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Punjab-Haryana Region: Agricultural Inputs and Machinery

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Modern agricultural technologies, including high-yielding varieties (HYV) of seeds, chemical fertilizers, insecticides /pesticides, and farm machinery have played a crucial role in boosting agricultural productivity and food production. High yielding varieties, particularly since the Green Revolution, have enabled farmers to have significant improvements in crop yields, food security, and livelihoods. HYVs of seeds are genetically modified to produce higher yields compared to traditional varieties. These seeds are more responsive to fertilizers and pesticides than traditional varieties, leading to increased yield of crops. HYVs of seeds are disease resistant and have relatively shorter maturity periods, contributing to higher and more reliable harvests. Chemical fertilizers provide essential nutrients like nitrogen, phosphorus, and potassium, which are crucial for plant growth. Chemical fertilizers help to replenish soil fertility, especially in areas where natural nutrient levels are low, leading to increased crop yield. Fertilizers also enable farmers to cultivate crops in nutrient-depleted soils and improve the quality of crops. Insecticides and pesticides protect crops from pests and diseases, preventing significant yield losses of crops. These chemicals control the insect population that may damage crops and help to ensure that crops reach to their full yield potential and maintain their quality. However, their excessive use contaminates the environment. Hence, these chemicals need to be carefully managed to minimize their potential environmental and health impacts. Similarly, application of farm machinery, such as tractors, harvesters, and irrigation equipments, streamline agricultural operations and increases agricultural efficiency. Tractors enable efficient ploughing and tilling that reduces manual labour and saves time. Harvesters accelerate the harvesting process, significantly reduce labor requirements and post-harvest losses. For irrigation, pumping sets ensure continuous and consistent water supply, especially in areas with unpredictable rainfall.

The present map series is based on the data of the agricultural inputs and machinery for the agricultural year of 2023-24. This data has been acquired from Statistical Abstracts of Punjab and Haryana. Since district-wise data have not been available for all the parameters of modern agricultural inputs and farm machinery, therefore the present study is based on the proportion of area under HYVs of seeds, consumption of chemical fertilizers, consumption of fertilizers by types of nutrients, and density of tractors.

Area under HYVs of Seeds

Data pertaining to the use of HYVs of seeds are available for main cereals (wheat, rice, maize and bajra) only. These new seeds have been introduced in the irrigated districts

of Punjab and Haryana in mid-1960s as a part of the package of modern agricultural technology. The spatial diffusion of these seeds is associated with the spread of irrigation and readiness of farmers to accept these seeds. HYVs of seeds cover 100 per cent cultivated area in Punjab and 94 per cent in Haryana. It is interesting to note that six districts of Haryana, despite being part of wheat-rice cropping pattern, do not have 100 per cent coverage by HYVs of seeds. Fig. 1 shows that northern, western and southern parts of Punjab-Haryana Region have 100 per cent coverage of HYVs of seeds. This means that even the less irrigated Siwalik foothill districts of Punjab, having substantial area under cultivation of maize and south and western parts of Haryana having strong presence of bajra in cropping pattern, have 100 per cent area under HYVs of seeds. Panipat and Sonepat districts in eastern Haryana have lowest, less than 81 per cent, area under these seeds. Even Jind, Karnal and Kaithal have less than 90 per cent of the area under HYVs of seeds. It is inexplicable as how these districts have comparatively less area under HYVs of seeds

