

Status of farm mechanization of different agro-climatic zones in Uttar Pradesh

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■ **ABSTRACT** : India accounts for only about 2.4 per cent of the world's geographical area and 4 per cent of its water resources, but has to support about 17 per cent of the world's human population and 15 per cent of the livestock. Agriculture is an important sector of the Indian economy, accounting for 14 per cent of the nation's GDP and about 11 per cent of its exports. Agriculture in India is currently growing at an average compound annual growth rate (CAGR) of 2.8 per cent. The estimated numbers of tractors, power tillers, diesel engines and motors per 1000 ha were average found to be 116, 0, 63 and 119, respectively, in Uttar Pradesh. The number of power sources per 1000 ha of net area sown in the selected village of Bareilly, Bulandshahr, Bijnour, Firozabad, Etawah, Jalaun, Kushinagar, Azamgarh and Sonbhadra districts were: Tractors – 108, 172, 152, 159, 104, 106, 75, 104, and 65; Diesel Engines – 91, 91, 81, 36, 51, 15, 29, 85, and 85; and Electric Motors – 108, 151, 141, 165, 115, 155, 14, 145 and 80, respectively.

■ **KEY WORDS** : Tractor, Diesel engine, Electric motor

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India accounts for only about 2.4 per cent of the world's geographical area and 4 per cent of its water resources, but has to support about 17 per cent of the world's human population and 15 per cent of the livestock. Agriculture is an important sector of the Indian economy, accounting for 14 per cent of the nation's GDP and about 11 per cent of its exports. Agriculture in India is currently growing at an average compound annual growth rate (CAGR) of 2.8 per cent. About half of the population still relies on agriculture as its principal source of income and it is a source of raw material for a large number of industries. Accelerating the growth of agriculture production is, therefore, necessary not only to achieve an overall GDP target of 8 per cent and meet the rising demand for food, but also to increase incomes

of those dependent on agriculture and thereby ensure inclusiveness in our society (Mehta *et al.*, 2014).

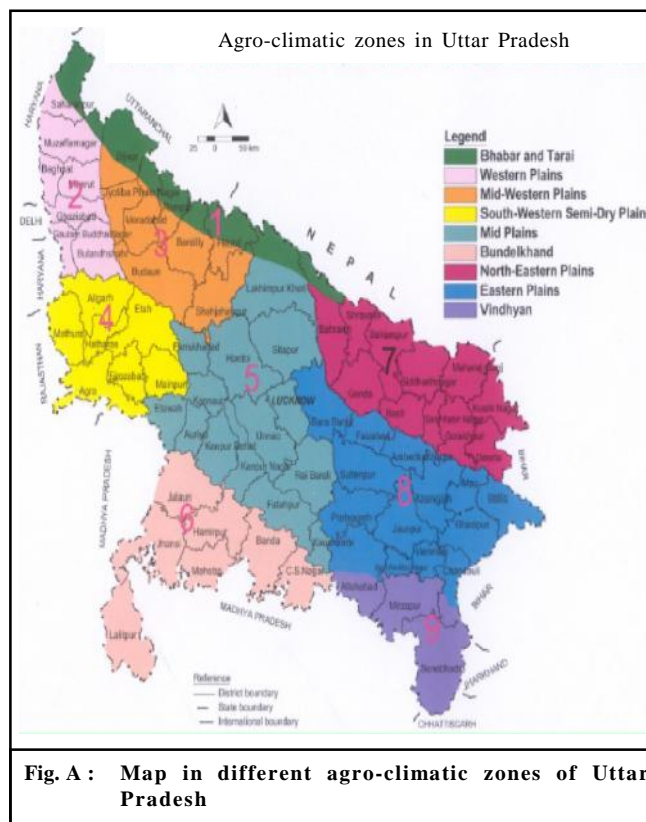
Farm power availability:

Agricultural workers, draught animals, tractors, power tillers, diesel engines, electric motors are used as sources of farm power in Indian agriculture. The available farm power (kW/ha) in Indian agriculture is from these sources and total farm power. It indicates that the composition and relative share of different sources of power for farming operations has undergone significant change during the last four decades. The availability of draught animals power has come down from 0.133 kW/ha in 1971-72 to 0.094 kW/ha in 2012-13, whereas the share of tractors, power tillers, diesel engines and electric

motors has increased from 0.020 to 0.844, 0.001 to 0.015, 0.053 to 0.300 and 0.041 to 0.494 kW/ha, respectively during the same period. The total power availability on Indian farms has increased from 0.293 to 1.841 kW/ha at a CAGR of 4.58 per cent during the last forty one years (Mehta *et al.*, 2014).

