



KENYA AGRICULTURAL RESEARCH INSTITUTE

Animal Drawn Planters for Vertisols and Lighter Red Soils to Save Labour and Time

Users Manual

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Dry planting tool with tubes for seed and fertiliser

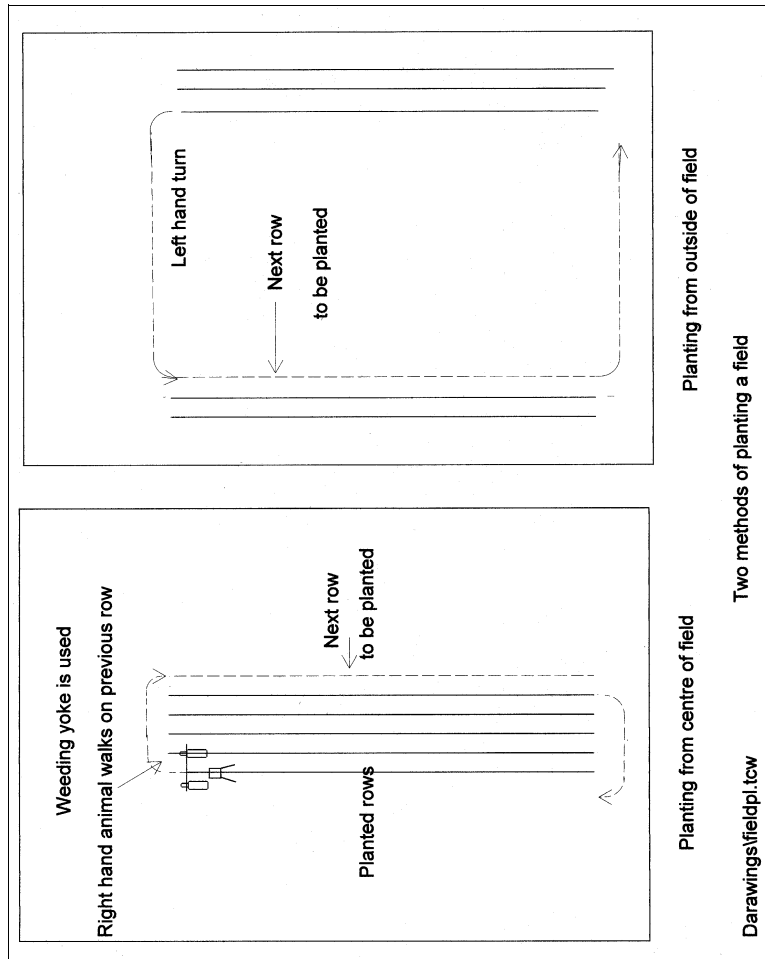


Diagram to illustrate methods of turning to plant a field)

Introduction

At present farmers cannot plant most soils until after sufficient rain has fallen to allow the current mouldboard plough to penetrate. Thus planting is late with a loss of potential yield. Various designs of chisels and rippers exist, which can penetrate and break up dry soils but the force needed to pull them is high and greater than two animals, weakened by the limited dry season grazing, can exert for more than a short period of time.

Therefore two tools have been developed by KARI and Triple W Engineering that enable early planting. One is for **vertisols** and the other is for **lighter red soils**.

What are the advantages of these new tools?

- They allow planting in dry soils before the rains starts.
- They have low draft requirements and can be pulled by small animals/weaker animals.
- They plant and cover the seed in one pass compared with three or four passes in normal plough/planting. This makes planting quicker and cheaper.
- They require only two persons to plant, one to guide the animals and the other to plant the seed. This saves one person compared with normal plough/planting.
- The trash is maintained on the surface conserving soil and water to the benefit of the crop.
- They can be made by *jua kali* artisans with locally available materials at a moderate cost.

Long pole beam

Both tools are connected to the animals through a long pole beam. This is similar to the method used in northern

Kenya, Ethiopia and many Asian countries except that the pole is a metal pipe in place of the usual wooden pole.

It is easier and cheaper to make than the normal chain and beam plough with wheel. It is also very stable in work and can be controlled using only one hand, freeing the other for dropping seed. It is light and easier to use by women and young persons than the conventional plough. When turning at the end of a row the handles and tool are lifted and held up to facilitate moving into the new position. This requires some practice, but is easily learned.

Long yoke

This is a modification of the yoke normally used for weeding with the victory type plough. Its effective working width can be changed by moving the neck band to different holes. This enables animals to plant crops at varying row spacing of 75 cm, 60 cm or 30 cm with one animal walking along the line of the previous row thus keeping the row spacing constant. The use of the yoke keeps animals apart and reduces the risk of injury when turning at the end of a row. Practicing with the animal is needed, but experience shows that a trained animal learns fast.

