

Study on farm power availability in Aligarh district

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■ **ABSTRACT** : Farm tractors and equipment play a key role in presenting Agriculture production system, during last three decades the use of animal power has declined and role of electro-mechanical power has increased in Indian Agriculture. During this period, Indian Tractor Industry showed rapid growth and Indian become the largest manufacture of tractors in the world with a record annual production of more than 250000 tractors. Certain increase in awareness of about tractor machinery system had led to more of its use at India farm mainly on medium and large farms. Diverse agro-climatic and socio-economic conditions practices. Now small formers also get their farm work done on custom hiring, especially for tillage work as bullocks required more time for seed bed preparation. At present, tractors are not utilized evenly by different categories of tractor owner farmers due to variation in land handing pattern, cropping system and socio-economic condition. Sizeable use of tractor for non-agriculture works was in vague. The non-agriculture work were accomplished by own tractors or custom hiring basis. Farmers used tractors on tractors on custom hiring as an entrepreneurship as this fetched direct income to farmers. It has been observed that many tractor owners took this as a business. A detailed study was done to know use pattern in terms of age and use hours, custom hiring and agriculture works as work as non-agriculture works, maintenance cast and frequency of breakdowns and mean time between failures. To determine above, a survey study was undertaken in the district Aligarh. The data were collected through personal interview in a specially designed schedule for this study. A detailed schedule was prepare encompassing the details of tractor owners both personal and their tractor machinery system. Tractor use patterns in term of agricultural, non-agricultural use, operation wise, use machinery ownership patterns; age and use hours were collected. The farmers owned highest percentage (22 %) Massey Tractor in the study area. Total culturable command area is 881 ha. Total number of tractor uses 110. Total number of stationary Engine and Electric Motor is respectably 115 and 95. Total power used Hp/ha is 5.45. Only one power tiller is available in five villages.

■ **KEY WORDS** : : Tractor industry, Power availability, Sources of farm power, Tractor marketing, Tractor utilization

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Agriculture is the mainstay of most economies in which there is an interest in formulating an Agricultural Mechanization Strategy. It is usually the principal source of national output and the main employer. The geographical area of country is 329 million hectares of which 69 million hectares (22.6%) come under forest, 22.97 million hectares (7.5 %) under non-agricultural uses, 19.44 million hectare (6.5 %) and barren and uncultivable land, 11.04 million hectares (3.6%) permanent pasture and grazing land, 3.69 million hectares (1.2%) land under miscellaneous tree crops and grooves not included in net area sown, 13.83 million hectares (4.5%) cultivable waste, 24.91 million hectares(8.1%) fallow lands and 141.28 million hectares (46.1%) net area sown. Out of the total cultivable area of the country 57.34 million

hectares (40.53%) is irrigated and 83.94. Million hectares (59.47%) is rainfed. Rainfed supports 40 % of India's 1000 million population and contributes 44% of the national food basket (Anonymous, 2004). Tractor in the country is used on an average for 538 hours annually, of which 73% time is utilized on one's own farm. An additional 15% of time is devoted to farm work, mainly either as custom service or an obligation. Use of the tractor is more intensive in Punjab, Rajasthan and Haryana utilization least in Tamil Nadu for only 335 hours in a year. Number of custom service rendered highest in Bihar (350 hours per year) and lowest in Punjab (13 hours per year) per tractor (Anonymous, 1990). The use of farm machinery depends upon the farm power sources availability for various tractive and stationary operations. Human and animal powers

