Lecture No –13/Ex. No.12 and 13 Seed drills

Sowing methods, seed drill, components of seed drill, seed metering mechanism

(Fluted roller and plate type only), types of furrow openers, calibration of seed drill,

Seeding or sowing: It is an art of placing seeds in the soil to have good germination in the field. A perfect seeding gives

a. Correct amount of seed per unit area.
b. Correct depth at which seed is placed in the soil.
c. Correct spacing between row-to-row and plant-to-plant.

Sowing methods

(i) Broadcasting:

Broadcasting is the process of random scattering of seed on the surface of seedbeds. It can be done manually or mechanically both. When broadcasting is done manually, uniformity of seed depends upon skill of the man. Soon after broadcasting the seeds are covered by planking or some other devices. Usually higher seed rate is obtained in this system. Mechanical broadcasters are used for large-scale work. This machine scatters the seeds on the surface of the seedbed at controlled rates.

(ii) Dibbling:

Dibbling is the process of placing and seeds in holes made in seedbed and covering them. In this method, seeds are placed in holes make at definite depth at fixed spacing. The equipment used for dibbling is called dibbler. It is a conical instrument used to make proper holes in the field. Small hand dibblers are made with several conical projections made in a frame. This is very time-consuming process, so it is not suitable for small seeds. Mostly vegetables are sown in this way.

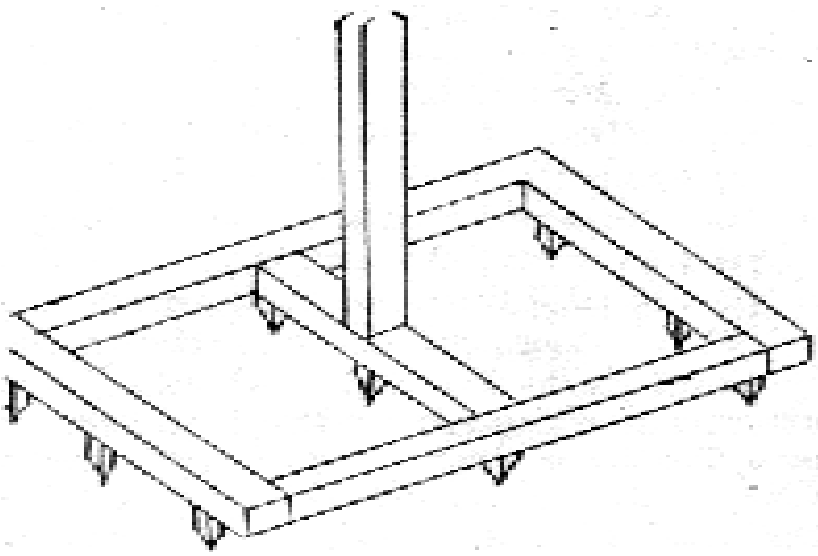


Fig. 14.1 Hand dibbler

(iii) Drilling:

Drilling consists of dropping the seeds in furrow lines in a continuous flow and covering them with soil. Seed metering may be done either manually or mechanically. The number of rows planted may be one or more. This method is very helpful in achieving proper depth, proper spacing and proper amount of seed to be sown in the field. Drilling can be done by (1) Sowing behind the plough (2) Bullock drawn seed drills (3) Tractor drawn seed drills.

(iv) Seed dropping behind the plough:

It is very common method used in villages. It is used for seed like maize, gram, peas, wheat and barley. A man drops seeds in the furrow behind the plough**. Sowing behind the plough can be done by a device known as malobansa.** It consists of a bamboo tube provided with a funnel shaped mouth. One man drops the seeds through the funnel and other man handles the plough and the bullocks. This is a slow and laborious method.

(v) Transplanting:

Transplanting consists of preparing seedlings in nursery and then planting these seedlings in the prepared field. It is commonly done for paddy, vegetable and flowers. It is very time-consuming operation. Equipment for placing plants in the soil is called transplanter.

