

# Performance of Seed Drill Machine For Bengal Gram

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**Abstract - Bengal gram or chick pea (*Cicerarietinum*) is an important food crop of India and largest producer accounting 70 per cent of total production of the world. In central Vidarbha Bengal gram is the major Rabbi crop grown, but for that not specially seed drill are available in market. Hence regarding this, a seed drill machine innovation by a farmer in the Jalgaon (Jamod) is tested and experiment was conducted at CAE&T Jalgaon (Ja) Buldhana. During the lab test of seed drill, the rate of seed drop was observed from different hoppers with respective to exposure length of fluted roller was found 25 to 100 kg/ha for 10 to 40 cm fluted roller exposure length. In field evaluation observed the field capacity, field efficiency, theoretical field capacity and fuel consumption are found 0.60 ha/h, 72 per cent, 0.82 ha/h and 3.53 l/h, respectively.**

**Keywords- Bengal Gram, Field Capacity, Seed Calibration.**

## I. INTRODUCTION

India is the largest producer of Bengal gram accounting 70 percent of total production of the world. The productivity in India is (8721 kg/ha). (FAO,2012). In India the traditional method of seeding (by hand) is almost used for sowing. So the efficiency of sowing is low. The most critical problem of this method is the not distribution of seed through the field and they consume more time and cost. Due to this seed germination is mostly affected and most of seed is loss due to region of bird and germination.

The modern development in agriculture engineering became "VARDAN" for the farmers. The agronomists had studied the key things in forming deeply and they had developed modern farm machinery, hybrid seeds modern techniques of farming etc. Thus ultimately the productivity has increased. Most of the farmers are now adopting modern farming through scientific techniques.

Now search of machine which is suitable for Bengal gram seed sowing machine. This need of farmers motivates us for making Bengal gram single seed sowing equipment. Bengal gram Seed drill is a sowing mechanism that precisely positions seed at a controlled depth and in specified amounts

and covers them. Seed drill of different types and capacities are now being extensively used in the country for sowing of different kinds of seeds and, it can also reduce sowing time thus overcomes the shortages of labour. In Jalgaon Jamod region most of Bengal gram grown but the especially seed drill for Bengal gram is not available in market. Hence regarding this, a seed drill machine developed by an innovative farmer of Jalgaon (Jamod), Dist. Buldana. In which there is a special plate type box arrangement and exposure length of plate. Keeping this view to study the lab test and field evaluation of seed cum fertilizer drill.

## II. METHODOLOGY

In present study seed cum fertilizer drill was calibrated at CAET Jalgaon (Ja) and field experiment were conducted at farm of CEAT Jalgaon (Ja) of Vidarbha Region duration 2014-15. In laboratory test calibration of seed cum fertilizer drill was conducted as the lab test included in specification checking, stationary calibration, Evenness of seed spacing in the row, Seed specification. The field performance test was conducted in order to obtain actual data for overall machine performance operating, accuracy, work capacity, field condition and field efficiency, fuel consumption and seed rate, the performance of seed drill show plate no 1.

*Lab test of seed drill machine.*

The lab test included in specification checking, stationary calibration, Evenness of seed spacing in the row, Seed specification as per RANAM test code.

*Seed Specification*

The bulk density and number of seeds in one kilogram was determined for the variety of seed to be used during testing before actual testing of seed drill is carried out.

*Laboratory test and Field Test*

Laboratory and field evaluation is carried out as per Standard procedure prescribed in RANAM Test code.

Table 1 Specification of seed drill machine

Sr. no.	Particulars	Details
1.	Type	Tractor Operated Seed Drill
2.	Make	Local Company Made
3.	Overall Length	2.5 m
4.	Overall Height	1.52 m
5.	Width of operation	16.38 m
6.	Seeding Width	5 cm
7.	Type of Metering Device	Sprocket Roller Type
8.	Type of Furrow Opener	Reversible Shovel Type
10.	How Driven	By Tractor
12.	To vary seeding rate	Seed rate control strip
15.	Total Weight	300-350 kg approximately
16.	Cost (Approximate)	50,000 Rs.



Plate No. 1. Evaluation of seed drill in Field

### III. RESULT

The following finding was obtained during lab test and performance evaluation of seed drill in field.

#### Lab test of seed drill machine

During the lab test, the following results were obtained and given in the Table: 2

#### Seed Specification

The test is conducted for Gulabi akola-1 variety with bulk density of seeds was 1271 kg/m<sup>3</sup> and 8334 test seed weight was 1000 gm.

#### Performance evaluation of seed drill machine

The evaluation of seed drill is carried out three different speed and to observed actual field capacity and field efficiency and fuel consumption.

#### Actual field capacity

The actual field capacity varied from 0.52 to 0.66 ha/hr at different forward speeds. It was observed that, as the forward speed increase the actual field capacity was increase, it show in fig.1.

