

Techniques and implements for weeding with draft animals in Tanzania

by

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Abstract

Small-scale farming generally relies on the use of hand tools for seedbed preparation, planting and weeding. Weeding using hand tools is a slow and tedious task, because a person is only capable of generating limited power output. Most weeding operations can be carried out more efficiently using animal power, supplemented by hand weeding only where necessary. This paper discusses techniques for weeding with draft animals in crops planted on ridges or on flat fields. Good soil preparation helps to control weeds. Implement options reviewed include tine cultivators (with points, sweeps and/or hillers) and plow beams fitted with large sweeps or earthing-up bodies.

Introduction

Weeding with a hand hoe involves scraping the soil to cut the roots of weeds just below the soil surface and shaking the soil off the roots to prevent regrowth. When hand weeding a crop that has been planted on ridges, the ridges need to be rebuilt at the same time, by scraping the soil upward from the furrows. In both cases the operation is slow and tedious.

All crops can be weeded using oxen or donkeys provided the inter-row spacings allow passage of the implement without causing damage to the roots and stems of the crop plants. Oxen and donkeys can also be used to weed along and across rows of fruit trees and plantation crops such as citrus, bananas, coffee, tea, sugar cane and vines. This paper outlines how animal power can be applied to weeding in Tanzania and so relieve the farmers of drudgery.

Plowing, harrowing and planting

The secret of successful and effective weeding using draft animals lies in adequate preparation, both of the animals and of the crop.

To make the crop easy to weed, it should be planted in parallel rows at least 45 cm apart. This can be achieved by planting behind the plow; by hand planting with jab planters, punch planters, etc, ensuring row spacing by using row markers or by estimating through experience; or by using a five-tine cultivator fitted with furrow openers, a

seed covering device and a row marker. The farmer can also use hillers to construct half ridges along which seed and fertiliser can be dropped and covered as the ridge is completed on the following run.

Plowing, harrowing and planting should be arranged and timed such that the crop germinates before the weeds, so that at weeding time the crop plants are taller than the weeds. If the land is plowed immediately after the onset of the rains, the farmer should allow three to five days for the first weed population to germinate before harrowing and killing the weeds using suitable implements

An alternative approach is to kill the first and second weed populations before planting. In this case, plowing is delayed until after the first weed population has germinated, about four days after the onset of the rains. After the first plowing, three to five days should be allowed for a second weed population to germinate before harrowing and killing the weeds.

In either case, the crop should be planted on the same day the field is harrowed. Post-emergence weeding should begin two to three weeks after the crop germinates.

Weeding in flat cultivation systems

For weeding crops planted on the flat a two stage approach is necessary. First the farmer has to cut the weed roots just below the ground surface in between the rows of the growing crop. The second operation is to bury the weeds by earthing-up using a hiller, the plow or the tie ridger/weeder blade (Kayumbo, Chitopela and Mnyau, 1987).

The animals must be adequately trained, and are best led from the front during the weeding operation. It is easier to weed with a single animal than with two, but if two animals are used the farmer should use a 240 cm yoke or evener. The farmer could also take precautions against the animals grazing the crop, by using muzzles or halters.

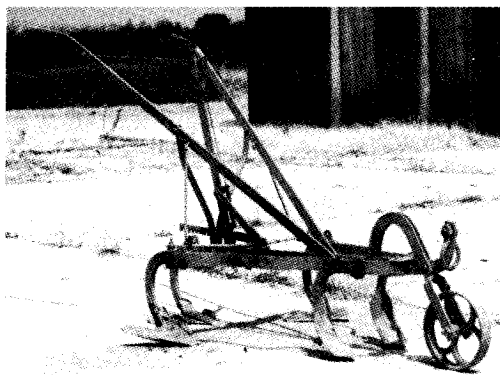


Photo: A K Kayumbo

Photo 1: Cultivator with reversible teeth and rear sweeps for inter-row weeding

Cutting weed roots between crop rows

Several implements can be used to cut the roots of weeds between crop rows:

- a cultivator fitted with two (or four) reversible teeth in the front and three 20 cm sweeps on the hind tines (Photo 1)
- a five-tine cultivator fitted with two reversible teeth in the front and a sweep on the rear tine, the size of which depends on the inter-row spacing
- a sweep, the size of which depends on inter-row spacing, fixed on the beam of a plow or ridger by means of a bracket (Photo 2).

