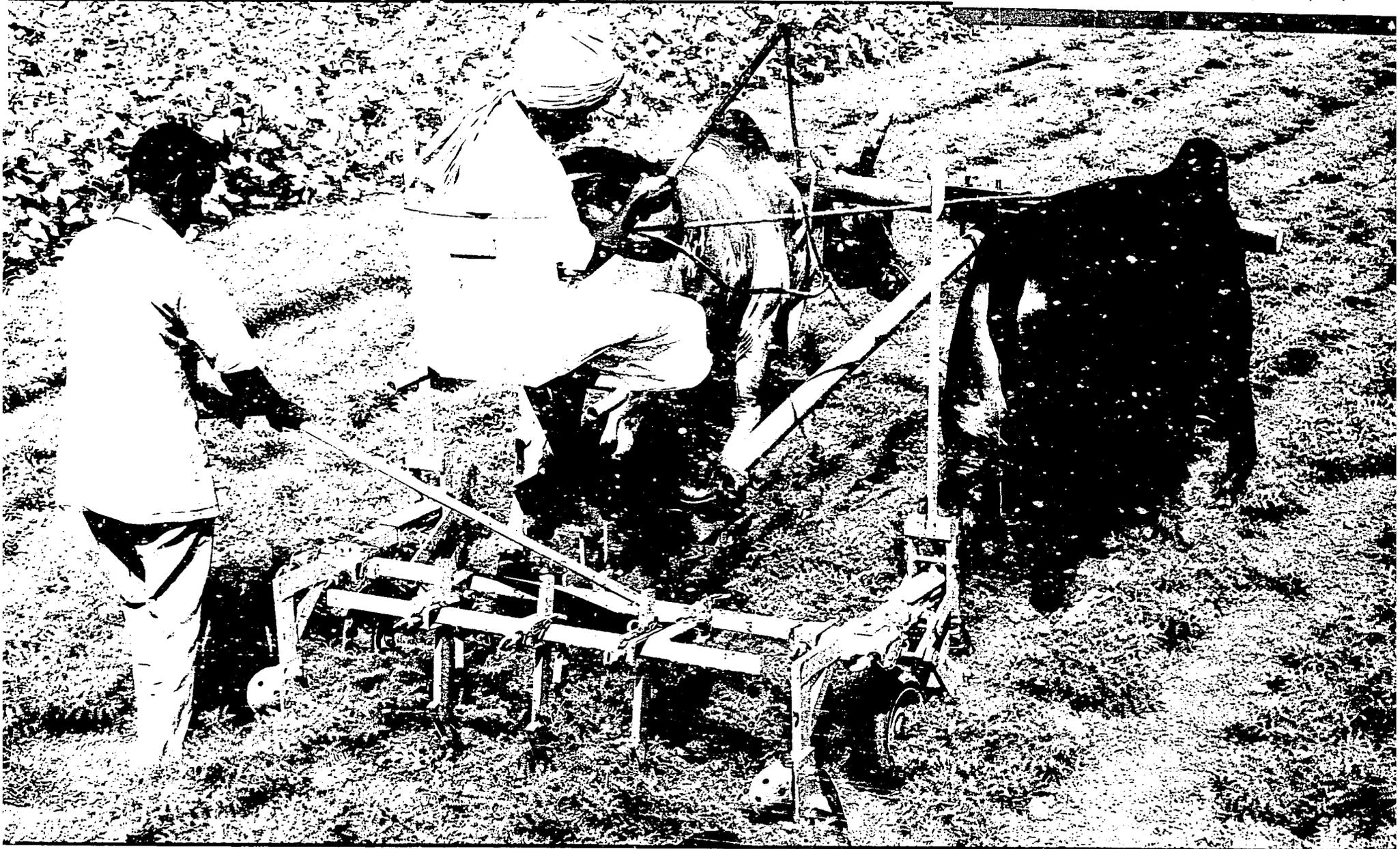


The Agribar Operator's Manual

FIELD OPERATIONS

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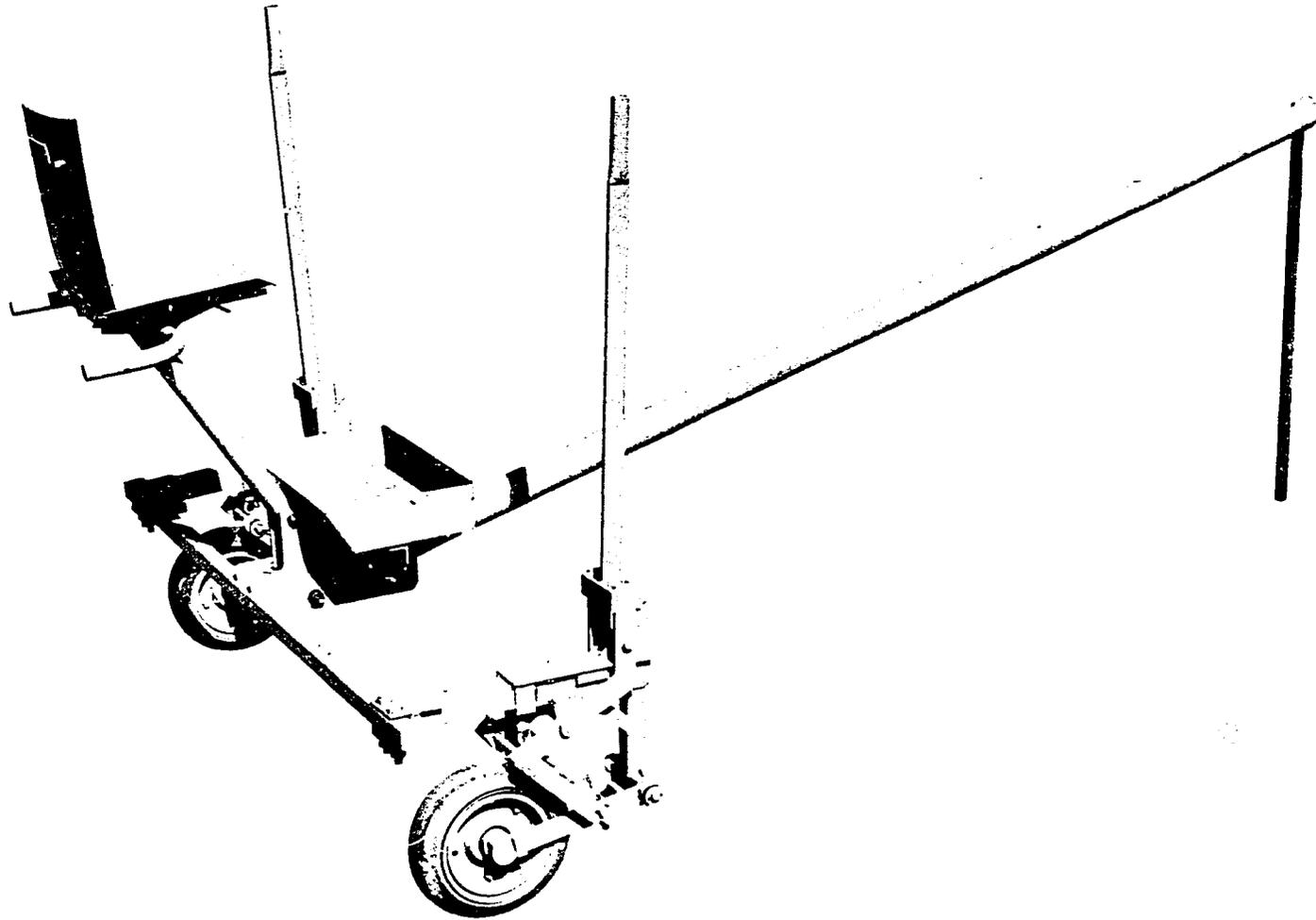


INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS

The Agribar Operator's Manual

Field Operations

R.K. Bansal



International Crops Research Institute for the Semi-Arid Tropics

Patancheru, Andhra Pradesh 502 324, India, 1989



The Agribar Operator's Manual: Field Operations

Compiled by R.K. Bansal

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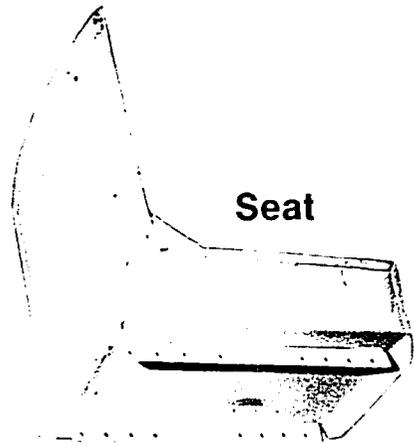
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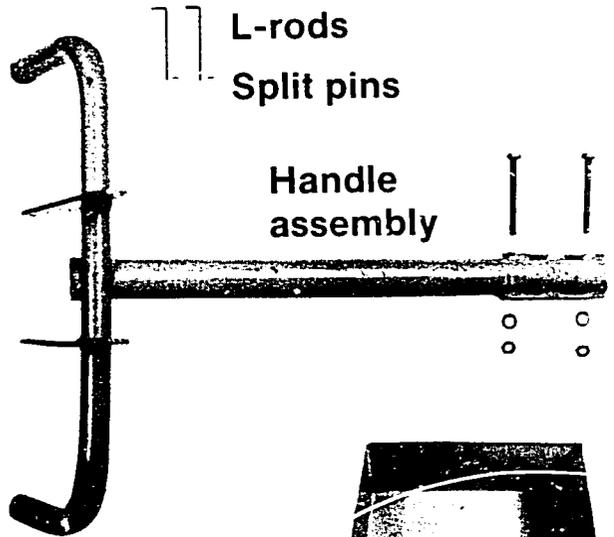
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AGRIBAR COMPONENTS



Seat

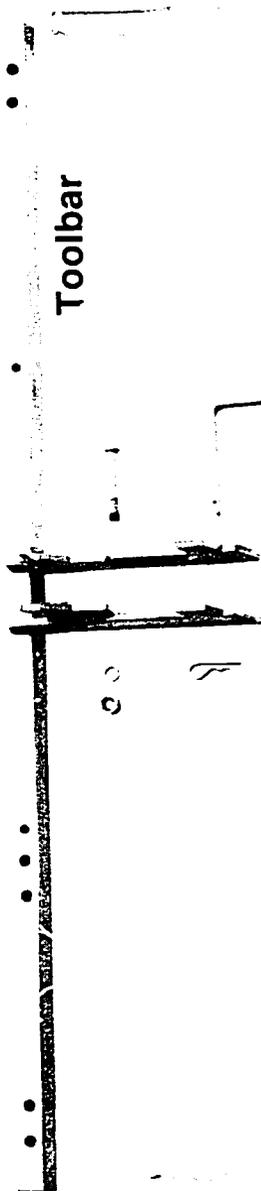


L-rods

Split pins

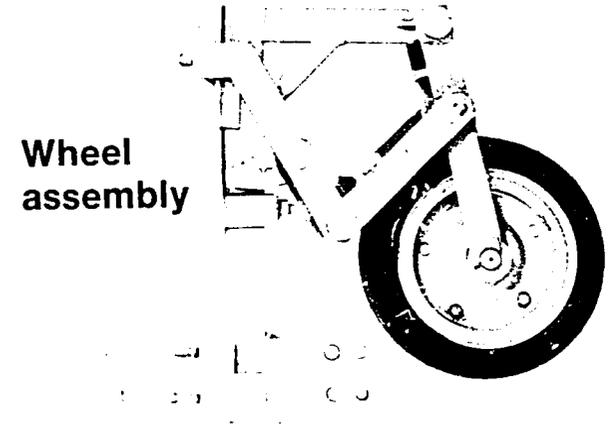
Handle assembly

Tool tray

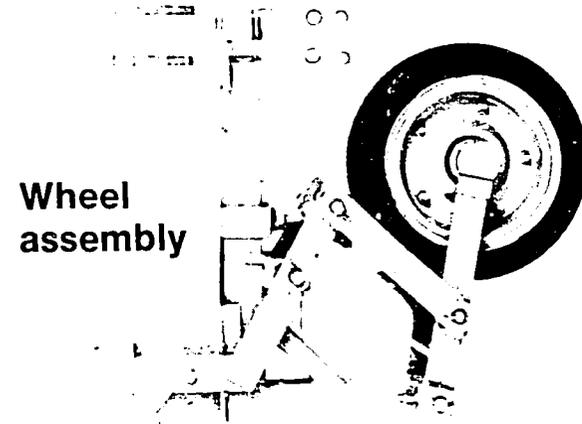


Toolbar

Beam



Wheel assembly



Wheel assembly

Tools for Agribar assembly

Spanner 17/19



Spanner 24/26



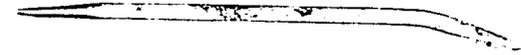
Hammer



Pliers



Tommybar



Recommended spares

Split pins



L-pins



Flat washers



Spring washers



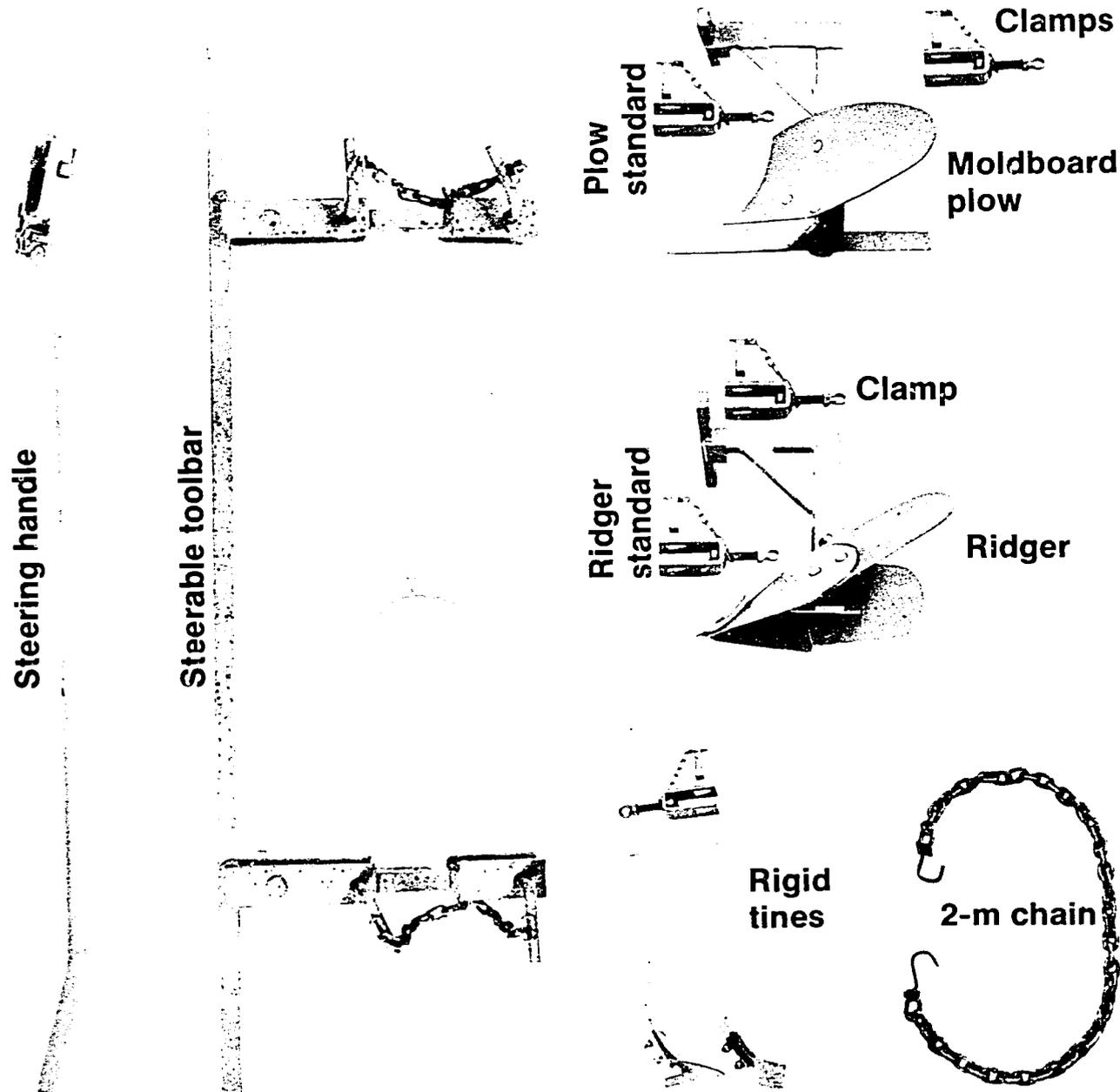
Bolts



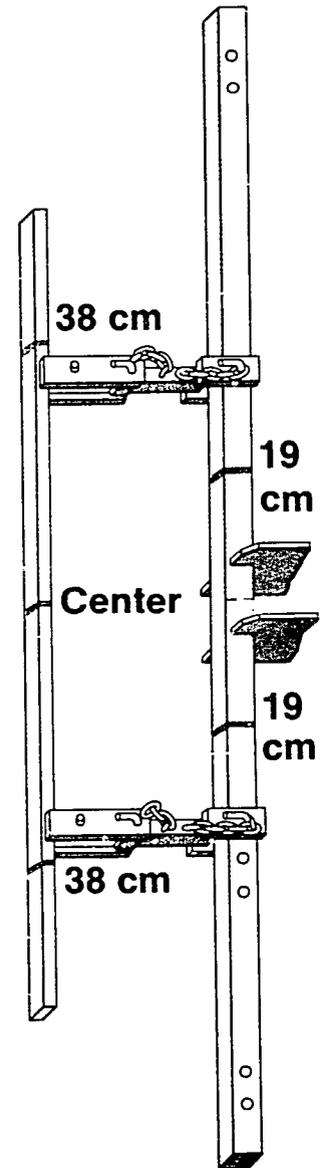
Nuts



Attachments for cultivation



These markings show the positions of the attachments

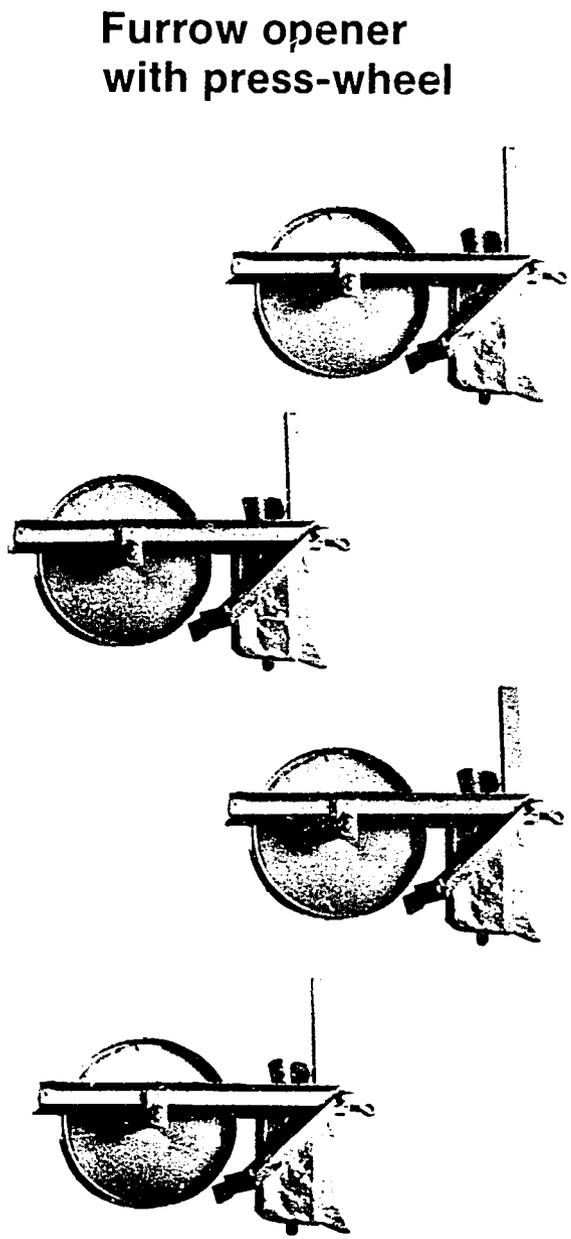


Attachments for sowing

Wooden bowls

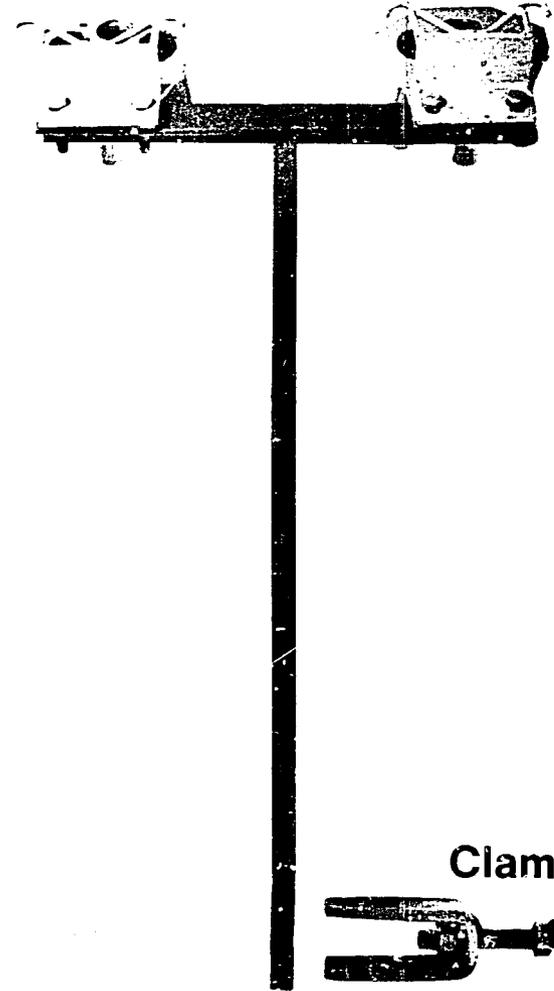


Single-row bowl



The T-stand

T-stand

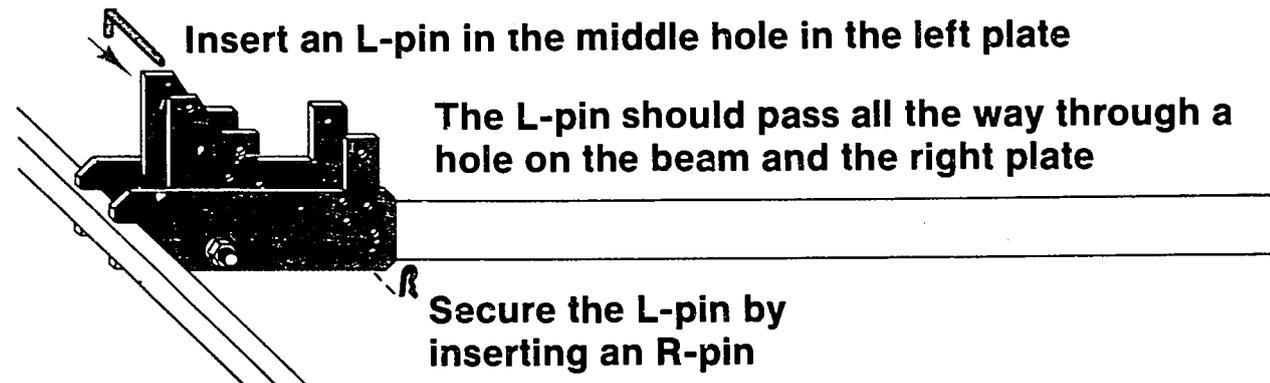
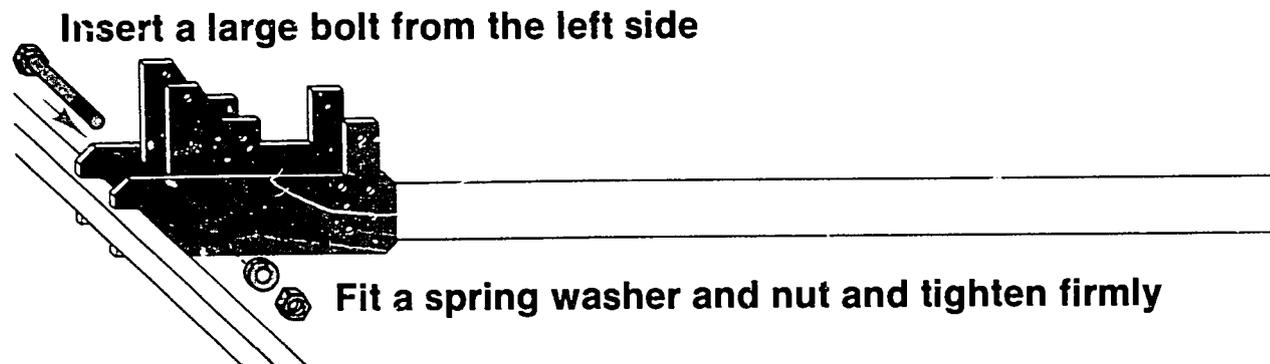
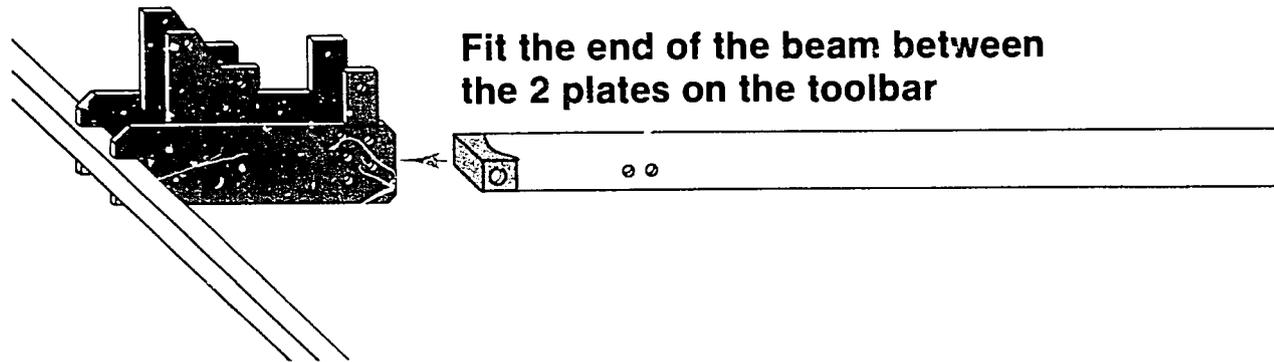


Clamp

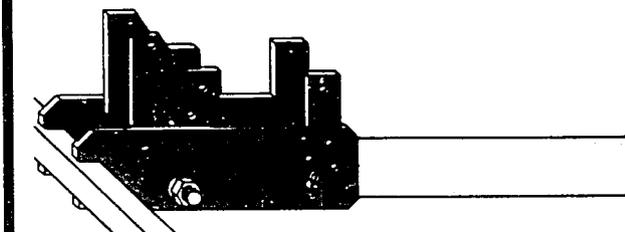
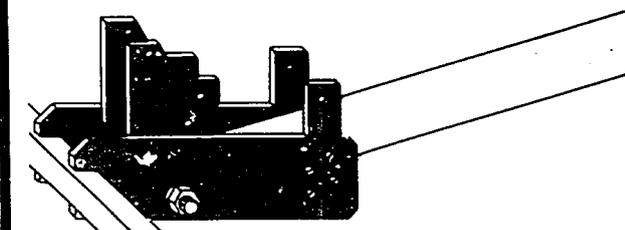
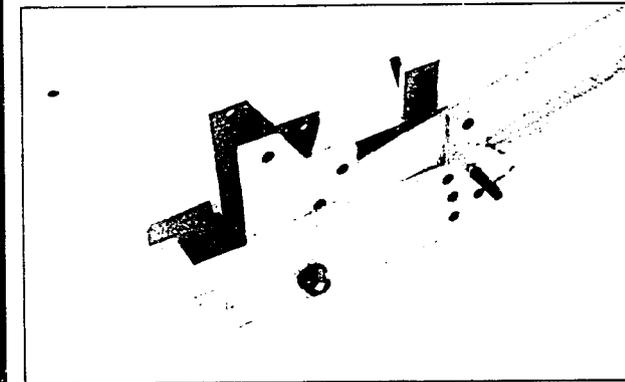