(vi) Hill dropping:

In this method, seeds are dropped at fixed spacing and not in a continuous stream. Thus the spacing between plant to plant in a row is constant. In case of drills, the seeds are dropped in continuous stream and the spacing between plant to plant in a row is not constant.

(vii) Check row planting:

It is a method of planting, in which row-to-row and plant-to-plant distance is uniform. In this method, seeds are planted precisely along straight parallel furrows. The rows are always in

two perpendicular directions. **A machine used for check row planting is called check row planter.**

Seed Drill:

Seed drill is a machine for placing the seeds in a continuous flow in a furrow at uniform rate and at controlled depth with or without the arrangement of covering them with soil.

Function of Seed Drill: Seed drill performs the following functions:

i. **To carry the seeds.**
ii. **To open furrow to a uniform depth.**
iii. **To meter the seeds.**
iv. **To place the seed in furrows in an acceptable pattern.**
v. **To cover the seeds and compact the soil around the seed.**

Seed-cum-fertilizer Drill:

Seed drills, fitted with fertilizer dropping attachment, distribute the fertilizer uniformly on the ground. It is called seed cum fertilizer drill. Such a drill has a large seed box, which is divided length-wise into two compartments, one for seeds and another for fertilizers. Seed drill may be classified as: i. Bullock drawn ii. Tractor drawn.

Depending upon the method of metering the seeds, bullock drawn seed drill can be further divided into two groups. Those in which seeds are dropped (a) by hand, (b) mechanically. There are a number of bullock drawn implements, which are used for sowing seeds in which seeds are dropped by hand. The most popular implement is three tined cultivators with seeding attachment. In different parts of the country it is made in different sizes and shapes.

Bullock drawn Seed drill **Tractor drawn seed drill**

Components of Seed Drill:

A seed drill with mechanical seed metering device mainly consists of: **(i) Frame (ii) Seed box (iii) Seed metering mechanism (iv) Furrow openers (v) Covering device (vi) Transport wheels.**

