

Calibration of Animal Traction Direct Planters

Animal traction direct planters place seed and apply basal fertilizer uniformly at correct application rates. However, poor calibration will result in lower or higher plant densities and over- or under-fertilization, which wastes seed and fertilizer and compromises yield and profitability. The direct planter should therefore be calibrated carefully and first tried in an area near the plots before seeding the plots themselves. Direct planters with horizontal seed plates, currently available from Brazil (e.g. Fitarelli) can be used for maize, soybean, cowpea, sorghum and sunflower crops. Direct planters with inclined seed plates (e.g. the Grownet planter from Zimbabwe) can also be used for groundnuts.

How do you adjust the planter's seeding depth?

The depth of sowing with chain-pulled planters can be adjusted by raising (deeper planting) or lowering (shallower planting) the hitch point at the front of the planter. With pole-drawn planters (i.e. Fitarelli and Grownet) the only way to change the seeding depth is by moving the cutting disc (coultter) up or down. The depth of the cutting disk will affect seeding depth differently in different soil moisture conditions, so you must check and adjust it each time you seed. The adjustment is made by removing the bolts that attach the coultter to the seeder frame and moving the disk up or down. If seed is applied at too shallow a depth, the coultter will have to be raised a little and vice versa.

The disk should cut through the mulch but be adjusted to not seed too deep. A seeding depth of 3-6 cm is ideal for maize, soybean, cowpea and groundnut crops

How is the seed distribution calibrated on a Fitarelli planter?

Maize is seeded with a seed plate labeled “*milho*” and a single spring-loaded expeller (knocker). There is a range of plates to suit different seed shapes and sizes. However, if the maize seed is too big for any of the available plates, the holes in the seed plate will need to be adjusted with a metal file. If the seed size is very variable, sieve the seed to select a more uniform grain size. The middle bevel gear under the seed box on the direct seeder should be used, aiming at a seed rate of about 44,000 plants/ha at 90 cm inter-row spacing. The seed rate can be varied by changing the bevel gear which drives the seed plate gear ring. This can be done by loosening the retaining screw on the gear cluster and sliding it along the shaft to engage the required drive gear. The largest gear will give a plant population of about 53,000 plants/ha and the smallest about 36,000 plant/ha at 90 cm row spacing.

Other crops: The Fitarelli planter can be used for soybean, cowpea, sorghum and sunflower, but the seed plate has to be exchanged according to the seed size. For **soybean**, a seed plate labelled “*soja*” is used. It has two rows of holes, for a higher plant population. Double row seed plates are used with a double seed expeller. To change the expeller, open the seed hopper by unscrewing the wing nut. The single-row expeller can then be exchanged by removing its locating bolt and substituting it by a double-row expeller. For soybean, use the smallest drive gear, aiming at a seed rate of about 444,000 plants/ha at 45 cm row spacing.



Photo: Christian Thierfelder

Farmers planting into sunn hemp mulch with a Fitarelli direct planter



Photo: Christian Thierfelder

Field calibration and testing of a Grownet direct planter

Fertilizer and seed are precious resources - use them wisely by properly calibrating your direct planter

How is the seed rate calculated?

To check the calibration of the seeder in the field you can mark a specific distance (e.g. 50 m), attach a plastic bag on the seed tube and let animals pull the seeder for that distance. Calculation of seed rate:

$$\text{Seed rate (seeds/ha)} = \frac{\text{Number of seeds}}{(\text{Row spacing (m)} \times \text{Distance (m)})} \times 10000$$

How is the seed distribution calibrated on a Grownet planter?

The Grownet planter operates with an inclined metal seed plate which has different hole sizes for seed metering. Depending on the type of **maize** seed, seed plates with hole sizes of 13, 15 or 17mm (small, medium, large) can be used. For sorghum a seed plate with smaller holes is provided. Similar to the Fitarelli planter, the middle bevel gear should be used for maize at 44,000 plants/ha. The same spacing and gear can be used for sunflower, cowpea and common beans.

Soybean can be seeded with a seed plate that allows two seeds to enter each hole instead of just one. The smallest bevel gear should be used to plant a high density (440,000 plants/ha) of soybean with a 45 cm row spacing. The same small bevel gear is also used for seeding groundnuts. Groundnuts can only be seeded with the Grownet planter because the Fitarelli mechanism tends to grind and break the fragile seeds. Field calibration of the precise seed rate can be done the same way as done with the Fitarelli planter by collecting the seeds metered over a measured distance.

How is the fertilizer distribution calibrated?

Only basal fertilizer is applied using the direct seeder. There are different widths of plastic fluted metering wheels that can be added or removed in the fertilizer compartment:

- One large wheel will give a fertilizer rate of about 165 kg/ha at 90 cm row spacing, and 200 kg/ha at 75 cm row spacing.
- One small wheel will give a fertilizer rate of about 82 kg/ha at a 90 cm row spacing, and 165 kg/ha at 45 cm row spacing

Two or three metering wheels can be used together to vary the dose rate. In the same way as for seed, the fertilizer calibration should be verified under field conditions. To do this, attach a plastic bag to the end of the fertilizer delivery tube and operate the machine over a measured distance (e.g. 50m). The amount of fertilizer in the plastic bag is then weighed and the delivery rate calculated as follows:

$$\text{Fertilizer application rate(kg/ha)} = \frac{\text{Weight of fertilizer in plastic bag (kg)}}{(\text{Row spacing (m)} \times \text{Distance (m)})} \times 10000$$

Maintenance of direct planters

Clean the direct planter after seeding. All fertilizer must be removed from the fertilizer hopper, and the hopper thoroughly washed with water. All moving parts should be greased or sprayed with a lubricant to reduce wear and corrosion.



Photo: Christian Thierfelder

A variety of seed plates are available for Fitarelli planters



Photo: Christian Thierfelder

Fertilizer amounts can be adjusted by adding or removing fertilizer wheels



Photo: Christian Thierfelder

The seed rate can be changed by shifting the beveled gear on the shaft



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