AGRIBAR ASSEMBLY

Fixing the beam to the toolbar

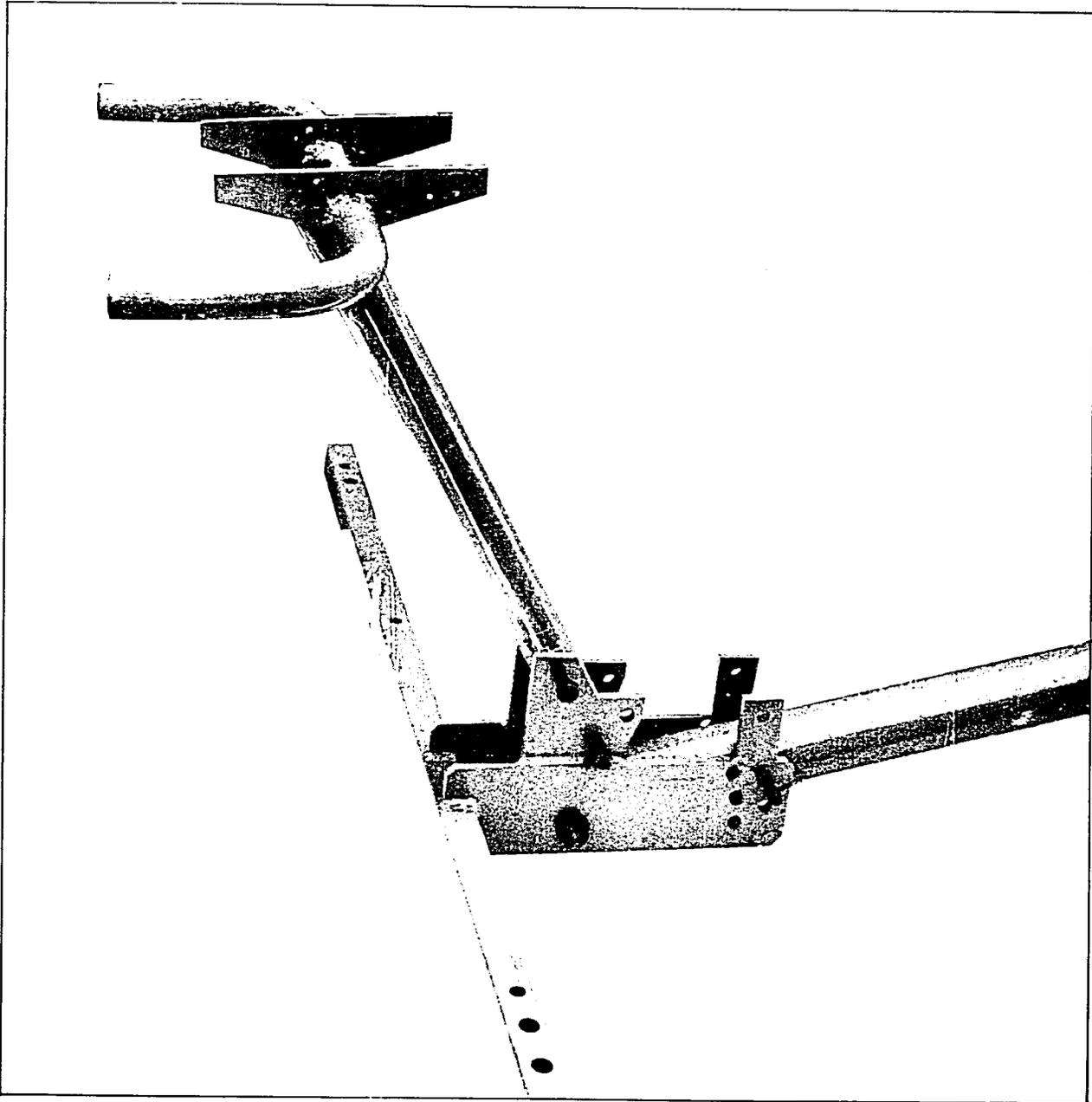
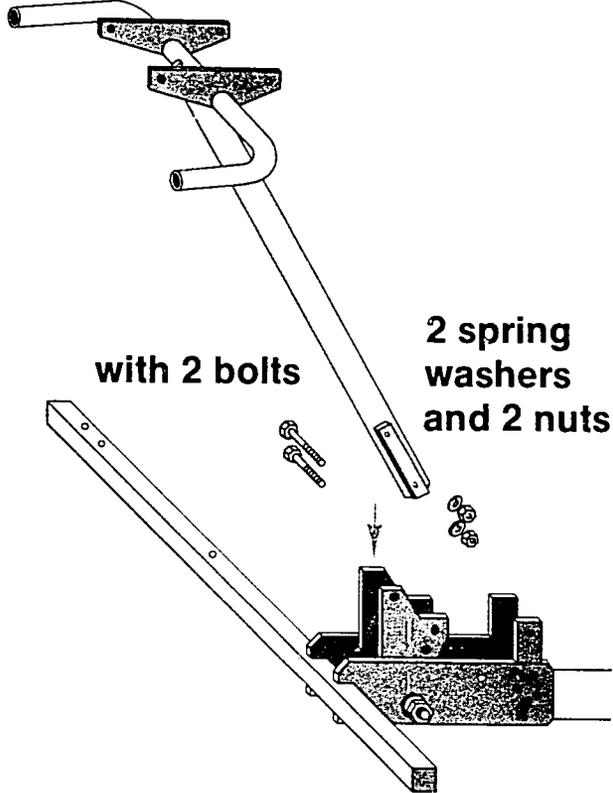


Adjusting the pitch

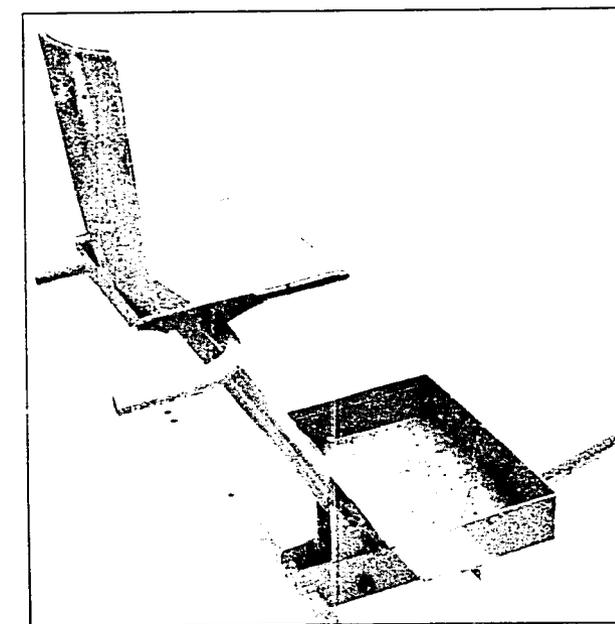
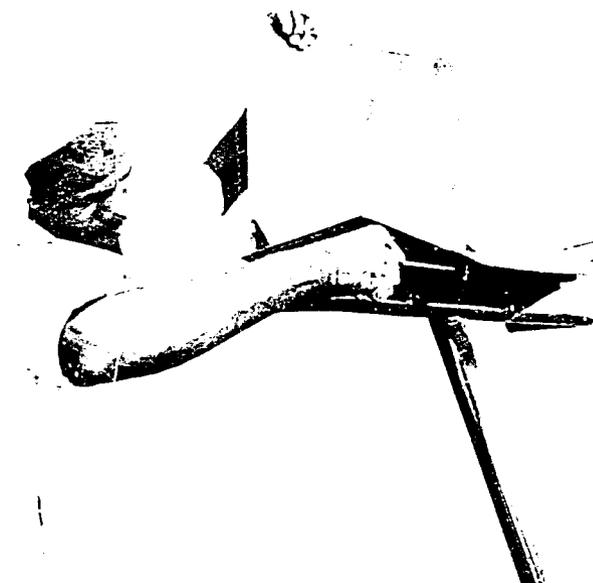
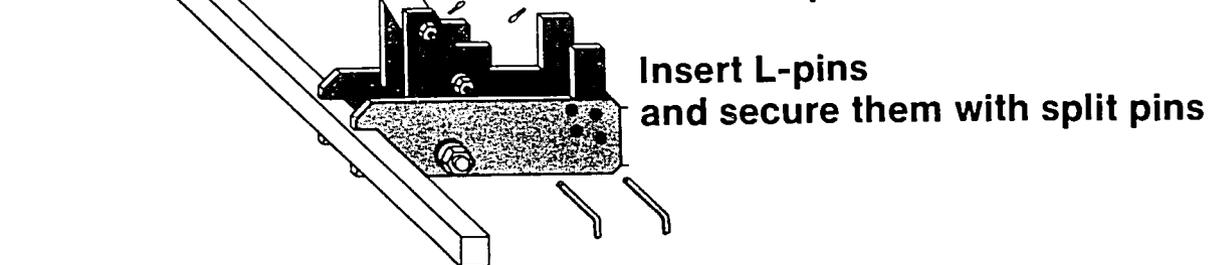
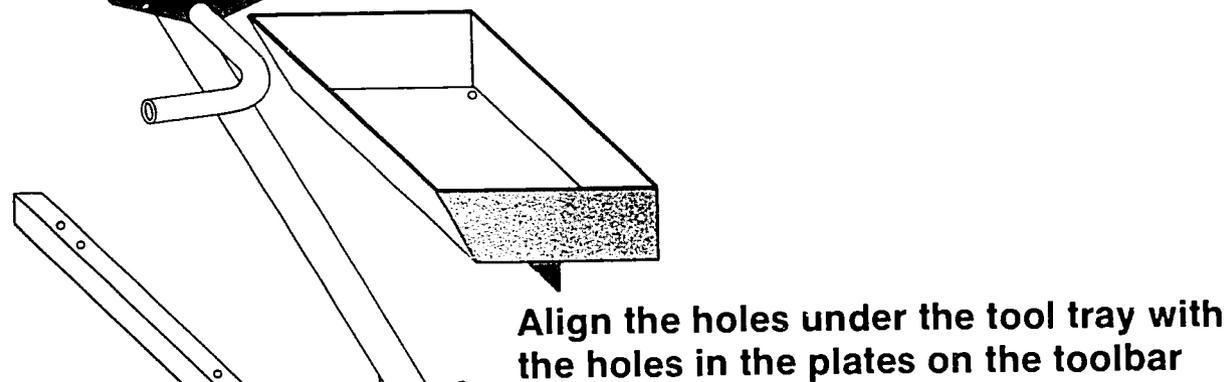
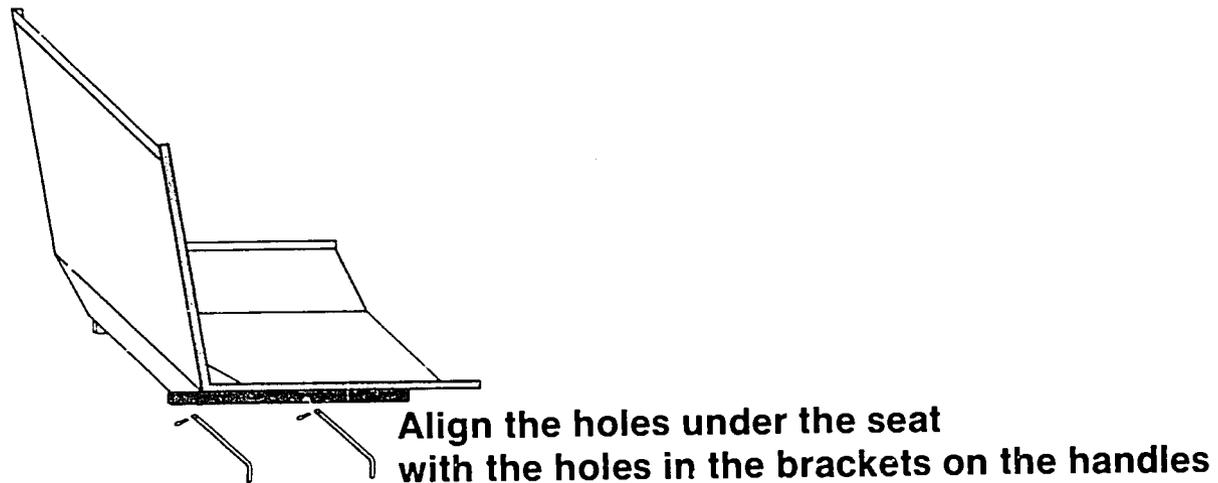


Fixing the handle assembly

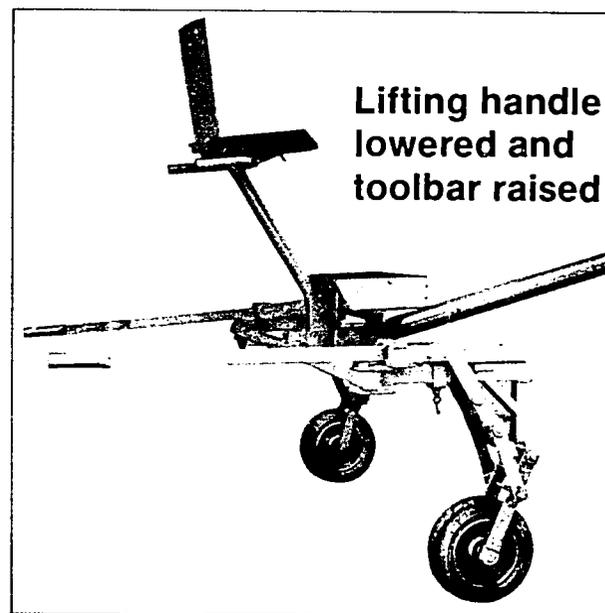
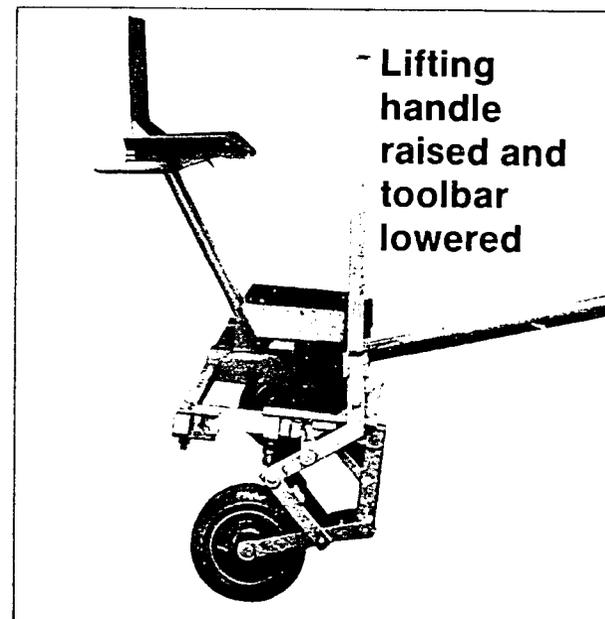
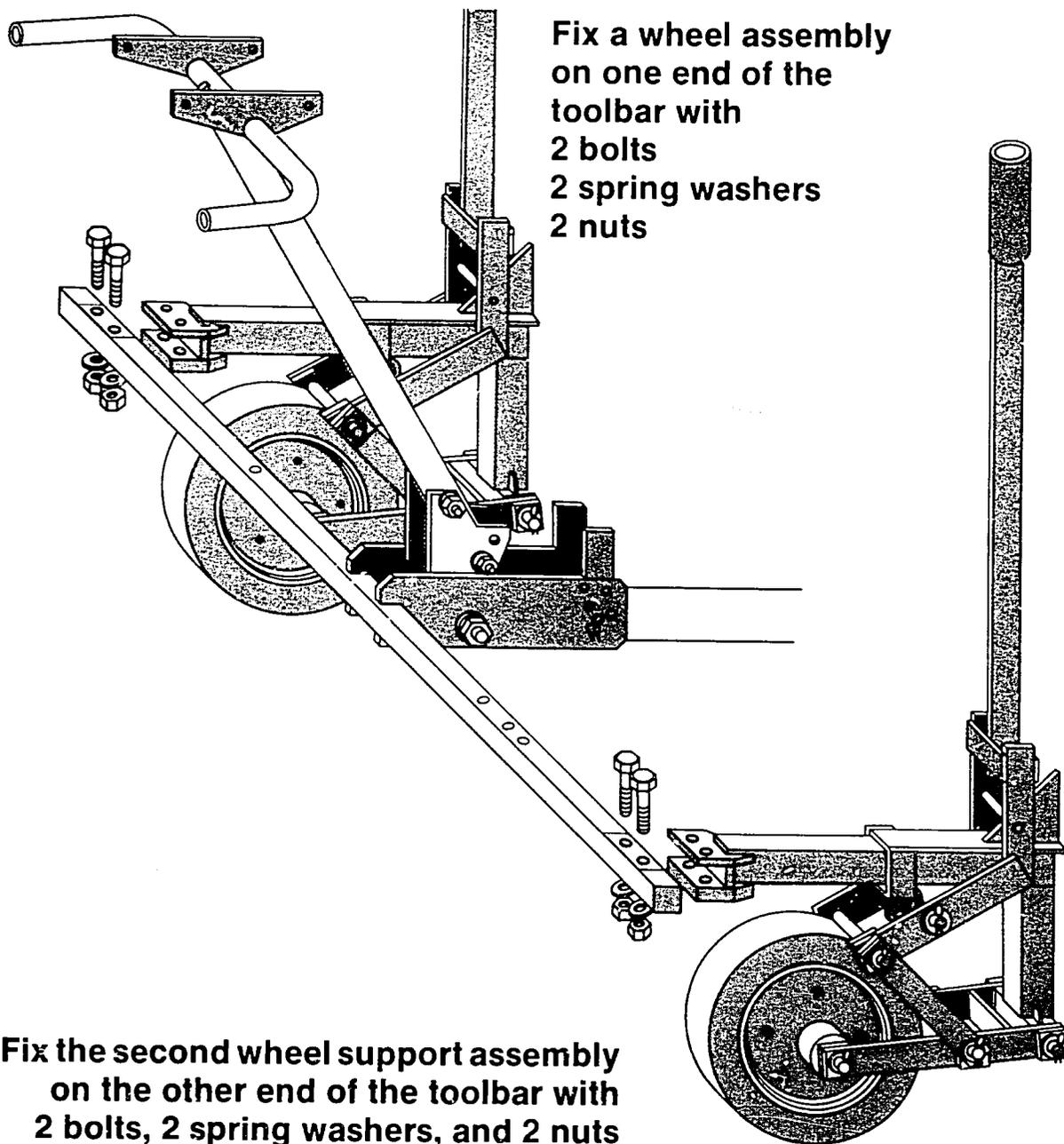
Fix the handle assembly to the plates



Fixing the seat to the tool tray



Fixing the wheel support assemblies

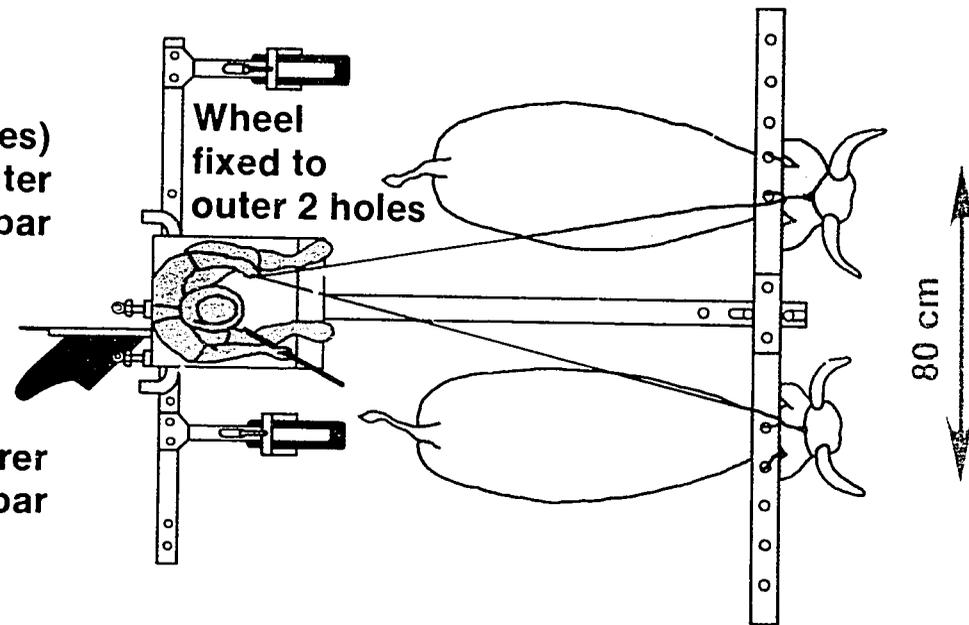


FLAT LAND: Preparation for plowing

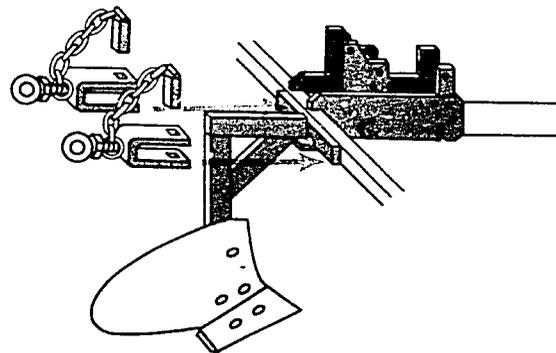
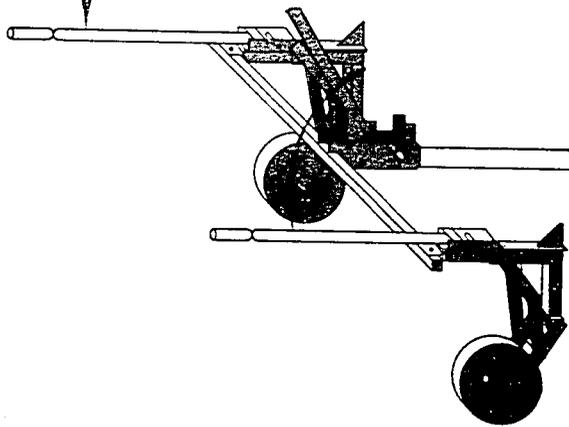
Plowing of flat land with a single moldboard plow

Fix the right-hand plow 10-cm (4 inches) to the right of the center of the toolbar

Fix the right wheel nearer to the center of the toolbar

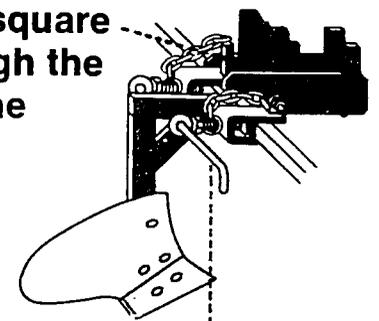


Raise the toolbar by pulling the handles down fully



Slide one clamp on either side of the plow standard

Insert the square pins through the holes on the clamps

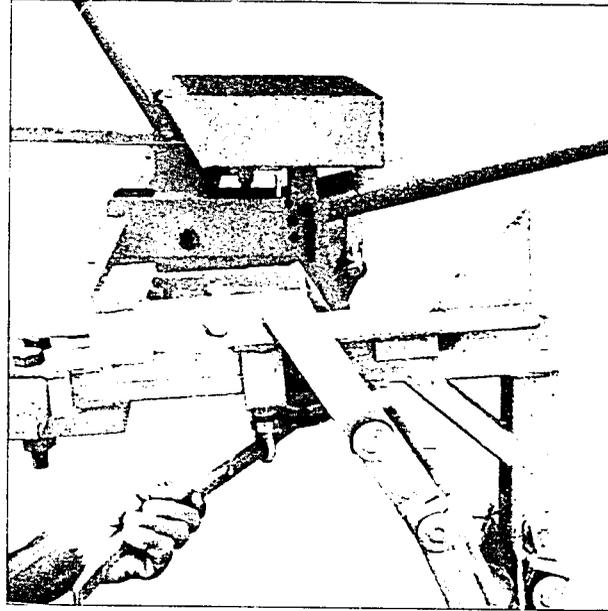
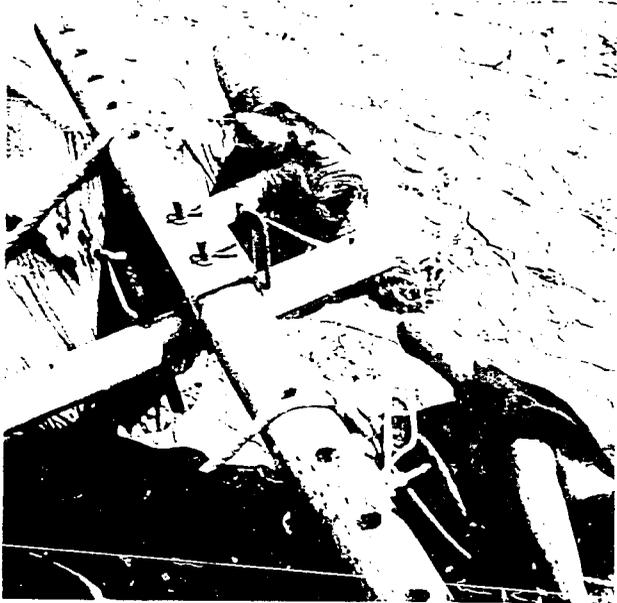


Tighten the eye bolts firmly with a tommybar

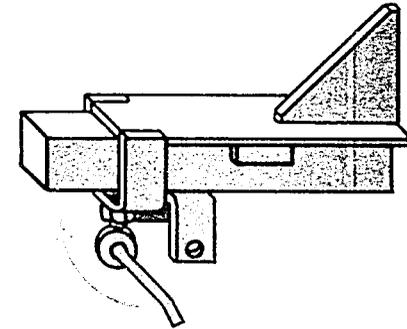
Hitching

Depth adjustment

Hitch the bullocks 80 cm apart

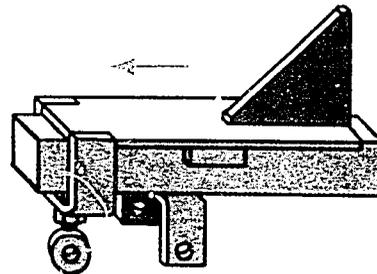


Loosen the eye bolts
on either side of the
depth adjusters

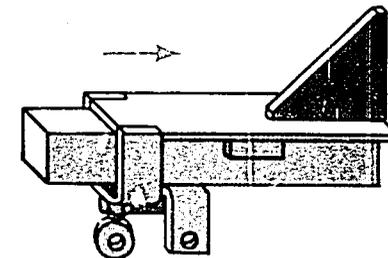


with the tommybar

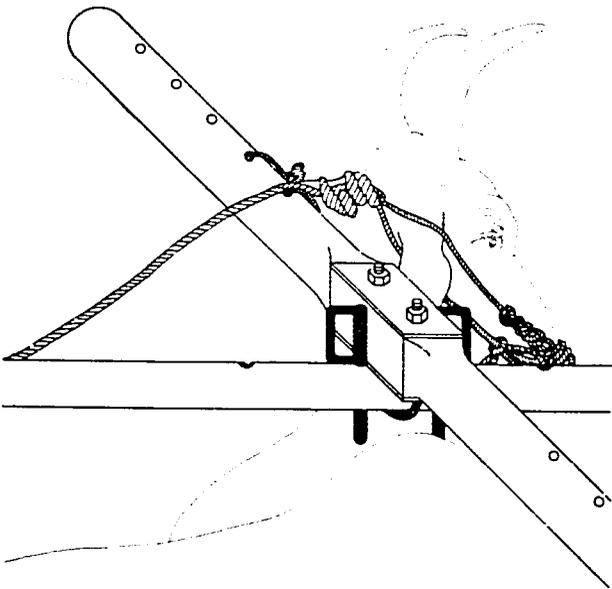
Slide the depth adjusters:



backwards to reduce
the depth of working

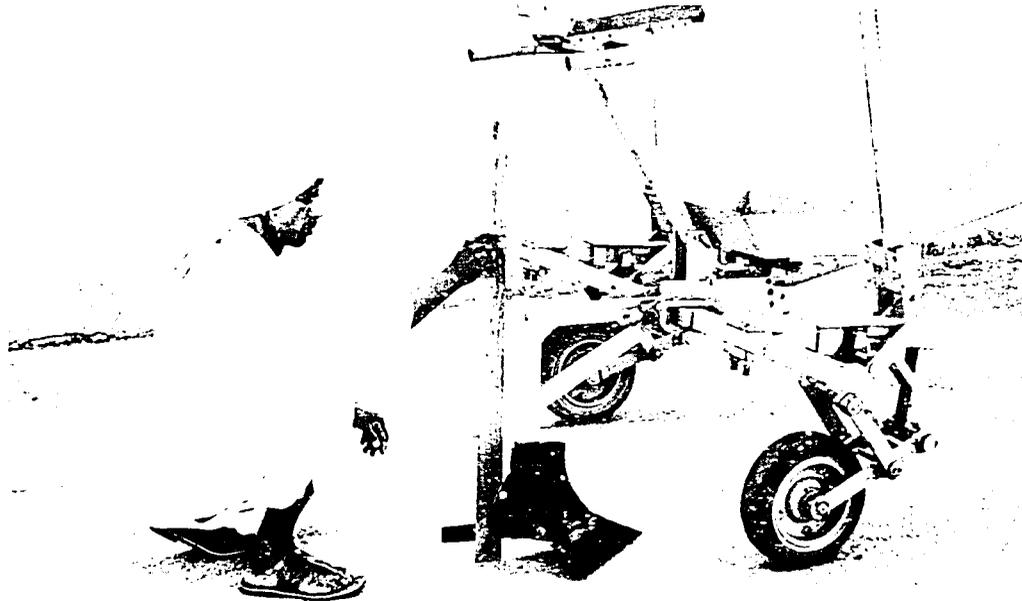
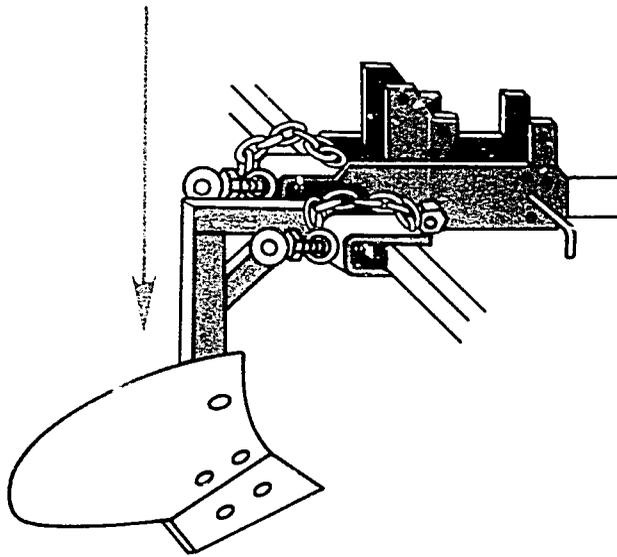


forwards to increase
the depth of working

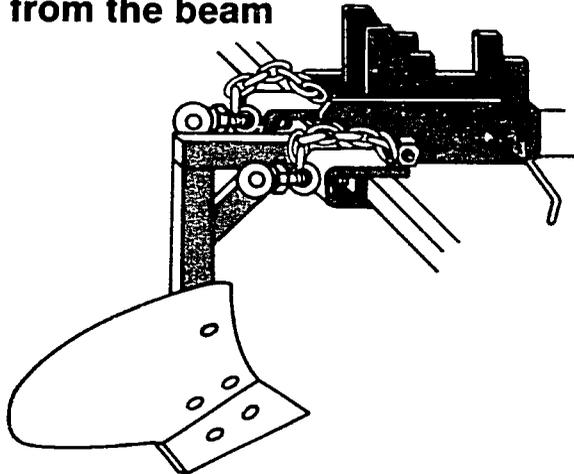


Pitch adjustment

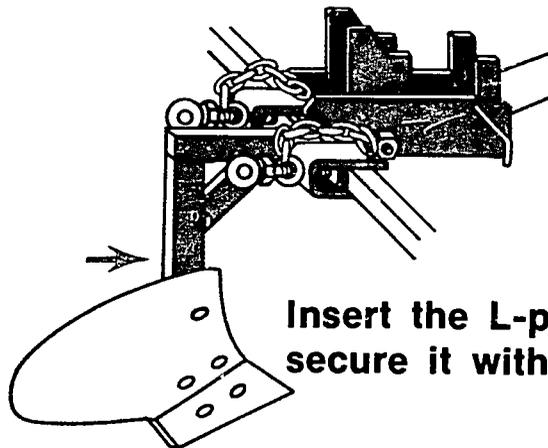
Check if the plow standard is vertical



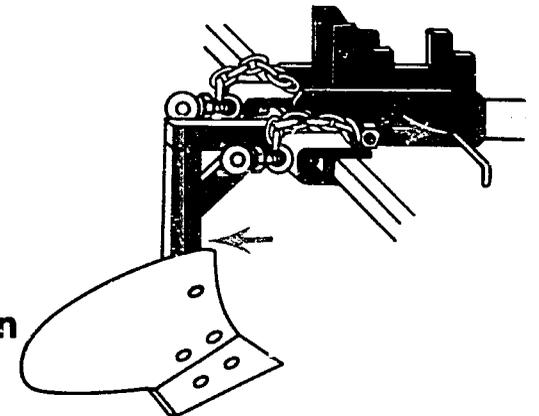
If the plow standard is not vertical, remove the L-pin from the beam