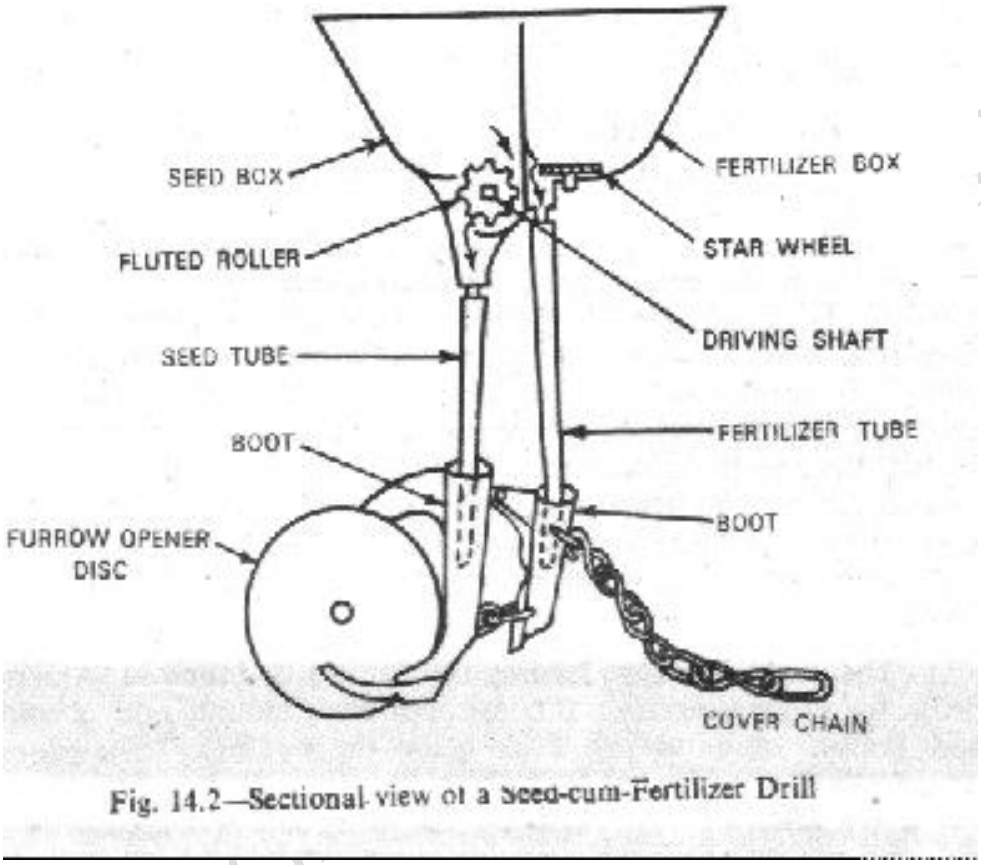


Fig. 14.2—Sectional view of a seed-cum-Fertilizer Drill

seed cum fertilizer drills

Frame:

The frame is usually made of angle iron with suitable braces and brackets. The frame is strong enough to withstand all types of loads in working condition.

Seed Box:

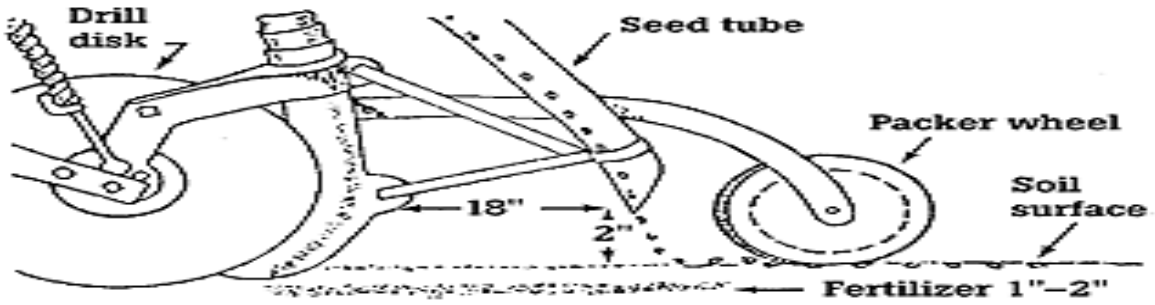
It may be made of mild steel sheet or galvanized iron with a suitable cover. A small agitator is sometimes provided to prevent clogging of seeds.

Covering Device:

It is a device to refill a furrow after the seed has been placed in it. Covering the seeds are usually done by patta, chains, drags, packers, rollers or press wheels, designed in various sizes and shapes.

Transport Wheel:

There are two wheels fitted on the main axle. Some seed drills have got pneumatic wheels also. The wheels have suitable attachments to transmit power to operate seed dropping mechanism.



SEED METERING MECHANISM

The mechanism of a seed drill or fertilizer distributor which deliver seeds or fertilizers from the hopper at selected rates is called Seed metering mechanism, Seed metering mechanism may be of several types:

1. Fluted feed type
2. Internal double run type
3. Cup geed type
4. Cell feed mechanism
5. Brush feed mechanism
6. Auger feed mechanism
7. Picker wheel mechanism
8. Star wheel mechanism

1.Fluted roller seed metering mechanism: It is a seed metering device with adjustable fluted roller to collect and deliver the seeds into the seed tube. Fluted feed type mechanism consists of a fluted wheel, feed roller, feed cut-off and adjustable gate for different sizes of grains. (Fig.). The feed roller and the feed cut-off device are mounted a shaft, running through the feed cups. The roller carries grooves throughout its periphery. It rotates with the axle over which it is mounted throws the grains out on the adjustable gate from where it falls into the seed tube. The fluted rollers which are mounted at the bottom of the seed box, receive seeds into longitudinal grooves and pass on to the seed tube through the holes provided for this purpose. By shifting the fluted wheel sideways, the length of the grooves exposed to the seed can be increased or decreased and hence the amount of seed is controlled.

