

Performance evaluation of animal drawn multipurpose tool carrier for tillage and Biasi operations

VINAY KUMAR NAYAK AND AJAY VERMA

Received : 23.07.2012; Revised : 29.08.2012; Accepted : 30.09.2012

See end of the Paper for authors' affiliations

Correspondence to:

VINAY KUMAR NAYAK
Department of Farm Machinery and Power,
Faculty of Agricultural Engineering, Indira Gandhi Krishi Vishwavidyalaya, RAIPUR (C.G.) INDIA

■ **ABSTRACT** : A prototype implement named multipurpose tool carrier (MPT) was developed and tested with ploughing (primary tillage) and Biasi attachments, at the Faculty of Agricultural Engineering, IGKV, Raipur (C.G.). It was developed with design consideration for easy control of animal, sharp turning, adjustment, and comfort to animal and operator. This MPT was developed to prepare seed bed in dry and wet soil condition and to perform various other agricultural operations. The ploughing (primary tillage) and Biasi attachments were tested in sandy loam soil fields. During the field testing the functional performance of universal frame and lifting mechanism and tool attachments was evaluated. The MPT performed well and strength of its components were found good as no break down was observed except loosening of nut-bolts at initial stage. The utilization of power during the operation of ploughing (primary tillage) and Biasi operation was 0.47 and 0.45 kW with 2.13 and 2.33 km/h speed, respectively in the field. The average field capacity of above attachments *i.e.* ploughing (primary tillage) and Biasi attachments in field was found to be 0.0958 and 0.112 ha/h.

■ **KEY WORDS** : Biasi, Economical evaluation, Field efficiency, MPT, Tillage

■ **HOW TO CITE THIS PAPER** : Nayak, Vinay Kumar and Verma, Ajay (2012). Performance evaluation of animal drawn multipurpose tool carrier for tillage and Biasi operations. *Internat. J. Agric. Engg.*, 5(2) : 254-259.

Bullock is one of the cheapest and oldest sources of draught power for all types of agricultural operation. Bullocks are mainly used for tillage and sowing operations. Though the population of draught animal is declining but still more than 50 per cent net sown area is cultivated by animal power source. In Chhattisgarh majority of the animals used in agricultural work belong to non descript breed. These animals are small to medium size (250 to 450 kg) with a draughtability of 10 to 12 per cent of their body weight (AICRP on UAE Report 2005). Biasi is a local term used for wet ploughing or intercultural operation, carried out in the standing rice crop (Shrivastava *et al.*, 1987 and Anonymous, 1996).

The Biasi system of rice cultivation is an accepted practice of farmers in the eastern region of the country. Mishra *et al.* (1993) observed that improved Biasi practice in paddy field reduce the plant mortality by 16-30 per cent with increased crop yield of 33-38 per cent over the traditional biasi cultivation. Jogdand and Chauhan (2001) also supported the mechanized intercultural operation in paddy to reduce drudgery on operator and for uprooting weeds in line sown paddy crop. Tillage is the basic operation in farming. It is

done to create favourable conditions for seed placement and plant growth. This is done mainly with a plough. Primary tillage is more aggressive, deeper, and leaves a rougher soil surface relative to secondary tillage. Naderloo *et al.* (2009) reported that effects of tillage depth and forward speed on draught of three primary tillage implements were studied by using a tension load cell in clay loam soil. Implements included a moldboard plough, a disk plough and a chisel plough. A photoelectric speed sensor was used for measuring forward speed. A significant increase in draught was observed for all the implements with increase in tillage depth and forward speed.

The present study attempts to give an overview of previous works toward development of animal drawn tillage tools and to identify the areas having most potential for future improvement. New methodologies in research are available to improve minimum draught requirement and best soil manipulation performance. Changing implement for every specific operation causes inconvenience and investment of extra money. The animal -drawn wheeled tool carrier is a multipurpose machine designed to perform agricultural operations and to provide transportation where animals are