The five-tine cultivator, fitted with reversible teeth on all tines (Photo 3), can be used to disintegrate the soil to expose the roots of weeds to the sun for desiccation after the weeding implements have been used.

Earthing-up to bury weeds

Hillers are used following sweeps. They can be attached to the steel beam of a plow or ridger (Photo 4) or to the rear of a cultivator, with or without the other tines on the frame (Photo 5).

In the absence of the hiller the farmer can use an ordinary plow for earthing-up.

Photo 2: Sweep fitted to a ridger beam for inter-row weeding

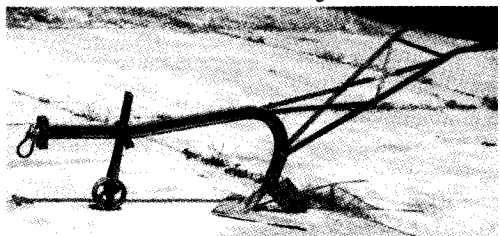


Photo: A K Kayumbo

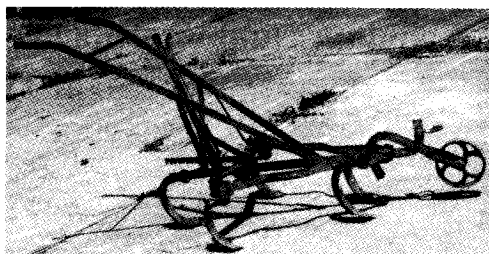


Photo: A K Kayumbo

Photo 3: Five-tine cultivator with reversible teeth

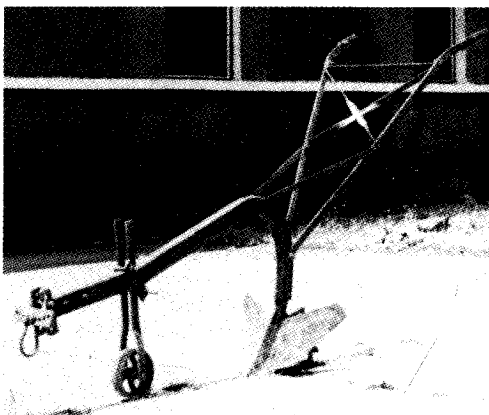


Photo: A K Kayumbo

Photo 4: Hiller fitted on a ridger beam. This arrangement is used for weeding by earthing-up

Similarly the tie ridger/weeder blade can be used for weeding when used in the tilted position, where necessary making use of the bracket on the plow beam, the standard on the ridger steel beam or the rear tine of the five-tine cultivator, with or without the other tines on the frame.

Cutting weed roots and earthing-up in one operation

A five-tine cultivator fitted with two reversible teeth in the front, a pair of 20 cm sweeps in the centre and a hiller on the rear tine is a complete implement

Photo 5: Hillers fitted to a cultivator for earthing-up (sweeps are also fitted)