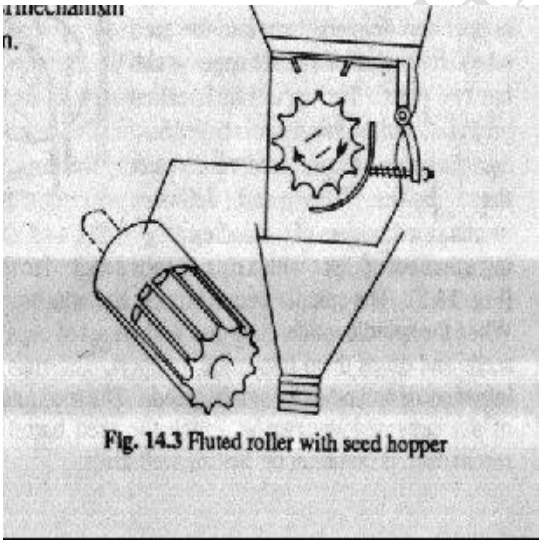


Fig. 14.3 Fluted roller with seed hopper

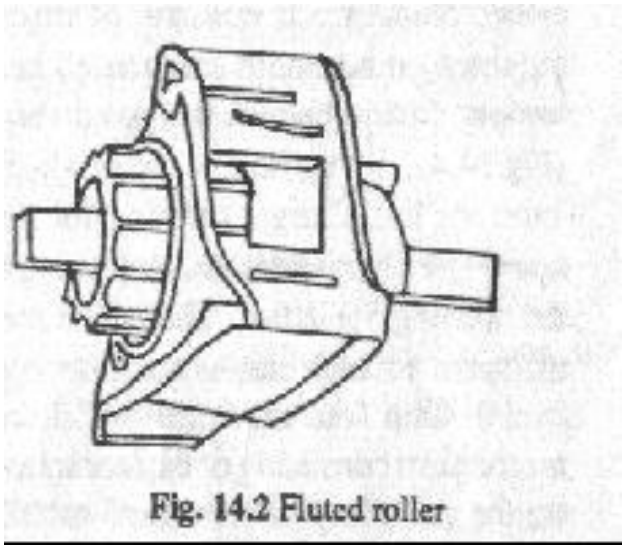


Fig. 14.2 Fluted roller

IV. Furrow openers: The furrow openers are provided in a seed drill to open up furrows well before dropping the seeds.

Type furrow openers are:

a) **Shovel type**

b) **Shoe type**

c) **Disc type (Single disc/double disc)**

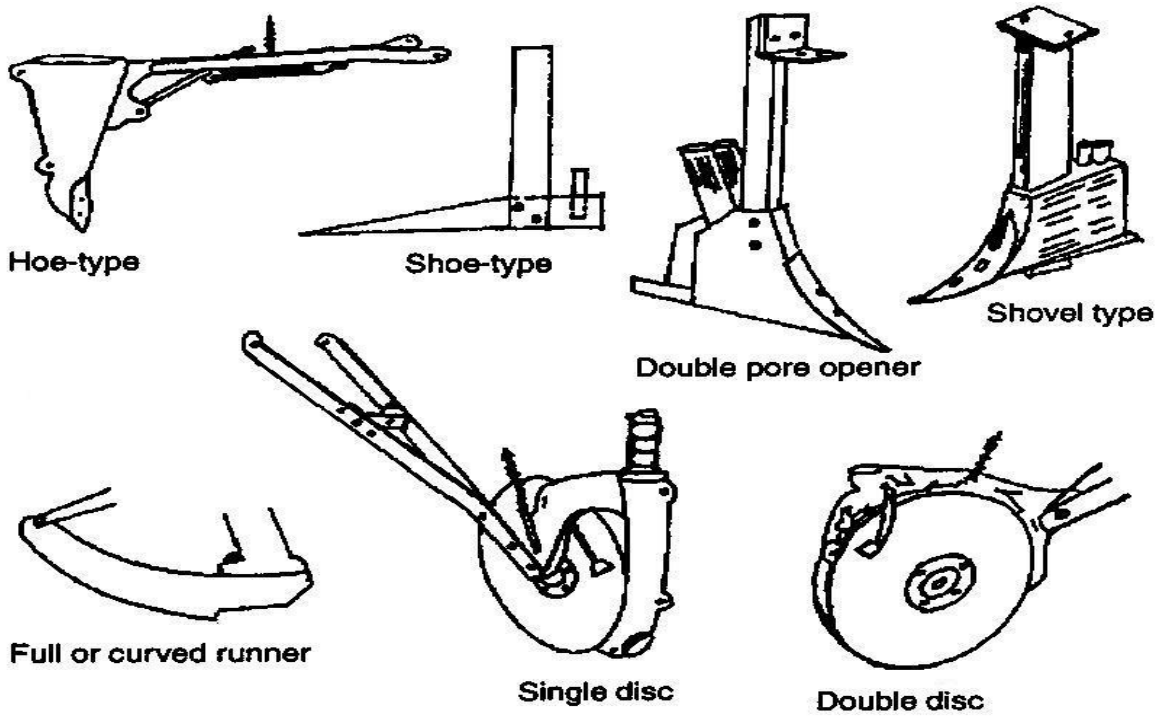
Type of furrow openers: In general, two main types of furrow openers used with ferti-drills are: (i) rotating type openers i.e., single disc and double disc type, and (ii) fixed type openers i.e., shovel type and shoe type. Shovel type furrow openers are widely used in seed drills. There are three types of shovels in use. They are a) Reversible shovel b) Single point shovel c) Spear point shovel. These are best suited for stony or root infested fields. In order to prevent shock loads due to obstructions, springs are provided. It is easy in construction, cheaper and easily repairable. It is very common with usual seed drill.