Consumption of Chemical Fertilizers

Chemical fertilizers have been an integral and significant component of the technology introduced to usher green revolution in Punjab-Haryana Region. Their application has provided essential soil nutrients and has helped in intensive use of land for crop raising. Consumption of chemical fertilizers is 252 kg/ha in Punjab and it is closely followed by Haryana, 230 kg/ha. The six districts in northeastern Haryana and two districts of Punjab, Kapurthala and SBS Nagar have very high consumption (more than 300 kg/ha) of chemical fertilizers (Fig. 2). These six districts of Haryana form the core of the areas producing wheat and rice crops. The two districts of Punjab, Kapurthala and SBS Nagar also have the same crop combination. The category of high consumption of chemical fertilizers i.e., 251-300 kg/ha is spatially most widespread. Ten districts of Punjab spreading across the state and three districts, Sonepat, Kaithal and Panchkula of Haryana in wheat-rice area are included in this category. The rest of the districts with wheat-rice combination in both the states have moderate (201-250 kg/ha) consumption of chemical fertilizers. Five districts of the region have comparatively very low (less than 151 kg/ha) consumption of chemical fertilizers. Four of these districts lie in the less irrigated south and western Haryana. The Hoshiarpur, Rupnagar and SAS Nagar districts of Punjab and Sirsa, Hisar and Charkhi Dadri districts of Haryana exhibit low (151-200 kg/ha) consumption of chemical fertilizers. In fact, the consumption of chemical fertilizers in Punjab-Haryana Region is determined by the level of irrigation and cropping pattern.

Fertilizer Consumption by Type of Nutrients

The use of nitrogen fertilizers, in both the states, dominates over the application of other nutrients. In Punjab, nitrogen fertilizers constitute about 80 per cent among the total consumption of fertilizers, while its share in Haryana is about 75 per cent. It is interesting to note that the use of phosphorus and potassium fertilizers is relatively higher in Haryana. Fig. 3 shows the district-wise consumption of chemical fertilizers by types of nutrients, i.e. nitrogen, phosphorus and potassium. It is evident that the total quantity of fertilizers used in Punjab-Haryana Region is higher in the

