



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.03

TPI 2019; 8(2): 161-164

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www.thepharmajournal.com

Received: 09-12-2018

Accepted: 12-01-2019

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Horticultural mechanization in Madhya Pradesh

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Abstract

As a major sector, agriculture continues to be the life line for millions of farmers in Madhya Pradesh; India. Change in the production and productivity in the field of agriculture being possible in Madhya Pradesh due to a massive diversion from the traditional agriculture to new commercial agriculture. As urbanization in the state is still very poor, nearly 90 per cent of the population lives in rural areas. The State of Madhya Pradesh is also lagging behind the national average On all socio-economic indicators like per capita income, average size of operational holding, per capita cultivated land, percentage of villages electrified, road length per thousand sq. km, per capita deposit, per capita bank credit, credit deposit ratio, male-female literacy, and life expectancy etc. Madhya Pradesh is considered to be at the middle. State of Madhya Pradesh have no rain effected area that's why farmers live at this place became poor due to crops affected by no rain. Farmers used only traditional cropping system at this place due to poor economy and abandoned by industries and govt. policies. So if farm mechanization applied at this place then the condition of the farmers will improve due to increase in the production of vegetable crops. Horticulture plays an important role in the economy of the Madhya Pradesh because of favorable climatic conditions. In this paper we are going to research on the present condition of the Madhya Pradesh in farm mechanization and also proposed a research on perspective of horticultural mechanization.

Keywords: Horticultural mechanization, vegetable crops, farm mechanization, Madhya Pradesh

Introduction

History indicates that the Technology and machinery enhanced the ability, quality, accuracy and efficiency of the human being. By using technology in any field the rate production and quality automatically increases. Development in farm mechanization is very closely related to the shortage of human labour and industrial development in India and abroad. The existing belief of surplus labour and work animals in the country is not correct. As a result of higher rates of daily wages in the nearby cities, the agricultural labour seeks employment there. There is now, in fact, a growing shortage of agriculture labour in the country side. There is a gradual movement of village population to the cities and industrial towns. Since the entire Indian agriculture cannot be mechanized very soon, the labour population displayed from agriculture due to mechanization is being absorbed in the industries producing tractors and other farm machines, and other service sectors. It is quite true that the Indian farmers have the lowest earnings per capita because of the low yield per hectare they get from their holdings. One of the few important means of increasing farm production per hectare is to mechanize it. The effective mechanization contributes to increasing production in two major ways: firstly, the timeliness of operation and secondly the good quality of work. The requirement of power for certain operations like seedbed preparation, cultivation and harvesting becomes so great that the existing human and animal power in the country appears to be inadequate Ref^[1].

The comparison of area and production of Madhya Pradesh with country is given in Table 1. It was observed from the table that the average yield of per unit area in Madhya Pradesh is quite low as compared to the other states of India and need to be enhanced through the proper and appropriate modernization of agricultural technology. Madhya Pradesh achieved 9th position in beans, 4th position in bottle gourd, 5th position in brinjal, 5th position in okra, 2^{ed} position in peas with production 100.96MT, 321.86MT, 918.78MT, 536.73MT, 1113.47MT. Whereas, Madhya Pradesh in case of tomato production it stands on 1st position with production 3102MT.

Tractor and machinery selection are important part of machinery management in any farm enterprise, as power and machinery jointly represent the largest single item of expenditure constituting about 60 per cent of the total farm investment on a farm. The size or capacity and number of equipment should match the power required by the various sequences of cropping operations that must be performed within specified time periods.