Farm mechanization in India is still in its early stages during the last two decades and is only able to achieve a meagre growth rate of less than 5 per cent. Even though, higher share of labour (55%) with lesser contribution to GDP (14%) with overall mechanization level of 40- 45 per cent makes farming in India less remunerative. The level of mechanization in India is still lower than United State (95%), Western Europe (95%), Russia (80%), Brazil (75%) and China (57%) (Renpu, 2014). The average farm power availability in the country is still at a low level as compared to China, Korea and Japan. Unlike other agricultural sectors, farm mechanization sector in India has a far more complex structural composition. It is facing various challenges related to farm machinery and equipment, technology, markets, operations, legislation, policy framework and other related areas. Land size, cropping pattern, market price of crops including minimum support price (MSP), availability of labour and cost of labour are the major factors deciding the agricultural mechanization. These challenges pose a serious impediment to the growth of the industry and agriculture. The key challenges faced by the farm mechanization in India (Mehta and Pajnoo, 2013).

the 9 agro-climatic zones of Uttar Pradesh namely 1. Tarai and Bhabhar, 2. Western Plain, 3. Mid- Western Plain, 4. South West. Semi-Dry, 5. Mid-Plain/Central, 6. Bundelkhand, 7. North Eastern Plain, 8. Eastern Plain and 9. Vindhyan (Fig. A).



METHODOLOGY

This chapter deals with the research methodology adopted for the present study with respect to the selection area, selection of respondents, collection of data and analytical techniques. The study was carried out in all

Selection of village:

From each block two villages were selected randomly. The sample was post-stratified to represent the whole district. The details of villages selected for study is shown below.

Table A : Agro-climatic zones wise selection of districts, tehsil/blocks and Gram Panchayat			
Sr. No.	Agro-climatic Zones	Selected district	Tehsil/blocks (Gram Panchayat)
1.	Tarai and Bhabhar Zone	Bijnour	Nagina (Narayana)
2.	Western Plain Zone	Bulandshahr	Bulandshahr (Paligid)
3.	Mid- Western Plain Zone	Bareilly	Faridpur (Rampurakatha)
4.	South West. Semi-Dry Zone	Firozabad	Bikapur (Husainpur)
5.	Mid-Plain/Central Zone	Etawah	Mahewa (Jaitpur)
6.	Bundelkhand Zone	Jalaun	Jalaun (Harsingpur)
7.	North Eastern Plain Zone	Kushinagar	Kasya (Kuramauta)
8.	Eastern Plain Zone	Azamgarh	Sagri (BarauliDiwakarpatti)
9.	Vindhyan Zone	Sonbhadra	Dudhi (Bijpur)

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

District wise percentage area under major crops in different agro-climatic zones :

The percentage share of different crops grown in Uttar Pradesh in different agro-climatic zones amongst surveyed farms is shown in Table 1. It is clear that paddy is the main crop in *Kharif* season and wheat in *Rabi* season. Whose share with is 31.21 per cent and 52.72 per cent of area, respectively, among the surveyed farms. Thus, these are the main crops in which high power is required, so that all the farm operation is completed in time.

Estimated number of mechanical farm power source per 1000 ha of area sown :

The estimated numbers of tractors, power tillers, diesel engines and motors per 1000 ha were average found to be 116, 0, 63 and 119, respectively in Uttar Pradesh as shown in Fig. 1, the number of power sources per 1000 ha of net area sown in the selected village of Bareilly, Bulandshahr, Bijnour, Firozabad, Etawah, Jalaun, Kushinagar, Azamgarh and Sonbhadra districts were: Tractors – 108, 172, 152, 159, 104, 106, 75, 104 and 65; diesel engines – 91, 91, 81, 36, 51, 15, 29, 85 and 85 and electric motors – 108, 151, 141, 165, 115, 155, 14, 145 and 80, respectively (Anonymous, 2006). It is clear that the number of tractors, power tillers, electric motors is increasing whereas diesel engines and draught animals are decreasing. This shows the increasing trend in level of mechanization. The number of electric motors per 1000 ha was found to be the highest in Bulandshahr.