Align the hole in the beam with another hole on the plates to make the plow standard vertical

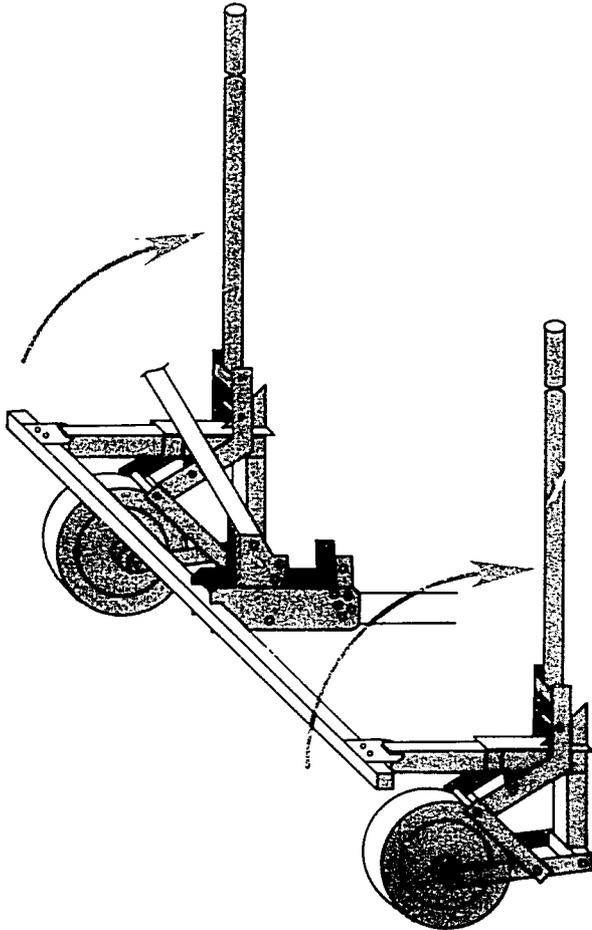


Insert the L-pin and secure it with an R-pin

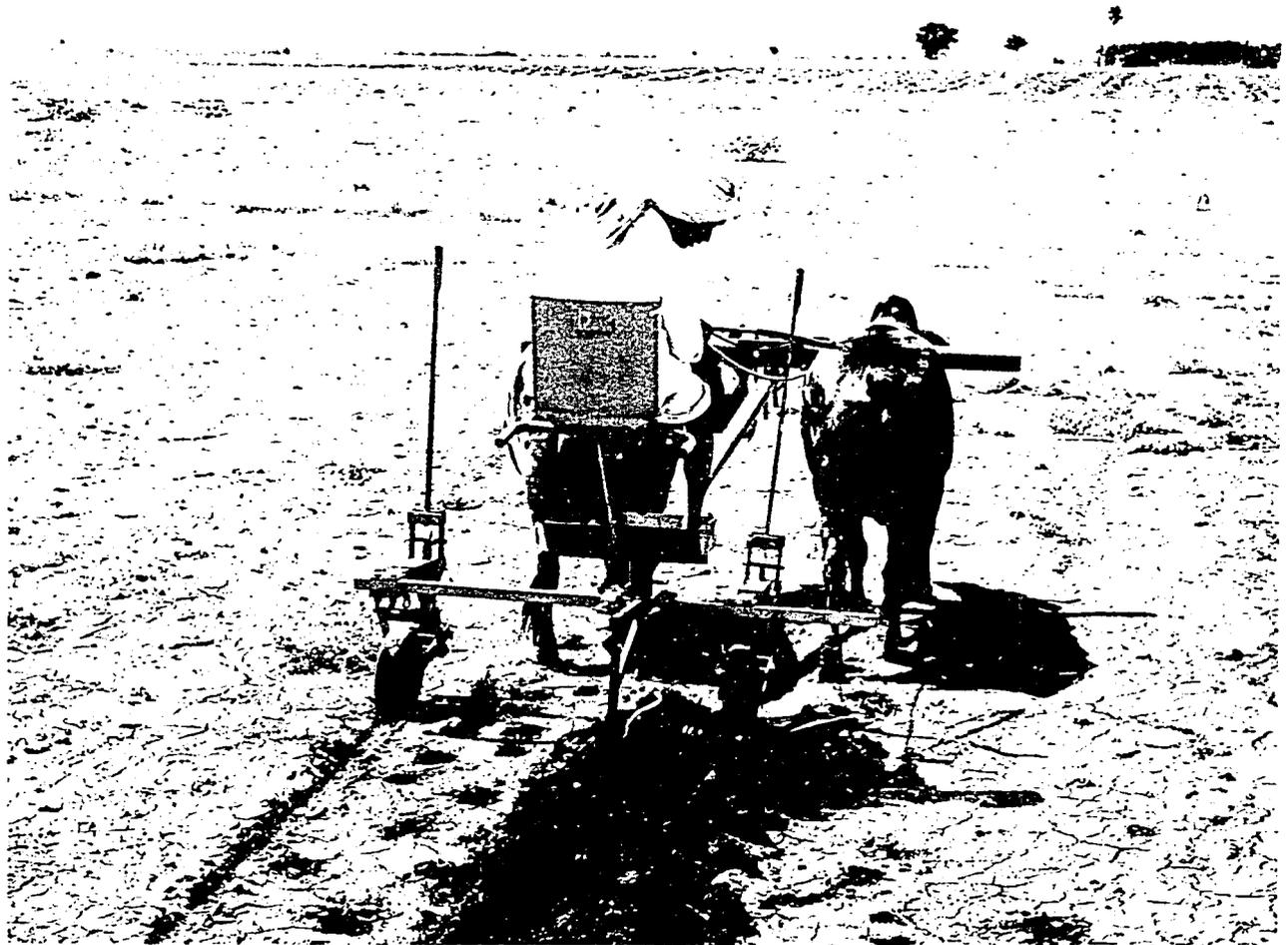


Take the Agribar to the field, lower the toolbar and begin plowing

Lower the toolbar by
lifting the handles

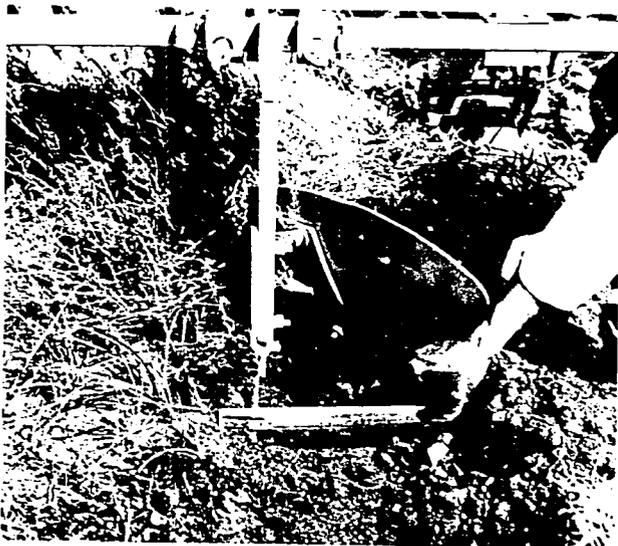


Check the depth of
working, and the pitch,
and make adjustments if
necessary

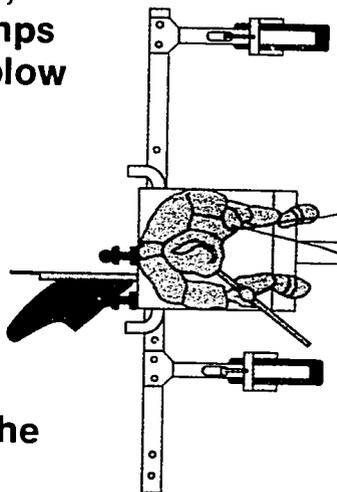


Width of cut

Check the width of cut



To reduce the width of cut and lighten the load on the bullocks, loosen the clamps and move the plow slightly to the right



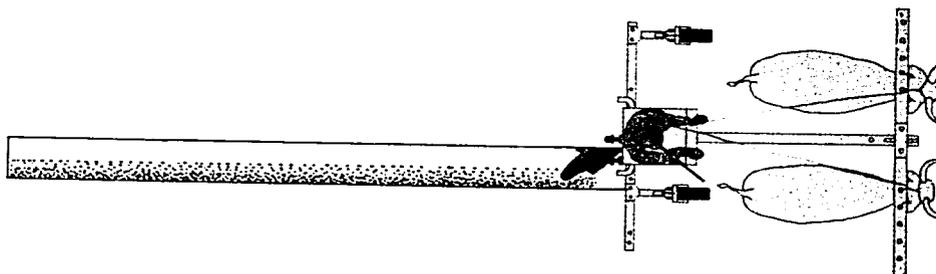
Firmly tighten the clamps

FLAT LAND plowing

Operating the plow

1st pass

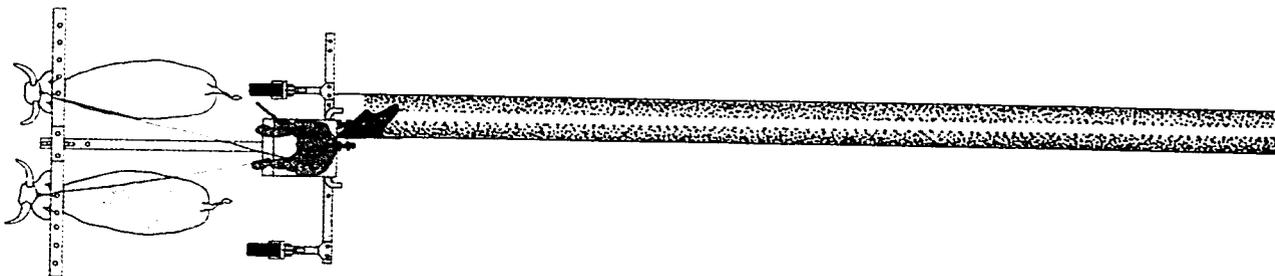
Plow the 1st pass in a straight line



Before turning, lift the plow fully

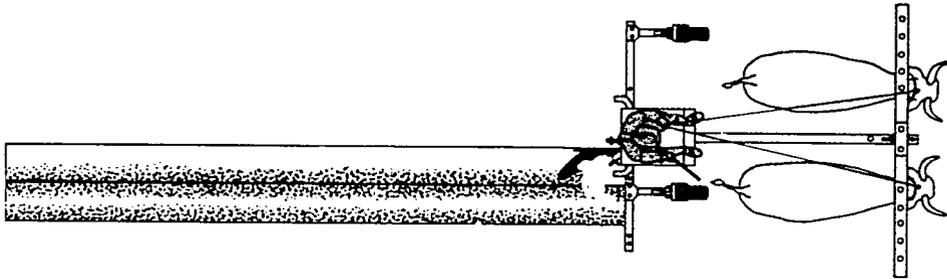
2nd pass

Position the right wheel in the furrow, and lower the toolbar



3rd pass

Position the right wheel on the plowed land



Caution

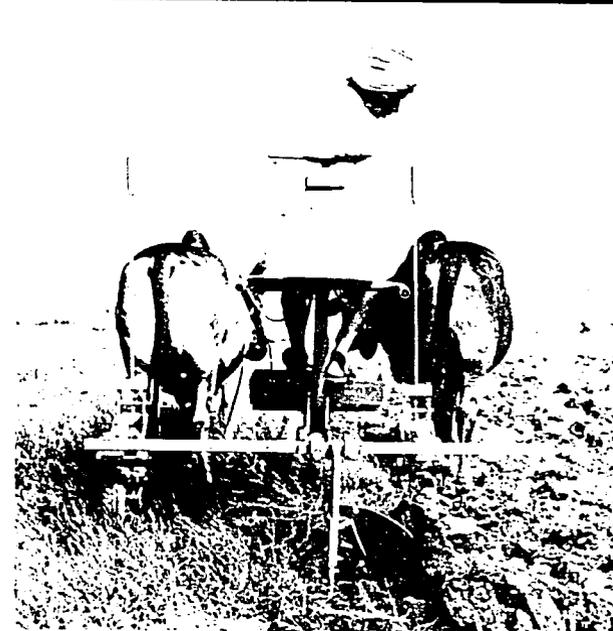
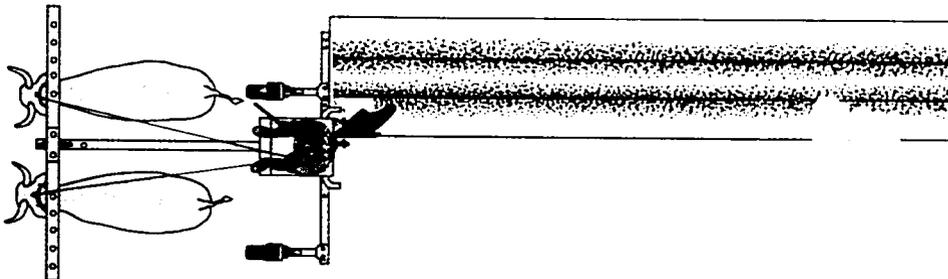
Select the right width and depth of plow to avoid straining the bullocks.

Lift the toolbar fully before turning.

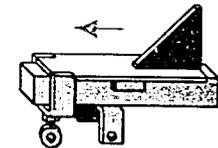
Plow when the soil is in good condition to avoid straining the bullocks.

4th pass

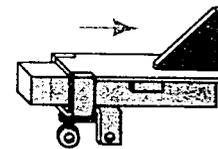
The toolbar is not level when the right wheel is on the plowed land ...



so level the toolbar by sliding the depth adjusters ...



backwards to reduce the depth

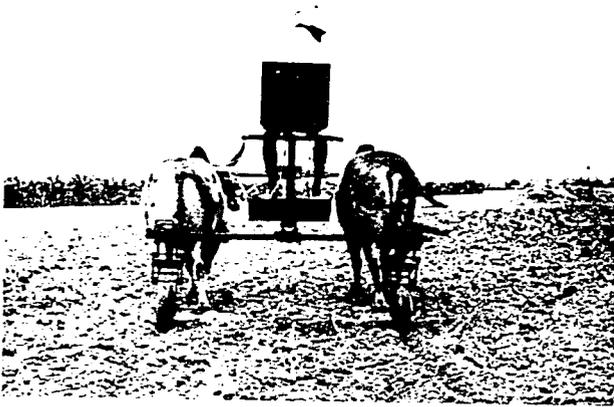


or forwards to increase the depth

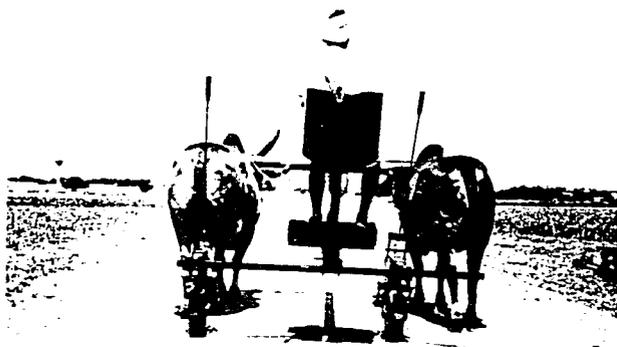
FLAT LAND: Cultivation with rigid tines

Position of the wheels

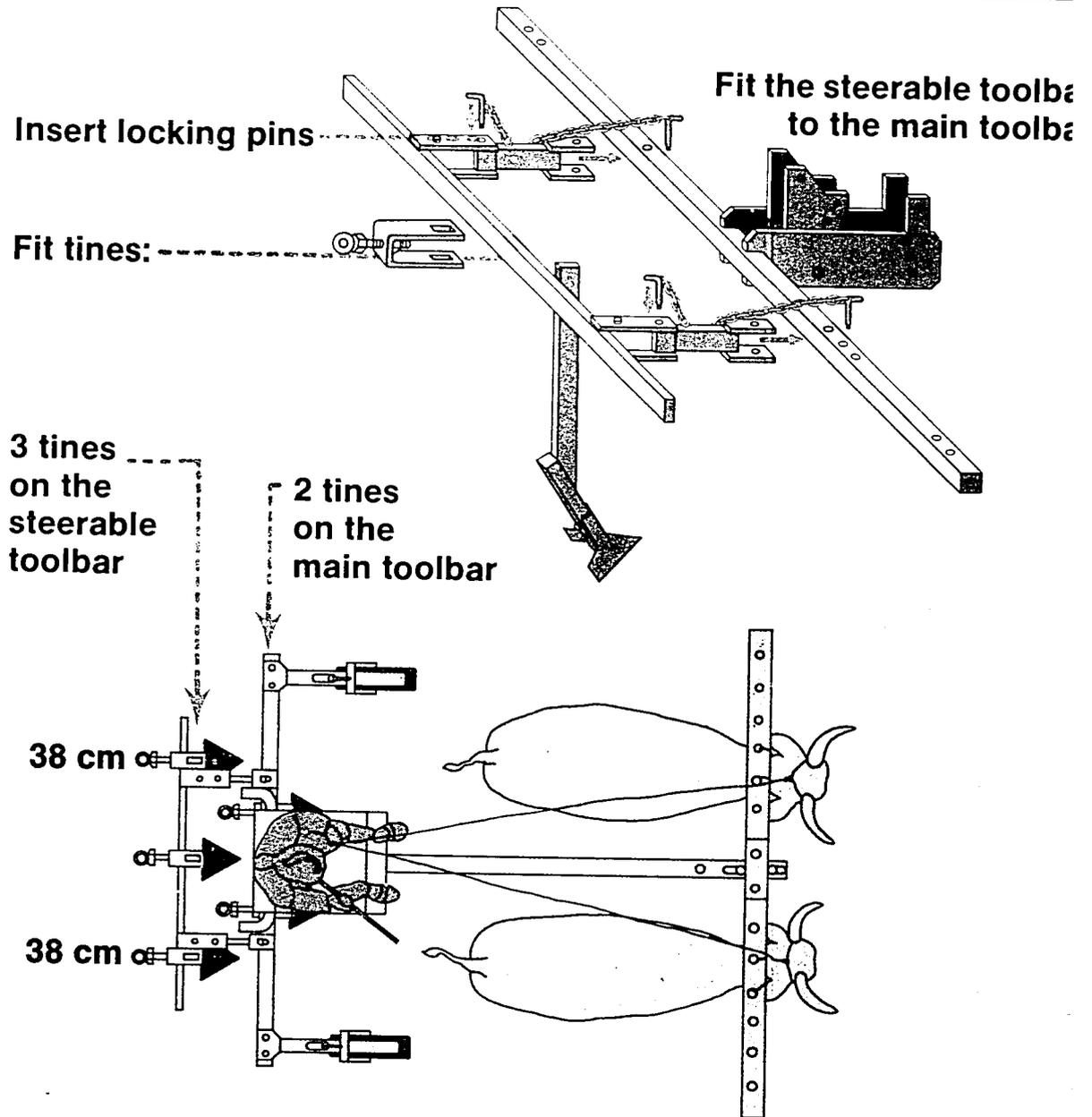
For cultivation, the right wheel can be at end of the toolbar ...



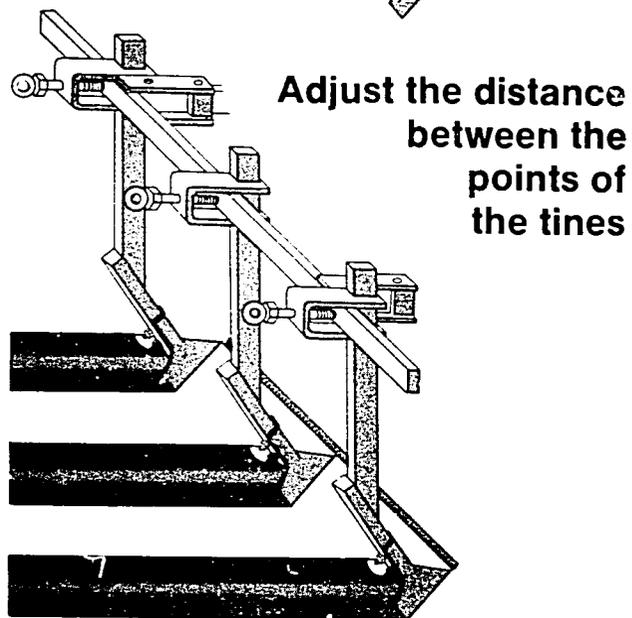
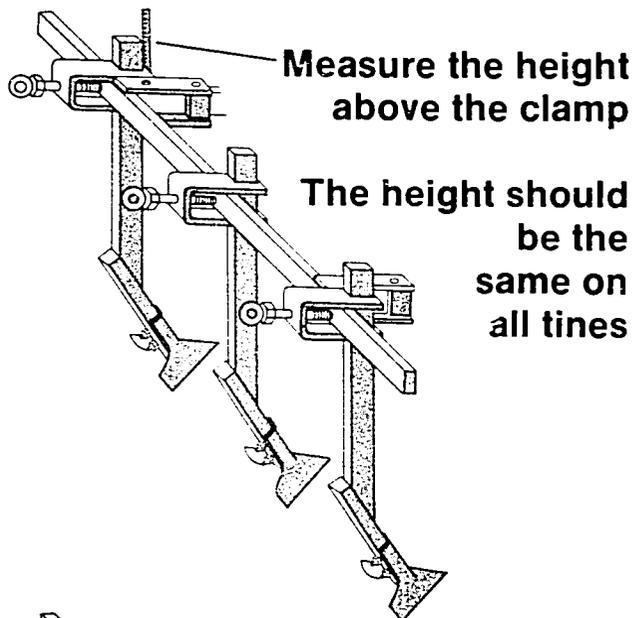
or near the center of the toolbar. This position is preferable because it avoids running the wheels over cultivated soil



Cultivation with rigid tines



Checking the position of the tines

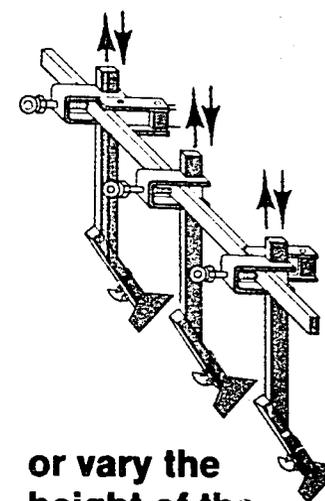
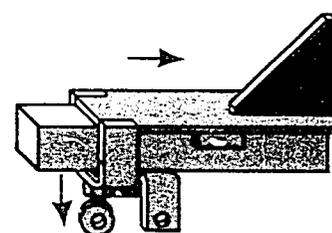
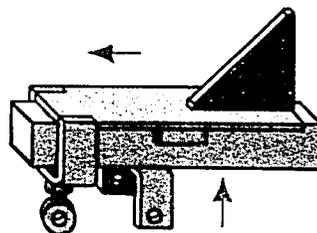


Checking the depth adjustment of the tines



Start cultivating from one end of the field and observe the depth of working

If necessary adjust the depth of working

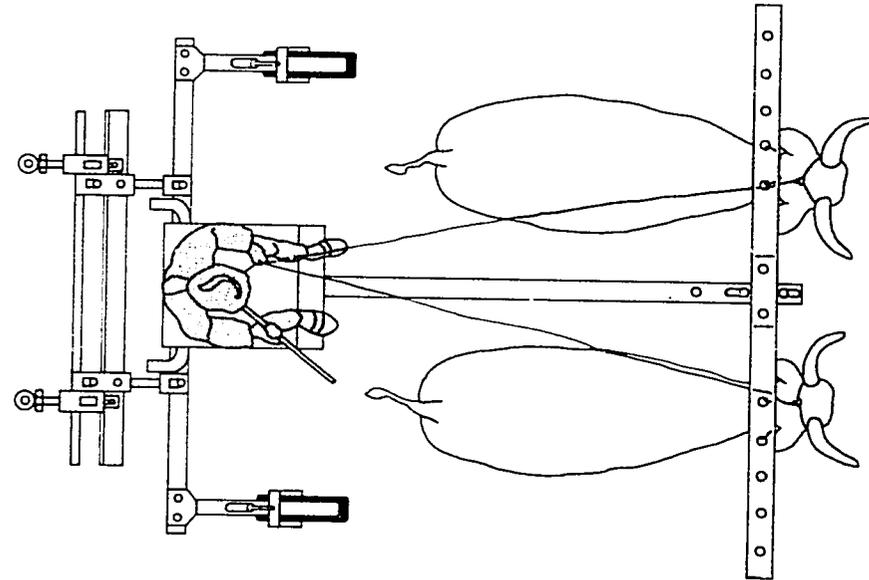


FLAT LAND: Cultivation with a blade harrow

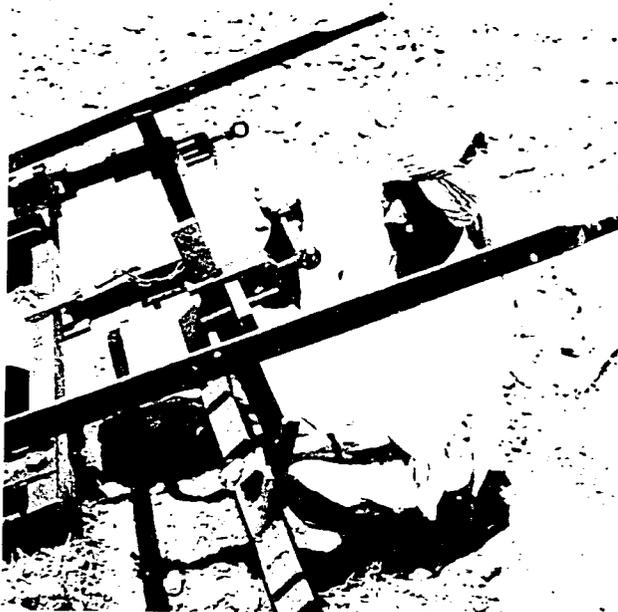
Fit a steerable toolbar to the main toolbar

Insert locking pins

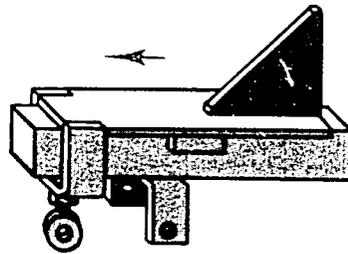
Fit a 120-cm blade harrow to the center of the steerable toolbar



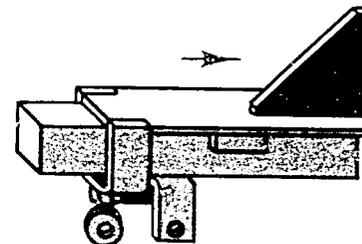
Fix the blade harrow with 2 clamps



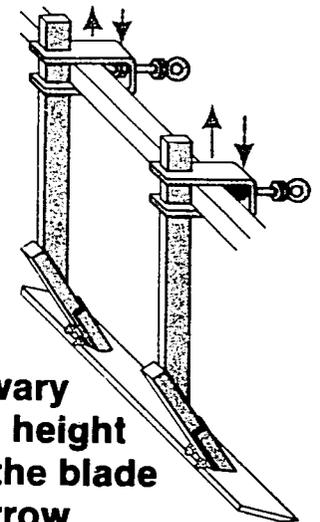
If necessary, adjust the depth of working



Slide the depth adjusters backwards to reduce the depth of working ...