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Table 1: Comparison of position, area, production in India

States	Area	Production	Position in India
Beans			
Gujarat	69.63	719.11	1 ST
Karnataka	17.98	179.73	2 ^{ED}
Jharkhand	12.5	177.42	3 ^{ED}
Andhra Pradesh	12.95	161.9	4 TH
Uttar Pradesh	9.83	147.38	5 TH
Tamil Nadu	6.96	146.62	6 TH
West Bengal	24.6	137.76	7 TH
Bihar	17.78	110.19	8 TH
Madhya Pradesh	8.72	100.96	9 TH
Bottle Gard			
Bihar	40.7	637.92	1 ST
Uttar Pradesh	14.4	424.38	2 ^{ED}
Haryana	25.77	347.81	3 ^{ED}
Madhya Pradesh	20.35	321.86	4 TH
Brinjal			
West Bengal	162.93	3019	1 ST
Odisha	117.91	2010.9	2 ^{ED}
Gujarat	74.06	1471.16	3 ^{ED}
Bihar	58.2	1149.43	4 TH
Madhya Pradesh	50.57	918.78	5 TH
Okra			
West Bengal	77.4	913.32	1 ST
Gujarat	73.79	859.47	2 ^{ED}
Bihar	58.48	770.63	3 ^{ED}
Odisha	63.96	565.18	4 TH
Madhya Pradesh	40.12	536.73	5 TH
Peas			
Uttar Pradesh	219.93	2496.2	1 ST
Madhya Pradesh	106.51	1113.47	2 ^{ED}
Tomato			
Madhya Pradesh	100	3102	1 ST
Karnataka	63.73	2138.13	2 ^{ED}

Area in '000 Ha, Production in '000 MT

Source: Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare Government of India 2017.

The main aim of tractor and machinery selection studies is to complete the field operations during the specified time at minimum cost. Since, the capacity or size of the power-machinery system is directly proportional to their costs, the appropriate selection of these components is important for determining the profitability of the given farming system. Over sizing of the power sources and machinery helps to reduce the labour cost as well as timeliness cost. However, this benefit may be offset by higher fixed cost. Selection and use of under sized implements on the other hand, may result in higher labour and timeliness cost, thereby, ultimately reducing the net returns.

Selection of optimum size farm machinery is quite critical, not only because of the high proportion of total cost attributed to machinery but also due to the infrequency and irrevocability of such decisions. Modern farming systems require large capital investment, complex economic decisions and higher levels of technical management to minimize cost of production and maximize profit. Hence, selection of proper size farm power and equipment to permit economic production in a farm is of paramount important area. Several models have been developed to simulate field machinery selection, Selection criteria in those models are based on a combination of economic analysis and life, operational requirements timeliness of operation and machine reliability and least cost technique. Most of these models are suitable for

use of the research workers for a particular crop rotation Ref [2]. A few location specific studies have been conducted in India for the selection of power and machinery for different farm sizes. However, no information is available for selection of machinery for vegetable crops. Generally, farmers do not have sufficient time for field preparation and sowing/planting of vegetable crops. Hence, timeliness of operation is very important for vegetable crops. In this paper we are going to research on the use of the mechanization in the horticulture sector and impact of it in India and its states like Madhya Pradesh.

Materials and Methods

What is Mechanization

In G. D. Aggarwal's words, "Farm mechanization is a term used in a very broad' sense. It not only includes the use of machines, whether mobile or immobile, small or large, run by power and used for tillage operations, harvesting and thrashing but also includes power lifts for irrigation, trucks for haulage of farm produce, processing machines, dairy appliances for cream separating, butter making, oil pressing, cotton ginning, rice hulling, and even various electrical home appliances like radios, irons, washing machines, vacuum cleaners and hot plates."

Mechanization is a crucial input for agricultural crop production and one that historically has been neglected in the context of developing countries. Factors that reduce the availability of farm power compromise the ability to cultivate sufficient land and have long been recognized as a source of poverty. Increasing the power supply to agriculture means that more tasks can be completed at the right time and greater areas can be farmed to produce greater quantities of crops while conserving natural resources. Applying new technologies that are environmentally friendly enables farmers to produce crops more efficiently by using less power.

Impact of farm mechanization on the agriculture

Agricultural mechanization plays an increasingly important role in agricultural production in the Wor. It reduces drudgery, increases the safety and comfort of the working environment; it enhances productivity, cropping intensity and production. It increases income for agricultural workers and then improves social equality and overall living standards. If properly used, it also conserves and properly utilizes natural resources and reduces the cost of production. It allows for timelier farm operations, effectively deals with climate change, produces better quality agricultural commodities, etc. Resultantly gross food production increased from 50.8 M tons in 1950-51 to 199.3 M tons in 1996-97 and land productivity rose from 0.58 tons/ha/year to more than 2.14 tons/ha/year. From the different studies the following impacts of the mechanization on the agriculture given below.

