

Released Technologies of Agricultural Implements

Developed by Department of Agricultural Engineering

1. Birsa Ridger

Developers / Scientist (s) Associated :Dr. A.K. Sinha, Dr. S. Quraishi, Dr. Uttam Kumar and Er. D.K. Rusia

Birsa Ridger is suitable for tillage operation. The draft requirement of the Animal drawn Birsa Ridger was within the pulling capacity of one pair of bullocks available in the state. The average field efficiency for Birsa ridger was 60 % where as the soil manipulation and inversion were 48.63 % and 77%, respectively. Field capacity of the ridger was 0.167 ha/day. It performs all functions of country plough with added efficiency and advantages. Birsa ridger saves about 9 % labour and operation time and 5 % cost of operation compared to the conventional method of using country plough.



2. Birsa Seed drill

Developers / Scientist (s) Associated : Dr. A.K. Sinha, Dr. S. Quraishi, Dr. Uttam Kumar and Er. D.K. Rusia

Birsa Seed drill is suitable for sowing paddy, ragi, wheat, linseed, gram, safflower and other small sized seeds. Seeds are dropped by a rubber agitator and slit hole while the fertilizer is dropped manually using the funnel provided for that purpose. Only the ground wheel drives the agitator for the seeds and a small ridger type furrow opener is used to reduce the draft on the animal. Birsa seed drill saves 56% labour and operating time & 25 % on cost of operation

compared to conventional method of sowing behind country plough. It also results in 14 to 27% increase in yield compared to sowing by conventional method.



3. Birsa Potato digger

Developers / Scientist (s) Associated: Dr. A.K. Sinha, Dr. S. Quraishi, Dr. Uttam Kumar and Er. D.K. Rusia

Animal drawn Birsa Potato digger is useful for digging and exposing potato tubers. It consists of a ridger shaped bottom with welded extension rods on its wings. These rods help in separation of soil and dirt from the potato tubers. A handle is provided at the rear for guiding the implement while in operation. It is suitable for digging potato tubers after removal of vines from the field. It is suitable for digging potato tubers after removal of vines from the field. It saves 40 per cent labour and operating time & 18 % on cost of operation compared to conventional method of digging with spade. It also results in reduction of 11.3% losses compared to conventional method of digging with spade.



4. Birsa Lac Sheller

Scientist(s) Associated : Dr. A.K. Sinha, Dr. S. Quraishi and Dr. Uttam Kumar

BAU lac shellers (cylinder type, blade type and peg type lac shellers) were evaluated using kusum, palas and ber sticks on which resin were accumulated. The output capacity of the cylinder type, blade type, peg type, and dabiawere 2.75 kg/h, 4.41 kg/h, 4.73 kg/h and 1.91 kg/h, respectively. The shelling output was nearly 2.5 times more in in case of peg type while nearly 2 times more in case of blade type lac sheller as compared to dabia. On examination of the data of the quality of different sized resin obtained from lac shellers were more or less comparable to the quantity obtained by shelling with dabia rather they produced more bigger size resin (73 mm). Lac shellers saves 29 per cent labour and 37 per cent on cost of operation and is 2.5 times faster, compared to conventional method of manual scrapping with the help of special knife (dabia). The quality of lac is not affected by the use of lac shellers.



(i) Cylinder type



(ii) Blade type



(iii) Peg type



(iii) Peg type with seating arrangement

5. Birsa Dryland Weeder

Developers /Scientist(s) Associated: Dr. A.K. Sinha, Dr. S. Quraishi, Dr. Uttam Kumar and Er. D.K. Rusia

Birsa Dryland Weeder is suited for weeding of crops sown in rows and can easily be operated by men as well as women due to its lesser draft requirement. The weeder is used for removing weeds in vegetable gardens, basins of orchard trees and vineyard plantations particularly in dryland area. It is also used for breaking the soil crust and creation of soil mulch. Dryland Weeder is suited for weeding of crops sown in rows and can easily be operated by men as well as women due to its lesser draft requirement. Its weeding efficiency is 79.05 %. The man-hr requirement per ha for 2 laborers (weeding by dryland weeder) is 110.6 hrs. The average cost of weeding per ha comes out to be about Rs. 16500. Field capacity of this machine is 0.072 to 0.08 ha per day.



6. Birsa Dutch Hoe

Developers / Scientist(s) Associated :Dr. A.K. Sinha, Dr. S. Quraishi, Dr. Uttam Kumar and Er. D.K. Rusia

Birsa Dutch Hoe is suited for interculture / weeding of crops sown in rows and can easily be operated by men as well as women due to its lesser draft requirement. Dutch hoe consists of a working blade having two ends. One end is usually flat and the other has a triangular shape phorhas prongs for raking or collection of weeds. The blade is fabricated from medium carbon steel and hardened to 40-45 HRC. The working blade has an eye to which a wooden

handle is attached. The function of the rake is to break the soil crust for aeration. The tool can be operated in the crop rows for weeding, interculture and earthing in the vegetable gardens, flower crops, nurseries, orchards etc. Average field capacity of the machine is 0.036 ha per day with weeding efficiency 75.62 %. The man-hr requirement per ha for 2 labourers (interculture by dutch hoe) is 444 hrs.