Slide the depth adjusters forwards to increase the depth of working ...



or vary the height of the blade harrow



If the depth is correct,
complete the cultivation of
the field

Caution

*When turning at the end of a
pass, raise the toolbar fully
to avoid damage to the
attachments.*

BROADBEDS

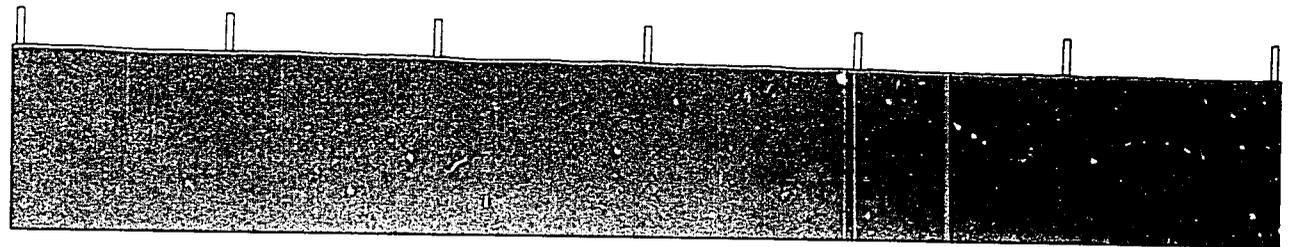
The broadbed-and-furrow system

This system of cultivation is good for deep black soils (Vertisols)

Crops are grown on broad seedbeds separated by furrows 150 cm apart



Marking the slope of the land



The broadbeds should be on a slope of about 0.4-0.8%
Mark the key line with pegs (or lime)

If the broadbeds are completely level, there will be no drainage



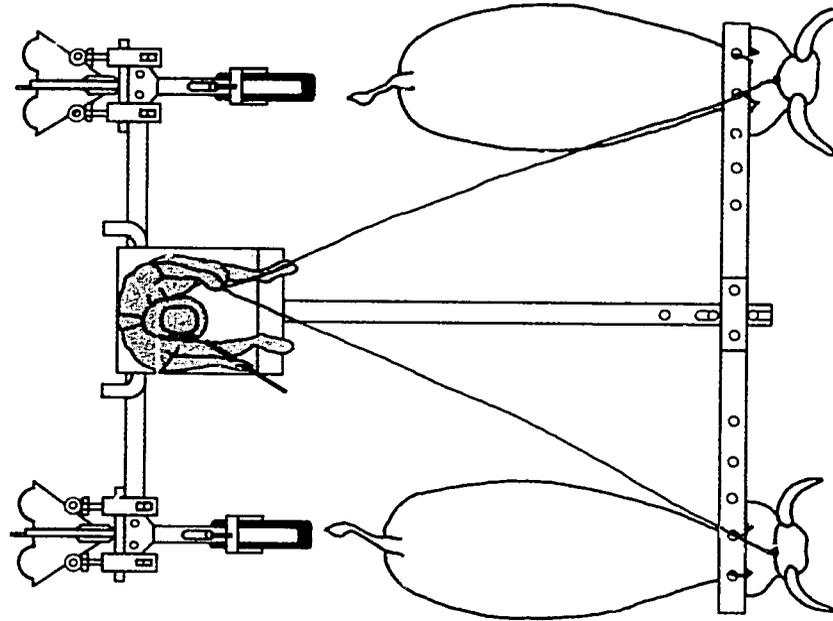
If the broadbeds slope too much the water will run off, causing erosion



BROADBEDS: Shaping

Making broadbeds for the first time

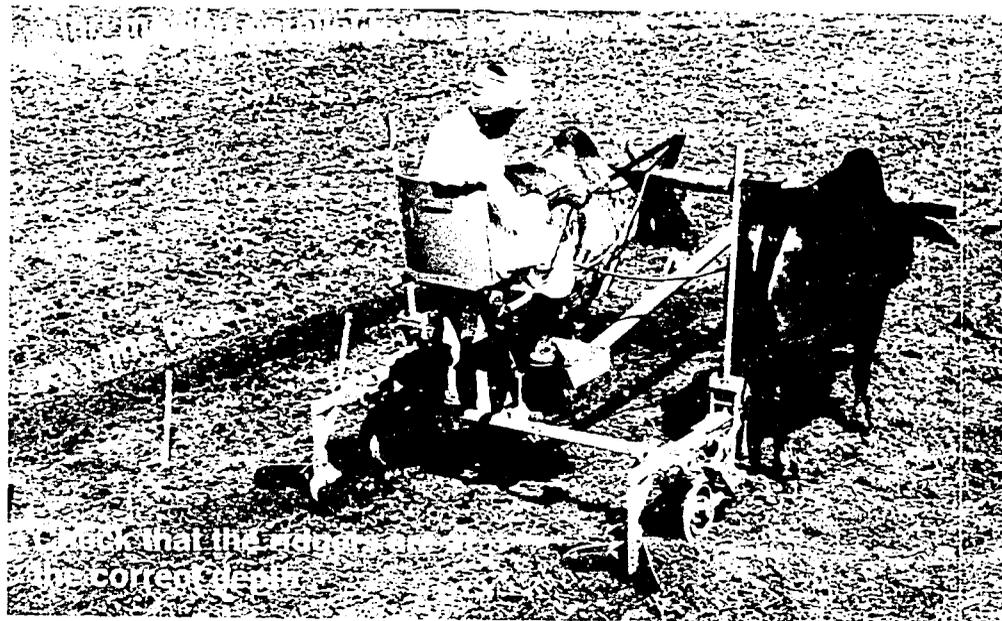
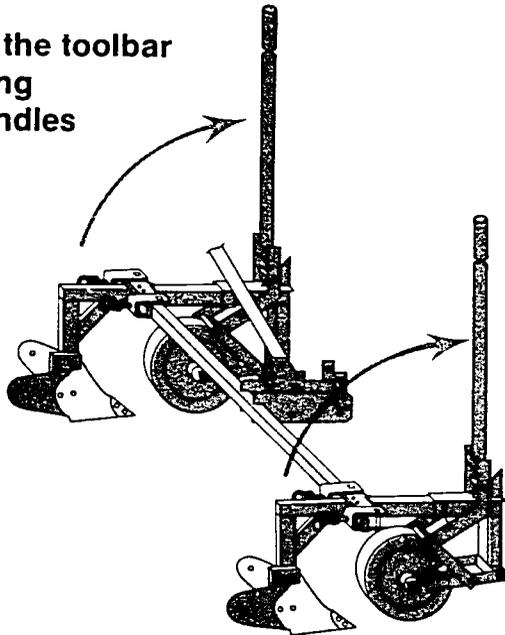
Fit 2 ridgers on the toolbar directly behind the wheels



Hitch the bullocks 150 cm apart directly ahead of the wheels

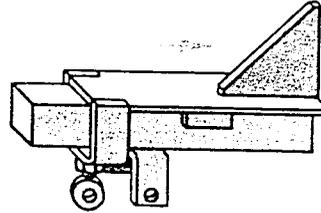
Take the Agribar to the field

Lower the toolbar by lifting the handles

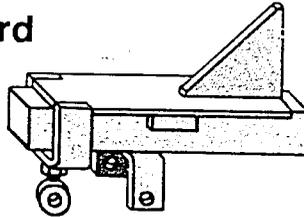


Adjusting the depth and pitch

Slide the depth adjusters forward to increase the depth of working

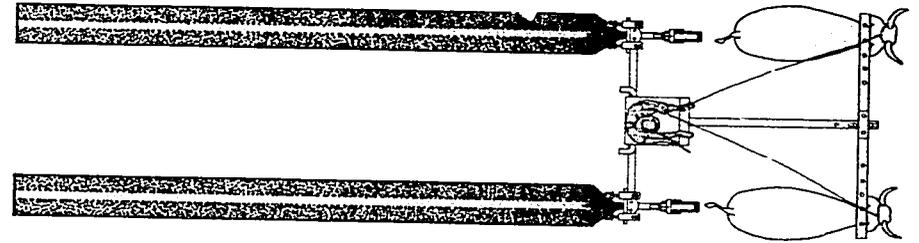


Slide the depth adjusters backward to reduce the depth of working



1st pass

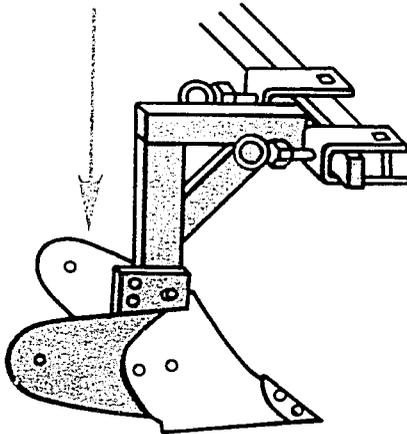
Continue moving parallel to the key line



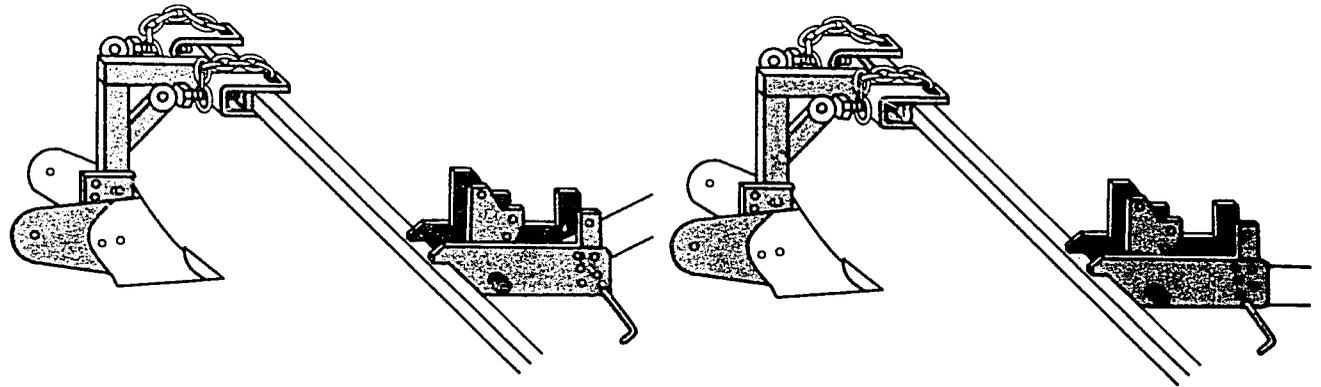
Lift the toolbar before turning

If necessary, adjust the pitch

If the ridger standard is not vertical ...

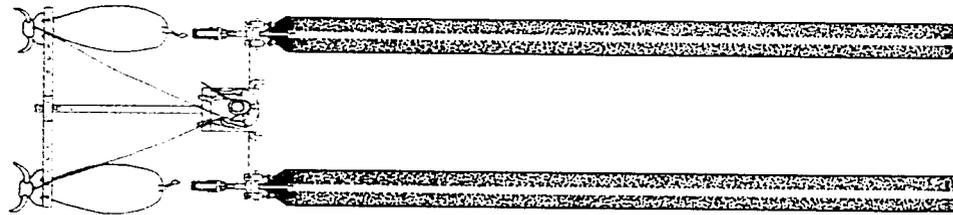
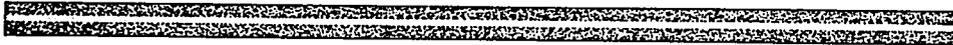


align the hole in the beam with another hole on the plate to make the ridger vertical



2nd pass

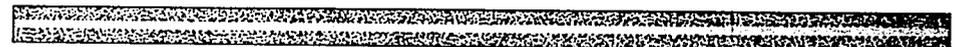
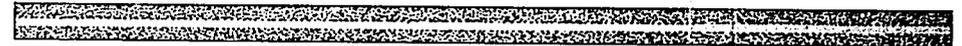
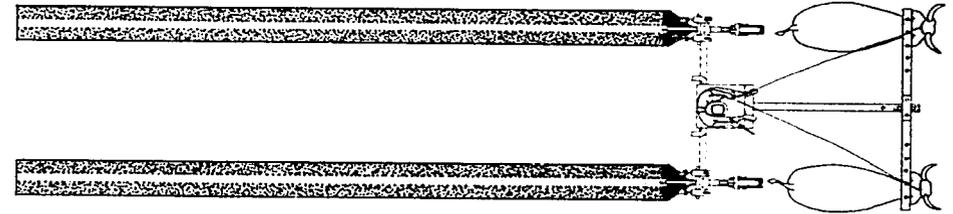
Position 1 wheel and 1 bullock in the previous furrow. Lower the toolbar and start moving



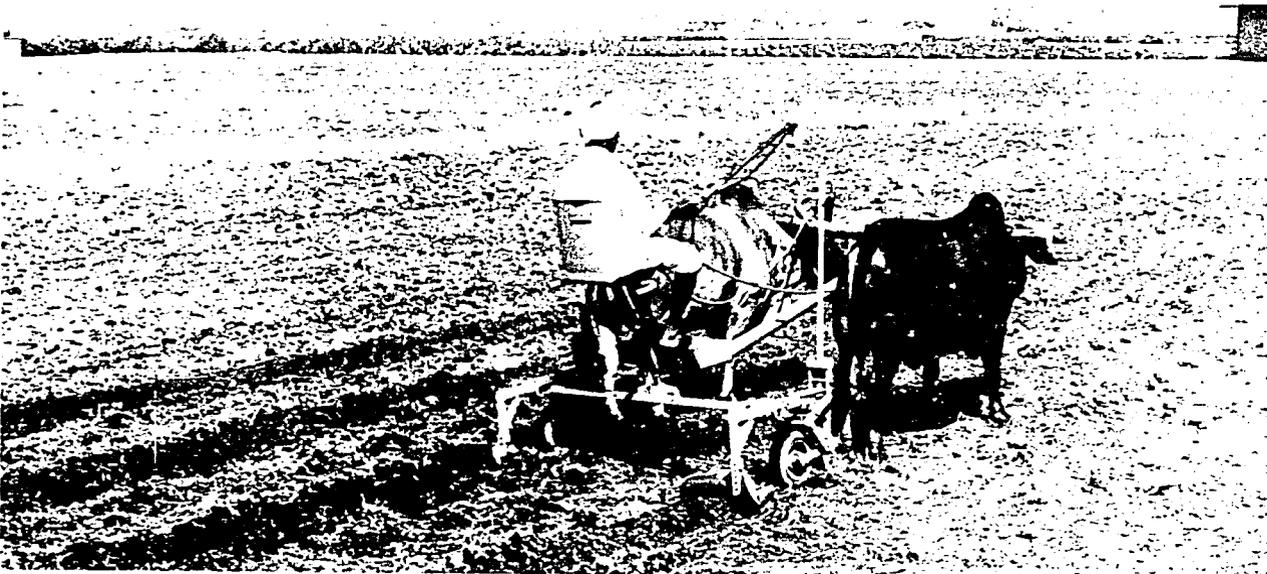
Lift the toolbar before turning

3rd pass

Position 1 wheel and 1 bullock in the previous furrow. Lower the toolbar and start moving



Lift the toolbar before turning



Caution

In the first pass be careful to follow the key line.

Work at a shallow depth so that the bullocks may walk in a straight line without strain.

Always turn outside the field or in the waterway,

and lift the toolbar fully before turning.

BROADBEDS

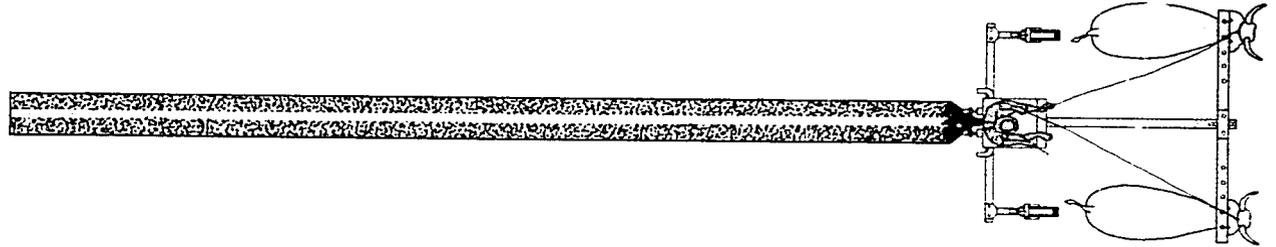
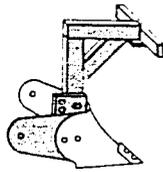


BROADBEDS: Plowing

Primary tillage on existing broadbeds is done in 4 passes

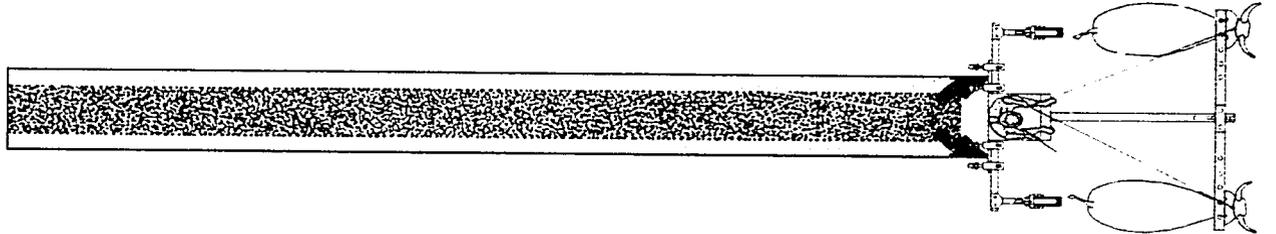
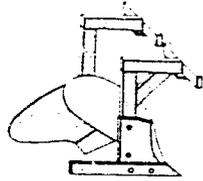
1 st pass

with 1 ridger



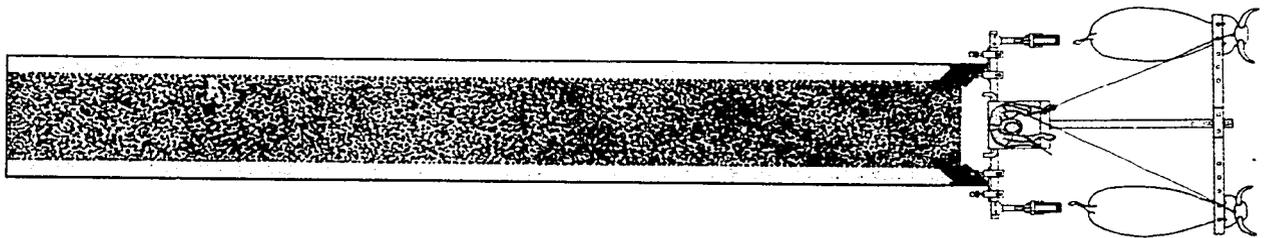
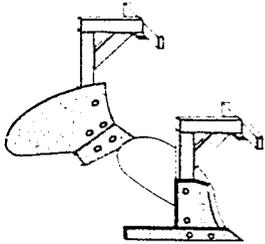
2 nd pass

with 2 plows



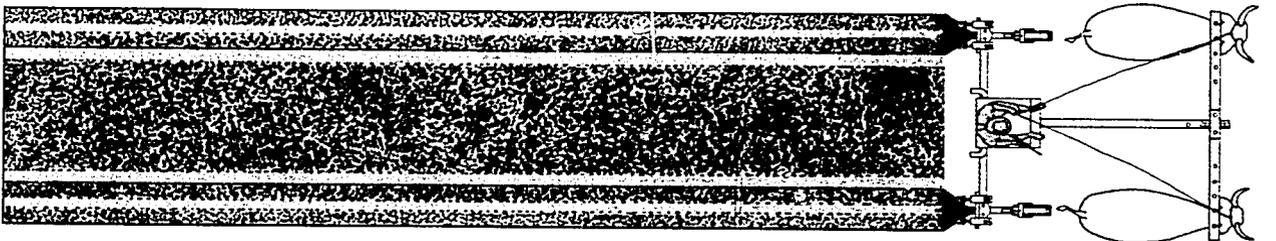
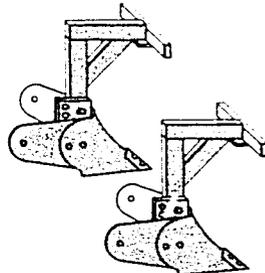
3 rd pass

with 2 plows



4 th pass

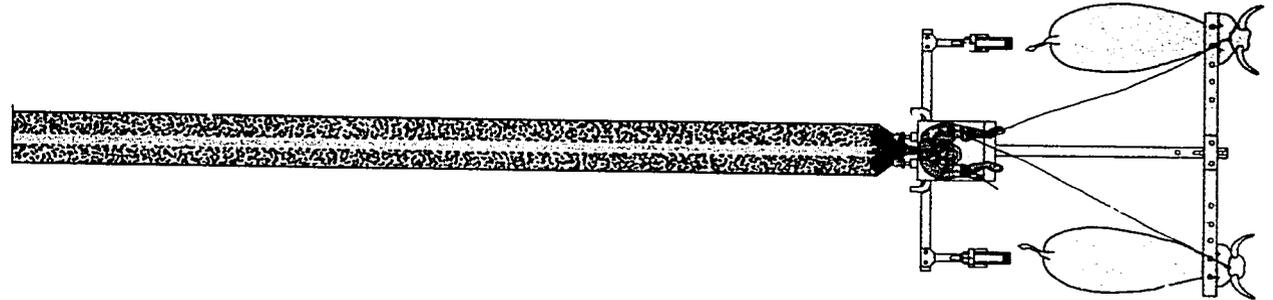
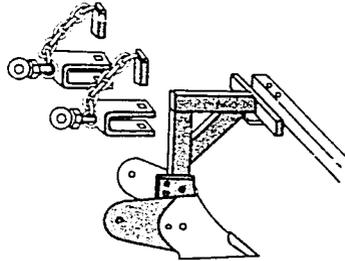
with 2 ridgers



1st pass

Opening the center of the broadbed

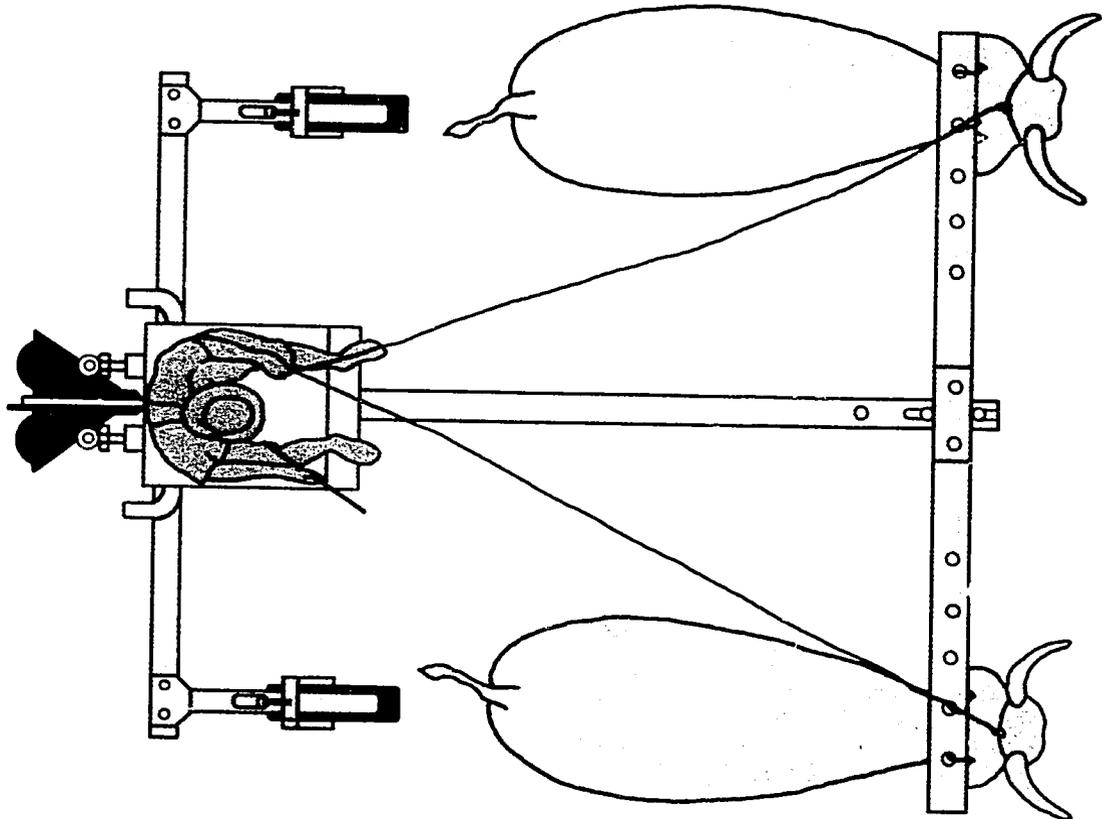
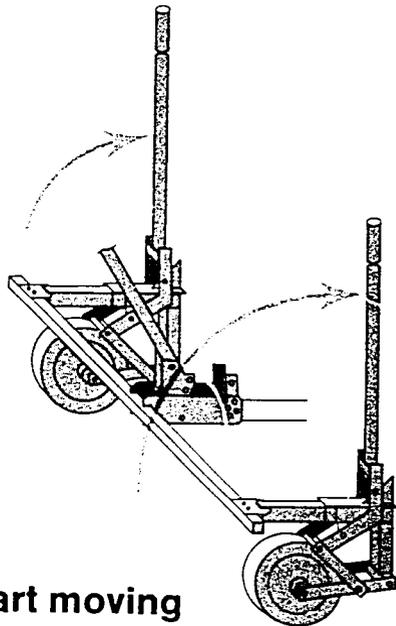
Fit the ridger in the center of the toolbar



Fit the wheels at the ends of the toolbar

Take the Agribar to the field

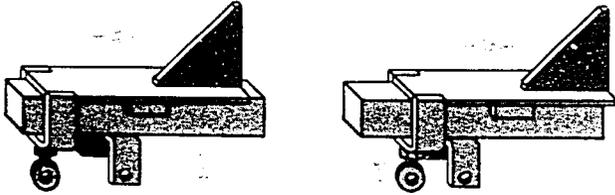
Lower the toolbar by lifting the handles ...



... and start moving

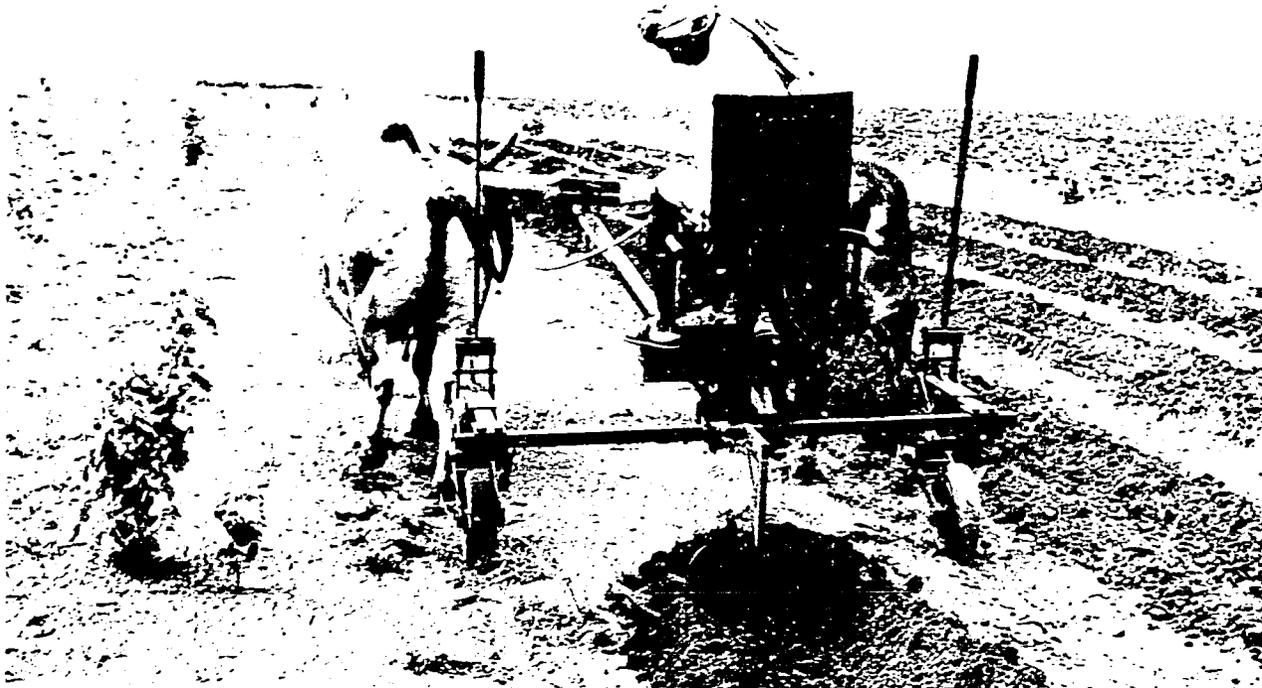
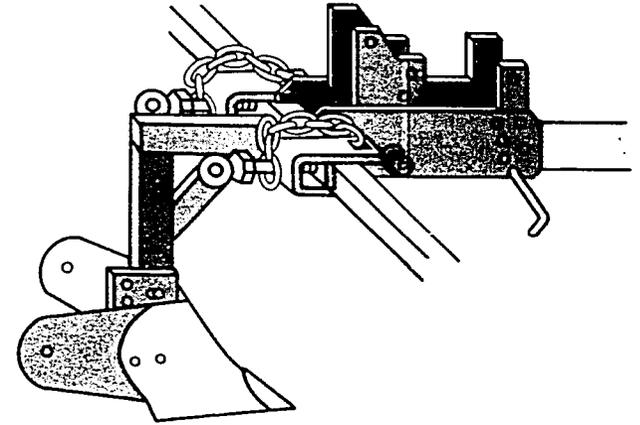
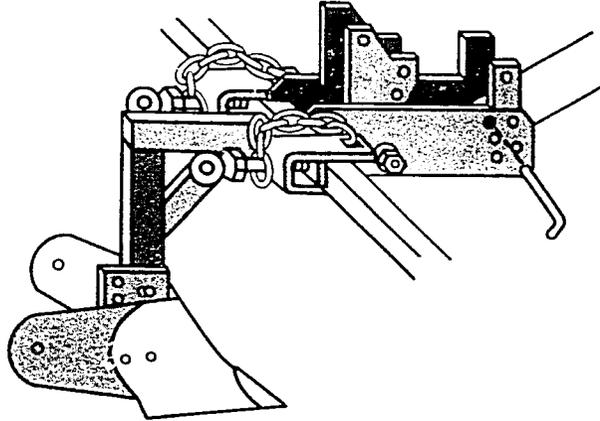
Adjusting the depth

Slide the depth adjusters to alter the depth of working



Adjusting the pitch

If the standard is not vertical, move the L-pin to another hole to change the pitch



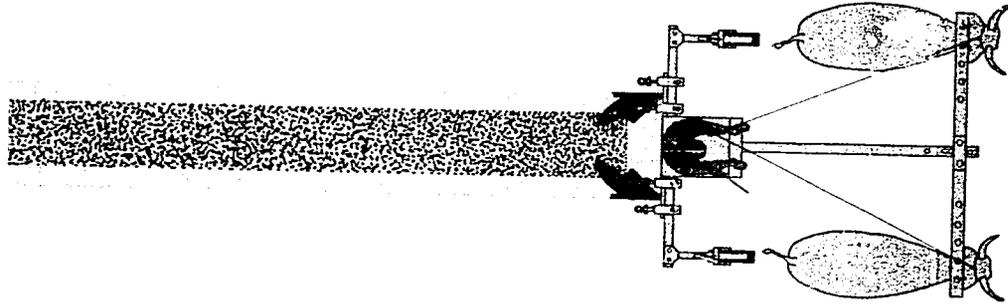
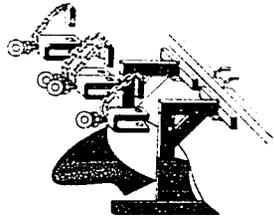
Complete making furrows in the center of the broadbeds throughout the field

