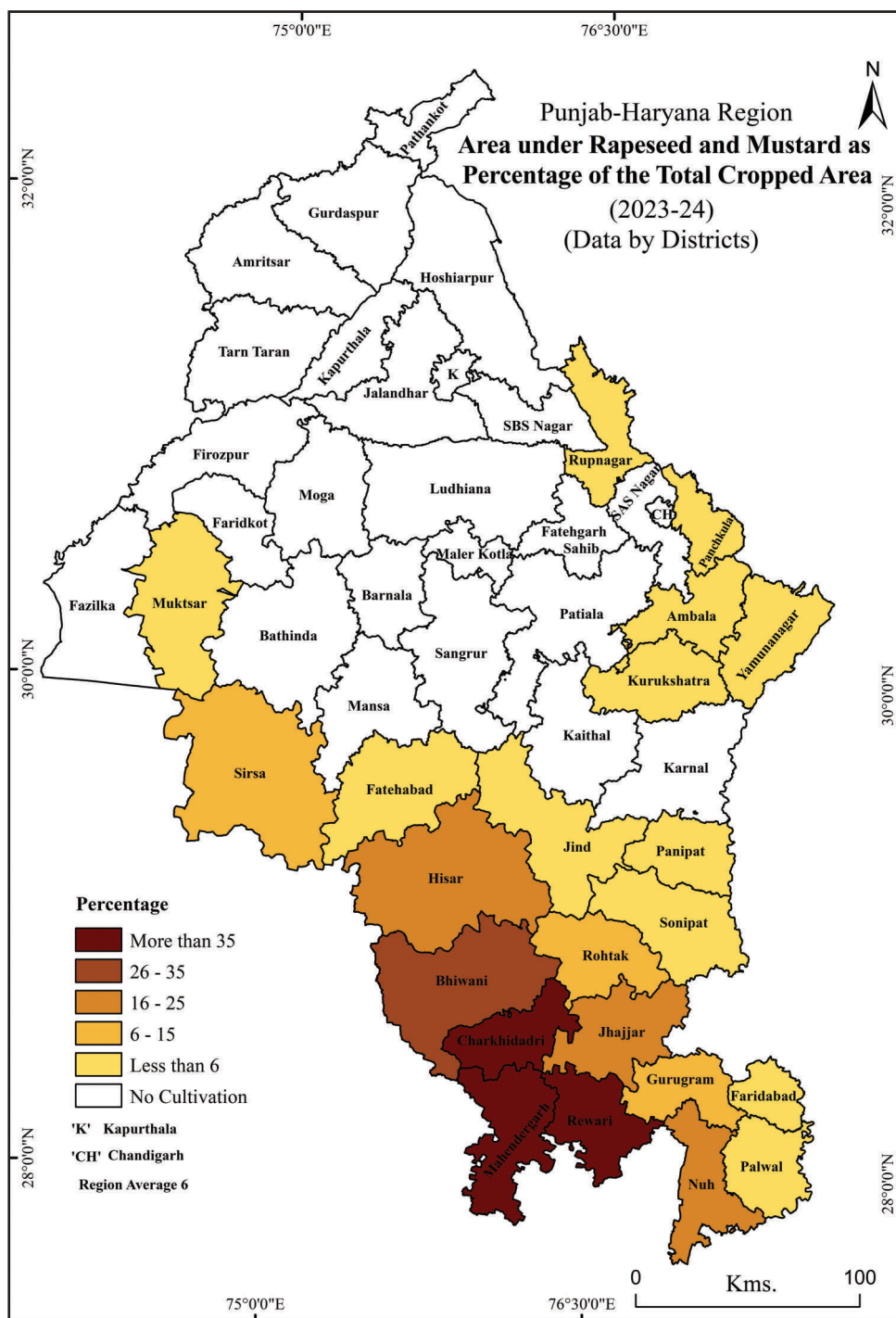


Fig. 7

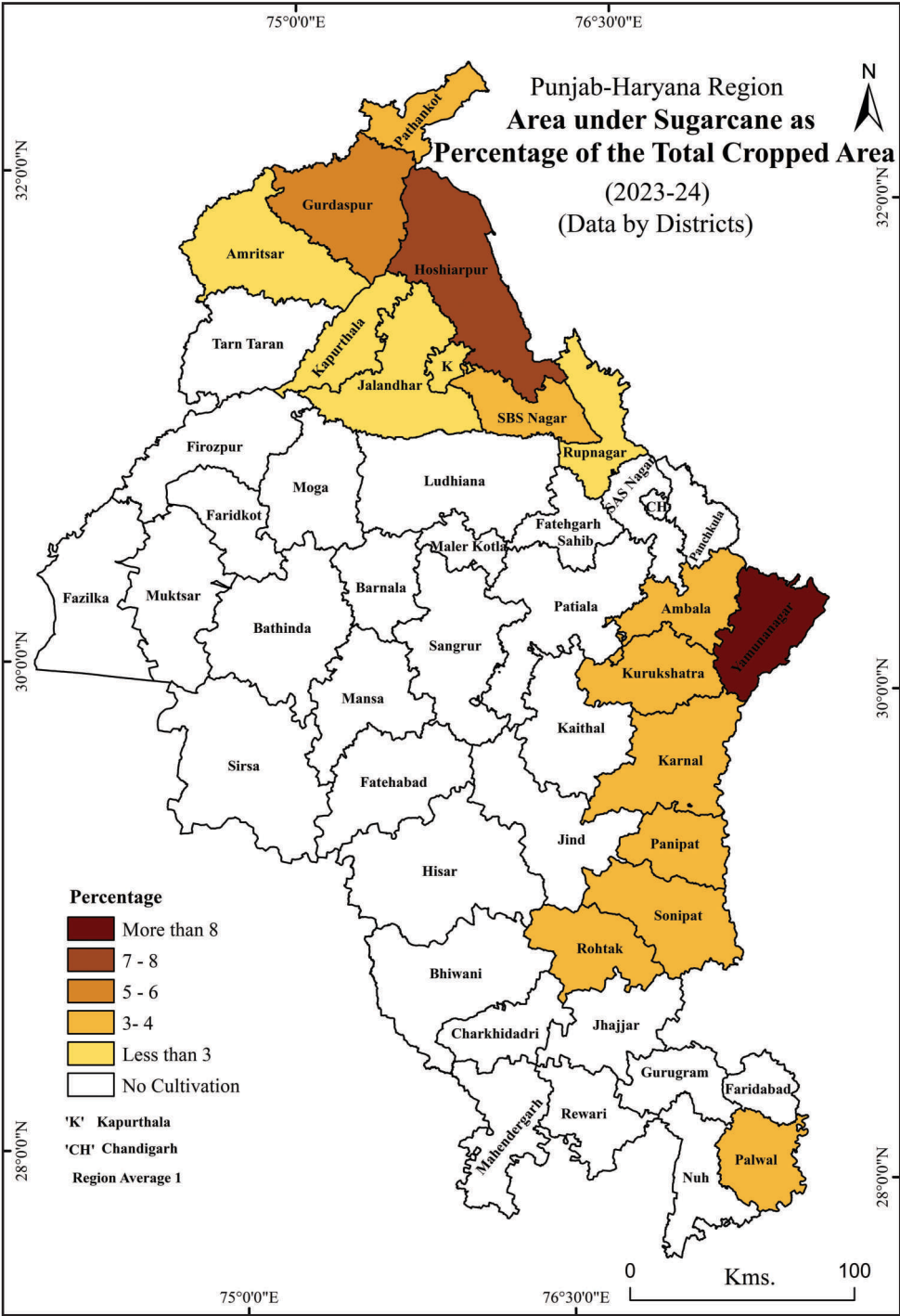


Fig. 8

to sugarcane. Although it covers a relatively small area, sugarcane cultivation in Punjab is confined mainly to the north-eastern districts. Hoshiarpur district has 6 to 8 per cent of its total cropped area under sugarcane cultivation, followed by Gurdaspur district with 4 to 6 per cent of total cropped area under it. Sugarcane is a minor crop in Pathankot, Amritsar, Kapurthala, Jalandhar, SBS Nagar and Rupnagar districts of Punjab (Fig. 8).

Sum Up

The Punjab-Haryana region represents one of India's most intensively cultivated agricultural landscapes, characterized by intensive irrigation, multiple cropping and a highly commercialized agricultural system. The contemporary cropping pattern is overwhelmingly dominated by the wheat-rice combination, particularly across the fertile and well-irrigated alluvial plains of Punjab and north-eastern and central Haryana. However, the spatial pattern of cropping remains geographically differentiated because of variations in rainfall, soil, irrigation, relief, market access and agro-climatic conditions.

The Green Revolution brought a fundamental transformation in the region's traditional cropping system. The cultivation of wheat expanded rapidly during the *Rabi* season, while rice became the dominant *Kharif* crop in areas with assured irrigation. The expansion of these crops occurred largely at the expense of traditional crops such as maize, bajra, gram and other pulses. Maize, once a prominent cereal and staple food in Punjab, has become largely confined to the *Kandi* areas. Bajra has almost disappeared from Punjab but continues to retain considerable importance in the rainfed and semi-arid areas of southern and south-western

Haryana. Mustard similarly remains concentrated in the drier south-western parts of Haryana, particularly in Rewari, Mahendergarh and Charkhi Dadri districts.

Cotton historically has been a major commercial crop of the south-western Punjab and western Haryana belt. However, the area under its cultivation has declined considerably because of pest and disease problems and increasing competition from paddy, particularly where irrigation has become more reliable and rice procurement provides relatively predictable returns.

Sugarcane, which has been an important commercial crop in the pre-Green Revolution period has also experienced a decline in its relative importance. At present, its cultivation is spatially concentrated in the irrigated Yamuna *Khadar* and adjoining plains of Haryana and the north-eastern districts of Punjab. Thus, the present cropping pattern of the Punjab-Haryana region reflects not merely natural agro-climatic differences but also the powerful influence of irrigation, technology, procurement policy, market incentives and changing farm economics. Overall, the region has moved from a relatively diversified cropping pattern to a highly specialized wheat-rice economy. While coarse cereals and non-cereal crops have survived mainly in areas where ecological conditions, market incentives or comparative profitability provide them with a distinct advantage.

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