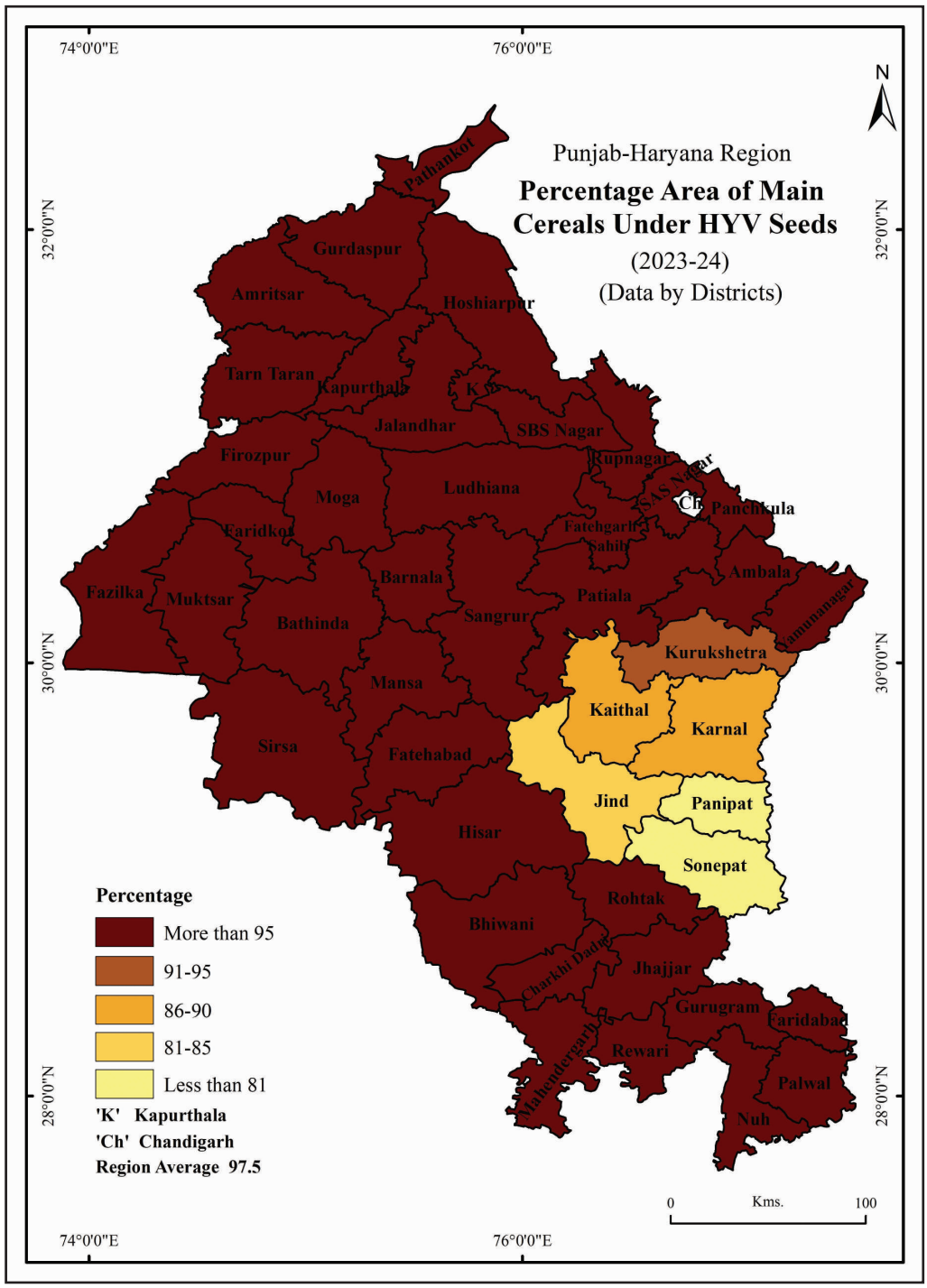
Punjab-Haryana Region
Percentage Area of Main Cereals Under HYV Seeds
(2023-24)
(Data by Districts)
74°0'0"E
76°0'0"E
32°0'0"N
30°0'0"N
28°0'0"N
N
Pathankot
Gurdaspur
Amritsar
Hoshiarpur
Tarn Taran
Kapurthala
K
Jalandhar
SBS Nagar
Firozpur
Rupnagar
SAS Nagar
Ch
Panchkula
Moga
Ludhiana
Faridkot
Fatehgarh Sahib
Ambala
Fazilka
Muktsar
Barnala
Patiala
Bathinda
Sangrur
Yamunanagar
Kurukshetra
Mansa
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonepat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Mahendergarh
Rewari
Palwal
Nuh
Percentage
More than 95
91-95
86-90
81-85
Less than 81
'K' Kapurthala
'Ch' Chandigarh
Region Average 97.5
0
Kms.
100