have traditionally been used for various farm operations. Animal power contributes 60% of the total farm power in 1971-72 whereas mechanical and electrical together contributes only 40%. In 2000-2001 the contribution from animal power has decreased to 16.38% only and share of mechanical power has increase to 83.62% (Alama and Singh, 2003). The average command area per tractor in the country varies from state which is 14 to 1145 ha per tractor. The intensity of tractor population in few states like Punjab (14 ha/ tractor) and Gujarat (116 ha/ tractor) and Rajasthan (107 ha/ tractor) is much higher as compared to other states (Alama and Singh, 2003). In spite of the fact the tractor population is increasing at a rapid, the annual utilization is quite low in many regions of the country. The survey was carried out in the month of January 2012 April 2012 to find out the utilization pattern of tractors in the Khair Block region of Aligarh district, 5 villages are selected considering the average value of the tractor population in the village covering the study area. Detailed information of the total number of tractor in each village in a particular block has been collected from development officers of the respective villages. The study area of the respective village has been divided into equal interval of four with reference to the tractor population of the village. Villages for each detailed study have been selected randomly considering the average value of tractors for each group. The results showed that the total number of tractors used 110. The farmers owned percentage (22 %) Massey tractor in study area. Total culturable command area is 881 ha; number of stationary Engine and Electric Motor is respectably 115 and 95. Total power used in five village is 5.45 hp/ha.

■ METHODOLOGY

In the present study an attempt was made to determine use pattern of tractor and Machinery of selected region of Khair Block. Effort was made to know the use pattern of tractor under its operating condition and socio-economic situation of farmers Khair Block. The study was undertaken to collect information on various factor stated above. The most important aspect of the study was the collect comprehensive and authentic data from the tractor owner farmer of the selected study area:

- Description of study area
- Sampling and survey methods
- Data collection
- Analysis of data.

Sampling and survey methods: Detailed information of total number of tractors in each village in a particular block has been collected from concerned Khair Block. The percentage of tractors in each village is also show in graph. This graph is represented of the each village how many tractors is which company and it's used.

Custom hiring of tractor:

Tractor were hired for Agriculture as well as non-agriculture work by need people. As the land holding size had gone down reaming of bullocks have become uneconomical people prefer to do tillage and sowing operation by tractor custom hiring. Data were collected regarding the attitude of farmers towards custom hiring and rate of custom haring. It was expressed in percentage of the total use hours and farms practicing custom hiring to total number of farmers, respectively.

Frequency of maintenance of tractor:

Numbers of repair in a particular year of age of tractor were counted with the help of farmer's memory recall. Type of repair was noted under major and minor classes. Major repair included the job like major engine overhaul, Major repair included h job like general servicing, and changing of minor parts works alike.

Soil and irrigation facility:

The soil of the entire block is generally rich inorganic matter; the soil of the study area is clay loam type. The mostly comprised of fertile land, having good irrigation facilities. Block contain canal, tube well and wells for irrigation purpose.

Cropping pattern and agriculture:

The average size of land holding is Khair Block in medium in study are mainly wheat, sorghum and millet and major cereal crops, which are widely grown, this Block also grow mustard, maize and vegetables.

Sampling and survey methods:

From study area of Khair Block selected by keeping in mind the availability of form power, irrigation level and varying cropping pattern. A multi stage sampling procedure was followed. Form clock villages were randomly selected and form each village all the farmers who owned tractor were selected. Thus 40 farmer's Khair Block and list of selected villages of Aligarh. The following points were kept in mind- for collecting the data- of the study area:

- To select the farmer who owned tractors base on sampling and collected information on tractor and there use pattern in agriculture and agricultural purpose.
- To get as far as possible authentic information about the different items included in the study.
- To make random selection so that the result should be unbiased and appropriate statistical tools can be applied for analysis.
- To determine gap is use and maintenance pattern of tractors.

Method of data collection:

Data were collected through personal interview in a specially designed schedule for this study. Farmer's form the 5 villages of selected block were contacted the authorized agencies and workshops of the tractors in study area were also contract for verification of certain data. Thus the desired information were collected in structured schedule from all 40 farmers form 5 selected villages. A part form above parameter, he schedule included personal data of farmers' availability of faring infrastructure, copping pattern and all other relevant information.

Details of schedule for data collection:

The data were collected keeping in mind the following parameters.