Table: 2 Effect on Seed Discharge Rate Due to Different Revolutions

Runs	Revolutions	Exposure length of plate (cm)	Discharge rate of seed (kg/ha)
1.	10	20	50
2.	10	30	75
3.	10	40	100

#### Field efficiency

The field efficiency varied from 81.82 to 64.72 per cent, at different forward speeds. It was observed that, the field efficiency decreased as speed increases as shown in fig. 2.

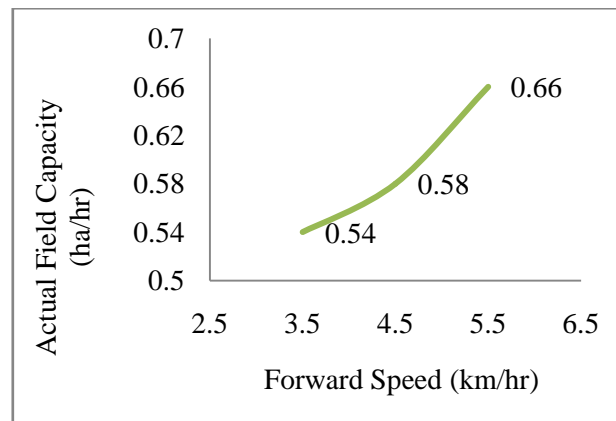


Fig.1. Effect of forward speed on Actual field capacity

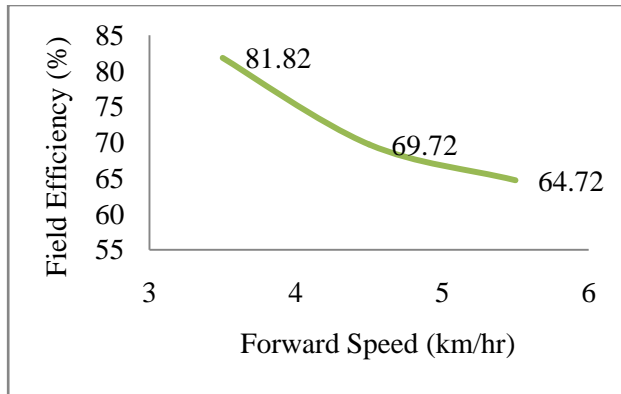


Fig.2. Effect of forward speed on Field efficiency

*Fuel consumption*

The fuel consumption varied from 2.62 ltr/ hr to 4.45ltr/hr at different forward speeds. It was observed that, the average fuel consumption increased with increase may be due to as the speed increase the load come out in machine, so the fuel consumption is also increase, as shown in fig.3.

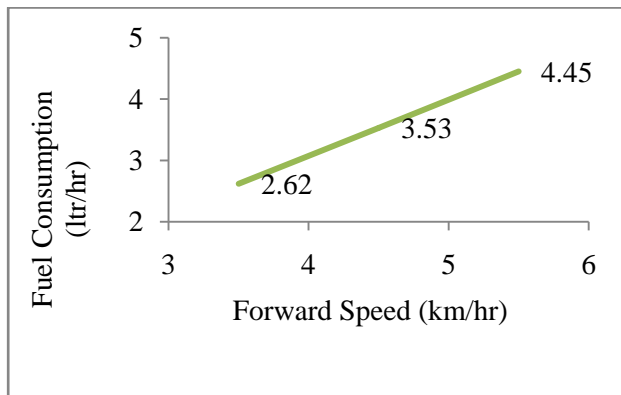


Fig. 4.3 Effect of forward speed on Fuel Consumption

*Field calibration at different speed*

Field calibration is done with the same type of seeds which are used for laboratory calibration. A 30 meter run of well-prepared seedbed is used for field calibration. The condition of the seedbed is recorded. The machine is run for actual sowing operation except that the seeds dropped from the different spouts are collected separately and weighed. The number of revolutions of the ground wheel are also recorded to determine the wheel speed effect on seed rates in comparison to that obtained in the laboratory. The calibration is done at the same notch setting as during laboratory test and reported accordingly. The field calibration is done at different seed rate settings and speed as shown in Table: 3.

Table:3 Field calibration at different speed

Runs	Speed (km / hr)	Time Required (sec.)	Ground Wheel Rotations	Area (hect.)	Seed Rate (gm)
1.	3.5	30	19	0.016	900
2.	4.5	23	17	0.016	1200
3.	5.5	20	13	0.016	1500

IV. CONCLUSION

- It was observed that, the maximum actual field capacity of 0.66ha/h was recorded at a forward speed of 5.5 km/hr while, it was minimum of 0.52 ha/h at forward speed of 3.5km/hr.
- It was observed that, the maximum field efficiency of 81.81% was recorded at a forward speed of 5.5 km/hr while, it was minimum of 64.71% at forward speed of 3.5 km/hr.
- It was observed that, the maximum fuel consumption of 4.5 l/hr was recorded at a forward speed of 5.5 km/hr while, it was minimum of 2.62 l/hr at forward speed of 3.5 km/hr.
- The cost of performance of tractor operated seed drill was observed as 331.21 Rs h<sup>-1</sup>.

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