Fig. 1

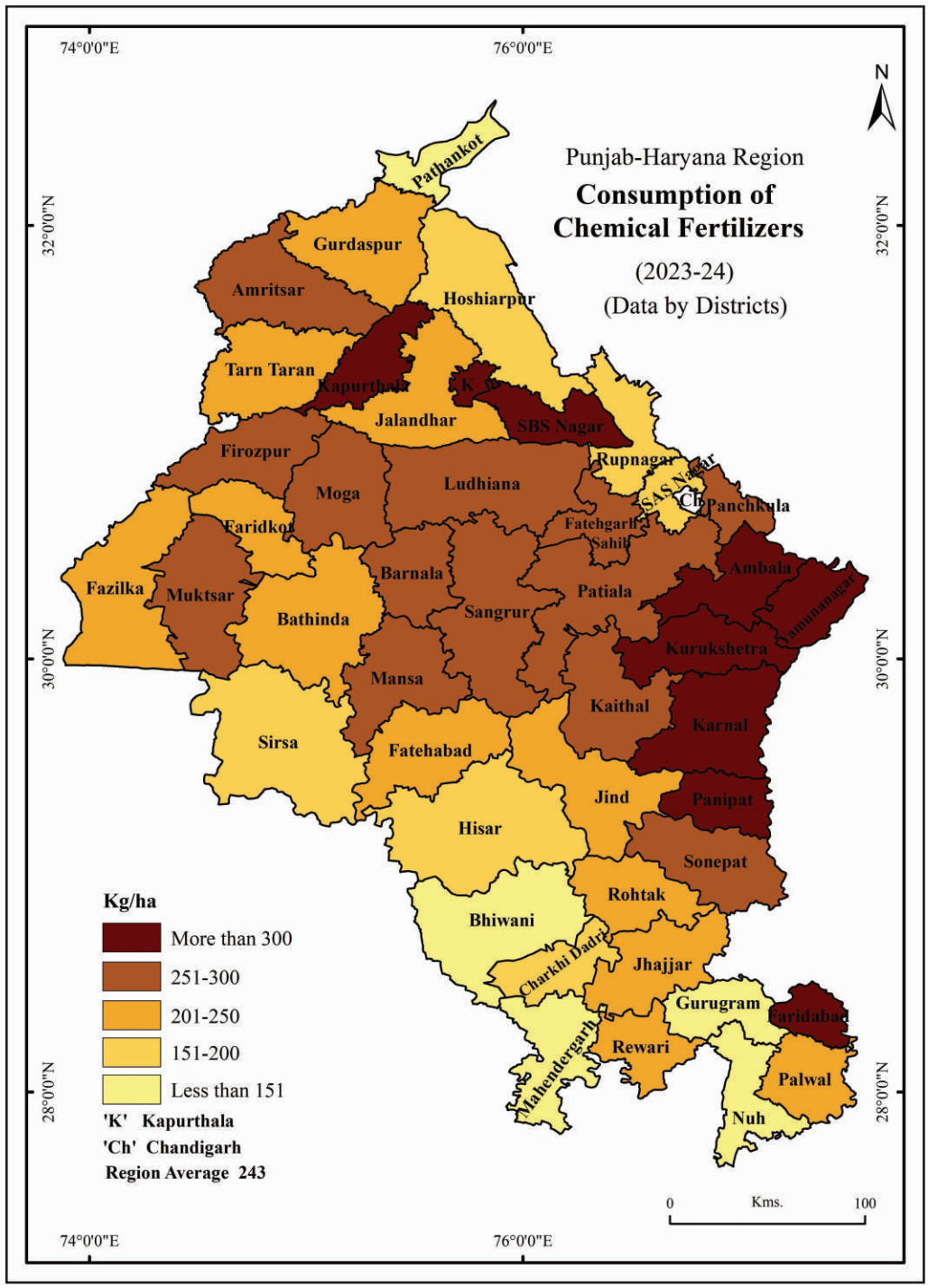
74°0'0"E
76°0'0"E
N
32°0'0"N
30°0'0"N
28°0'0"N
Punjab-Haryana Region
Consumption of Chemical Fertilizers
(2023-24)
(Data by Districts)
Pathankot
Gurdaspur
Amritsar
Hoshiarpur
Tarn Taran
Kapurthala
K
Jalandhar
SBS Nagar
Firozpur
Rupnagar
Moga
Ludhiana
SAS Nagar
Ch
Panchkula
Faridkot
Fatehgarh Sahib
Ambala
Fazilka
Muktsar
Barnala
Patiala
Yamunanagar
Bathinda
Sangrur
Kurukshetra
Mansa
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonepat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendergarh
Palwal
Nuh
Kg/ha
More than 300
251-300
201-250
151-200
Less than 151
'K' Kapurthala
'Ch' Chandigarh
Region Average 243
0
Kms.
100