Personal data:

Keeping in view the influence of personal factors on use and maintenance of tractors, the data were collected on the farmers, qualification, whether folding driving license or not and role of training in proper use and operation of tractor and machinery system. Information on member of family engaged in agriculture and only side business under taken by farmers were also recorded through personal interviews.

Cropping pattern:

Information was also collected from farmers of respective study area through personal discussion on different crops grown during rainy seasons. The source of irrigation whether it is cannal, tube well are tank are a conjunction of above.

Tractor utilization:

The total use hours of tractor for particular years was

collected through a standard schedule. The extant of tractor use in different operations depended upon type of crop implement used and mind see of the Farmers.

The operation performed by tractor included the following.

- Tillage
- Seeding and planting
- Threshing
- Transportation

The use hours of tractors for a particular operation were obtained on the basis of the number of days the tractor was used in cropping season and hours required in particular operation. An average use hour of tractor Machinery system was calculated through enquires form individual farmer.

Non-agricultural used of tractor:

Non Agricultural use of tractor included the use in transportation other than agricultural material, for example transporting building material Ricks, Soil, etc. Tractor-trolley system is used for transporting.

■ RESULTS AND DISCUSSION

The main objective of study was to determine the use pattern of the tractor in Khurja block of Bulandshahr district

Ownership pattern and farmers background:

The ownership pattern of tractors and farmers background was studies under the following headings.

Tractor ownership pattern:

The information is collected by the survey of different villages of Khurja block the Table 1 shows that the percentage availability of different farm tractors.

Table 1 : Availability percentage of different tractors

Name of tractor	M&M	Massey tractor	Escort	Farm-trac	Sonalika	Eicher	N. Hollend	Other
Availability of farm tractor in %	17.27	22.72	09.09	2.27	17.27	20	1	9.92

Table 2 : Name of tractor, number of tractor and total hp in Arrana village

Name of village	Name of tractors	No. of tractor	Hp	Total Hp
Arrana	Sonalika	3	45, 45, 45	135
	New Holland	1	60,	60
	Eicher	7	30, 30, 30, 30, 30, 30, 30	210
	Massey	2	45, 45,	90
	M & M	2	40, 40,	150
		2	35, 35	
	Swaraj	1	45,	45
	ACE	1	45	45
TOTAL		19	735	735

The result obtained during the investigation have been presented and discussed under following heads :

– General information about the study area and tractor owning farmers.

– Tractor utilization pattern.

The results obtained from the above heads are:

– The major crops grown in the area were wheat, gram, barley and potato in *Rabi* season and paddy, millet, arhar and jowar in *Kharif* season.

– During the study it was found that (18.00%) farmers fell under marginal category (having area less than 1 ha) followed by small category farmers having area between 1 to 2 ha (38.00 %), (24 %) farmers under semi-medium category owning 2 to 3 ha. 16.00 per cent farmers

– Under medium category owning 3 to 4 ha and only 4.00 per cent as large farmers having area more than 4 ha.

– Out of total 50 selected farmers all had cultivators, where 48.00 farmers had wheat threshing and land levellers were possessed by 54.00 per cent farmers.

– The maximum utilization of tractor was 535.90 hours annually in the tractor population rang 8 to 12 tractor per village. Out of which 435.90 hours (81.34 %) was utilized for Agriculture operations and remaining 107.00 hours (20.99%) for non- agriculture operations.

– The average annual utilization of tractors in these regions was 510.00 hours. Out of which 403.00 hours (79.01 %) were utilization for agriculture operations and remaining 107.00 hours (20.99 %) for non-agricultural operations.

– Considering the operations, the maximum annual utilization of tractors were 156.00 hours (13.00 %) for wheat threshing and minimum was for levelling which was only 13.00 hours (2.55 %).

– The maximum utilization of tractor was hours in the *Rabi* season. Threshing of wheat was main operation during this season and it consumed 121 hours (61.73 %). The maximum utilization of tractors was 120 hours in Zaid season. Agricultural transportation was main operation and it consumed 42 hours (35.00 %). In *Kharif* season tractor utilization was maximum for the tillage and ploughing operations, it consumed 105 hours (54.12 %).

