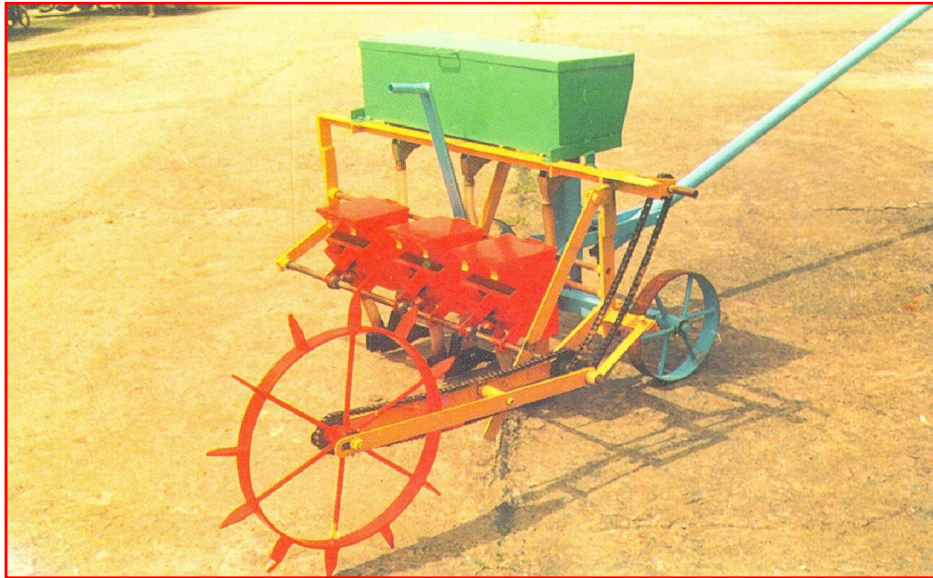


CIAE ANIMAL DRAWN INCLINED PLATE PLANTER

A SUCCESS STORY



All India Coordinated Research Project on
FARM IMPLEMENTS AND MACHINERY
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PLANTER**

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Introduction

In most parts of the country, of bold seeds are sown by dropping seed manually in a furrow formed by a country plough. After sowing, the furrows are covered using wooden plank. For sowing in small areas dibbling is practiced. In traditional sowing, it is not possible to achieve uniformity in distribution of seeds. There is also poor control over depth of seed placement. The high seed rate and labour requirement are also common problems associated in traditional sowing of bold seeds. For bold seeds such as maize, cotton, groundnuts and pigeon pea, planting and fertilizer placement are the two operations performed by animal drawn planter. They ensure uniform spacing between rows and seed to seed. The animal drawn planter is an important machine in the area for improving productivity.

Traditional Practices

The traditional sowing practices followed by farmers in different parts of country are broadcasting manually, opening furrows by a country plough and dropping seeds by hand and dropping seeds in the furrow through a metal funnel attached to a country plough. For sowing in small areas making slits by a stick or tool and dropping seeds by a hand is practiced. All these conventional practices are time consuming and require high seed rate. The animal drawn inclined plate planter is precision equipment which can meter bold seeds and plate them at predetermined depth with uniform seed to seed and row to row spacing. Thus it saves labour, time of operation, cost and costly seeds.

Salient Features of the Machine

It is animal drawn 3-row sowing equipment suitable for maize, cotton, groundnut, pigeon pea, sorghum, sunflower and pea etc. It consists of main frame, three seed hopper, fertilizer hopper, ground drive wheel, chain and sprocket type transmission and furrow openers, inclined plate with cells type metering mechanism provided for each of the seed hoppers. The seed hoppers are fixed on the tool bars with bushes. The hoppers can slide on these bars for positioning them according to row spacing and allowing the seed delivery point just above the furrow openers (shoe type). The height of the seed delivery spout has been kept close to the ground to achieve seed spacing uniformity. The fertilizer box is provided in front side on main frame with fluted roller metering mechanism. The power to the inclined plate is transmitted from the spiked ground wheel through chain and sprockets and a set of bevel gears. The planter is provided with screw jack mechanism for adjustment of depth and use during transport.

Evolution of the Design

This equipment was developed at CIAE, Bhopal during 1990-95. The laboratory testing included inter-row variation of seeds, mechanical damage, and calibration for seed and fertilizer rates. At CIAE, Bhopal the machine field tests were conducted for different crops using inclined plates suiting to various crops at research farm and farmers' fields. The machine performance was evaluated for cotton, groundnut and sunflower at UAS, Raichur and for pea, soybean and pigeon pea at JNKVV, Jabalpur. Feedback information from farmers were incorporated for design refinement.