Fig. 2

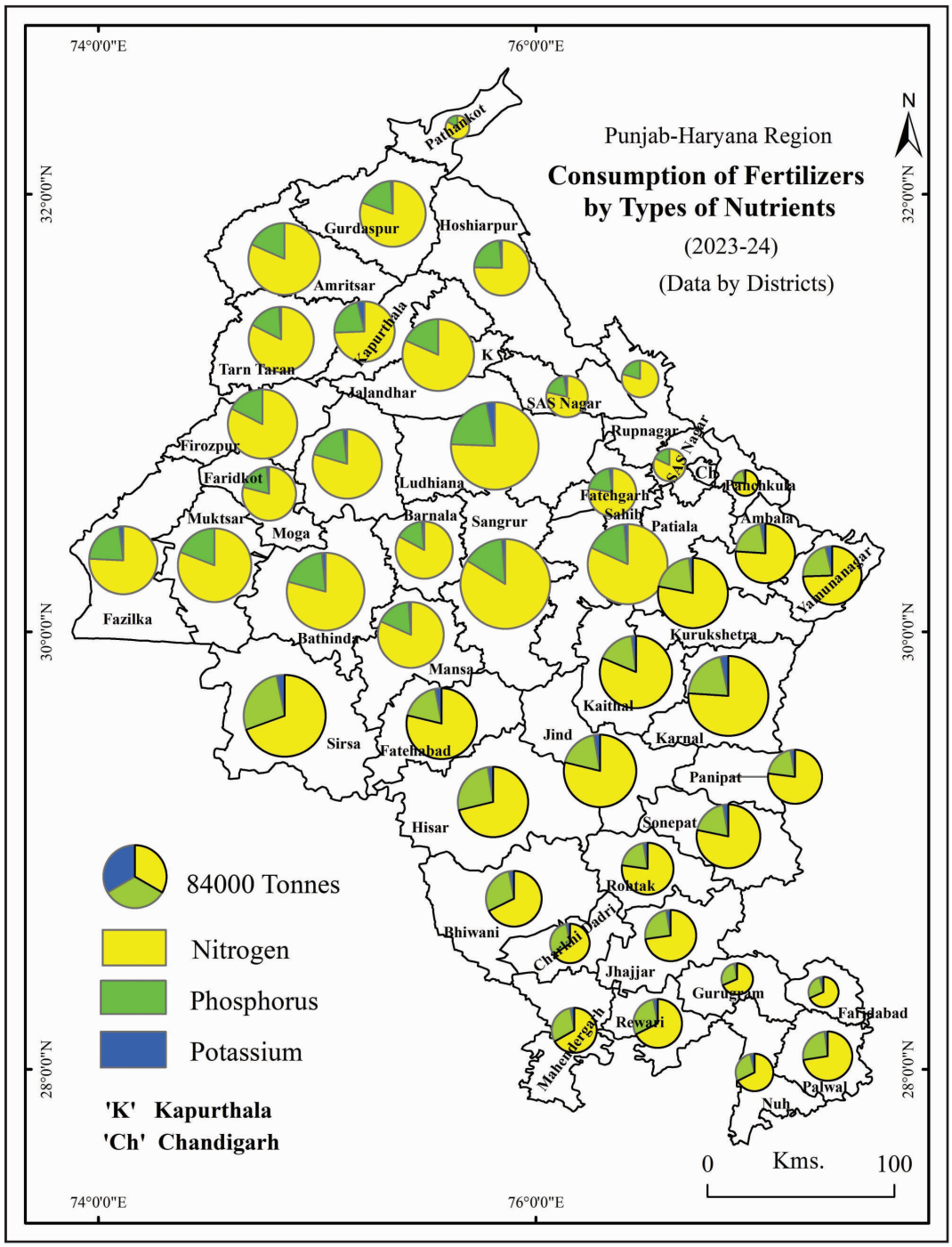
Punjab-Haryana Region
Consumption of Fertilizers by Types of Nutrients
(2023-24)
(Data by Districts)
N
74°0'0"E
76°0'0"E
32°0'0"N
30°0'0"N
28°0'0"N
Pathankot
Gurdaspur
Hoshiarpur
Amritsar
Kapurthala
Tarn Taran
Jalandhar
SAS Nagar
Rupnagar
Firozpur
Faridkot
Ludhiana
Fatehgarh Sahib
Ch
Panchkula
Muktsar
Moga
Barnala
Sangrur
Patiala
Ambala
Yamunanagar
Fazilka
Bathinda
Mansa
Kurukshetra
Kaithal
Sirsa
Fatehabad
Jind
Karnal
Panipat
Hisar
Sonepat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendergarh
Palwal
Nuh
84000 Tonnes
Nitrogen
Phosphorus
Potassium
'K' Kapurthala
'Ch' Chandigarh
0
Kms.
100