7. Birsa SRI Marker

Developers / Scientist(s) Associated : Dr. Uttam Kumar, Prof. Anil Kumar and Er. Birendra Oraon

A simple and low cost device to marking at desired spacing i.e. 25 cm × 25 cm for transplanting of rice seedlings under SRI cultivation has been developed. The marker consists of axle shaft, 4-ground wheels, marker flat, line marker, pointer and a handle. Four ground wheels separated at a spacing of 250 mm were mounted longitudinally on a single shaft. Six rods are provided at a spacing of 250 mm along the circumference at each wheel so as to maintain a plant to plant spacing of 250 mm in the field. Six pointers were provided at each cross point of rod on each ground wheel to mark the point for transplanting. Two line markers are placed in both the ends to guide the marker to operate in the same line in return. The weight of the total assembly is about 11 kg. Field capacity of the marker was found to be 0.03 ha/h with field efficiency 73.17 % at an operating speed of 0.41 km/h.



8. Birsa Seed-cum-Fertilizer Drill

Developers / Scientist(s) Associated : Dr. Uttam Kumar, Er. Roshan Hapadgara and Er. Birendra Oraon

Birsa Seed-cum-Fertilizer Drill consists of frame, seed and fertilizer hopper, seed and fertilizer metering mechanism, shovel type of furrow openers, power transmission system, metering mechanism for seed as well as fertilizer, delivery tubes, adjusting lever, hitch etc. The developed seed drill have overall dimension of 600 mm × 420 mm × 900 mm, height of hopper from ground level was 900 mm and total weight of the machine was 45 kg. The developed Birsa Seed-cum-Fertilizer Drill worked satisfactory in actual field condition for sowing of different crop seeds. The draft requirement of developed machine was within the pulling capacity of local small/medium bullocks. The machine can be easily transported from one field to another. The average draft and power requirement of the developed seed-cum-fertilizer drill were 416.74 N and 0.372 kW, respectively. The average effective field capacity and field efficiency of the developed seed-cum-fertilizer drill were 0.069 ha/h and 65.9%, respectively at an average speed of 2.37 km/h.



9. Birsa Zero till Seed drill

Developers / Scientist(s) Associated :Dr. Uttam Kumar, Er. Birendra Oraon and Er. D.K. Rusia

During peak period of sowing and scarcity of labour Birsa zero till seed drill is suitable for sowing of wheat and gram crops. The seed metering mechanism receives drive motion from the ground wheel through chain and sprockets. Seed metering unit consists of a box with slit hole and rubber agitator which is worked with the help of a lugged ground wheel. Birsa zero till seed drill saves about 30% labour and operating time and 50% on cost of operation compared to conventional method of sowing.



10. Birsa Bullock Cart

Developers / Scientist(s) Associated :Dr. Uttam Kumar and Er. D.K. Rusia

A bullock cart with brake system has been designed and developed suitable for the draft capacity of the state. The bullock cart consists of main frame, wheel, dala (upper part) and a brake system. All parts of the cart are attached with each other by nut- bolts. As per our requirement we can attached or remove the parts of bullock cart. Brakes on both wheels have been provided individually so that overturning and returning back of the cart can be minimized. Two individual springs with spring constant 20 KN/m (approx.) were attached in the each brake. These individual brakes can be operated individually by the operator's leg as well as by hand as per requirement. With the brake system, drudgery on the animals as well operator could be minimized.

The draft observed for tar road and kachha road in plain surface were 350 N and 400 N, respectively. It was found that in sloppy land i.e. upward direction draft increased whereas in downward direction draft decreased. Power requirement for tar road and kachha road in plain

surface were 0.28 kW and 0.29 kW, respectively. It was found that in sloppy land i.e. upward direction as well as in downward direction power requirement decreased. The increased respiration rate and pulse rate observed after two hours of continuous work on tar and kachha road is within the safe limit of fatigue score. Bullock cart-man likes the bullock cart specially the brake system.



11. Birsa Yoke

Developers / Scientist(s) Associated :Dr. Uttam Kumar and Er. D.K. Rusia

Considering the need of operation wise, two designs of yokes have been fabricated and found suitable for animals of Jharkhand state. Birsa yokes can be used for tillage, intercultural as well as cart purpose. Weight of both the yokes were about 7 kg. Load is evenly distributed about the individual working bullock on the Birsa yoke which leads to stability and reduction in loss of energy. There is an increase in the working convenience, overall performance, efficiency and out-put of the bullocks, as observed by the local farmers during test operations.

The bullocks of this state can pull the load upto 12 % of their body weight for continuous four hours, with Birsa yoke in rainy and summer seasons. Whereas with the local yoke, the bullocks can pull only 10 % load of their body weight. At 12 % load, the bullocks experienced fatigue after 2.5 hours of continuous operation with local yoke.