Performance of the Machine

The laboratory testing was carried out to ascertain the functional performance of different components. The lab tests were conducted for mechanical damage to seed and uniformity of seed distribution on greasy sticky belt. The calibration of machine for seed and fertilizer rates was also performed. For maize, cotton, soybean, pigeon pea and groundnut metering mechanism effect was assessed by putting metered samples of seeds for germination. At CIAE, Bhopal, UAS, Raichur & JNKVV, Jabalpur the performance evaluation of planter was carried out at farmers' fields for different crops which established identity of machine. The observations during field test included soil type, soil moisture, variety, seed rate, fertilizer rate, row spacing, depth of planting, speed of operation, time losses in refilling of seeds and fertilizer, working width, number of seeds/10 m length, seeds and fertilizer quantity and total duration.

Table-1(a): Results of laboratory calibration of CIAE Animal drawn planter at UAS, Raichur

Variety of groundnut : KRG-1
1000 grain weight, g : 320
Visible damage to the seed, % : 0.78-2.19
Cells carrying more than one seed, % : 5.56

No. of cells on seed metering plate	Replica-tions	Weight of seeds collected from furrow opener, g			Total seed dropped, g	Average seed rate, kg/ha
		F1	F2	F3		
20	R1	215	210	225	650	91.96
20	R2	200	225	210	635	89.84
20	R3	225	210	218	653	92.39
20	R4	200	222	219	641	90.69
	Av.	210	216.75	218	644.75	91.47

fertilizer

Table-1(b): Calibration of CIAE inclined plate planter for

Type of fertilizer : Granular
Fertilizer : DAP

Exposed length of roller, mm	Replications	Weight of fertilizer collected from furrow opener, g			Total fertilizer dropped, g	Av. Fertilizer rate, kg/ha
		F1	F2	F3		
8	R1	358	355	350	1063	125.32
8	R2	351	353	353	1049	123.67
8	R3	355	351	353	1059	124.85
8	R4	355	355	355	1053	124.02
	Av.	354.75	353.50	352.70	1055.75	124.46



CIAE Animal drawn inclined plate planter in operation

Performance of the planter was evaluated for different crops and it was compared with conventional practice. The field capacity, field efficiency, labour requirement, seed rate, fertilizer rate, speed of operation were computed. At later stage germination percentage and yield were also recorded.

Table-2: Performance evaluation results of animal drawn inclined plate planter (Groundnut)

Parameters	Groundnut		Pigeon pea
	CIAE	UAS	JNKVV
Variety	-	KRG-1	Asha-148
Soil moisture content, % db	-	18.28	23.50
Seed rate, kg/ha	-	105	12.8
Fertilizer rate, kg/ha	-	120	-
Germination, %	-	86.4	84
Yield, kg/ha	-	1875	1640
Width of coverage, mm	1350	900	1250
Row spacing, mm	450	300	400
Operating speed, km/h	2-3	1.93	1.30
Depth of placement, mm	100 (max)	60	30
Field capacity, ha/h	0.12-0.15	0.112	0.11
Field efficiency, %	60-65	64.2	68
Labour requirement, man-h/ha	7-8	8.92	9.1
Draft, N	800-900	809	-

Status of Technology

The CIAE animal drawn planter was made available to FIM Project centres for multi-location trials. The design was feasibility tested for adoption at UAS, Raichur for groundnut and cotton. Similarly JNKVV, Jabalpur centre carried out test trials for pigeon pea, pea and vegetable seeds. The machine has been demonstrated at various project centres on 120 ha. Four manufacturers have supplied a total of 50 units.

Specifications

Dimensions (lxbxh), mm	4200 x 1300 x 900
Weight, kg	115
No. of rows	Three
Seed metering	Inclined plate with cells
Fertilizer metering	Fluted roller
Power transmission	Spiked ground wheel, chain and sprockets
Furrow opener	Shoe type
Power source	A pair of bullocks
Depth control	By depth cum transport wheel through screw jack
Provision for seed cut off	By lifting the ground wheel
Provision for sowing different seeds	i) By selecting seed plates for different crops ii) By changing the transmission ratio
Hopper i) Seed ii) Fertilizer	Separate seed hopper for each row Combined hopper for fertilizer
Angle of hitch	Arrangement for changing angle of hitch through screw jack provided on beam
Transmission ratio	1:1
Cost, Rs	6500/-

List of Manufacturers

1. Prototype Production Centre
Central Instt. of Agril. Engineering
Nabi Bagh, Bhopal-462 038
2. M/s Fine Fabrication Works
104, Sector-I, Industrial Area
Govindpura, Bhopal-462 023
3. Vasundhara Krishi Yantra Udyog
Nishatpura, Berasia Road, Bhopal
4. M/s Manak Industries
Indrapuri, Bhopal