Fig. 3

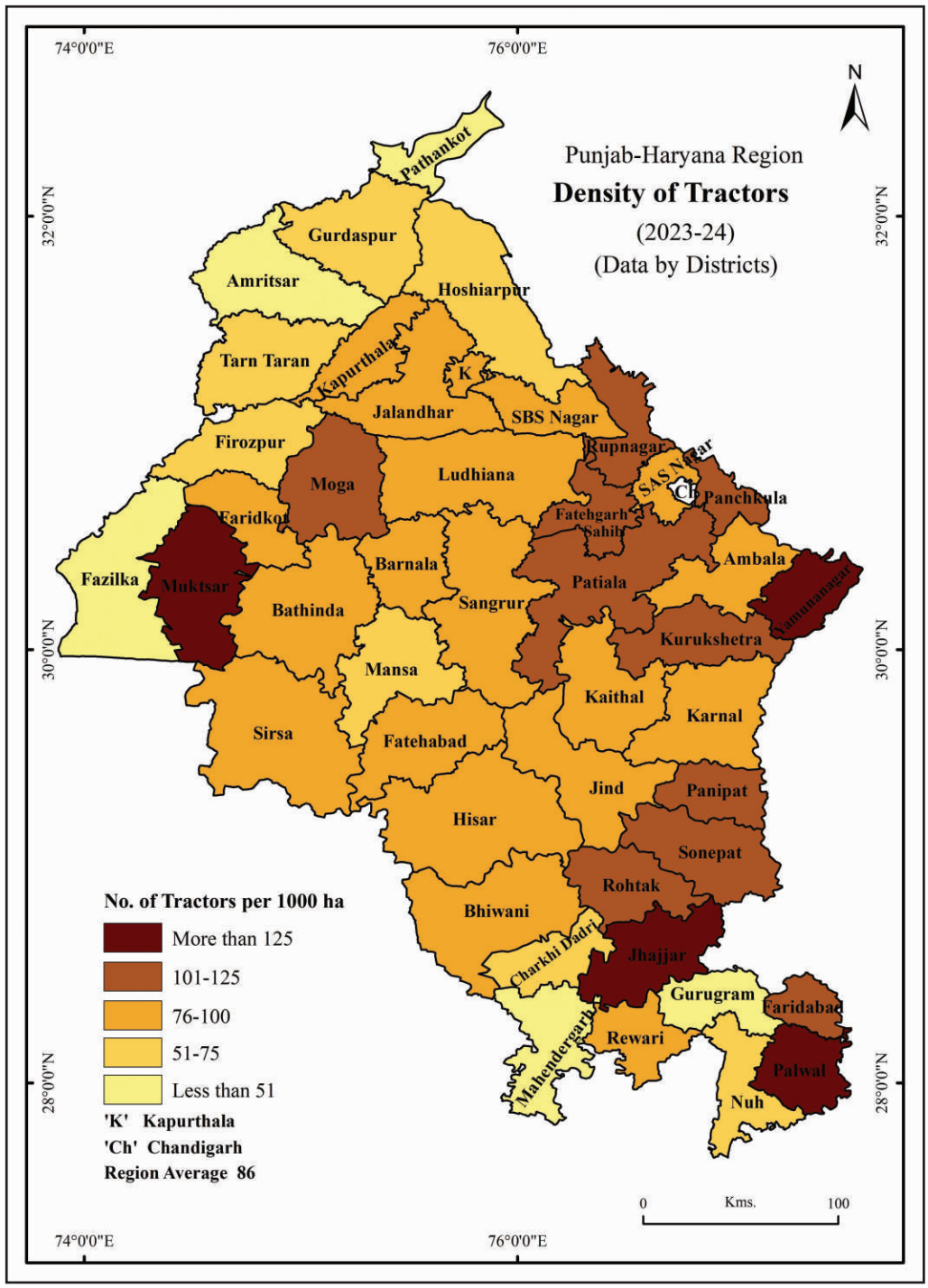
74°0'0"E
76°0'0"E
32°0'0"N
30°0'0"N
28°0'0"N
N
Punjab-Haryana Region
Density of Tractors
(2023-24)
(Data by Districts)
Pathankot
Gurdaspur
Amritsar
Hoshiarpur
Tarn Taran
Kapurthala
K
Jalandhar
SBS Nagar
Firozpur
Rupnagar
SAS Nagar
Ch
Panchkula
Moga
Ludhiana
Faridkot
Fatehgarh Sahib
Ambala
Fazilka
Muktsar
Barnala
Patiala
Bathinda
Sangrur
Yamunanagar
Kurukshetra
Mansa
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonepat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendergarh
Palwal
Nuh
No. of Tractors per 1000 ha
More than 125
101-125
76-100
51-75
Less than 51
'K' Kapurthala
'Ch' Chandigarh
Region Average 86
0
Kms.
100

