

Animal Drawn OUAT IRON PLOUGH

SUCCESS STORY



**ALL INDIA COORDINATED RESEARCH PROJECT ON
INCREASED UTILIZATION OF ANIMAL ENERGY
WITH ENHANCED SYSTEM EFFICIENCY**

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OUAT Iron Plough: A Success Story

INTRODUCTION

Orissa is situated in the east coast of India extending over a geographical area of 15.17 mha with 6.55 mha under cultivation. In Orissa around 77 % of the farmers are under small and marginal categories and they possess about 43 % of the total cultivable land. The numbers of operational holdings are 333.30 lakhs with a cropping intensity of 145 %. The average size of holding is 1.5 ha. Due to small and scattered holding and low input capacity, the farmers mainly depend on bullock power for different agricultural operations. About 82 % of the total cultivable land is under the command of the draught animal power and the rest is under tractors and power tillers. In Orissa both primary tillage is mostly carried out by bullock drawn wooden plough or MB plough and secondary tillage is carried out by wooden plough. The main reason for the use of this plough is the low cost and easy availability from local black smiths and carpenters.

The life of wooden plough is less due to quick wearing out of soil engaging parts. Therefore frequent replacement of the plough is necessary. This delays the tillage work often causing delay in sowing operations. Some farmers use bullock drawn disc harrow but due to higher cost, it has not become popular.

Considering the poor economic condition of the small and marginal farmers, work was taken up by OUAT, Bhubaneswar Centre to develop an iron plough in which the soil engaging portion was made of mild steel. The handle and the beam of plough was made of wood. The plough was demonstrated to farmers and a good response was obtained from them. Consequently training was given to village artisans on fabrication of unit. The iron plough has now become popular in Orissa and is being manufactured at village level by village artisans.

EVOLUTION OF THE TECHNOLOGY

The bullock drawn wooden plough is the traditional implement used by small and marginal farmers of Orissa. The plough uses wooden body and wooden soil engaging parts. Width of plough is less (40-50 mm width). The life of plough is also less. While conducting a survey regarding the status of bullock drawn implements in Cuttack district, it was observed that most of the farmers were using same wooden plough for primary and secondary operations. Some farmers use bullock drawn MB plough for primary and secondary tillage. However use of MB plough for secondary tillage results in alternate ridges and furrow which causes undulation of field.

With a view to increase life of wooden plough, the wooden soil engaging portion was replaced with steel plate. The width of the plate was designed so that it matches the sustained draught capacity of the bullocks. The width of the plough was kept as 300 m. The iron plough was evaluated in Institute farm and subsequently in farmers fields. Due to encouraging response of farmers, efforts were made to popularize it. The iron plough has now been commercialized and is being manufacture by village artisans of Cuttak and Bhubaneswar districts of Orissa.

SALIENT FEATURES OF IRON PLOUGH

The iron plough consists of a wooden body, iron share and a bracket fitted to the wooden body. A square pipe of 50 mm x 50 mm size is welded to the share and the wooden body is fitted in it. A bracket is attached to the wooden body of the plough for attaching the beam. The iron share is rectangular in shape but gradually tapering at the front portion. In order to facilitate penetration into the soil, a bar point is welded to the front portion of the share.

The width of the plough was selected based on the

sustained draught capacity of the bullocks. In Orissa, bullocks usually weigh 400-500 kg and the sustained draught capacity varies from 40-60 kg. Initially the different sizes of share of the iron plough were fabricated and initial trials were carried out Institute farm. The different sizes of the share varied from 150-350 mm. Based on draughtability, share size was selected as 300 m. The specifications of the iron plough are presented in Table 1. The iron plough weights 9.8 kg and can be easily carried by the farmer.

Table 1: Specifications of OUAT iron plough.

S. No.	Varibales	Values
1.	Cutting width, mm	300
2.	Overall dimensions, mm	
	Length	2200
	Breadth	300
	Height	1200
3.	Weight without beam, kg	9.8
4.	Cost (Rs.)	1000.00



Fig 1: Intermediate development over desi plough-Wooden body fixed with iron share and gunnel



Fig 2: Set of OUAT iron plough

PERFORMANCE EVALUATION OF OUAT IRON PLOUGH

The plough was evaluated in Central Farm, OUAT, Bhubaneswar. Along with the iron plough, the performance of 150 mm MB plough and 4 disc harrow was also evaluated. The results of the performance evaluation is presented in Table 2. The operation of iron plough is shown in Fig 3.