– Introducing new improved implements can enhance

annual utilization of tractors.

– Increasing the tractor annual utilization hours can reduce cost of operation.

General Information about the study area and tractor owning farmers:

The contents on the general information have been discussed under following heads.

Total population	-	30,1,559
Total Male	-	16,2,550
Total Female	-	13,909
Total area (ha)	-	34698
Total Irrigated area (ha)	-	27556

Non-irrigated area (ha):

Government area	-	01
Agriculture security unit	-	01
Government hand pump	-	30

These are following given blow:

- Arrana
- Aandla
- Milk
- Raypur
- Nagla Harmaya

Tractor ownership versus land holding:

From the data, it is shows that all categories of farmers owned tractors but it was maximum with large category farmers. The recent trend in tractor purchase in based on bank loan and below a certain land holding, no bank provides loan. As an appreciable number of tractors were new, the land ownership became one of the determinant factors of tractor ownership.

Availability percentage of different tractors in Aandla village:

This is shown in Fig. 2 that is acceptability of Massey is maximum and Escort tractors comes in second position and then uses Mahindra and Mahindra. Share of others is 15 per cent in others we have considered number of company according to suitable Land uses for forming. Onusing custom

Name of village	Name of tractors	No. of tractor	Hp	Total Hp
Aandla	Massey	6	35, 35, 35, 35, 35, 35	295
		1	45	
		1	40	
	Mahindra and Mahindra	1	45	75
		1	30	
	Escort	2	35,35	70
Total		12	440	440

hiring which required more farm power availability. Then population is uses Massey, which used for threshing, harvesting and transport also in the farm land. In Aandla village Massey tractor uses (68.09 %), Escort tractor consist (18.91 %) and Mahindra and Mahindra (12.81 %). The population of Aandla village is 742 people.

Tractors ownership versus land holding:

As an appreciable number of tractors was new, the ownership become one of the determinant factor of tractor ownership. From the data, it is shows that all categories of farmers owned tractors but it was maximum with large

category farmers (Fig. 2). The recent trend in tractor purchase in based on bank loan and below a certain land holding, no bank provides loan.

Table 4 : Name of tractor, number of tractor and total hp in milk village

Name of village	Name of tractors	No. of tractor	Hp	Total Hp
Milk	Sonalika	3	60	185
		6	35	
		1	40	
		1	50	
	Escort	3	45	180
		2	35	
		1	60	
	Massey	1	40	
		4	60	140
		2	45	
M & M	1	35		
	3	35	130	
	4	45		
Swaraj	1	50		
	1	45	105	
Ford	1	60		
	1	45	105	
Total		1	60	
		37	845	845