2nd pass

Plowing at 70-cm spacing

Remove the ridger

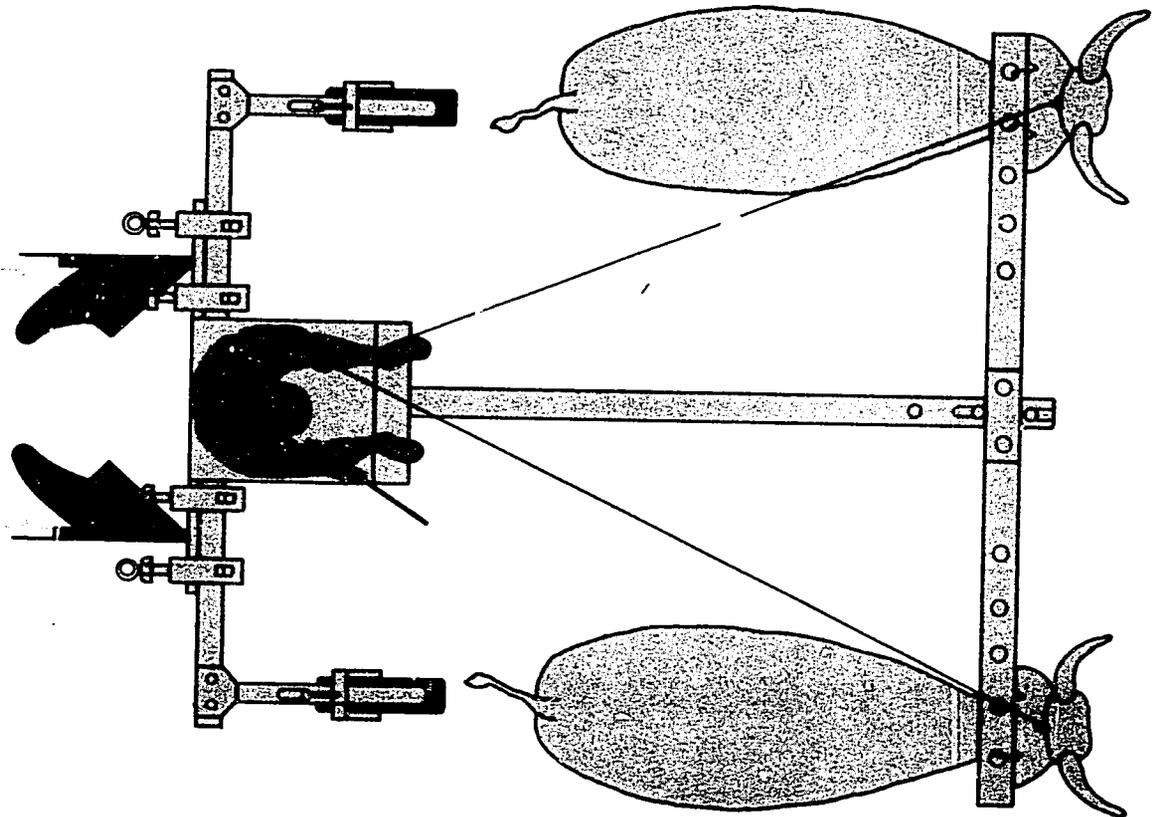
Fit 2 plows
to the toolbar



Fit 1 right-hand plow
35 cm left of the center

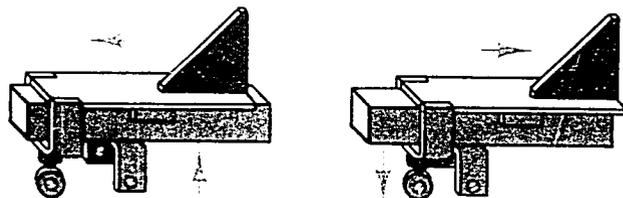
Fit 1 left-hand plow
35 cm right of the center

Position the wheels in the furrows



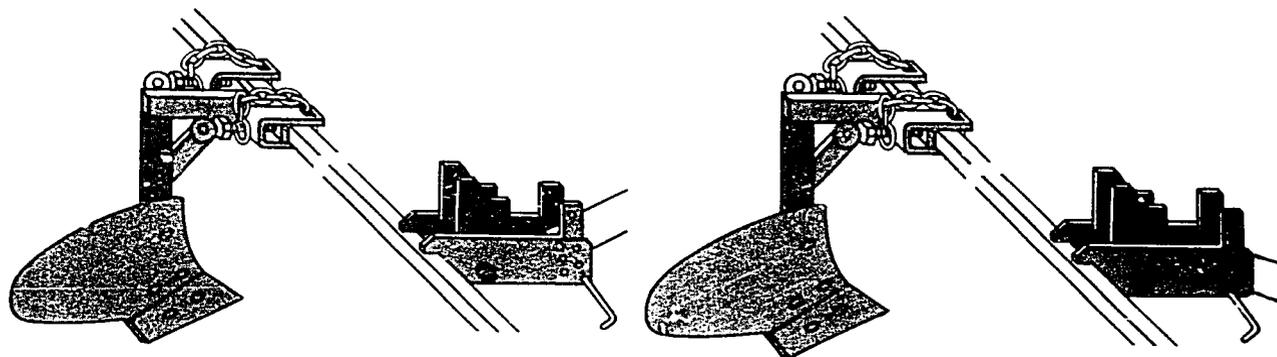
Adjusting the depth

Slide the depth adjusters to alter the depth of working

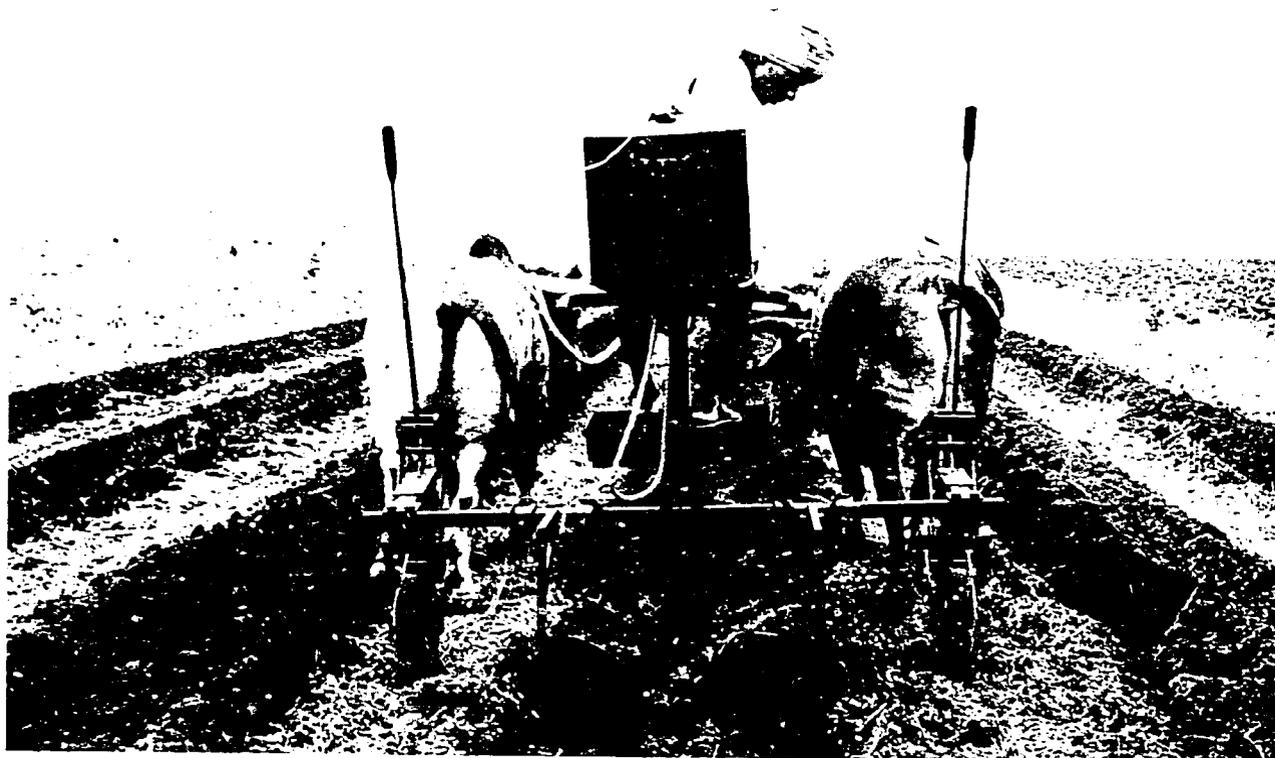


Adjusting the pitch

If the standard is not vertical, move the L-pin to another hole to change the pitch



Finish plowing the field



Caution

Make the turns outside the field or in the waterway.

Lift the toolbar fully before turning.

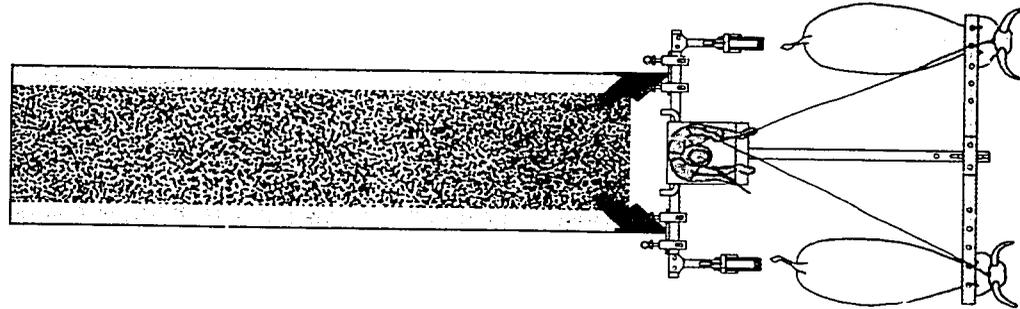
Drive the bullocks carefully so that they walk in the furrows without strain.

Tighten the clamps occasionally while working.

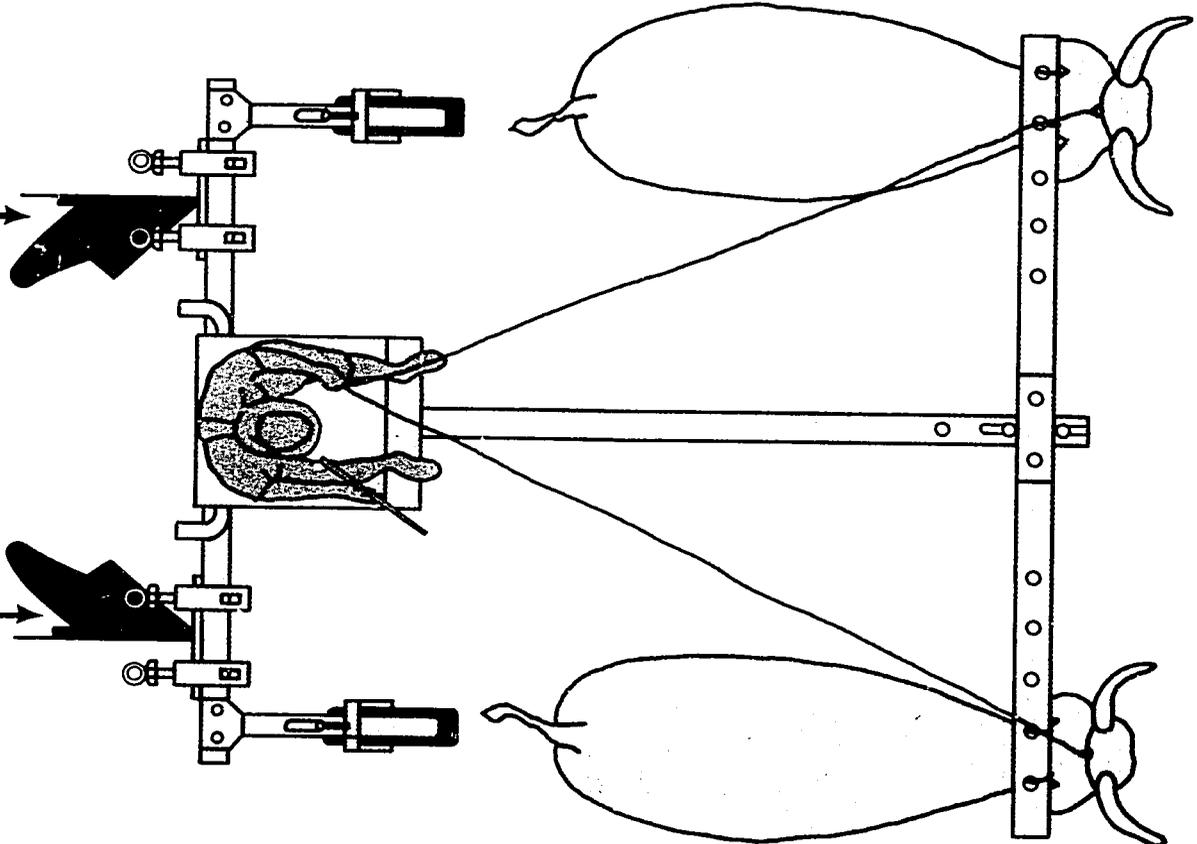
3rd pass

Plowing at 110-cm spacing

Change the position of the plows



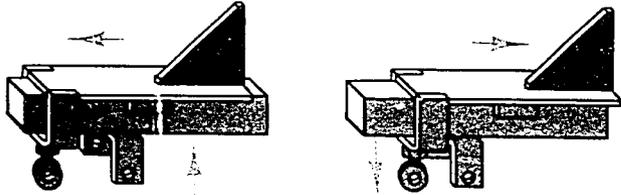
Fit 1 right-hand plow
55 cm left of the center



Fit 1 left-hand plow
55 cm right of the center

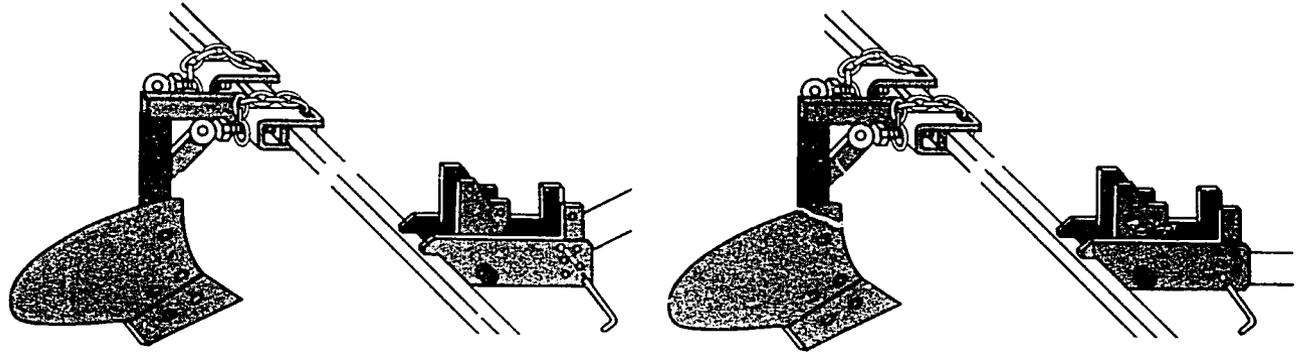
Adjusting the depth

Slide the depth adjusters to alter the depth of working

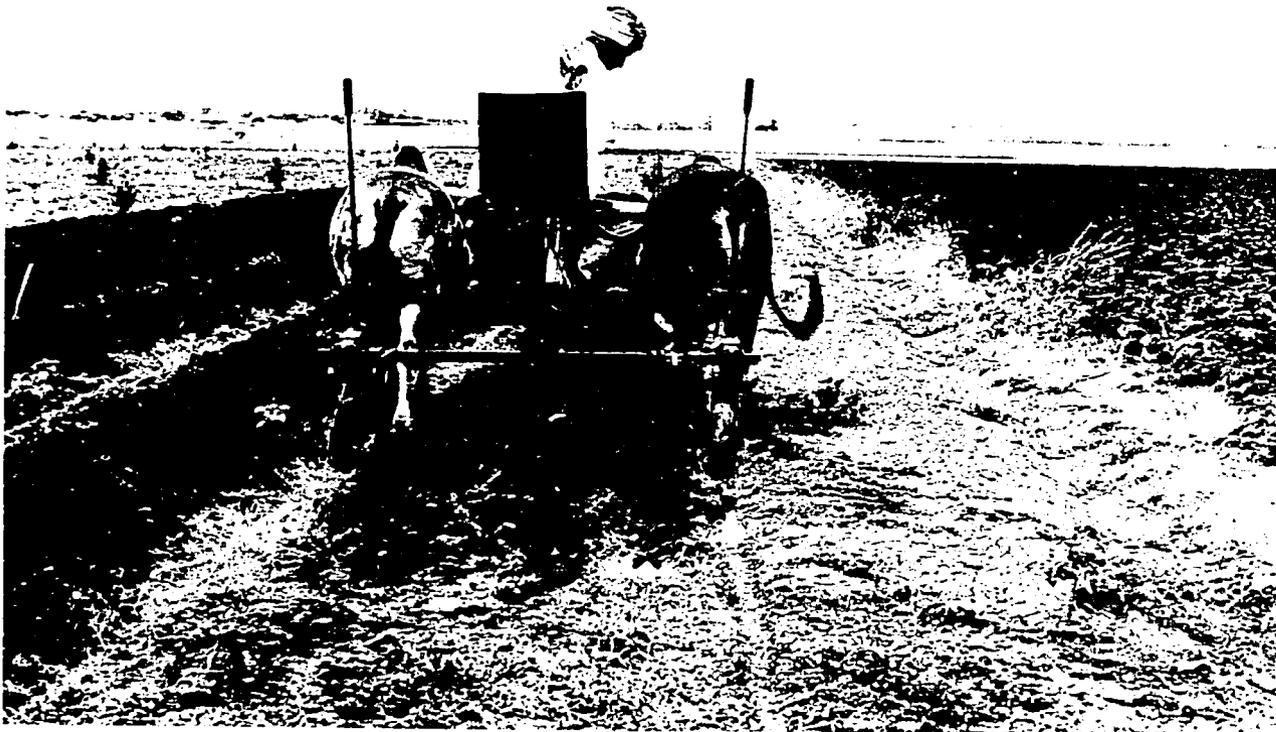


Adjusting the pitch

If the standard is not vertical, move the L-pin to another hole to change the pitch

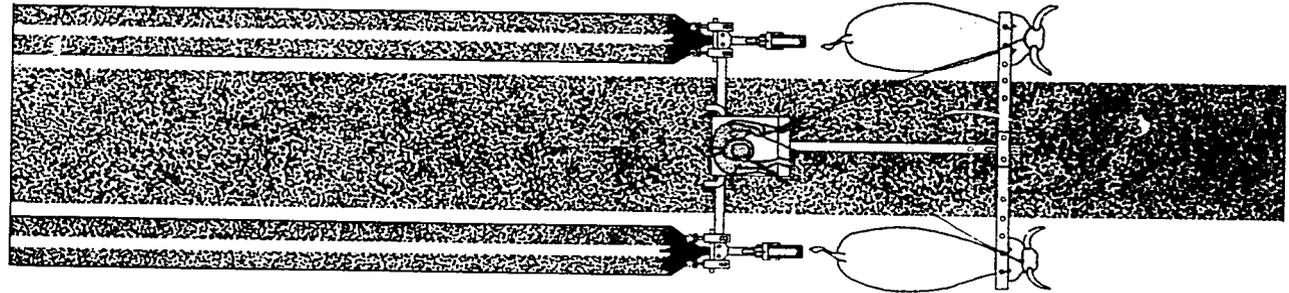
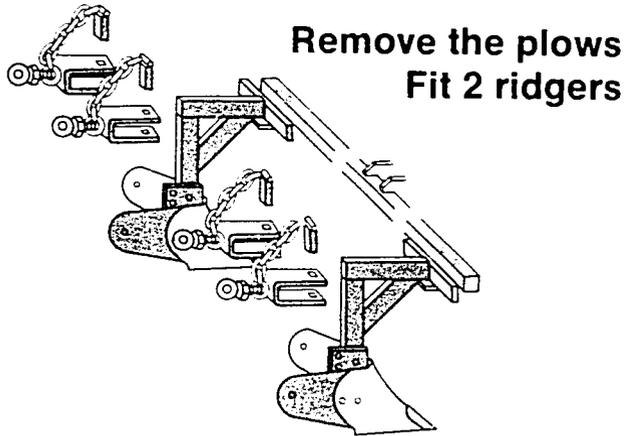


Finish plowing the field



4th pass

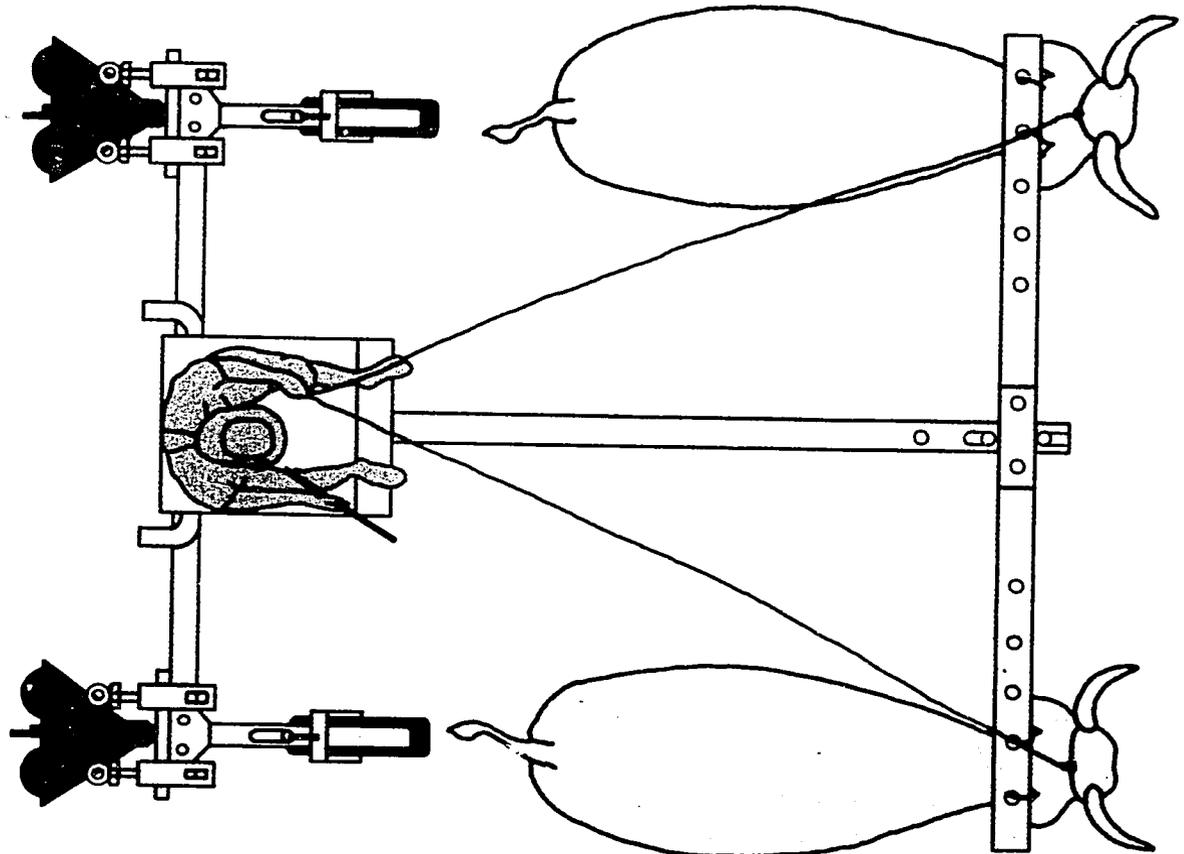
Tillage in the furrows



Fit 1 ridger behind the wheel
75 cm from the center

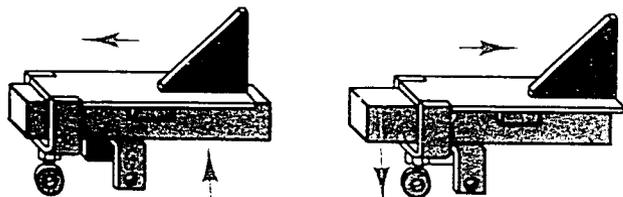
Position the wheels in the
furrows

Fit 1 ridger behind the wheel
75 cm from the center



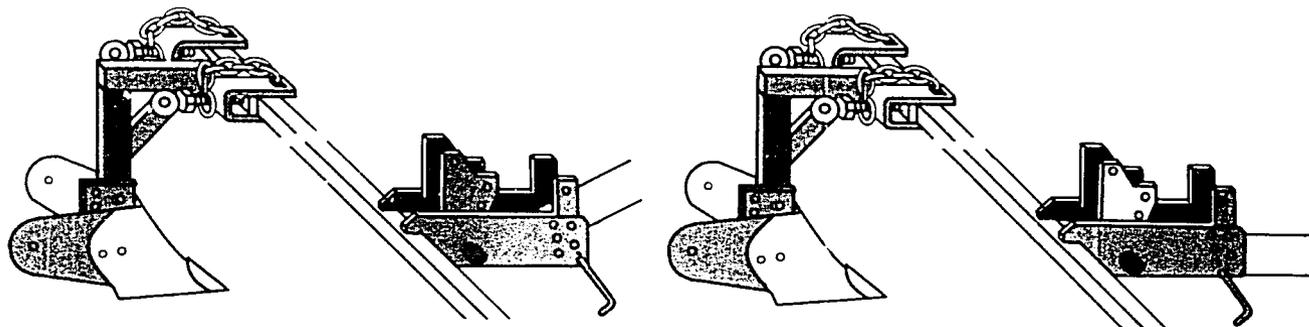
Adjusting the depth

Slide the depth adjusters to alter the depth of working



Adjusting the pitch

If the standard is not vertical, move the L-pin to another hole to change the pitch

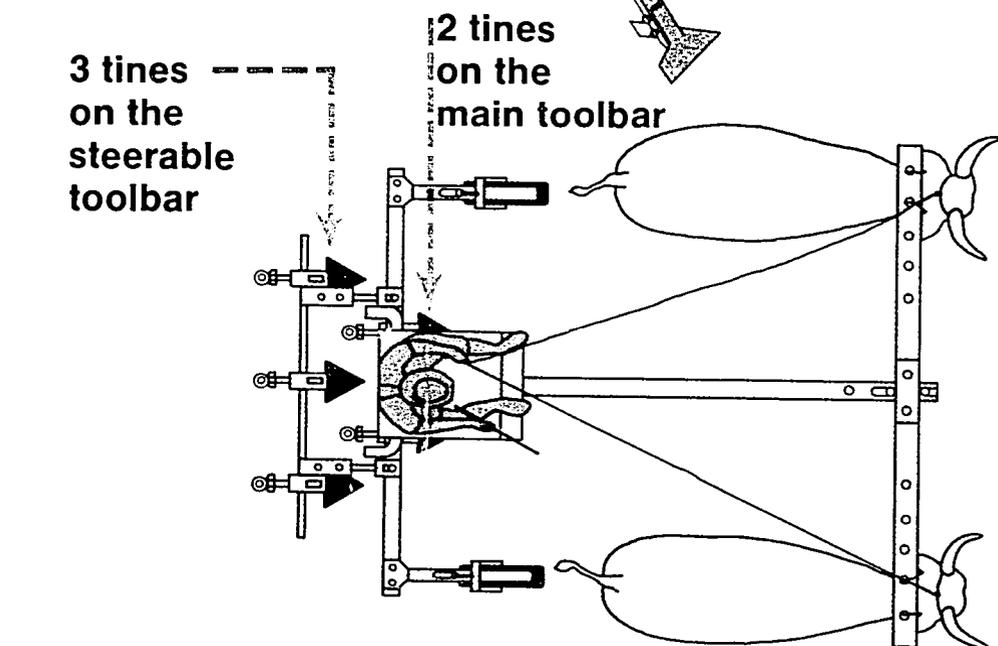
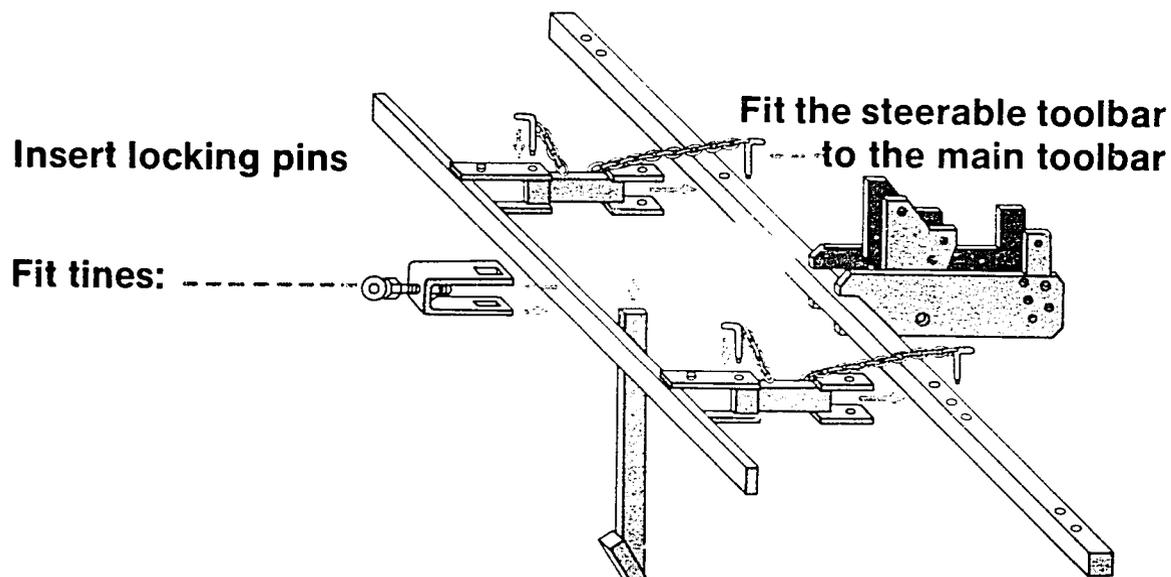