Photo: A K Kayumbo

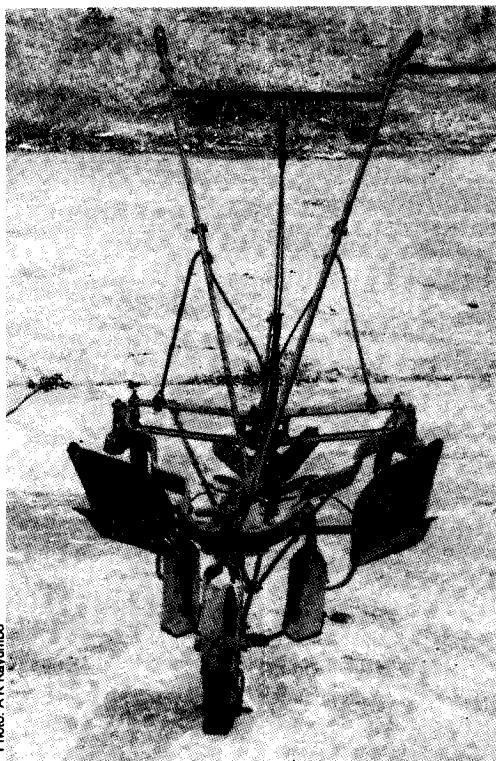


Photo: A K Kayumbo

Photo 6: Cultivator fitted with reversible front tines, hiller blades and rear sweep

suitable for inter-row weeding and earthing-up to bury the weeds along the row of crop plants. The implement can be adjusted to give a shallow or deep cut. A similar combination with front points and side hillers is shown in Photo 6.

Alternatively the tie ridger/weeder blade can be fixed on the rear tine of the cultivator instead of the hiller for inter-row weeding and earthing-up, when used together with sweeps and or reversible teeth.

The farmer can also use the ordinary mouldboard plow for inter-row weeding and earthing-up along the growing crop during weeding.

Photo 7: Tie-ridger/weeder fitted to ridger beam

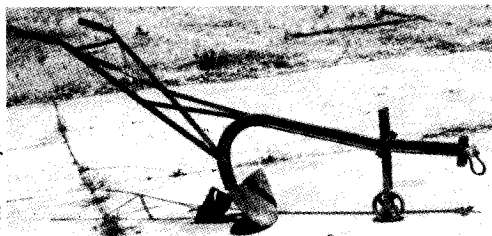


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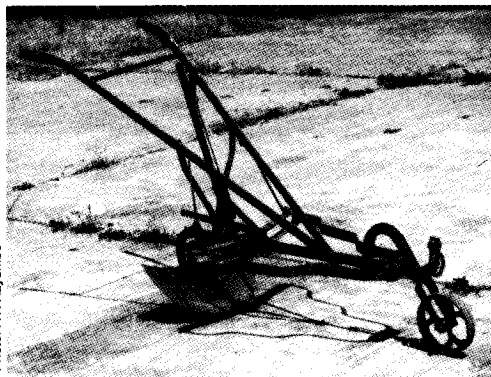


Photo: A K Kayumbo

Photo 8: Tie-ridger/weeder blade fitted on the frame of a five-tine cultivator

Weeding in ridged cultivation systems

Land preparation for ridged cultivation involves the construction of 70–90 cm ridges using an ox ridger or a mouldboard plow adjusted to cut at maximum width and depth. Crops are then planted on the ridges.

Ridged cultivation systems can be weeded using a tie ridger/weeder (Photo 7). Farmers can make a blade for this implement by cutting a 55–60 cm diameter used plow disc in half and drilling two holes vertically at the centre of one of the half discs. The blade can be fitted on a plow beam, on the standard of a ridger steel beam (after the ridger body has been removed) or on the rear tine of a cultivator, with or without the other tines removed (Photo 8). The implement can then be used for weeding between the ridges and for tying the ridges, all in one operation.

As the implement is pulled between the ridges by one or two animals it cuts all the weeds growing on the sides the ridges and on the bottom of the furrow. By lifting the implement every few paces soil is deposited in the furrow, thus tying the ridges.

However, this implement cannot be used to weed the tops of the ridges; this operation must therefore be done using hand tools.

Reference

Kayumbo A K, Chitopela A T and Mnyau W, 1987. *Draught animal power*. Teacher's manual. Ministry of Agriculture and Livestock Development, Dar es Salaam, Tanzania.