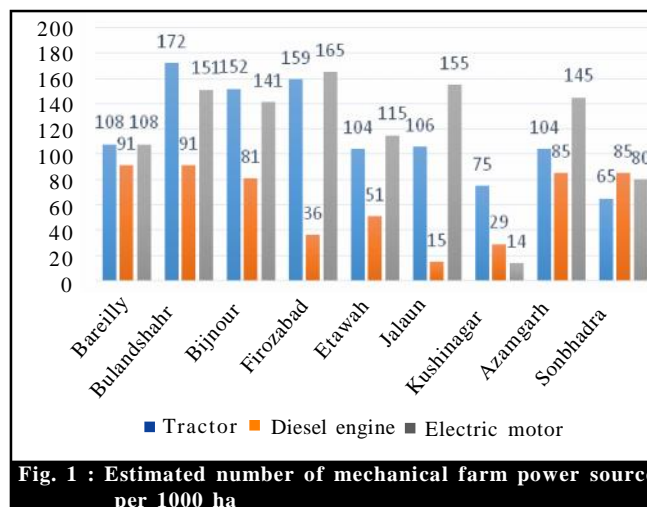


Fig. 1 : Estimated number of mechanical farm power source per 1000 ha

Total farm power availability :

In the surveyed districts, farms in Uttar Pradesh was found to be 4.82 kW/ha. In the surveyed farms of the districts Bareilly, Bulandshahr, Bijnour, Firozabad, Etawah, Jalaun, Kushinagar, Azamgarh and Sonbhadra farm power availability was found to be 4.74, 6.94, 6.19, 6.25, 4.34, 4.43, 2.56, 4.82 and 3.17 kw/ha, respectively. The farm power input per unit cultivated land in India is still very low as compared to South Korea (7 kW ha⁻¹), Japan (14 kW ha⁻¹) and United states of America (6 kW ha⁻¹) (Singh, 2006). The farm power availability of India was 0.22 kW ha⁻¹ in 1960-61, which was increased to 0.73 kW ha⁻¹ in 1990-91 and further increased upto 1.84 kW ha⁻¹ in 2012-13 (Singh, 1999; Lohan *et al.*, 2000; Srivastva, 2006; Singh, 2010; Singh *et al.*, 2011; Sharma and Mukesh, 2013 and Verma, 2006). In 1997, the highest farm power availability among the states of India was of Punjab state *i.e.* 3.5 kW ha⁻¹ (Singh *et al.*, 2002; Singh, 2006 and Mehta *et al.*, 2014). Later in 2012-13 the power availability of Punjab state had reached upto 5.68 kW

Table 1 : District wise percentage area under major crops in different agro-climatic zones

Sr. No.	Crop	Bareilly	Bulandshahr	Bijnour	Firozabad	Etawah	Jalaun	Kushinagar	Azamgarh	Sonbhadra	Average
1.	Paddy	48.21	19.75	15.86	8.83	32.85	0.16	54.38	70.88	29.99	31.21
2.	Wheat	55.67	63.65	32.59	57.38	64.42	42.23	49.90	75.61	33.02	52.72
3.	Sugarcane	27.86	19.10	61.58	0.09	0.45	0.73	31.15	6.82	0.11	16.43
4.	Potato	1.57	2.39	0.27	20.40	6.78	0.14	0.72	1.64	0.50	03.82
5.	Maize	0.11	18.70	0.00	4.42	4.24	0.00	2.70	2.50	10.00	04.74
6.	Bajra	2.98	2.47	0.00	36.03	27.10	4.20	0.04	0.04	0.24	08.12
7.	Pules	4.39	5.96	1.17	3.12	9.28	50.34	2.47	7.17	25.02	12.10
8.	Oilseeds	6.23	2.75	1.38	7.04	11.21	16.73	4.53	0.45	8.75	06.56

ha⁻¹ due to which this Punjab state becomes the highly mechanized state in the country followed by Haryana, Uttar Pradesh, Andhra Pradesh and Tamil Nadu states.

Conclusion:

Mechanical power availability in the district Bareilly, Bulandshahr, Bijnour, Firozabad, Etawah, Jalaun, Kushinagar, Azamgarh and Sonbhadra of Uttar Pradesh was found to 4.74, 6.94, 6.19, 6.25, 4.34, 4.43, 2.56, 4.82 and 3.17 kw/ha, respectively.

The total farm power availability was found the highest (6.94 kw/ha) in Bulandshahr among the surveyed districts whereas the lowest (2.56 kw /ha) was available in Kushinagar district.

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