Finish ridging the field

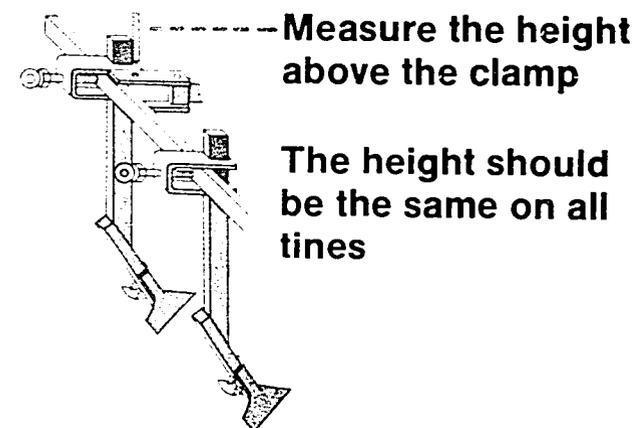


BROADBEDS: Cultivation with rigid tines

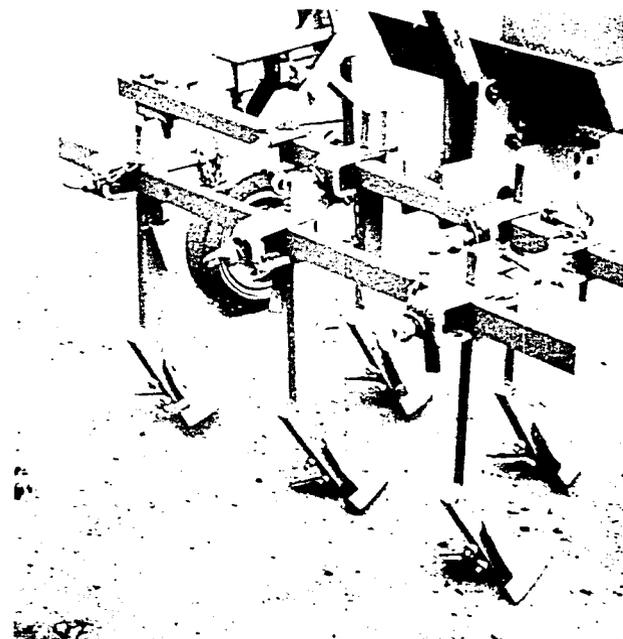
Fitting the steerable toolbar and rigid tines



Checking the height of the tines

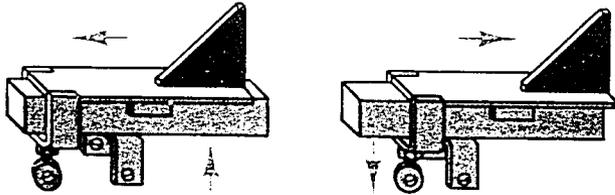


The rigid tines fitted for cultivation



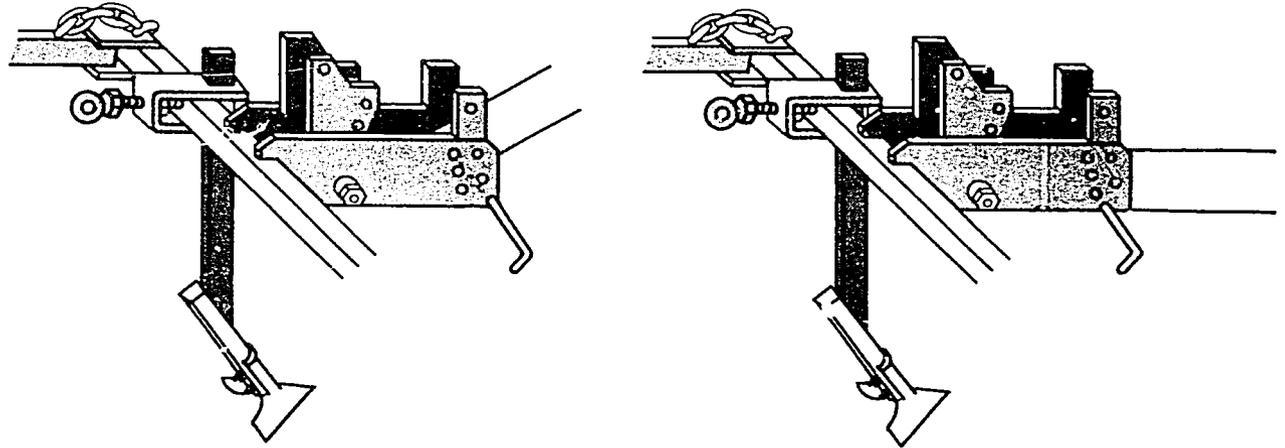
Adjusting the depth

Slide the depth adjusters to alter the depth of working

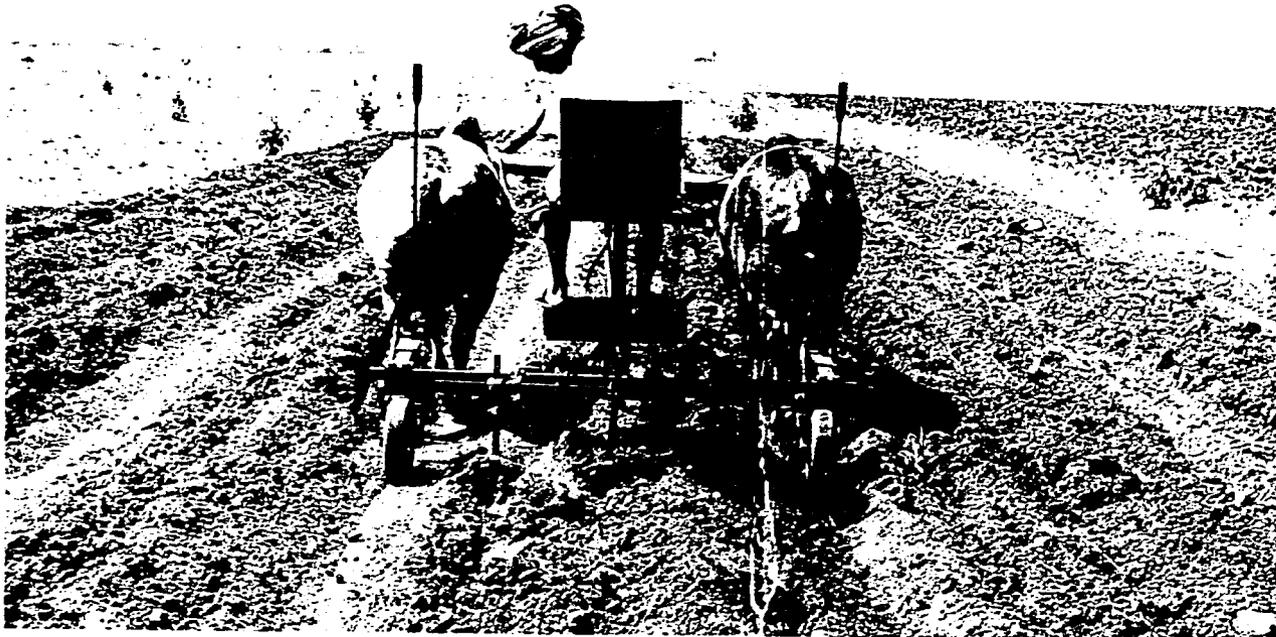


Adjusting the pitch

If the standard is not vertical, move the L-pin to another hole to change the pitch



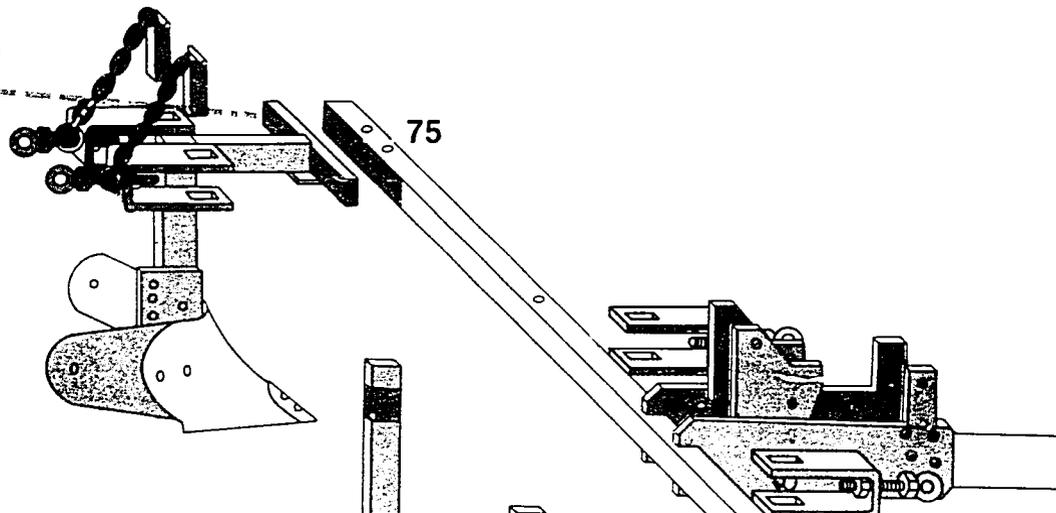
Finish cultivating the field



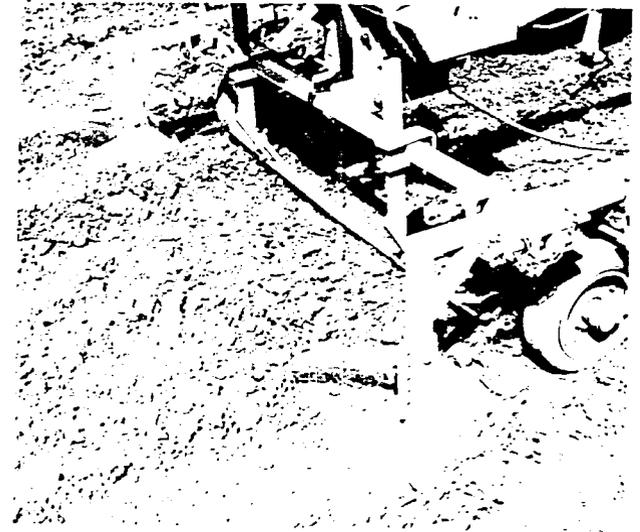
BROADBEDS: Cultivation with a blade harrow

Fitting the blade harrow and 2 ridgers

Fit 1 ridger behind the wheel
75 cm from the center

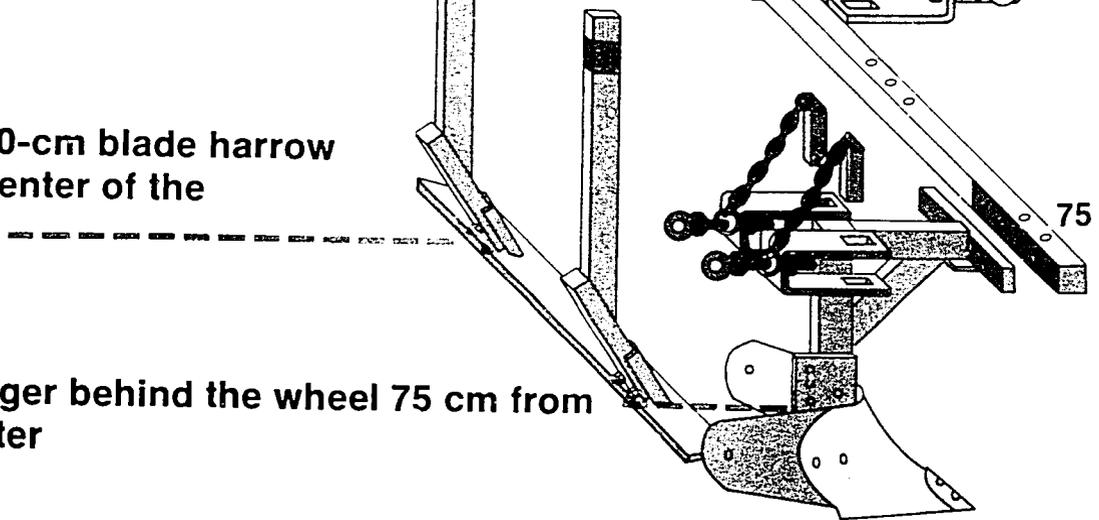


The ridgers and blade harrow fitted for cultivation

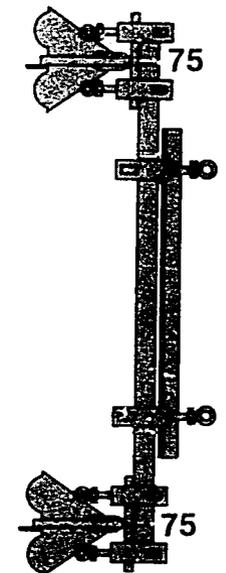


Check the position of the blade harrow and the ridgers

Fit a 120-cm blade harrow at the center of the toolbar

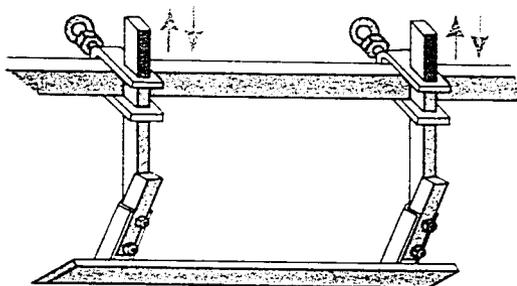


Fit 1 ridger behind the wheel 75 cm from the center



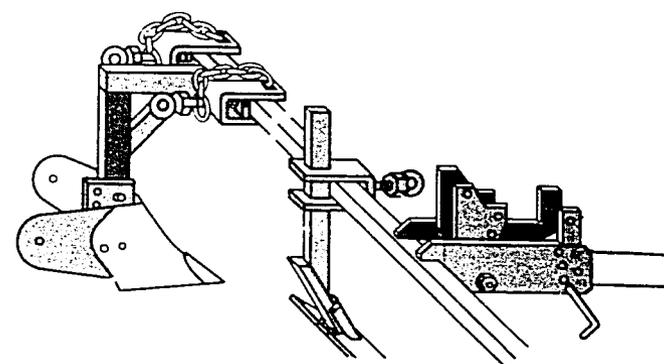
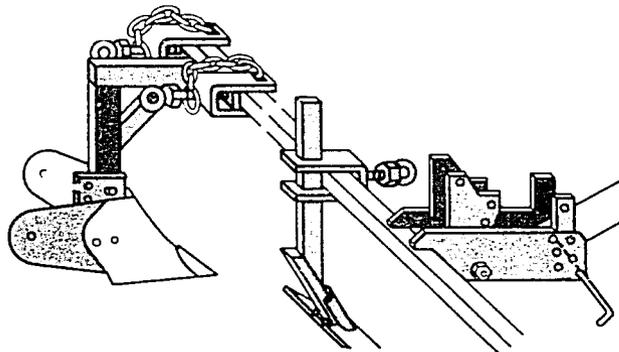
Adjusting the depth

Adjust the depth by changing the height of the blade



Adjusting the pitch

If the standard is not vertical, move the L-pin to another hole to change the pitch



Position the wheels in the furrows and cultivate the field



Caution

Make the turns outside the field or in the waterway.

Lift the toolbar fully before turning.

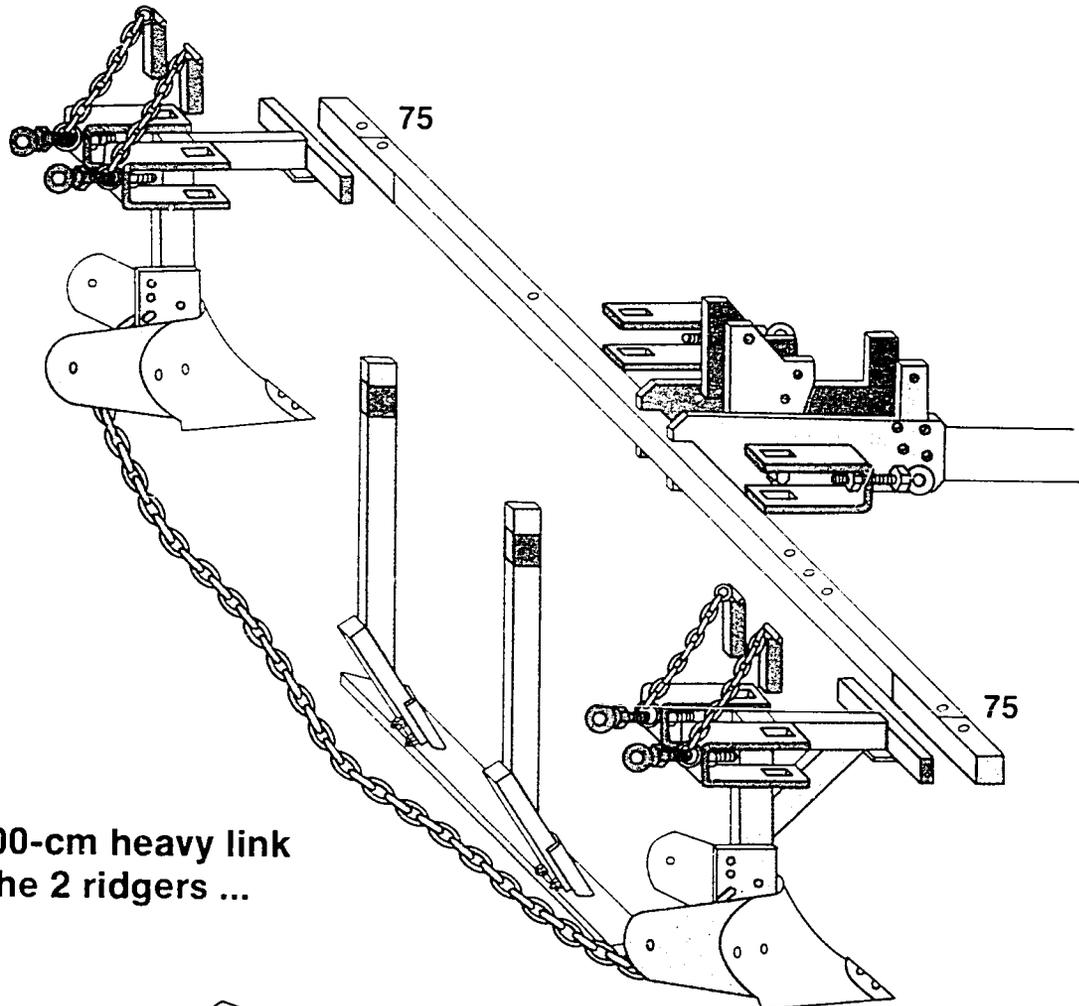
Drive the bullocks carefully so that they walk in the furrows without strain.

Tighten the clamps occasionally while working.

BROADBEDS: Shaping with a chain

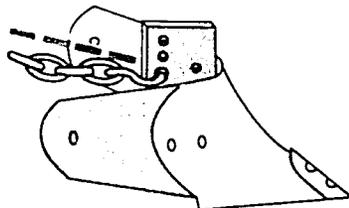
Bed shaping is the last part of seedbed preparation

Fit a 120-cm blade harrow and 2 ridgers to the main toolbar

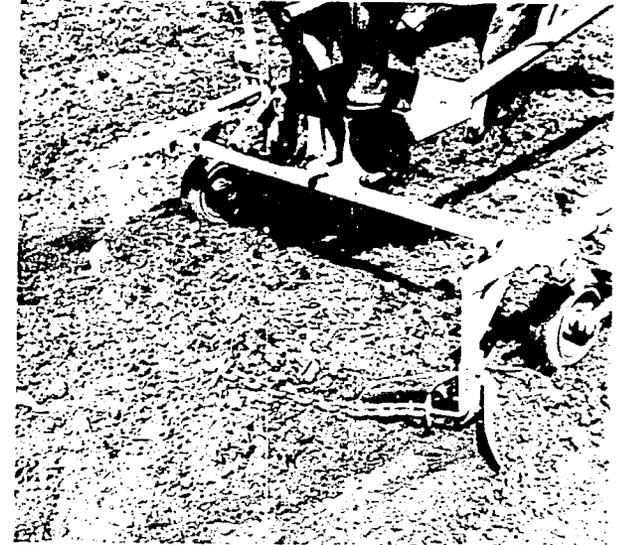


Hook a 200-cm heavy link chain to the 2 ridgers ...

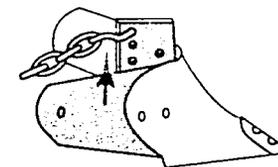
3rd hole from the bottom



The chain attached for final bed shaping

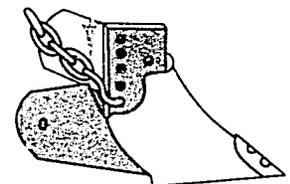


Adjusting the depth



Move the hooks to one of the upper holes to decrease soil movement

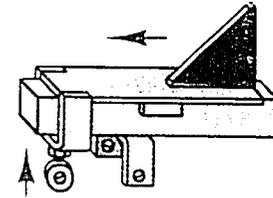
Move the hooks to lower holes to increase soil movement



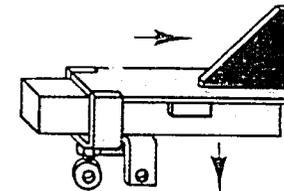


Adjusting the depth

Slide the depth adjusters
to alter the depth of working:



backwards to decrease depth



forwards to increase depth

Caution

Make the turns outside the field.

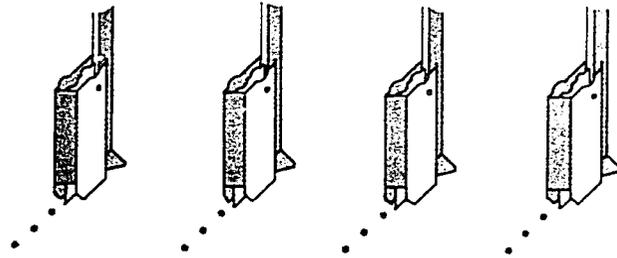
Lift the toolbar fully before turning.

Drive the bullocks carefully so that they walk in the furrows without strain.

BROADBEDS: Sowing and fertilizer application

Sowing a sole crop

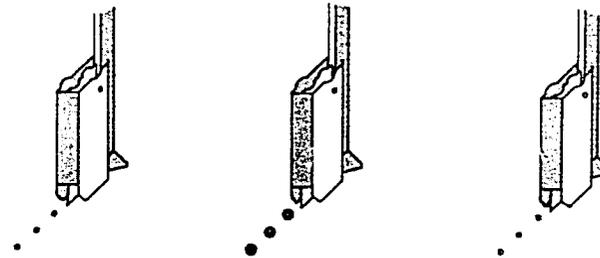
The Agribar can sow up to 4 rows



The Agribar can sow a sole crop at any row spacing

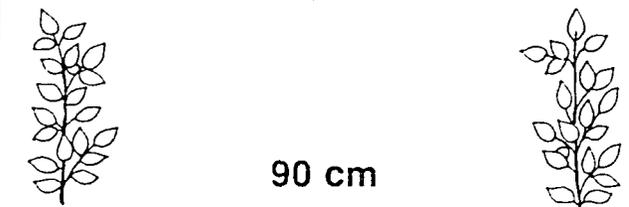
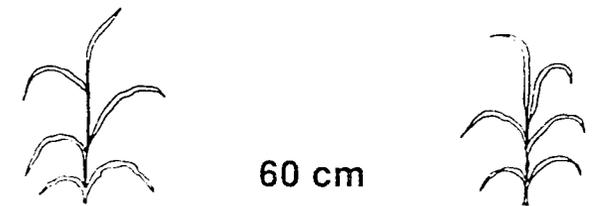
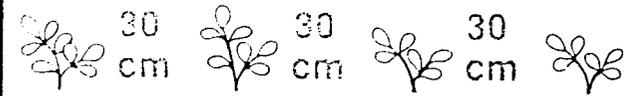
Sowing an intercrop

The Agribar can sow an intercrop



The Agribar can sow an intercrop at any row spacing

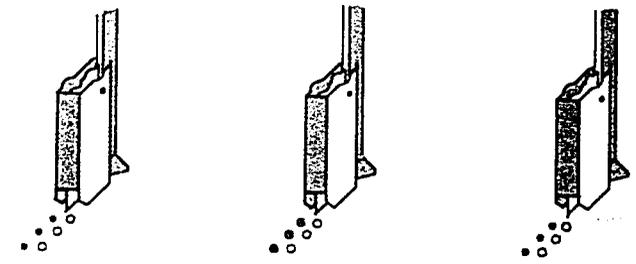
Recommended spacing of rows





Fertilizer application

Fertilizer is placed 3 cm to the side of the seed

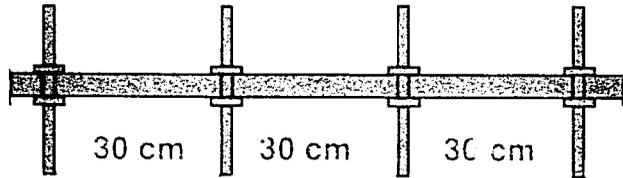


Fertilizer can be applied as a top dressing

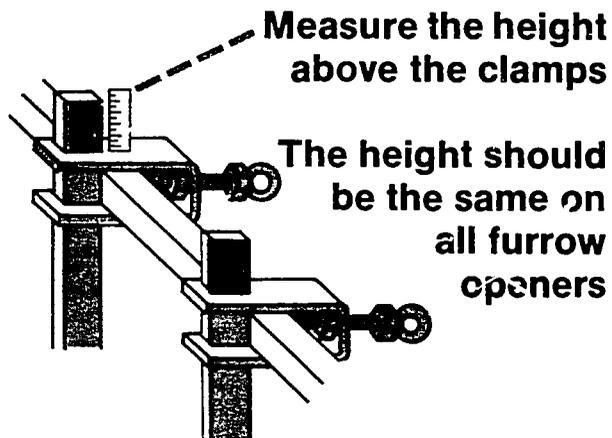
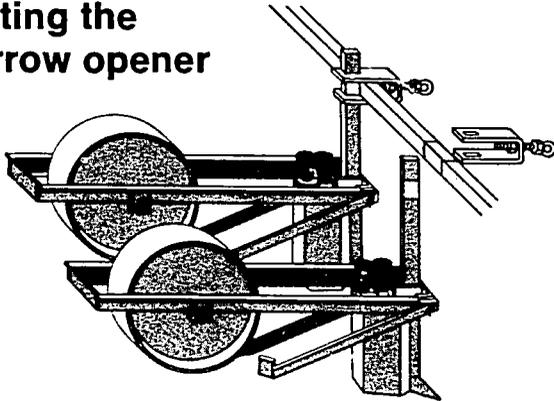