Fig. 4

districts dominated by wheat-rice cropping pattern. In almost all the districts of Punjab, the use of nitrogen fertilizers is relatively higher. However, its use is relatively less in western and southern districts of Haryana. There is not much inter-district variation in use of phosphorus fertilizers in Punjab. However, in case of Haryana, there is more consumption of phosphate in western and southern parts. In Punjab, the use of potassium is relatively higher in Ludhiana, Kapurthala and Fazilka districts. Sirsa, Fatehabad, and Hisar districts in northwest Haryana and Karnal district in eastern part exhibit higher use of potassium. The spatial variations in the use of different nutrients may be attributed to the factors, such as the fertility status of soils, cropping pattern, area under horticultural crops etc.

Density of Tractors

There are different kinds of machines and tools such as tractors, combine harvesters, seed drills, rotavators, threshers, sprayers, cultivators etc. used in agriculture. However, tractor is the most important among these as many tools can be attached to and run by tractor. Hence, availability, of tractors in terms of numbers, has been taken as an indicator of the level of agricultural mechanization. The density of tractors has been computed in terms of number of tractors per thousand-hectare net sown area. Overall, the density of tractors is slightly higher (89) in Haryana than Punjab (83). There are four districts, Muktsar in Punjab and Yamuna Nagar, Jhajjar and Palwal in Haryana, having very high density of tractors (more than 125 tractors per thousand hectares of cultivated area) (Fig. 4). Ten districts in the region, comprising six of Haryana and four of Punjab have high (101-125) density of tractors. As many as nineteen districts in the region have moderate (76-100) level density of tractors. Among these, ten districts are located in Punjab and nine in Haryana. These districts cover largest area in the region and form contiguous belts in both the states. Twelve districts in the region, eight in Punjab and four in Haryana, have low to very low density of tractors. In Punjab, these districts are mainly located with the international boarder of Pakistan and in the southern parts of Haryana.

Sum Up

There is a widespread use of HYVs of seeds for cultivation of cereals in Punjab-Haryana Region. The use of chemical fertilizers is quite high in the region. But as compared to Punjab, their use is less in Haryana. However, the foothill districts of Punjab and western and southern districts of Haryana have low use of fertilizers. Broadly speaking, the consumption of chemical fertilizers seems to be determined by the level of irrigation development and cropping pattern. The use of nitrogen fertilizers is slightly higher in Punjab than Haryana, while the application of phosphorus and potassium fertilizers is relatively higher in Haryana. There is moderate to high density of tractors in most of the districts in Punjab-Haryana Region

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