Fig 3: OUAT iron plough in operation



Table 2: Comparative performance of OUAT iron plough, MB plough and 4 disc harrow.

Particulars	Iron plough	MB plough	Four disc harrow
Weight, kg	9.8	8.5	65
Working width, mm	300	150	550
Depth of operation, mm	80-100	100-120	70-80
Speed, km/h	2.4	2.2	1.3
Draft, kg	45-50	55-60	65-70
Cost, Rs	1000	750	5000
Field capacity, ha/h	0.057	0.026	0.05
h/ha	17.54	38.46	20.00
Cost of operation, Rs./ha	270.72	585.05	359.02

The width of operation was highest for four disc harrow and lowest in case of MB plough. Due to this reason, the draught requirement for disc harrow (65-70 kg) was highest. In the case of MB plough, even though the cutting width was 150 mm, the draught requirement was 55-60 kg which was higher than draught requirement of iron plough (45-50 kg). The reason was that in case of MB plough the soil is inverted which needs higher draught. The draught requirement of 300 m iron plough matched the sustained draught capacity of the bullocks. The speed of operation of four disc harrow was significantly lower due to increased draught. Due to this reason, although the harrow had higher width, field capacity was more or less equal to iron plough. Field capacity of MB plough was 0.026 ha/h which was lesser than iron plough (0.057 ha/h). The cost of operation of iron plough was Rs 270.72/ha which was significantly less than MB plough (Rs 585.05 /ha) and four disc harrow (Rs 359.02/ ha) respectively.

POPULARIZATION OF IRON PLOUGH

The success of any implement depends on its adaptability by the users who try it in their field. Front Line Demonstration of OUAT iron plough was carried out for secondary tillage operations in the farmers' field during Kharif season of 2005 and 2006. Eighteen numbers of FLDs were conducted in 10 villages in the districts Khurda and Cuttack districts of Orissa. 278 number of farmers were made aware of the implement, its utility and suitability. 104 farmers used it covering an area of about 140 ha. The following were the feedbacks of the farmers:

1. The farmers were of opinion that the iron plough was easy to operate and durable than their existing wooden plough.
2. The performance of the plough was appreciated by the farmers particularly for good pulverization of soil compared to wooden plough.
3. Farmers reported that the iron plough was easy to repair by the village level artisans.
4. The time required for secondary tillage operation per unit area by this implement was almost half of MB plough and slightly less than 4 disc harrow.



Fig .4 Farmer with developed Iron Plough

COMMERCIALIZATION AND ADOPTION OF TECHNOLOGY

The local blacksmith/carpenters of all the coastal districts like Balasore, Bhadrak, Jajpur, Jagatsinghpur, Kendrapara, Cuttack, Puri, Khurda and Ganjam are fabricating the iron plough. The local artisans of some of the inland districts like Mayurbhanj, Keonjhar, Dhenkanal and Nayagarh are fabricating this plough in a large scale. The names of the some of the artisans of Cuttack and Jajpur districts are listed below.

This plough has not been included in the subsidy scheme of the Department of Agriculture and Cooperation, Govt. of Orissa. The farmers of the coastal districts and some of the inland districts are using this plough for the secondary tillage operation. These ploughs are now fabricated and sold in thousands in the above districts.

Names of the artisans fabricating the implement

S.No.	Name of the artisans	Address
1.	Rabindra Narayan Ojha	At/Po-Mahidharapada, Dist-Cuttack
2.	Kedar Nath Ojha	At/Po-Mahidharapada, Dist-Cuttack
3.	Biswanath Moharana	At- Aradihapada Po- Mahidharapada, Dist-Cuttack
4.	Jaya Moharana	At-Chheda Po-Kaitha, Dist-Cuttack
5.	Sukuti Moharana	At-Chheda Po-Kaitha, Dist-Cuttack
6.	Banka Moharana	At-Chheda Po-Kaitha, Dist-Cuttack
7.	Prafulli Moharana	At-Chheda Po-Kaitha, Dist-Cuttack
8.	Sadhu Charan Behera	At/Po-Jaraka , Dist-Jajpur
9.	Akshya Kumar Moharana	At/Po-Chandikhol , Dist-Jajpur
10.	Kasinath Behera	At/Po-Chandikhol , Dist-Jajpur