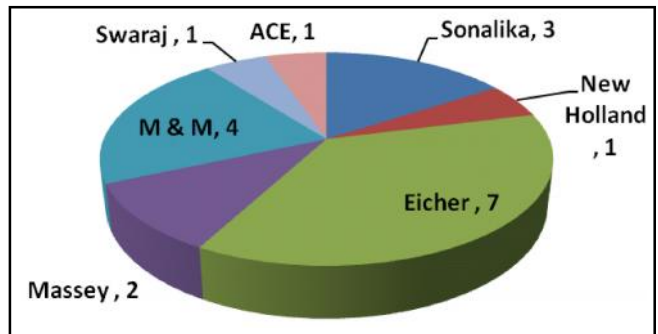


Fig. 1 : Number of tractor in Arrana village

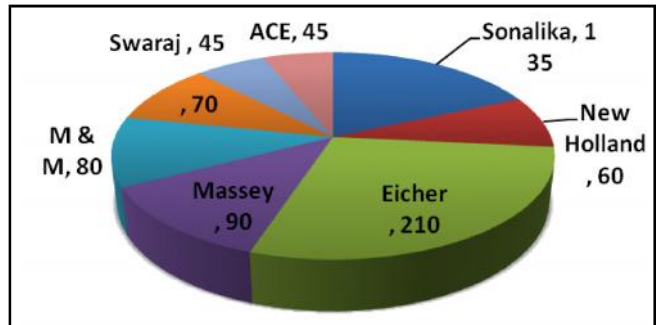


Fig. 2 : Total power of different tractor in Arrana village

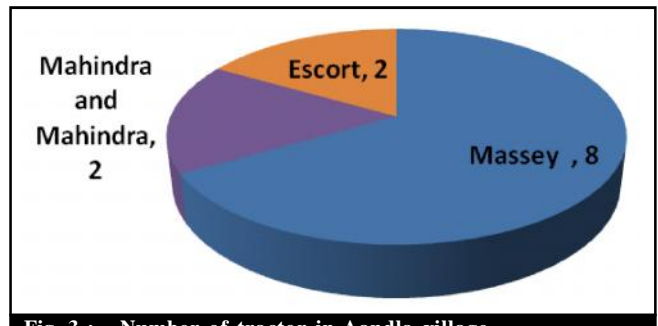


Fig. 3 : Number of tractor in Aandla village

Table 5 : Name of tractor, number of tractor and total hp in Raypur

Name of village	Name of tractors	No. of tractor	Hp	Total Hp
Raypur	Massey	1	35	215
		4	45,45,45,45	
		1	45	80
	M & M	1	35	
		1	45	80
	Sonalika	1	35	80
		1	45	
Eicher	1	30	30	
	1	50	50	
John Deere	1	50	50	
	1	50	50	
Total		11	455	455

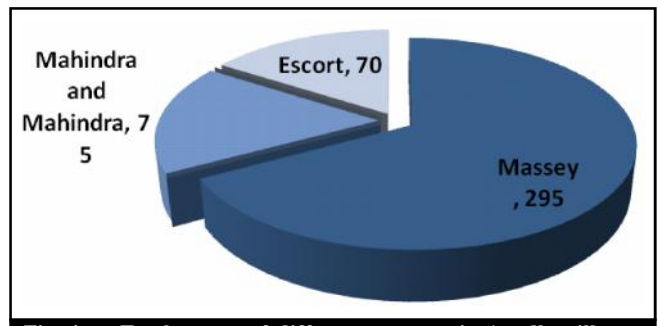


Fig. 4 : Total power of different tractors in Aandla village

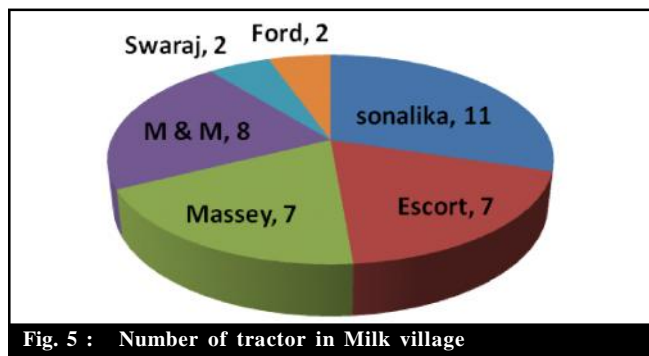


Fig. 5 : Number of tractor in Milk village

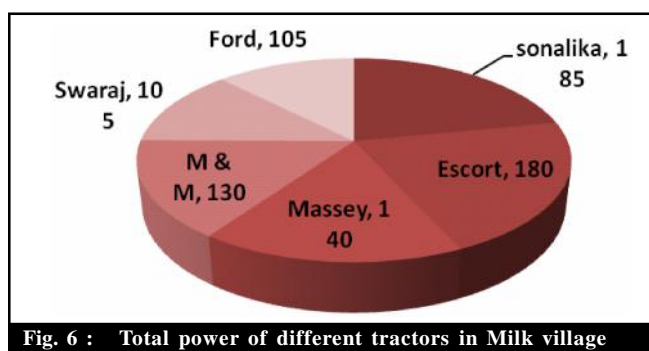


Fig. 6 : Total power of different tractors in Milk village

Availability percentage of different tractors in milk village:

In the Milk village most suitable tractor is Sonalika and Massey tractor comes in second position, Mahindra and Mahindra is on third position after that uses Eicher and Escort tractor. According to utilization of crops for various operations. In *Kharif* season maximum hours were consumed by the ploughing operation and least by the levelling operation and transport also.

Here, Sonalika uses (29.87 %), Massey tractors is (26.40

Table 6 : Name of tractor, number of tractor and total hp in milk village

Name of village	Name of tractors	No. of tractor	Hp	Total Hp
Milk	Farmtrac	1	45	165
		2	60,60	
	M & M	2	35,35	100
		1	30	
	Eicher	7	30,30,30,30,30,30,30	545
		4	60,60,60,60	
		2	35,35	
		1	25	
	Swaraj	1	35	35
	Massey	2	35,35	100
		1	30	
	Shayame	1	45	45
	Sonalika	1	30	100
		2	35,35	
	Escort	1	30	30
	ACE	1	30	65
		1	35	
Total		31	1185	1185

%), Mahindra and Mahindra tractors is (18.18 %), Eicher tractor is (12.98 %) and Escort tractor is (12.33 %).

Tractor ownership versus land holding :

The recent structural changes in economic environment, liberalization policy and the signing of general agreement on tariff and trade laid down new challenges in which, India has to compete in the international trade including agricultural trade. The basic requirement of this competition is to reduce

Table 7 : Total tractor hp, stationary engine, electric motor and total area in ha

Village name	Tractor power (hp)	Stationary engine (hp)	Electric motor (hp)	Total area of village (ha)
Arana	735	152	40	200
Aandla	440	80	70	80.5
Milk	1185	160	330	329
Raypur	455	120	40	136
Nagla Harmaya	845	80	70	135.5

Table 8 : Total Hp/ha Used in five village (Tractor, Stationary engine and Electrical motor)

Village name	Tractor power (Hp)	Stationary engine (Hp)	Electric motor (Hp)	Total area of village (ha)	Total Hp/ha
Arana	735	152	40	200	4.63
Aandla	440	80	70	80.5	7.32
Milk	1185	160	330	329	5.09
Raypur	455	120	40	136	4.52
Nagla Harmaya	845	80	70	135.5	7.34
Total	3660	592	550	881	1.45