Shoe type furrow openers: It works well in trashy soils where the seed beds are not smoothly prepared. They are made from two flat pieces of steel welded together to form a cutting edge. It is especially suited for black cotton soil. Shoe is made of carbon steel having minimum carbon content of 0.5 percent with a minimum thickness of 4 mm.

Disc type furrow openers: They are of two types (a) Single disc type and (b) Double disc type.

a) Single disc type furrow openers: Disc type furrow openers are found suitable where plant debris or trash mulches are used. It is a furrow opener consisting of one concave disc and set at an angle while operating, shifts the soil to one side making a small ridge. The disc is kept clean by two scrapers, one toe shaped at the convex side and one “T” shaped at the concave side. The disc penetrates well in the soil, cuts all the trashes and clods in the field. It works in sticky soils also, but the discs are costly and maintenance work is bit difficult.

b) Double disc type furrow openers: In double disc type furrow opener, there are two flat discs, set at an angle to each other. The discs open a clean furrow and leave a small ridge in the centre. The seeds are dropped between the two discs, providing a more accurate placement. It is suitable for the trashy lands. Seed drills attached with tractors having high speeds, usually have this type of furrow opener.



vii. Seed tube:

It is a tube which carries the seed from hopper/the seed metering device to the boot. The most common type of seed tube is steel ribbon one. Polythene / rubber tubes are also used for this purpose. The minimum diameter of seed and fertilizer tube is 25mm.

viii. Boot:

It is a part of the sowing machines which conveys the seed or fertilizers from the delivery tube to the furrow. It is bolted/ welded to the tine.

Calibration of Seed Drill

Calibration of seed drill and seed-cum fertilizer drill

The procedure of testing the seed drill for correct seed rate is called Calibration of seed drill. It is necessary to calibrate the seed drill before putting it in actual use to find the desired seed rate. Calibration is done to get a predetermined. seed rate of the machine. Before using the seed drill or seed-cum fertilizer drill in the field, it is calibrated.

The following steps are followed for calibration of seed drill or seed-cum fertilizer drill.

1. Determine the nominal width (W) of drill.

$$W =.M \times S$$

where M is the number of furrow openers and S is the spacing between the openers in metre and W is in metre.

