Manual and Animal Traction Seeding Systems in Conservation Agriculture

Seeding crops in conservation agriculture

Soil tillage leads to the breakdown of soil structure and land degradation (see bulletin on land and soil degradation) and is therefore not sustainable. However to be able to plant into unploughed soil, special methods or equipment are necessary. Both manual and mechanical systems are available to small-holder farmers for sowing crops under conservation agriculture (CA).

Manual systems

Manual seeding of crops into residues is relatively easy and can be done by several methods: with a hoe or pointed stick (top photo), digging of basins or zai pits (center photo), or using equipment such as the jab planter (bottom photos). The simplest of these are the hoe or pointed stick: small holes are made at the required spacing and seed placed in these, preferably with fertilizer or manure placed in another hole a few centimeters away.

Photo: Patrick Wall

Using a dibble stick to seed into maize residues.

Planting basins

Basins are small holes of approximately 15 cm x 15 cm and 15 cm deep in rows 75-90 cm apart and with 50-60 cm between basins (centre to centre) in the row. Basins are dug manually with a hoe during the winter period so that labour is distributed over a longer period and the crop can be planted with the first effective rains. Basins leave over 90% of the soil area undisturbed, capture run-off water and benefit from precise fertilizer placement. Basins should be made in the same place each year and, after initial formation, do not need as much labour to re-form. Because of the concentration of water and initial rains in the basins, the benefits can be apparent in the first season. However, basins do require considerable labour, especially in the first dry season when soils can be very hard. For more information on basins please contact ICRISAT Bulawayo. Further bulletins can be downloaded from the PRP website: (http://www.prpzim.info/conservation-agriculture/2.html).

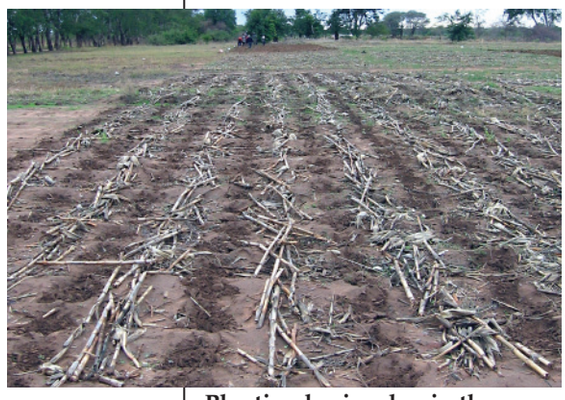

Photo: Christian Thierfelder

Planting basins dug in the winter period ready for planting with the first rains.

Jab-planters (matracas)

The jab-planter used for CA is a manual implement with two points that are pushed into the moist soil through the mulch, and opened to release the seed and fertilizer. The jab planter is quicker than hoe or pointed stick methods once the technique is mastered, and seed and fertilizer can be placed with more precision. However, experience is needed to be able to seed well and accurately, and in wet clay soils, seeding can be difficult as soil sticks to the points. Jab planters are also more expensive than hoes or pointed sticks, and are still difficult to purchase.

Photo: Christian Thierfelder

Seeding with a jab-planter on a residue covered field

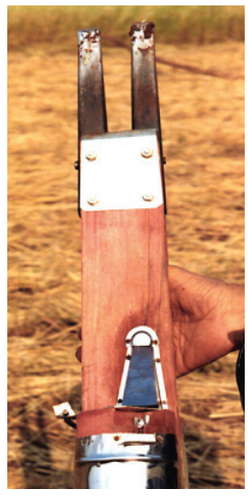

Photo: Patrick Wall

Double points of a jab-planter designed for CA.

Animal Traction Systems

Seeding behind ripper tines

Ripper tines are attachments fitted to the plough frame. They were developed to open furrows for moisture capture or to break superficial compacted layers, but in CA they work well to open planting furrows. The animal-drawn Magoye ripper works at a shallow depth (10-15 cm) and, after making the rip line, seed and fertilizer are placed manually in the furrow and covered. Other ripper tines such as knife rippers can be found in the region, but are not as common. In the first year of CA, if there is a plough pan, then a sub-soiler can be used to break the pan: the Palabana sub-soiler is efficient and can work up to 25 cm. The furrow formed by the sub-soiler may be suitable for seeding or may need to be reformed.

Benefits

- Low-cost modification to the plough.
- The ripper uses less energy and labour than the plough and can be used with smaller or weaker animals.
- Timely planting is possible if animals are available.

Challenges

- Residues often get caught and dragged by the tines.
- Seeding and fertilizer application have to be done by hand, which is labour intensive.
- Planting is delayed if oxen are not available.

Photo: Patrick Wall

The Magoye ripper mounted on a plough frame can be used to open small furrows for hand seeding.

Animal traction direct seeders

Direct seeders are designed to seed into surface mulch in untilled soil. The implement has separate seed and fertilizer bins and a cutting disk (coulter). The coulter cuts through the residues, a ripper tine opens a furrow, and the seed and fertilizer are placed in the furrow– all in a single operation. Seeder units are manufactured for both oxen and donkeys.

Benefits

- Seeding with the animal traction seeder is fast and efficient.
- Depending on the tine used, direct seeding disturbs little soil.
- Higher yields are generally achieved than with the ripper and hand systems.

Challenges

- Implements are relatively expensive and not readily available.
- Residues have to be dry to enable the coulter to cut through the mulch.
- Seeding depth has to be carefully calibrated.
- Animals need to be trained.

Photo: Patrick Wall

An animal traction direct seeder.

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