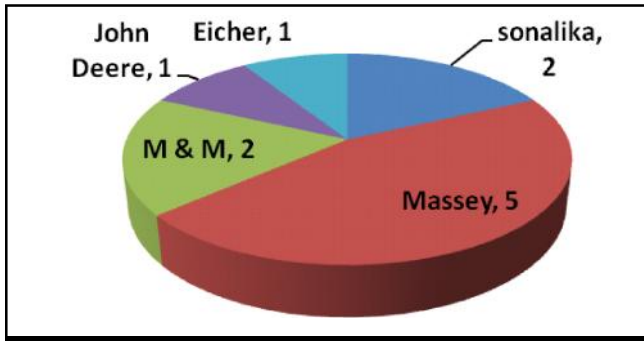


Fig. 7 : Number of tractor in Raypur

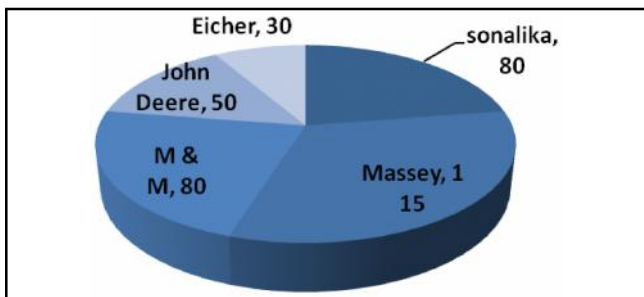


Fig. 8 : Total power of different tractors in Raypur

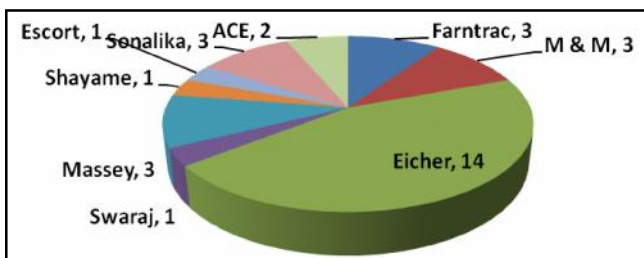


Fig. 9 : Number of tractor in Nagla Harmaya

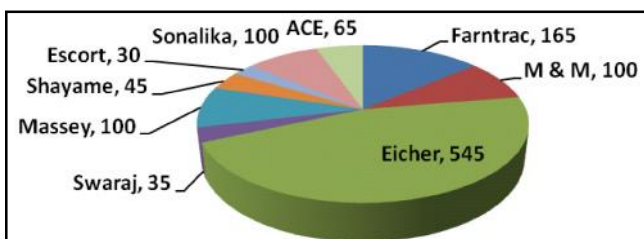


Fig. 10 : Total power of different tractors in Nagla Harmaya

the unit cost of production, and improved quality of agricultural produced so as to meet the international standard.

Availability percentage of different tractors in milk:

Agriculture operations are getting mechanization

through use of tractors for ploughing of land and for carriage of the agricultural produced after harvesting. Threshing of land Harvesters are also being taken help of for decreasing cost and time in agriculture. Enhancement of yield is ensured through proper does of fertilizer after soil testing and through help in stoppage of district sale as well as ensures higher return from agricultural produce. In this village several uses of tractors, here most popular tractor is Massey Ferguson tractor is maximum and Mahindra and Mahindra tractor comes in second position after that uses Sonalika and Eicher also. Here Massey uses (41.53 %), Mahindra and Mahindra tractor is (24.61 %), Sonalika tractor is (24.61 %) and Eicher tractor is (09.23 %).

Tractor ownership versus land holding:

The composition of Indian farms varies drastically. India has a large number of small farms with land holding of less than 2 hectares and very poor economic condition. Single farm ownership and use of tractors and machinery on these small farms is not economically viable. But through custom hiring of agricultural machinery even small farmer have been able to get the benefit of agricultural mechanization.

Availability percentage of different tractors in milk village:

Nagla Harmaya is an important village in Khair Block, which uses tractors at high scale for using land levelling, harvesting, transporting and irrigation purpose uses also. Nagla Harmaya consist 1568 population where approximate 950 people depend on agriculture work and others depend on business and job also. Nagla Harmaya have grown significantly with the increasing demand for agriculture land because there are farm power sources available at high scale. This is shown in (Fig.5) that is acceptability of Eicher tractor is maximum, farntnac tractors comes in second position and Massey is on third position after that people uses ACE, Mahindra and Mahindra, Shayame, Swaraj, Sonalika and Escort also in milk village tractor uses Eicher at (42.41 %), Farntnac tractor is (14.78 %), Massey Ferguson tractor is (09.53 %), ACE tractor is (09.23 %), Mahindra and Mahindra tractor is (07.78 %), Sonalika tractor is (07.78 %), Shayame tractor is (03.50 %), Escort tractor is (02.33 %), Swaraj tractor is (02.72 %).

Conclusion:

- The farmers owned highest percentage (22 %) Massey Tractor in the study area.
- Total cultivable command area is 881 ha.
- Total number of tractor uses 110.
- Total number of stationary Engine and Electric Motor is respectably 115 and 95.
- Total power used Hp/ha is 5.45.
- Only one power tiller is available in five villages.

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