Preparation for sowing BROADBEDS at

Fitting the 4 furrow openers

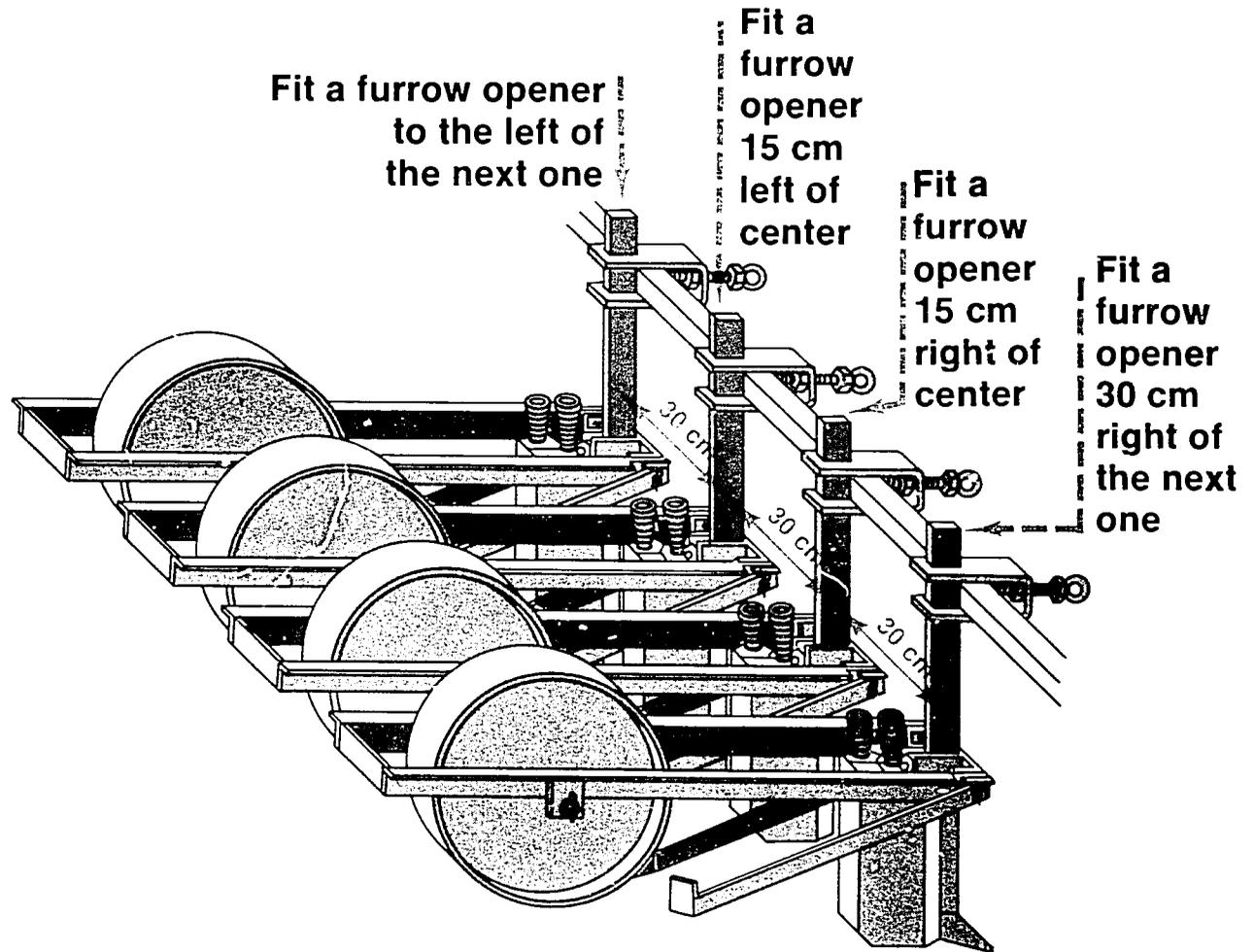


Fitting the furrow opener



Measure the height above the clamps

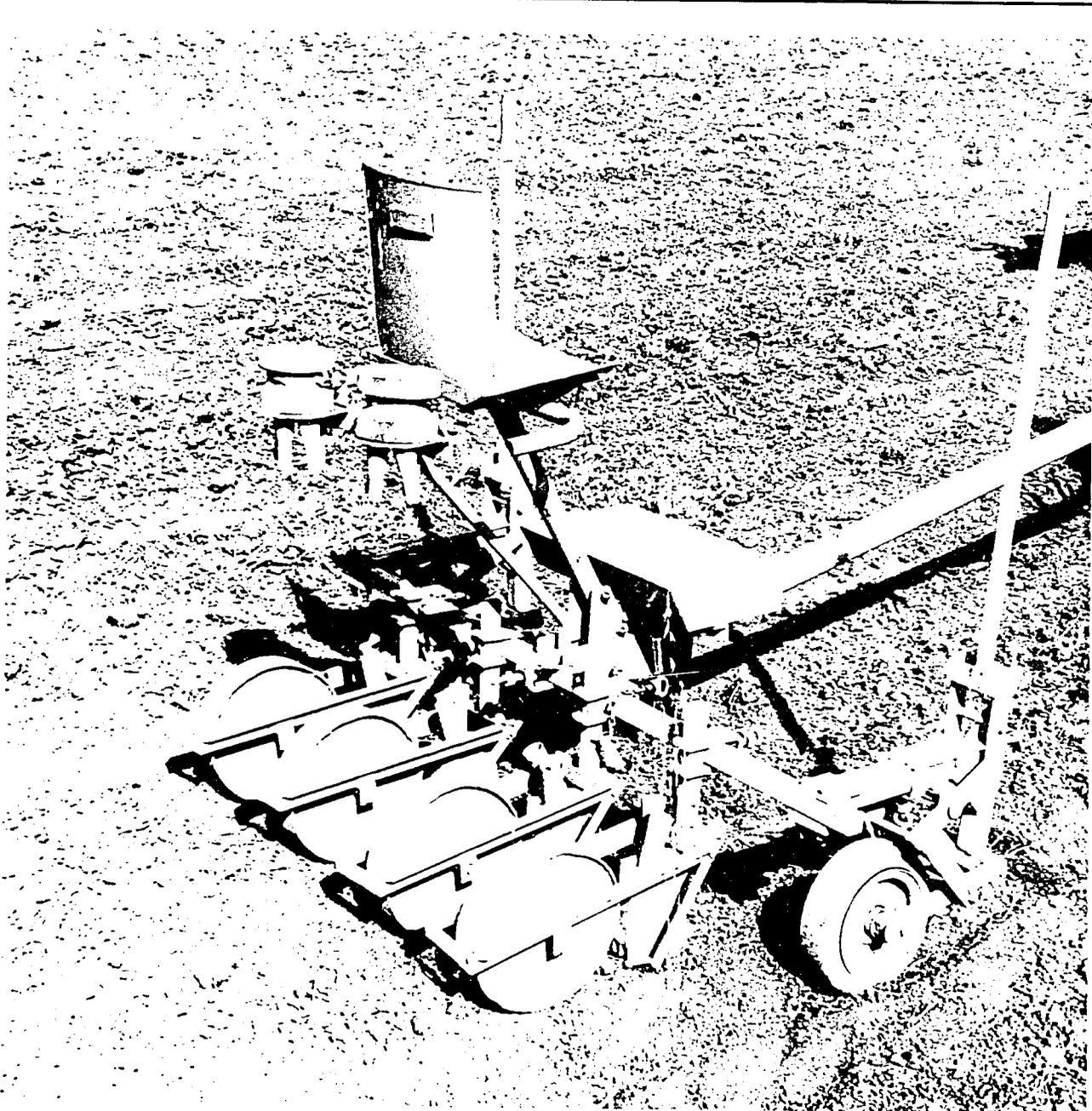
The height should be the same on all furrow openers



Check that the furrow openers are 30 cm apart

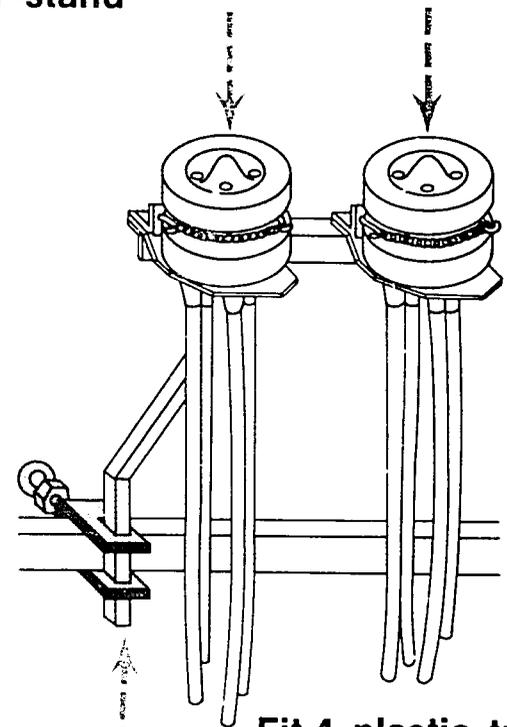
30-cm spacing

Fitting the T-stand



Fitting the tubes

Fit 2,4-hole wooden bowls to a T-stand

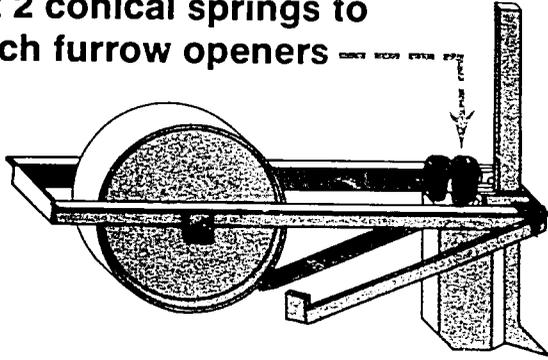


Fit 4 plastic tubes to each bowl

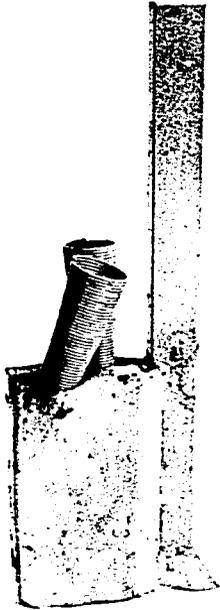
Fit the T-stand to the center of the toolbar using a clamp

Fitting the springs

Fit 2 conical springs to each furrow openers



Notice that a spring wire projects from the hole in the furrow openers



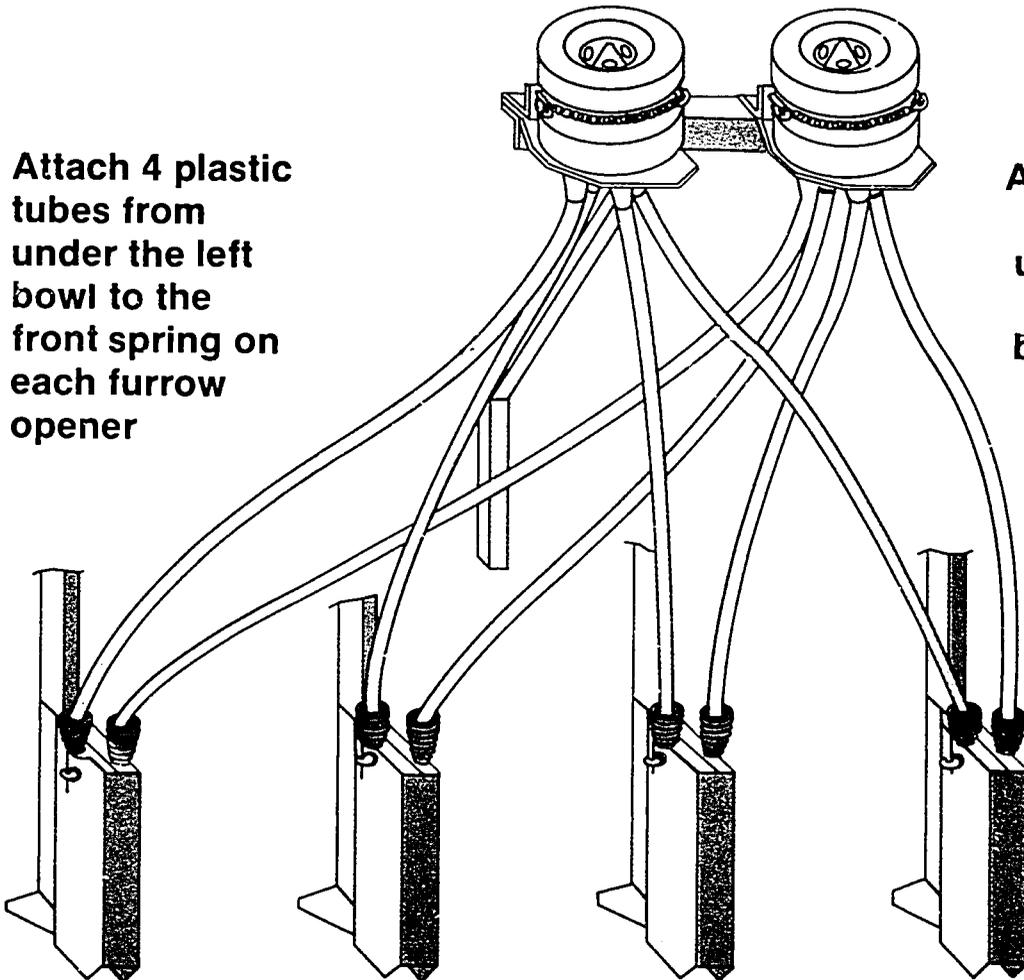
Fitting the tubes to the furrow openers

1 wooden bowl
is for fertilizer

1 wooden bowl
is for seed

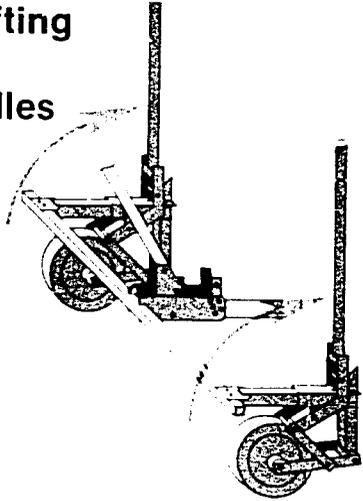
Attach 4 plastic tubes from under the left bowl to the front spring on each furrow opener

Attach 4 plastic tubes from under the right bowl to the back spring on each furrow opener

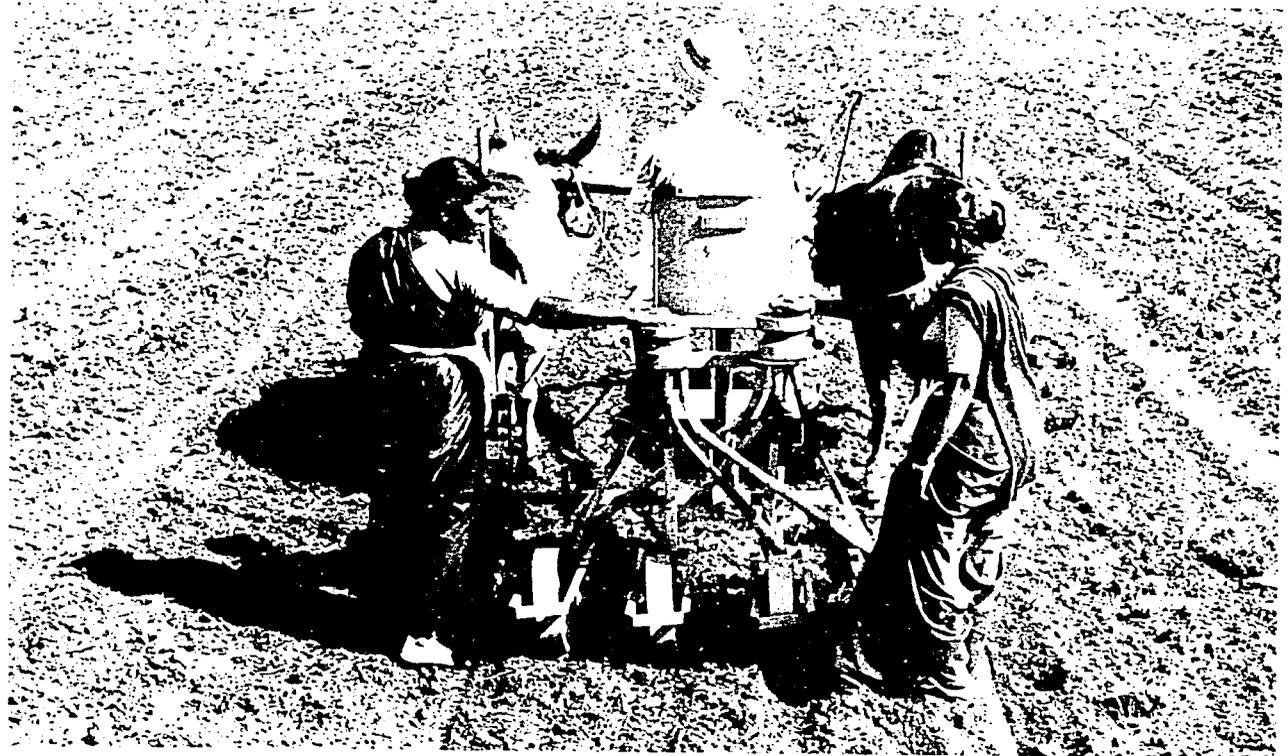
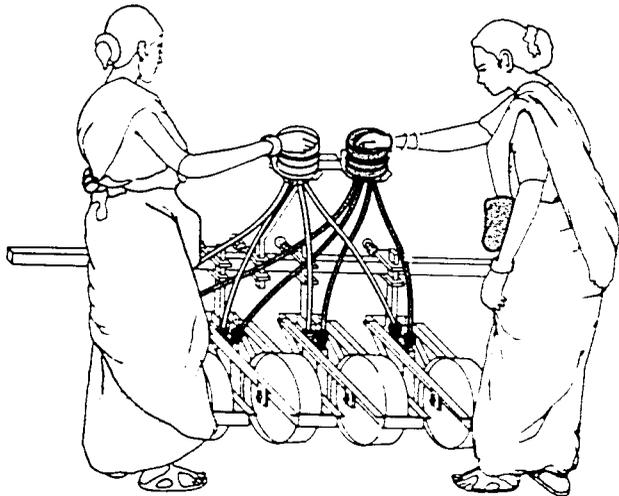


Sowing BROADBEDS at 30-cm spacing

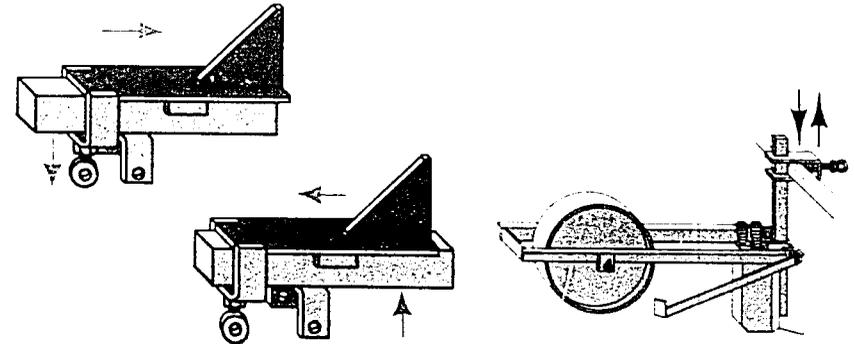
Take the Agribar to the field and lower the toolbar by lifting the handles



2 persons are needed to drop the seed and fertilizer into the wooden bowls



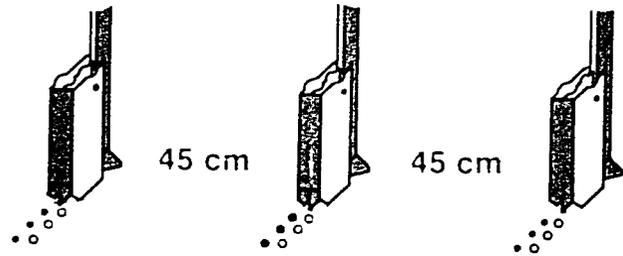
Adjust the depth by varying the height of the furrow openers or by moving the depth adjusters



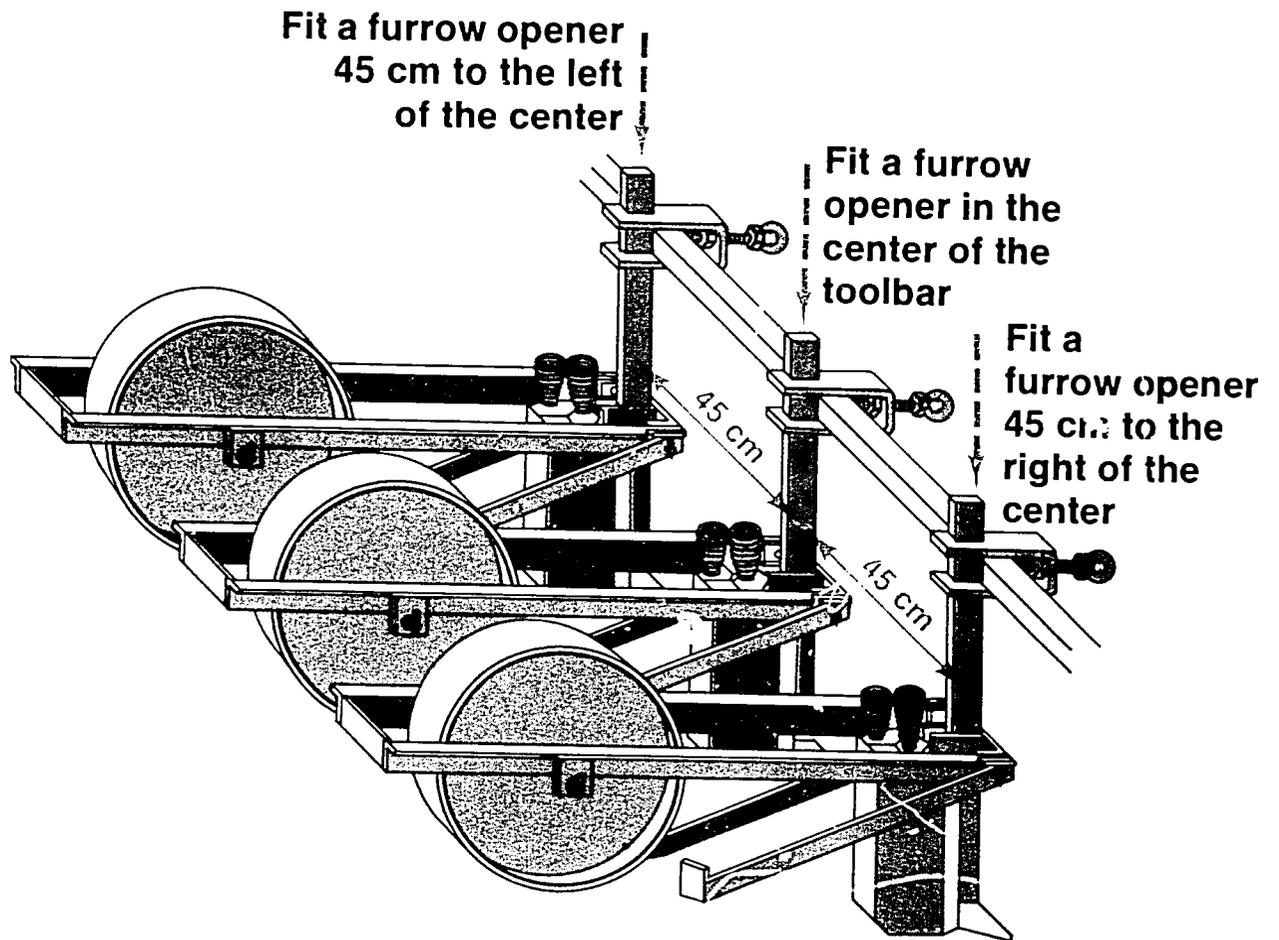
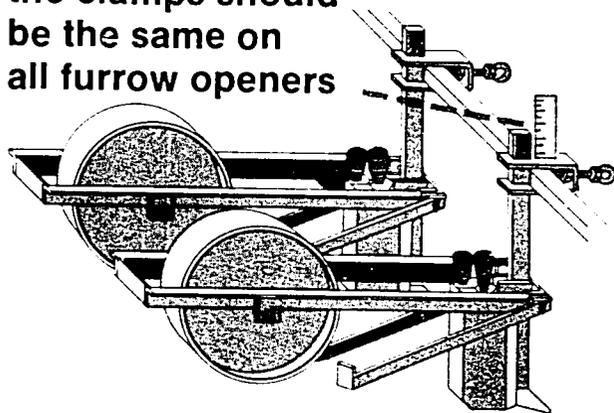
Check the depth of seed placement in all 4 lines

BROADBEDS: Sowing an intercrop at 45-cm

Fitting the 3 furrow openers



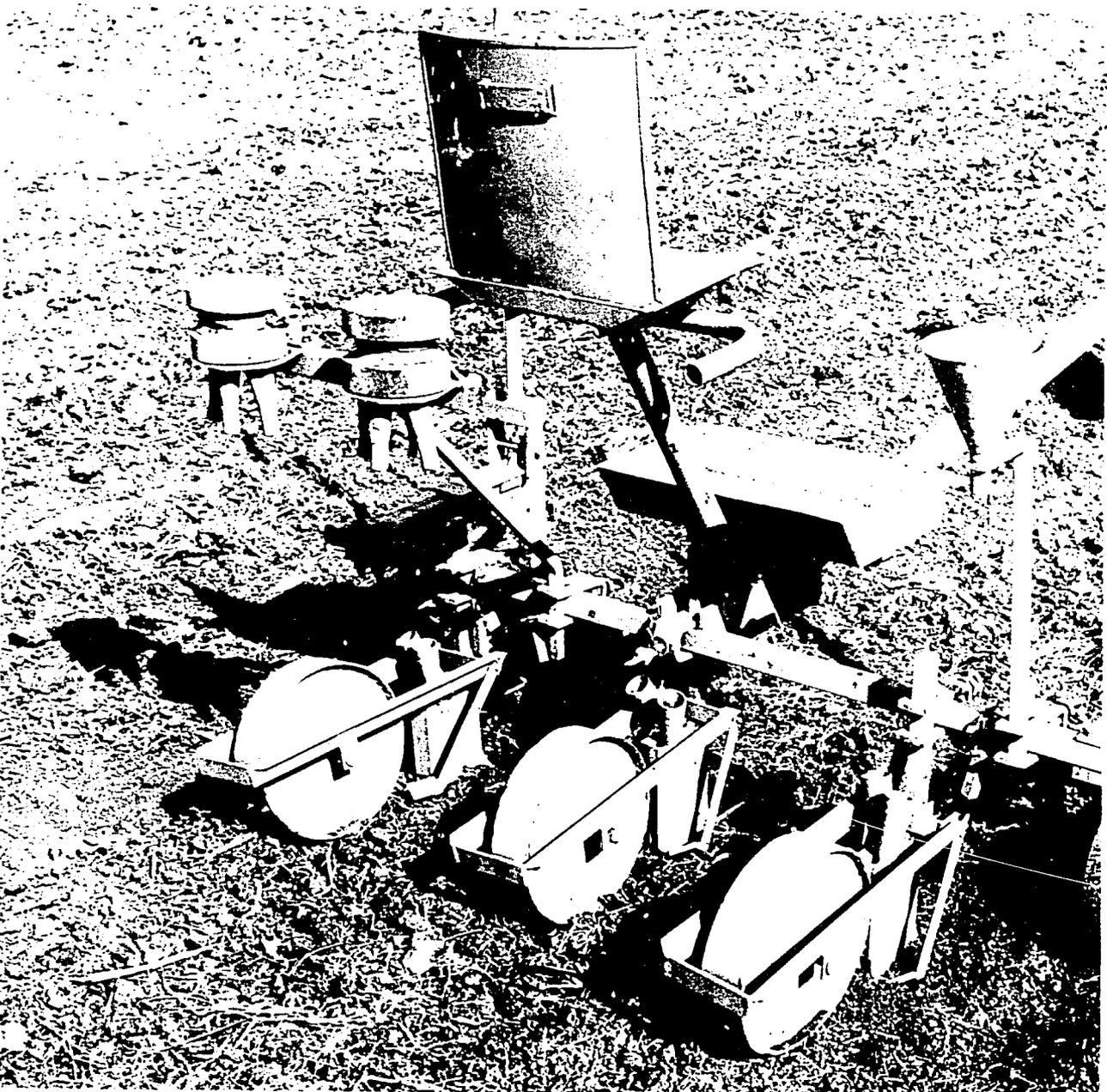
The height above the clamps should be the same on all furrow openers



Check that the furrow openers are 45 cm apart

spacing (cereal and pigeonpea)

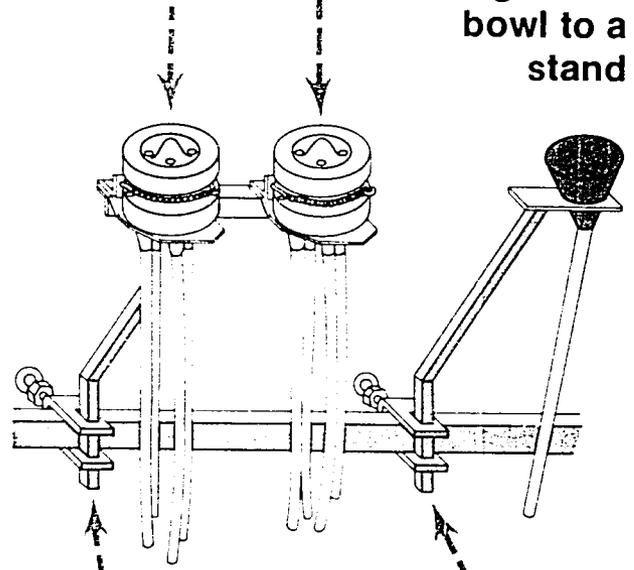
Fitting the T-stand and single stand



Fitting the tubes

Fit 2 wooden bowls to a T-stand

Fit a single-row bowl to a stand

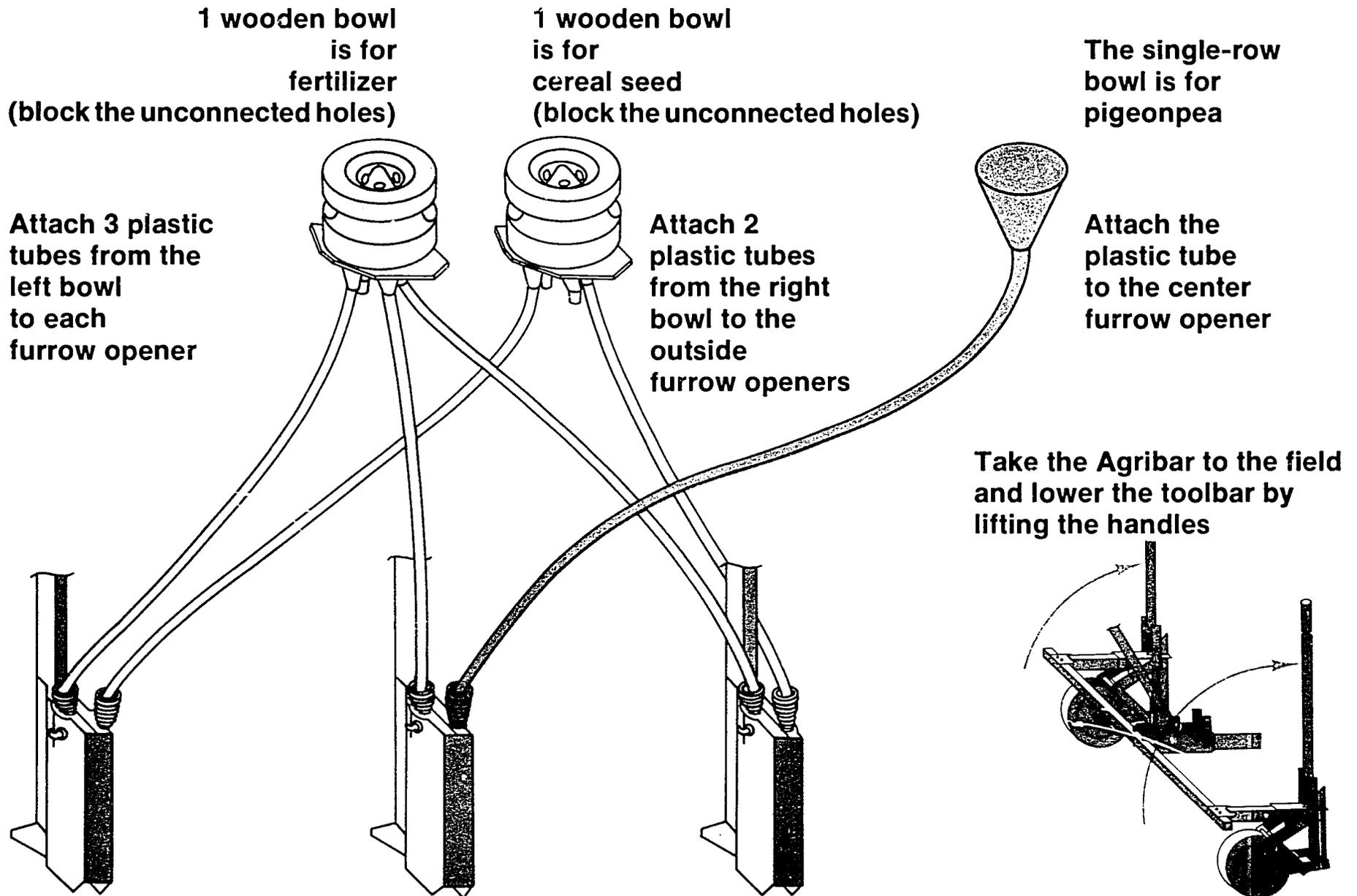


Fit a T-stand near to the center of the toolbar with a clamp

Fit the single-row bowl stand to the right side

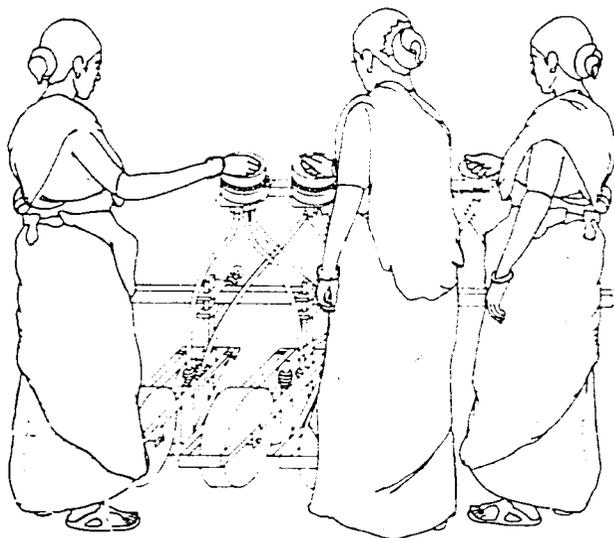
Fit 1 tube to the bowl

Fitting the tubes to the furrow openers



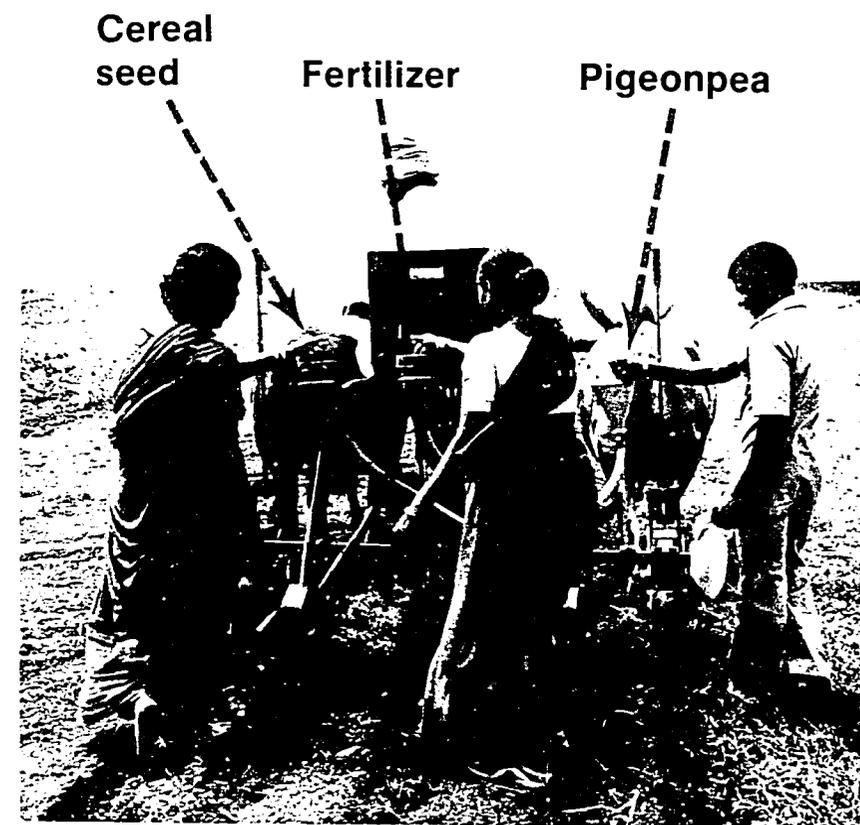
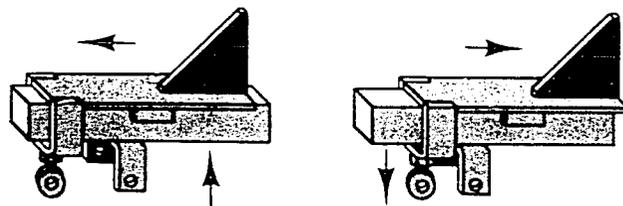
Sowing cereal and pigeonpea with fertilizer

3 persons are needed to drop the fertilizer, cereal seed, and pigeonpeas into the bowls



Check the depth of seed in all 3 lines

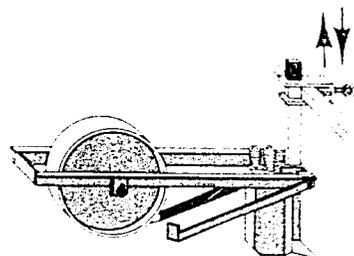
If necessary, adjust the depth by sliding the depth adjusters ...