Planter for vertisols

The photograph on the right shows a typical vertisol during the dry season. In this state the soil is so hard that it cannot be cultivated with conventional tools. Loose soil, however, accumulates on the surface of vertisols during the dry season as a result of weathering. This soil can be used to cover seed, which has been hand dropped down a planting tube to the surface.

Covering the seed

Vertisol planter

If seed is not well covered by one pair of weights then use two pairs, but only when needed as they can cause blockage where thick trash or stones are present. If the field has a few large stones it is better to remove them as they can cause damage to the scrapers.

Light soil planter

Normally the soil will fall back into the slot and cover the seed.

Methods of planting a field

In order to be able to keep the rows at the same distance using the long yoke, the lead or right hand animal must always walk on the previously planted crop row. Two methods of planting a field are possible. One is to start with a row down the centre of the field and turn clockwise. Another is to start at the edges of the field and turn anti-clockwise.

However, turning clockwise and then anti-clockwise must be avoided. The critical walking on the previous row must always be done by the same animal.

The planting operation

The person planting has to co-ordinate several activities at once like dropping seed at regular distances, replenishing seed in the hand, observing the tines for blockage, clearing blockages, lifting before turning at the ends. This co-ordination requires practice.

Before planting actual seed it is advised to use the tool on one or two rows for testing. If the results of the testing are satisfactory (straight lines and good turns):

- Make the first row as straight as possible by guiding the animal
- Take small handful of seed from the container in one hand
- Use other hand to keep the planter upright
- Drop seeds down the seed tube at an estimated 30 cm spacing. Some practice is needed for this but it is better to drop more, which can be thinned later, than less
- With the long yoke being used for maize the right hand animal should walk on the previously planted row to ensure a spacing of 75 cm
- Raise the planter to remove blockage by maize stalks or stones when in motion. This is an operation the operator will learn with practice
- Raise and carry the handles of the planter when turning at the ends of the row to prevent the planter being dragged sideways and suffering damage
- At the ends of the row replenish the seed container but do not fill it fully to avoid loss due to bumping and shaking when moving.



A typical vertisol (black cotton soil) before the rains

Two v-shaped scrapers that float over the surface gather the loose surface soil from either side to concentrate it into a ridge over the seed. Weights may be added to the scrapers to increase the amount of soil when the layer is thin. The attachment slides over the soil surface on a skid and no part penetrates the soil. Thus the draft force to pull it is very low and can be handled by one animal. Experience has shown that:

- The seeds germinate with the first rains and, due to the water retaining capacity of vertisols, continue to establish a root system even if a dry period follows the first shower.
- The early planted crop does not become water logged as it is planted on top of the soil surface while late planted crops show yellowing, especially in their early stages due to being planted below the soil surface.

Planter for lighter soils

Farmers on lighter soils such as red soils cannot plant until sufficient rain has fallen to loosen the soil crust and allow the current mouldboard plough to penetrate. Thus planting is often late with a loss of potential yield. If the plough is replaced by a well-designed chisel penetrating the soil this creates a slot, into which seed is hand dropped down a tube. Wings on the chisel loosen the surface soil and some falls into the slot to cover the seed. Due to the design a low draft force is needed, which is within the capability of a pair of small animals if weak after the dry season.

The first rains tend to run over the soil surface into the slot where they concentrate in the area of the seeds. The seeds use this rain to grow and resist any short dry period, which may follow.

A fertiliser attachment is being developed to drop fertiliser along with the seed. The single seed funnel and tube is replaced with by forked funnels and tubes and its use requires an additional person. However this is at experimental stage.

Connecting the planters to the animals

The animals should be a pair accustomed to working together and preferably trained to walk in straight lines as with traditional plough/planting. They should be handled gently and well treated without the use of sticks other than as a guide.



Scraper planter for vertisols

The wide yoke should be used for dry planting with two animals as this facilitates maintaining row width and keeps the animals' feet from contacting the planter.

The long pole beam is attached to the yoke using a pin. The animals may be accustomed to having a chain between them but soon become used to the pole especially if they have pulled a cart before.

Familiarisation with the parts of the planters

The main parts of the **vertisol planter** are: Tine and skid, hangers for the scrapers, seed container, funnel and dropping tube, furrow opener, covering scrapers and weights. There are also ropes for lifting the scrapers to clear trash ends of row.

The main parts of the **red soil planter** are: Seed container, funnel and dropping tube, chisel and wings.