1. That farm mechanization led to increase in inputs on account of higher average cropping intensity and larger area and increased productivity of farm labour.
2. That farm mechanization increased agricultural production and profitability on account of timeliness of operation, better quality of work done and more efficient utilization of inputs.
3. That farm mechanization increases on- farm human labour marginally, whereas the increase in off- farm labour such as industrial production of tractors and ancillaries was much more.

4. That farm mechanization displaced animal power to the extent of 50 to 100% but resulted in lesser time for farm work Ref [3].

Impact of farm mechanization on the farmers

The effects of the farm mechanization on the farmers are in the form of new seed, fertilizer technology, new cultural techniques of farming, modern farming implements and changes in the timing of operations. Agricultural mechanization implies the use of various power sources and improved farm tools and equipment, with a view to reduce the drudgery of the human beings and draught animals, enhance the cropping intensity, precision and timelines of efficiency of utilization of various crop inputs and reduce the losses at different stages of crop production. The end objective of farm mechanization is to enhance the overall productivity and production with the lowest cost of production.

Mechanization affects the coat structure of agricultural production by

- Saving labour (manual and bullock)
- Easing jobs
- Increasing yield
- Saving land
- Facilitating the opening up of new land.
- Conserving natural resources

Need of horticulture mechanization

The average power availability in Madhya Pradesh state is

about 0.69 kW/ha and target is to achieve 2 kW/ha by the year 2020. This is necessary to increase yield and cropping intensity also to enhance proper utilization of natural resources. The majority of the population of Madhya Pradesh lives in rural area as 72.37 percent of total population lives in the village of rural area. Total population of rural area was 52,538 thousand in which 2,71,49,388 was males and 2,54,08,016 was females as per census of 2011. It reveals that agriculture is still the backbone of state’s economy. Varied ecological condition enables cultivation of various crops in different parts of the state.

Total area under horticultural crops in Madhya Pradesh is about 203.67 lakh hectare, out of its, 246219 hectare are under vegetables cultivation. The average productivity of barbat in Madhya Pradesh is 38.83 million tone.

Ladyfinger/okra is a staple vegetable crop of Madhya Pradesh, which occupies an area of 27.11 hectare with the total production of 342.05 million tones. The average productivity of tomato in Madhya Pradesh is 2285.9 million tone with 73.7 hectare area.

In 2016-17, it was estimated that pea and brinjal have share of 69.7 hectare and 45.11 hectare area with the total production of 707.46 and 1160.5 million tone.it was observed that the bottle goured area and production was decreased from 417.16 to 235.65 million hactera. Madhya Pradesh state contributes nearly 16664.7 million tone in total production of vegetables with 9.5% share. It was observed that the production and share % of leading vegetable producing states in the Table 2.

Table 2: Production Share of Leading Vegetable Producing States 2016-17 (Provisional)

Sl. No.	States/UTs	Production (in ‘000 MT)	% Share
1	UTTAR PRADESH	26407.3	15.1
2	WEST BENGAL	25500.6	14.6
3	MADHYA PRADESH	16664.7	9.5
4	Bihar	14225	8.1
5	Gujarat	13401.4	7.7
6	Maharashtra	10360.8	5.9
7	Odisha	8760.1	5
8	Karnataka	8207.2	4.7
9	Haryana	6960	4
10	Chhatisgarh	6701	3.8
11	Others	37819.8	21.6
12	All India Total	175007.9	100

Source: Horticulture Division, D/o Agriculture & Cooperation

Proposed research

This section explains and gives the preliminary research on “Impact of farm mechanization in Madhya Pradesh. As other eastern states of India, characterized by good soil, adequate rainfall, favorable hydrological profile & water resources, and congenial temperature regime, has high agricultural production potential.

