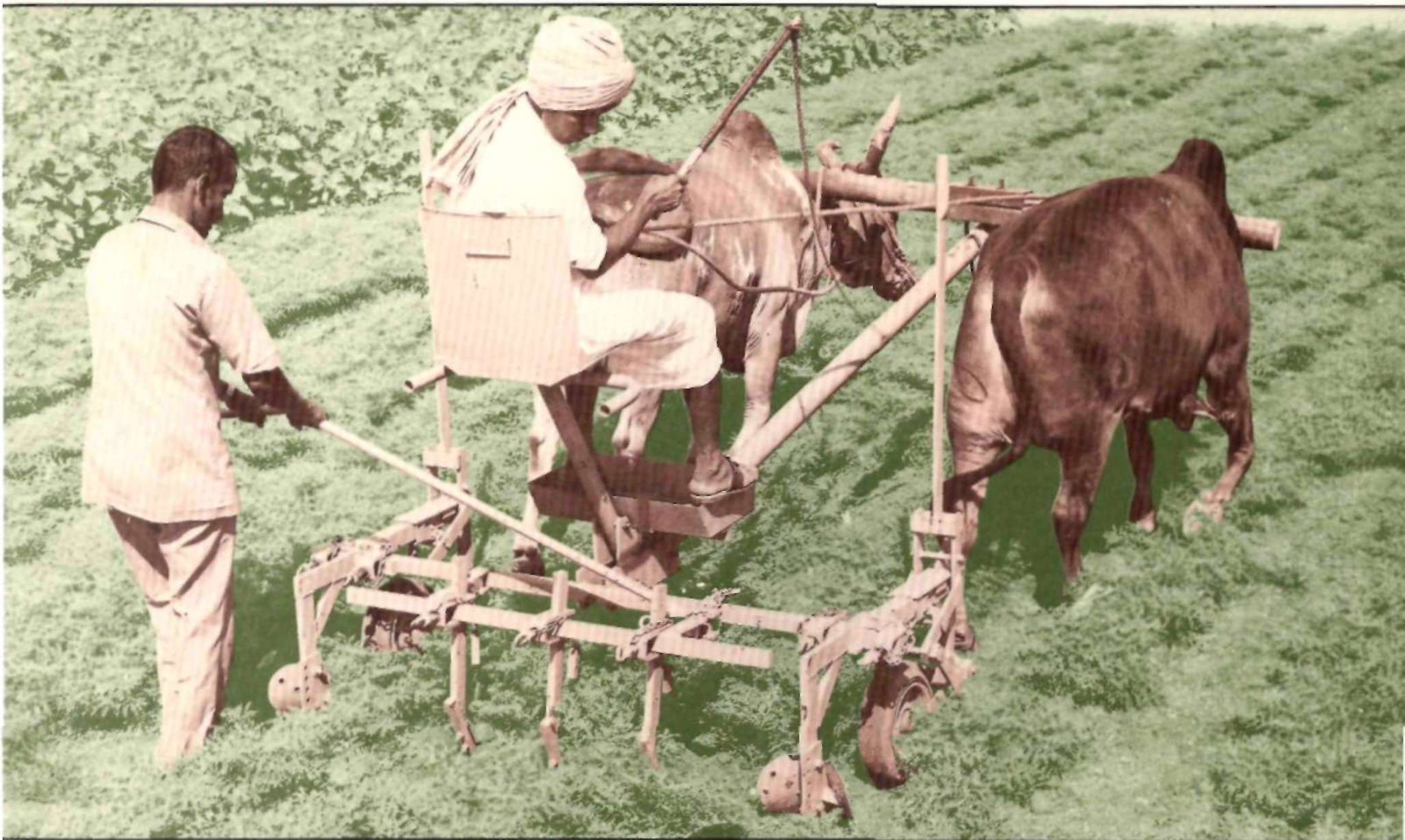


# The Agribar Operator's Manual

## FIELD OPERATIONS

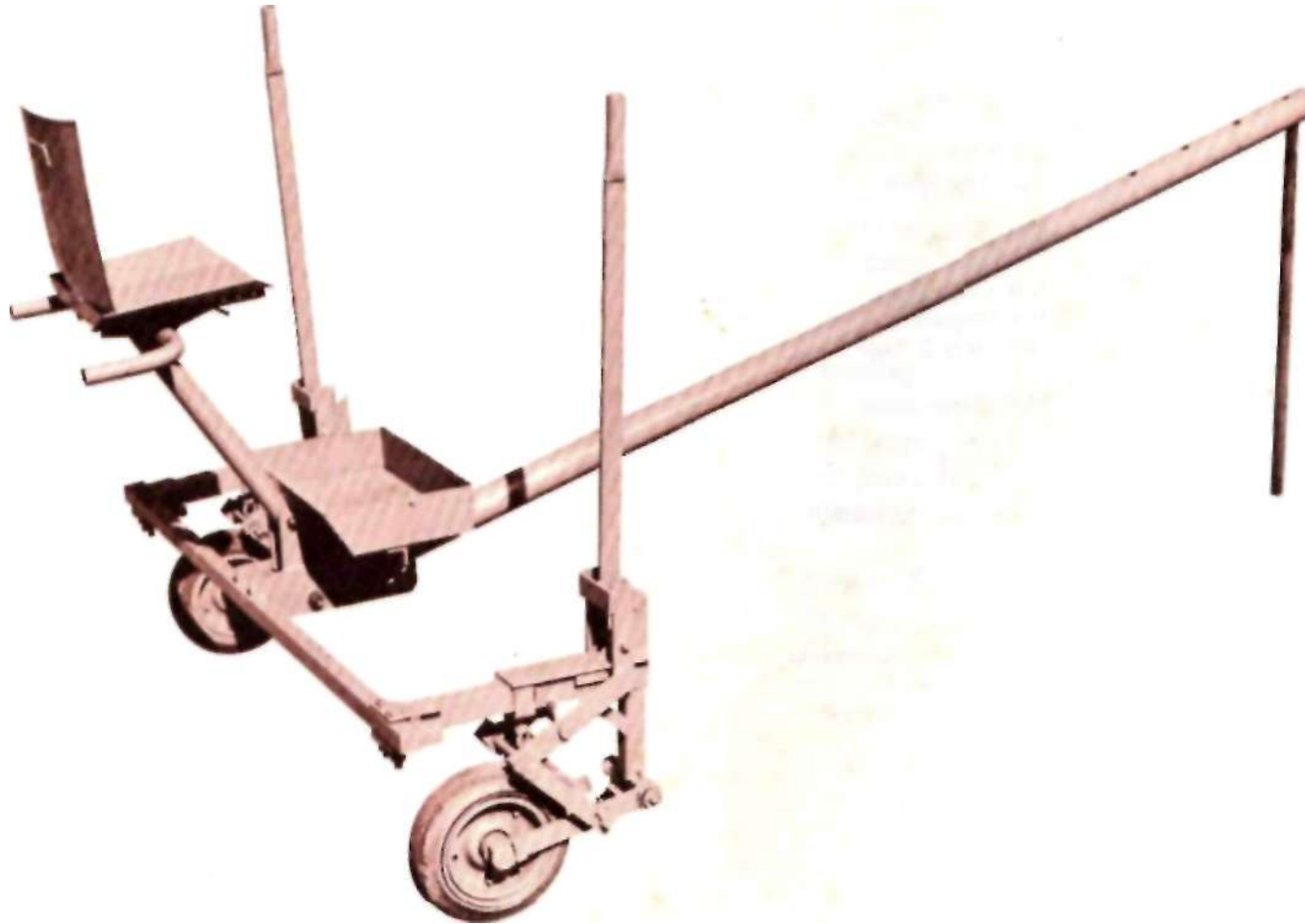


INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS

# 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



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# The Agribar Operators Manual: Field Operations

