SELF PROPELLED LIGHT WEIGHT BOOM SPRAYER

A SUCCESS STORY

All India Coordinated Research Project on
FARM IMPLEMENTS AND MACHINERY
Central Institute of Agricultural Engineering
Nabi Bagh, Berasia Road, Bhopal - 462 038 (M.P.) India

Extension Bulletin No.CIAE/FIM/2004/43

SELF PROPELLED LIGHT WEIGHT BOOM SPRAYER

Year : **2004**

Published by : **Coordinating Cell**
AICRP ON FARM IMPLEMENTS AND MACHINERY
CENTRAL INSTITUTE OF AGRICULTURAL ENGINEERING
Nabi Bagh, Berasia Road,
Bhopal-462 038, India

Implement designed & developed by : **IK Garg**
PAU, Ludhiana

Compilation & Editing : **IK Garg,** *PAU, Ludhiana*
MM Pandey, S Ganesan and Ramakant Tiwari
CIAE, Bhopal

Art, Cartography & Proof Reading : **Yashwant Bhokardankar**
Ramakant Tiwari
CIAE, Bhopal

Word Processing : **Zackaria V John**
NG Bhandarkar
CIAE, Bhopal

Reprography : **Radheyshyam Kushwaha**
CIAE, Bhopal

SELF PROPELLED LIGHT WEIGHT BOOM SPRAYER

Introduction

Knapsack sprayers, mostly used for spraying on wheat, vegetable and other crops, are inefficient and have low capacity. Tractor operated sprayers of high capacity have not been accepted by farmers in wheat and vegetable crops due crop damage by tractor tyres. PAU, Ludhiana centre of the project, designed and developed a light weight boom sprayer fitted on self propelled power unit. The sprayer has a capacity of 6 ha/day requiring 250-600 l/ha at different pressures. It also reduces labour requirement by 80% in comparison to knapsack sprayer. The sprayer of 100 l tank capacity covers 7 m width in a single pass. The developed sprayer provides uniform spray and cost economics is also favourable compared to knapsack sprayers.

Traditional practices

At present most of the area under wheat crop is sprayed by knapsack sprayers to control weeds. The output of these sprayers is low and also the spray pattern is not uniform. PAU, Ludhiana centre has developed a light weight power sprayer with narrow wheels. The spray boom has been mounted on the power unit through a canopy frame. It eliminates human drudgery in spraying operation, ensuring judicious use of chemicals.

Salient features of the machine

The sprayer consists of a light weight power unit and a spraying unit. The power unit has 3.75 kW diesel engine. It has two narrow rubber wheels which are powered from the engine through gears and chains. The ground clearance of the machine is 500 mm. A third wheel is also provided at the rear which acts as a support. The spray unit consists of a tank of 100 l capacity, roller type spray pump and a boom with 12 nozzles. The spraying boom has been mounted on the power unit through a canopy frame in such a way that spraying is done at the rear of the operator so that spray solution does not come on the operator. Provision has also been made in the mounting frame to adjust boom height from 600 mm to 1300 mm to suit different crops. The nozzle spacing is kept at 500 mm which can be adjusted to suit different types of nozzles and applications. A provision has also been made to adjust the track width from 900 mm to 1050 mm.

Evolution of the machine

The light weight boom sprayer on self propelled power unit was a felt need of wheat and vegetable growing farmers to complete the operation timely. The initial trials of sprayer upto 20 kg/cm^2 pressure was carried out at Research farm which gave uniform and effective spraying. The sprayer covered a width of 7 m in a single pass. The fuel consumption varied from 0.5 - 0.6 l/h. For spraying in wheat crop at farmer's fields, boom was adjusted at a height of about 600 mm from the ground. In order to make use of the same power source for spraying on paddy, a spray boom attachment was developed. The spray boom is attached to the sprayer through a long flexible pipe. The boom has 14 nozzles at a spacing of 500 mm. The boom was carried on the shoulders by two operators. The field capacity varied from 0.6 - 0.8 ha/h for spraying in paddy crop.

Performance of the Machine

The developed sprayer was evaluated at Departmental research farm for spraying weedicide. After initial trials, the machine was tested at 13 farmer's fields for wheat crop 10-15 days after first irrigation. The tank was filled with water and weedicide (topic) was added as per recommendation before the operation. The field performance data are given in table 1.

Table-1 Field performance results of sprayer

Parameters	Observations
Crop row spacing, mm	200
Height of crop, mm	250-350
Application rate, l/ha	100-120
Speed of operation, km/h	2.5-3.0
Swath, mm	630-700
Field capacity, ha/h	0.7-0.8
Fuel consumption, l/h	0.5-0.6
Plant damage	Negligible
Pump pressure, kg/cm^2	20-25
Field efficiency, %	55-60
Labour requirement, man-h/ha	1.25
Area covered, ha	50

Feedback of the farmers reported some slippage problem when operated in wet conditions which was rectified by modifying the wheels. For using the same power unit for spraying in paddy, 14 nozzles boom spaced at 500 mm was employed. The performance results of machine in paddy are given in table-2.

Table-2 Performance of the self propelled sprayer for paddy

Machine parameters	Observations
Boom height, mm	160-172
Forward speed, km/h	1.2-1.6
Swath, mm	730
Tank discharge time (min) for 100 l tank capacity	8-10
Field capacity, ha/h	0.6 - 0.8

Status of the technology

The developed unit has been evaluated at research farm for wheat crop spraying. Thirteen field trials in a total of 50 ha were conducted at 13 locations. Spraying on paddy crop was performed using boom of 14 nozzles spaced at 500 mm and frames at two ends with sponge belts for mounting. The trials at farmers fields for wheat and paddy were appreciated very much due to 80% saving in labour. Two manufacturers have started its production and five units have been marketed.

Appendix-I

Specifications of machine

Overall dimensions (lxh), mm	2870 x 1920
Power source	3.75 kW diesel engine
Type of pump	Rotor type
Pump speed, rpm	1000
Number of nozzles	12
Type of nozzle	Flat fan
Nozzle spacing, mm	500
Tank capacity, l	100
Wheel diameter, mm	440
Track width, mm	900-1050
Tyre width, mm	100
Swath, mm	700
Pump pressure, kg/cm^2	20
Machine cost, Rs	45000

Appendix-II

List of Manufacturers

1. M/s Pyara Singh and Sons
   Khanna Road, Samrala
   District : Ludhiana

2. M/s Standard Agril. Works
   Bhatina Road, Handiaya,
   Barnala, Punjab.