Yet, its agricultural productivity is one of the lowest in the country, resulting in high poverty, unemployment, and overall deprivation in the State. In fact, this state represents the heart of the great Indo-Gangetic Plains-one of the most fertile plains of the world. But, enigmatically, this plain continues to be “rich State inhabited by poor people”. The untapped production reservoir of the State must, therefore, be harnessed judiciously, not only to liberate the State from its socioeconomic and ecological glooms, but also to trigger the process of invigoration of the “Greatest Living Industry” of the nation. The world experience suggests that agriculture sector has been the pre-cursor of economic growth process.

The geography of this state in the country of India mainly includes its location on earth, area and area-wise divisions, rivers, weather, soil, crops, topography as well as its flora and fauna. With its geographical location at 22.42° N and 72.54° E, Madhya Pradesh is a state of central India. The state shares its borders with the other Indian states of Uttar Pradesh in the north eastern side, Rajasthan in the north western side, Gujarat in the western side, Chhattisgarh in the south eastern side and Maharashtra in the southern side Ref [4].

Agriculture is the backbone of Madhya Pradesh economy. This state, often called as the "Heart of India" stretches over an area of 3, 08, 252 sq. km. in the central part of the country. It accounts for 9.38 % of the land area of the nation. The State has the natural endowment of fertile soil, good rainfall, plenty of water resources, and agro-climatic conditions suitable for growing three crops a year and almost all types of vegetables. According to 2011 Census the population of the state is 7.27 crores and the total population growth in this decade was 20.35% while in previous decade it was 24.34 % is therefore

important to sustain self-sufficiency in food grain and vegetable production with rate of growth of food grain and vegetable production greater than population growth rate. In Madhya Pradesh, agricultural sector is faced with mainly four key challenges:

1. Nano size of land holdings,
2. Low yields and high risks,
3. Biotic and abiotic constraints in raising crop yields, and;
4. Weak institutions accompanied by poor infrastructure.

A strong argument depicting comparative backwardness of the state in regard to Agricultural Mechanization can be its low KW/hectare use of machinery. The same for Madhya Pradesh was 0.69 Kilo Watt/hectare and target is to achieve 2 Kilo Watt/hectare. It was much lower than Punjab (3.75 KW/ha i.e., the highest in India and even lower than the national average (1.5 KW/ha). The programme of Farm Mechanization included:

1. MMA,
2. ISOPOM,
3. Jute Technology Mini Mission – II,
4. NFSM,
5. RKVY, and;
6. State Plan for Promotion of Power Tiller (SPPPT).

Under these six schemes, farmers are provided with the implements, machines and/tools like the following:

(i) Tractor, (ii) Power Tiller, (iii) Zero till Seed-Cum-Fertilizer-Drill, (iv) Raised-bed Planter, (v) Sugarcane-Cutter Planter, (vi) Potato planter, (vii) Potato digger, (viii) Tractor driven reaper, (ix) Seed cleaner-cum-grader, (x) Mobile foot harvester, (xi) Power weeder, (xii) Power thresher, (xiii) Winnowing, (xiv) Conoweeder (xv) Irrigation pipe, (xvi) Sprinkler, (xvii) Pump set (diesel/electric driven), (xviii) Rotavator, (xix) Combine harvester, (xx) wheel-ho, (xxi) Multi row seed drill, (xxii) Sprayer duster, and; (xxiii) Other power driven/human driven agricultural implements, machines, etc.

Conclusions

Madhya Pradesh agriculture has the potential to grow rapidly so as to meet the existing shortages and assume primacy in the national agricultural economy. The State has immense agricultural resources, to facilitate a Second Green Revolution in the Country. The economy of Madhya Pradesh grew at 19.7% GDP for annual year 2017–18. However, despite the strength of the agriculture sector, it is a paradox that this sector is growing at a snail's pace. The rate of growth has been below its potential. There has been a conspicuous failure to exploit those resources to the desired level. This study has endeavored to identify the factors behind the dismal performance of the sector. Agriculture is the single largest private sector occupation in the State and can be considered the riskiest business. Increasing income of the land owning and landless rural population through increased production by enhancing productivity¹⁴ and intensity of farming, and by generating more employment in agriculture and other rural based production activities alone is not the solution and there is a need to integrate these endeavors with effective risk management strategies to cover potential losses in yield and hence incomes.

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