2. Find the length of a strip (L) having nominal width W necessary to cover $1/25^{th}$ of a hectare.

$$L = 10000 / 25W = 400/W \text{ metre}$$

3. Determine the number of revolutions (N) the ground wheel has to make to cover the length of the strip (L).

$$\pi DN=10000/25W$$

where D is diameter of ground wheel in metre

$$\text{or } N = 10000/25W\pi D = 400/ W\pi D \text{ rev /min}$$

4. Jack up the drill so that the ground wheels turn freely. Make a mark on the drive wheel and a corresponding mark at a convenient place on the body of the drill to help in counting the revolutions of the drive wheel.

5. Put selected seed and fertilizer in the respective hoppers. Place a sack or a container under each boot for seeds and fertilizers.

6. Set the rate control adjustment for the seed and the fertilizer for maximum drilling. Mark this position on the control for reference.

7. Engage the clutch or on-off adjustment for the hoppers and rotate the drive wheel at the speed N

$$N = 400/ W\pi D \text{ rev /min}$$

8. Weigh the quantity of seed and fertilizer, dropped from each opener and record on the data sheet.

9. Calculate the seed and fertilizer, dropped in kg/hectare and record on the data sheet. 10. Repeat the process by suitable adjusting the rate control till desired rate of seed and fertilizer drop is obtained.

Problems

1.Calculate the cost of seeding 1 hectare of land with bullock drawn seed drill of 5 x 22 cm size. The speed of bullock is 3 kmph. Hire charge of bullock is Rs. 150 per pair hire charges of seed drill Rs. 75 per day and wage of operator Rs. 50 per day of 8 hrs.
Solution:

Width of seed drill = 5×22 = 110 cm = 1.1 m

Area covered per hr = width × speed

= 1.1 ×3×1000 =3300 m^2 =0.33 ha

To cover 0.33 ha of area, one hour is required

To cover one ha of area, time requirement =1/0.33 = 3.03 hr

Time taken/ha = 3.33 hr

Cost of seeding/hr = 150 + 75 + 50 /8 = 275/8 =Rs. 34.375/-

Cost of seeding/ha for 3.03 hrs = 34.375 ×3.03= Rs.104.15/-

2.Calculate the time required for sowing 1.6 hectare of land by five furrows seed drill going 12.5 cm deep. the speed of seed drill is 3.2 kmph and pressure exerted by the soil on the seed drill is 0.42 kg/cm2. The space between furrow openers is 10 cm and loss in turning is 10 per cent.
Solution:
1.Total Width of seed drill = W=M x S = 5×10 = 50 cm =0.5 m

2.Theoretical Area covered per hr = width × speed

= 0.5 ×3.2×1000

=1600 m^2

=0.16 ha

$$3..Actualarea = \frac{theorotical\ area\ /\ hr \times efficiency\%}{100}$$

$$= \frac{0.16 \times 90}{100} = 0.144ha$$

Time required for sowing 1 ha area

1 hr. ⇨ 0.144 ha

? ⇨ 1 ha

= 1/0.144 ha = 6.94 hrs

Time required for 1.6 ha area

1 ha. ⇒ 6.94 hrs

1.6ha ⇒ ?

= 1.6 X 6.94 = 11.11 hrs

3.The following results were obtained while calibrating a seed drill. Calculate the seed rate per hectare

a) No. of furrows = 10

b) Spacing between furrows = 20 cm

c) Diameter of drive wheel = 1.5 m

d) RPM = 500 e) Seed collected = 20 kg.

Solution:

Effective width of seed drill *'W'*= M×S = 10×20 = 200cm = 2.0 m

Circumference of drive wheel *'x'* = π x D =π x 1.5 m = 4.71 m

Area covered in one revolution = *circumference X Width*

= π x1.5 m x 2 m =9.4247m^2

No. of revolutions, *N* = 500

Area covered in 500 revolution =9.4247 x 500 =4712.35 m^2

It is given that Seed dropped for 4712.35 m^2 = 20 kg.

Therefore, Seed dropped/ha (10,000 m^2) =42.44 kg

$$\frac{10{,}000 \text{ X } 20}{4712.35}$$

=42.44 kg