Note

The photograph illustrates the choice an operator has in placing the bowls. Here, the cereal seed and fertilizer bowls have been interchanged for operational convenience.

or by changing the height of the furrow openers



Caution

Turn outside the field or in the waterway.

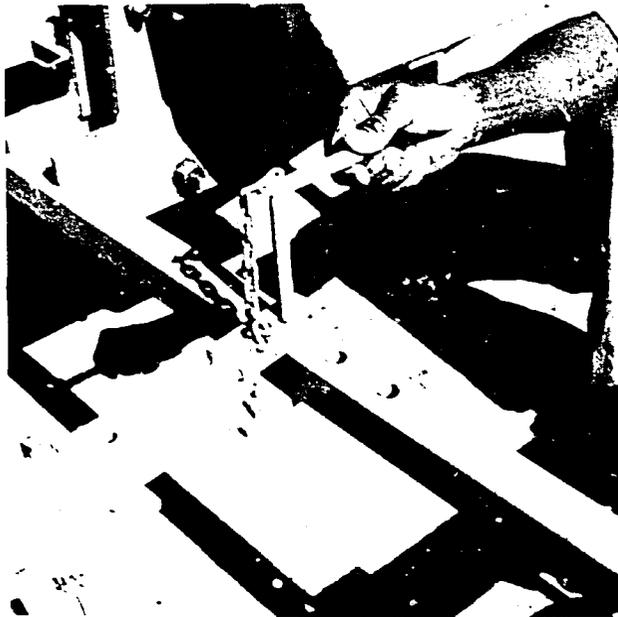
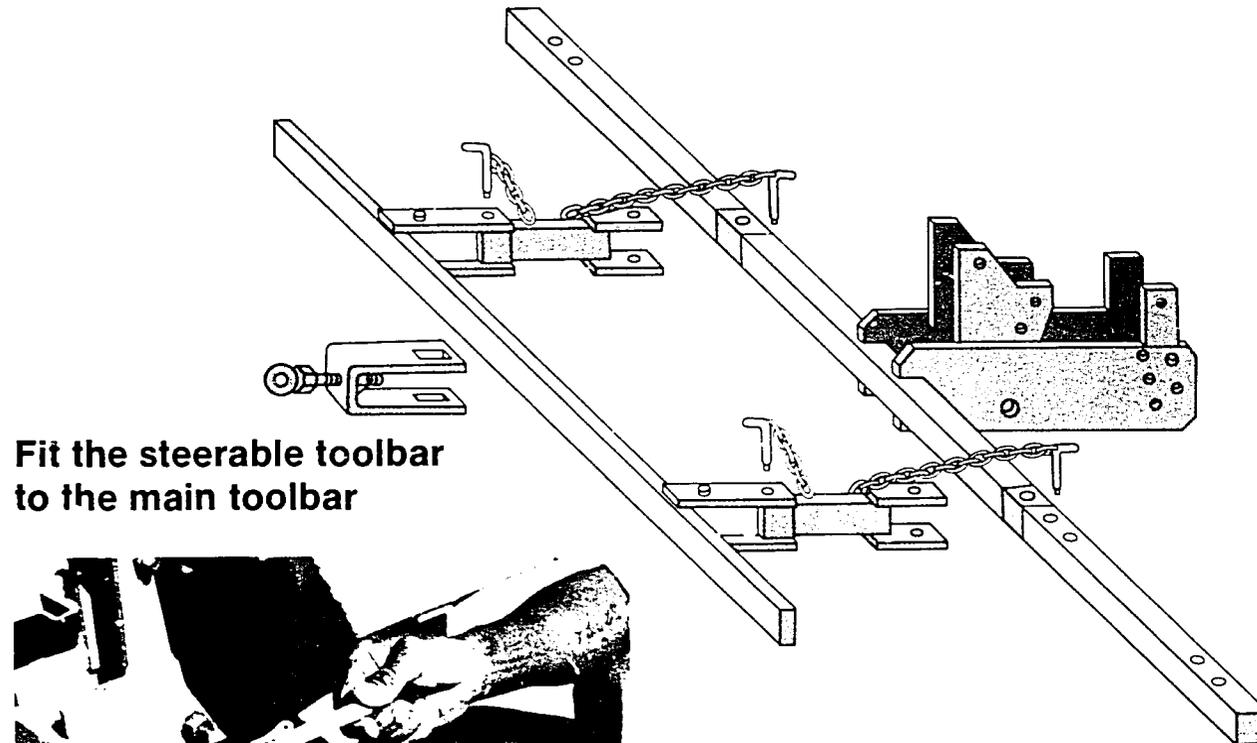
Lift the toolbar fully before turning.

Apply recommended quantities of seed and drop them evenly into the bowls.

Check the openings of the furrow openers often to see that they are not blocked.

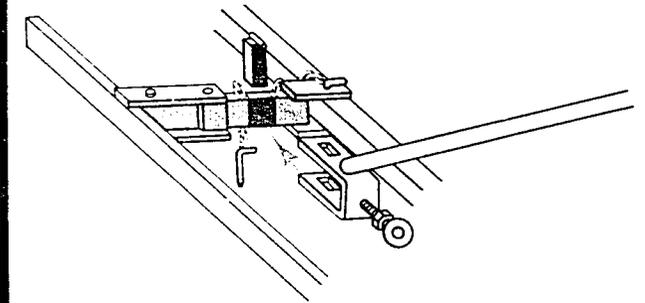
BROADBEDS: Interrow cultivation at 30-cm

Fitting the steerable toolbar



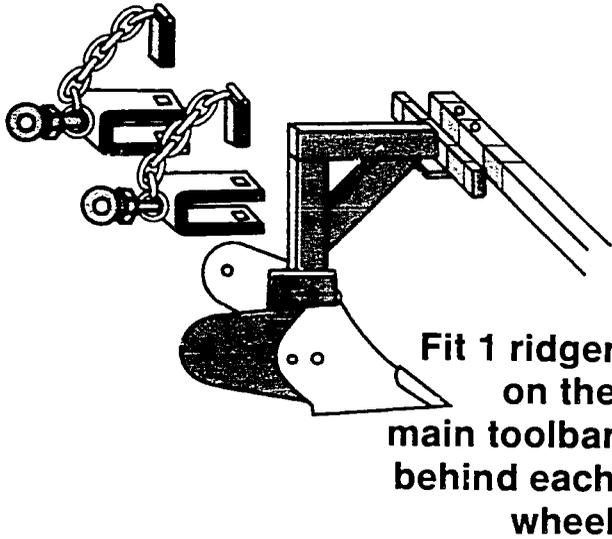
Fitting the steering handle

Fit the steering handle to the steerable toolbar

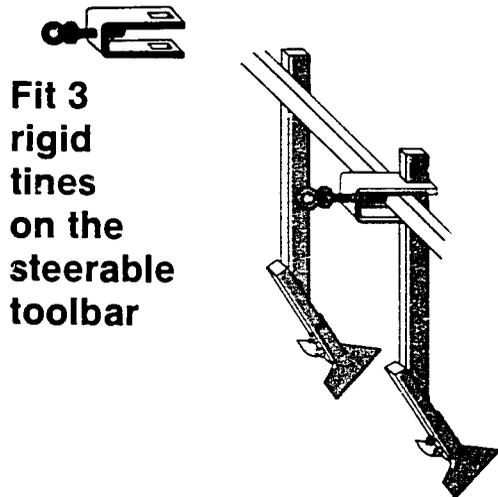


spacing

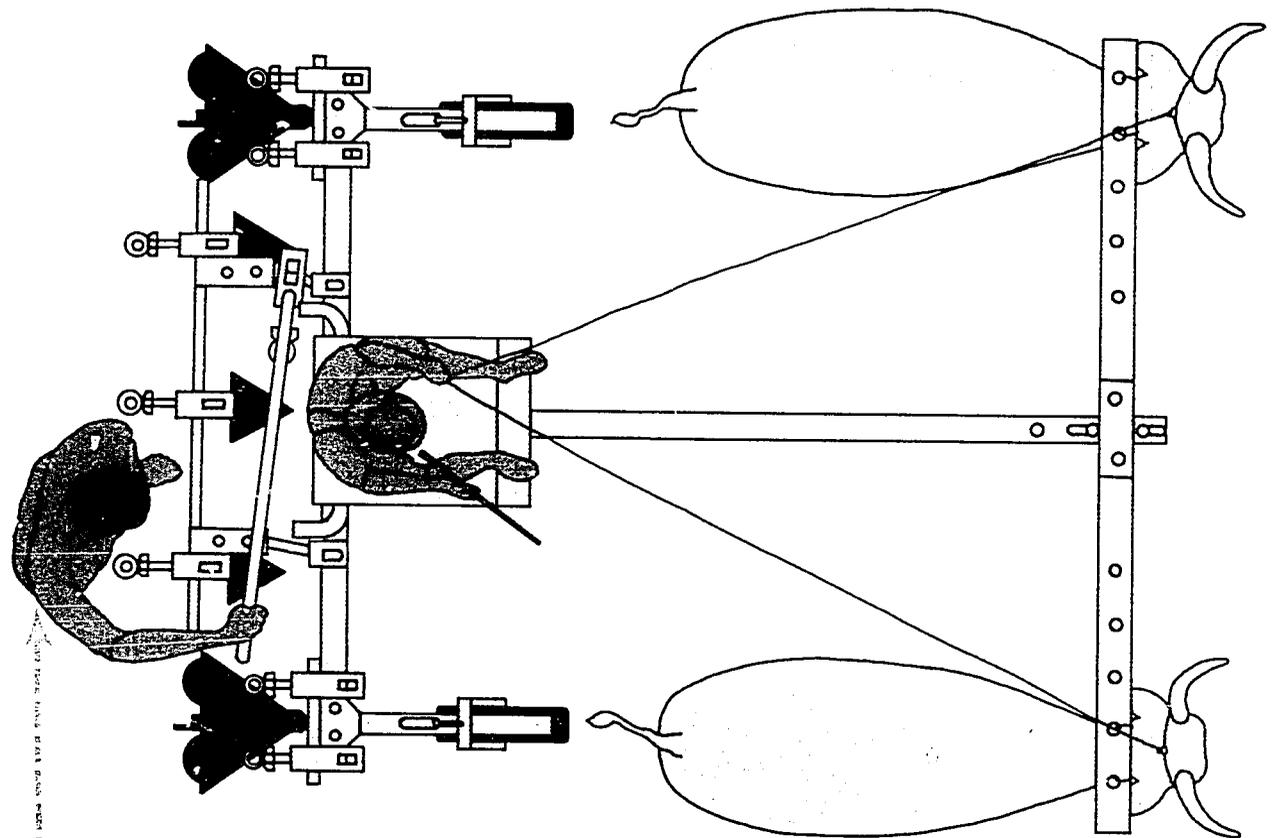
Fitting the ridgers



Fitting the rigid tines



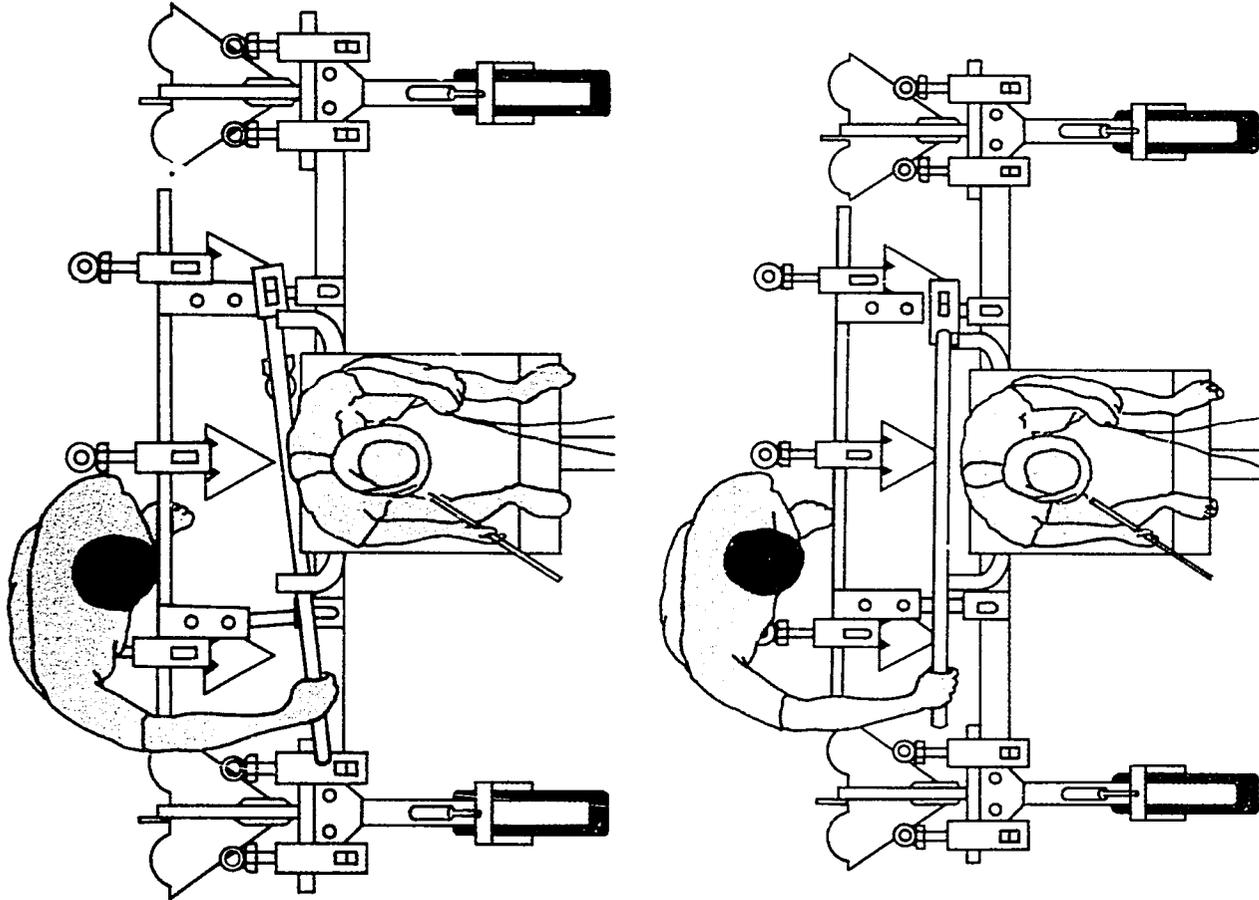
Position of the ridgers and tines



1 person is needed to steer the steerable toolbar

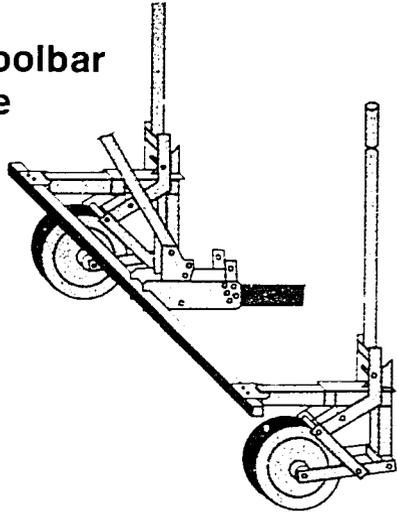
The steerable toolbar

The steering handle moves the steerable toolbar to avoid damaging the crop

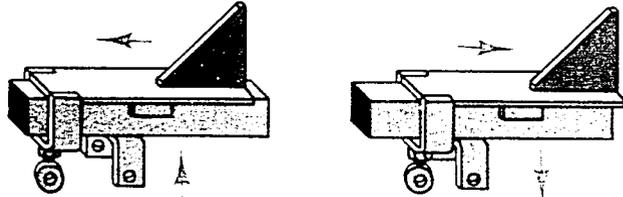


Take the Agribar to the field

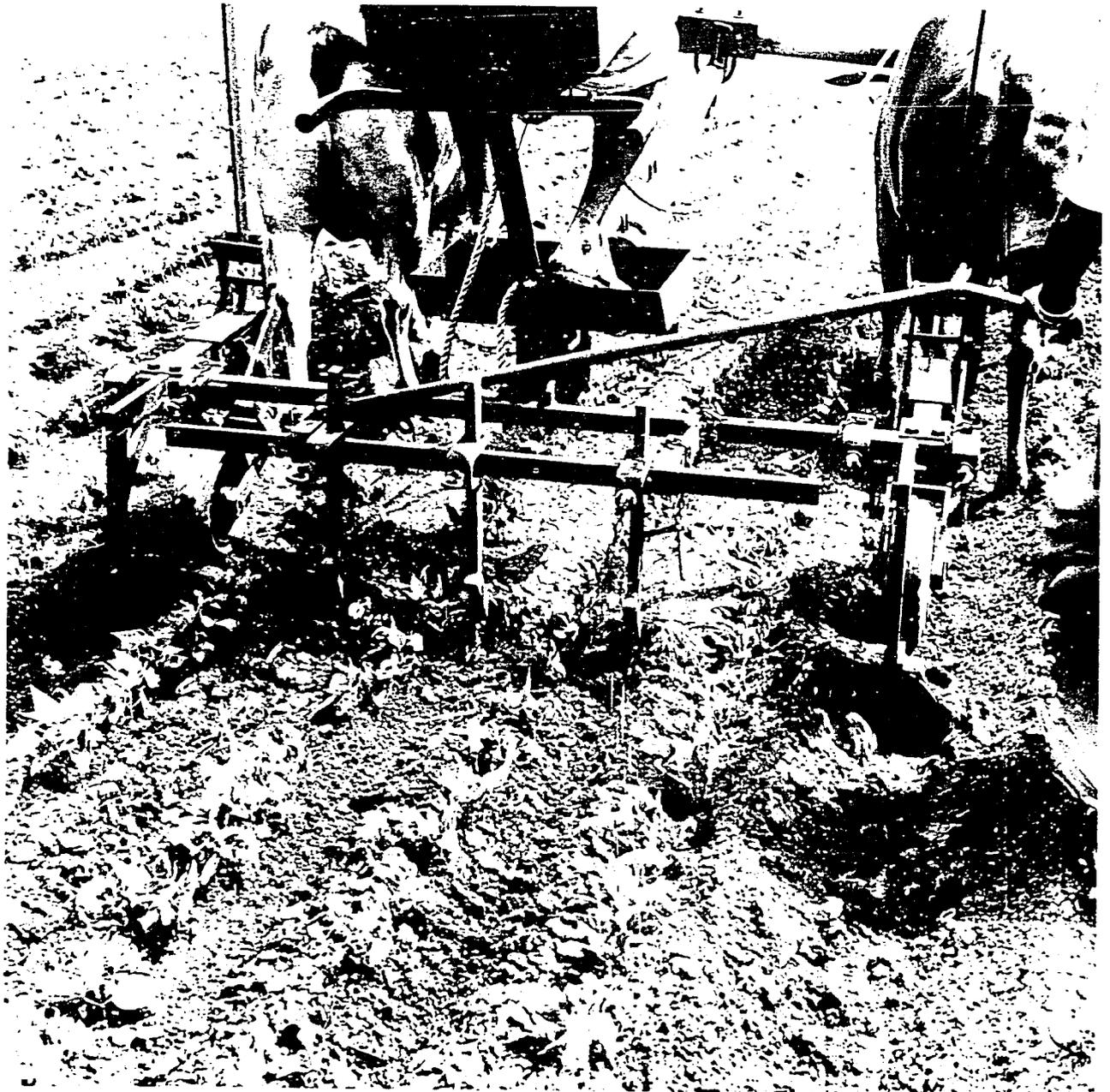
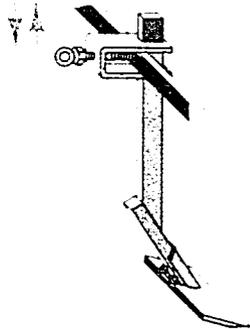
**Lower the toolbar
by lifting the
handles**



**Adjust the depth by sliding
the depth adjusters ...**

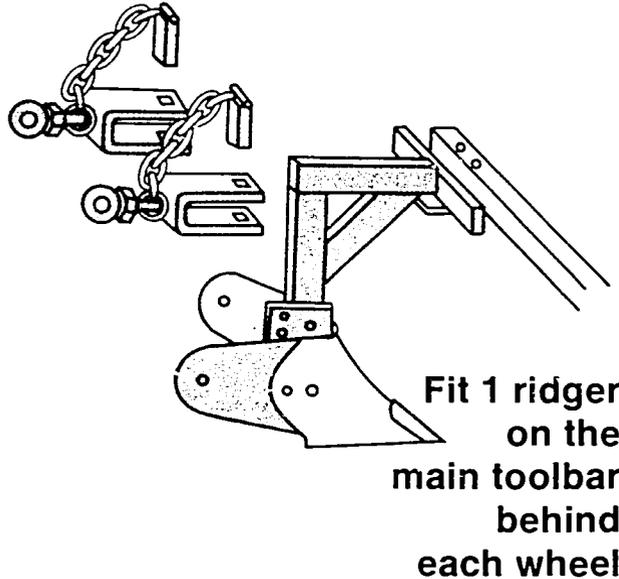


**or by changing the height
of the tines**

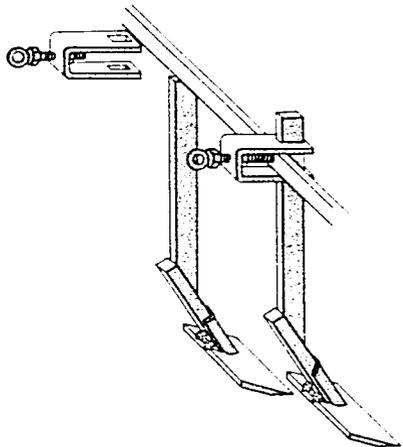


BROADBEDS: Interrow cultivation at 45-cm

Fitting the ridgers

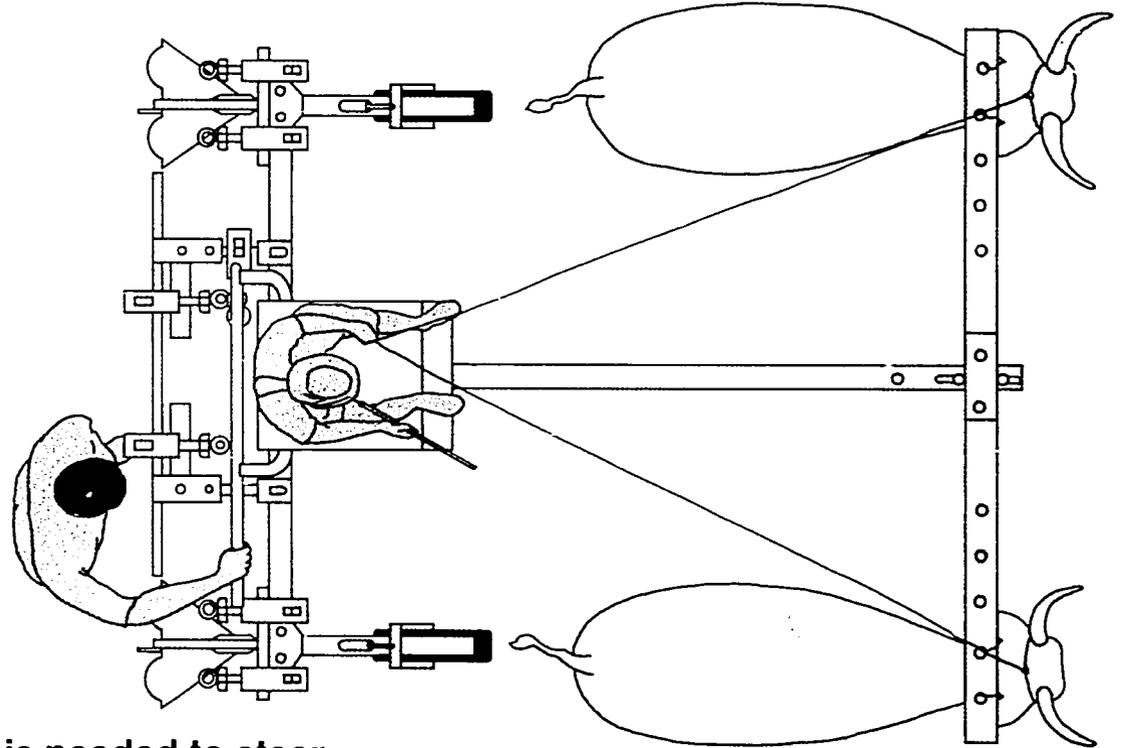


Fitting the rigid tines



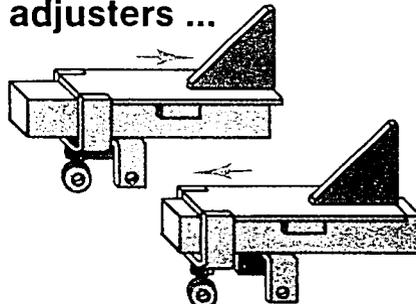
Fit 2 rigid tines on the steerable toolbar

Position of the ridgers and tines

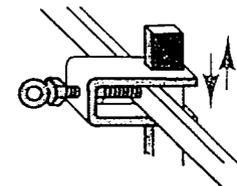


1 person is needed to steer the steerable toolbar

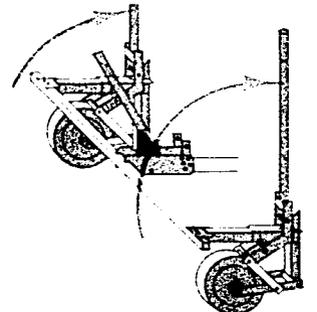
Adjust the depth by sliding the depth adjusters ...



or by changing the height of the tines



Lower the toolbar by lifting the handles



spacing



Caution

Make the turns outside the field.

Lift the toolbar fully before turning.

Drive the bullocks carefully and steer the toolbar carefully to avoid damaging the crop when the plants are not in straight rows.