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**Compiled by R.K. Bansal**

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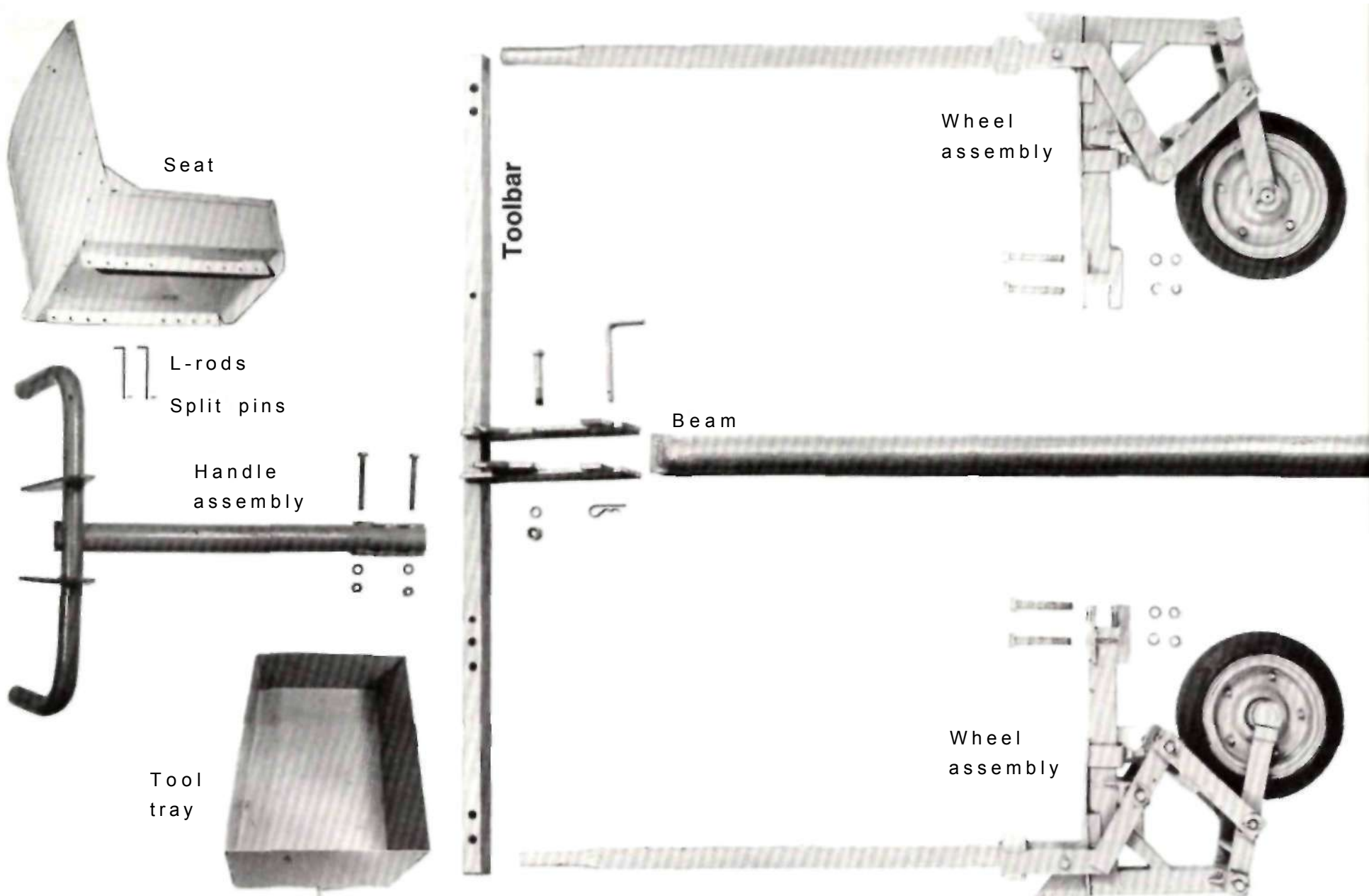
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# AGRIBAR COMPONENTS



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## Tools for Agribar assembly

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Spanner 17/19



Spanner 24/26



Hammer



Pliers



Tommy bar



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## Recommended spares

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Split pins



L-pins



Flat washers



Spring washers



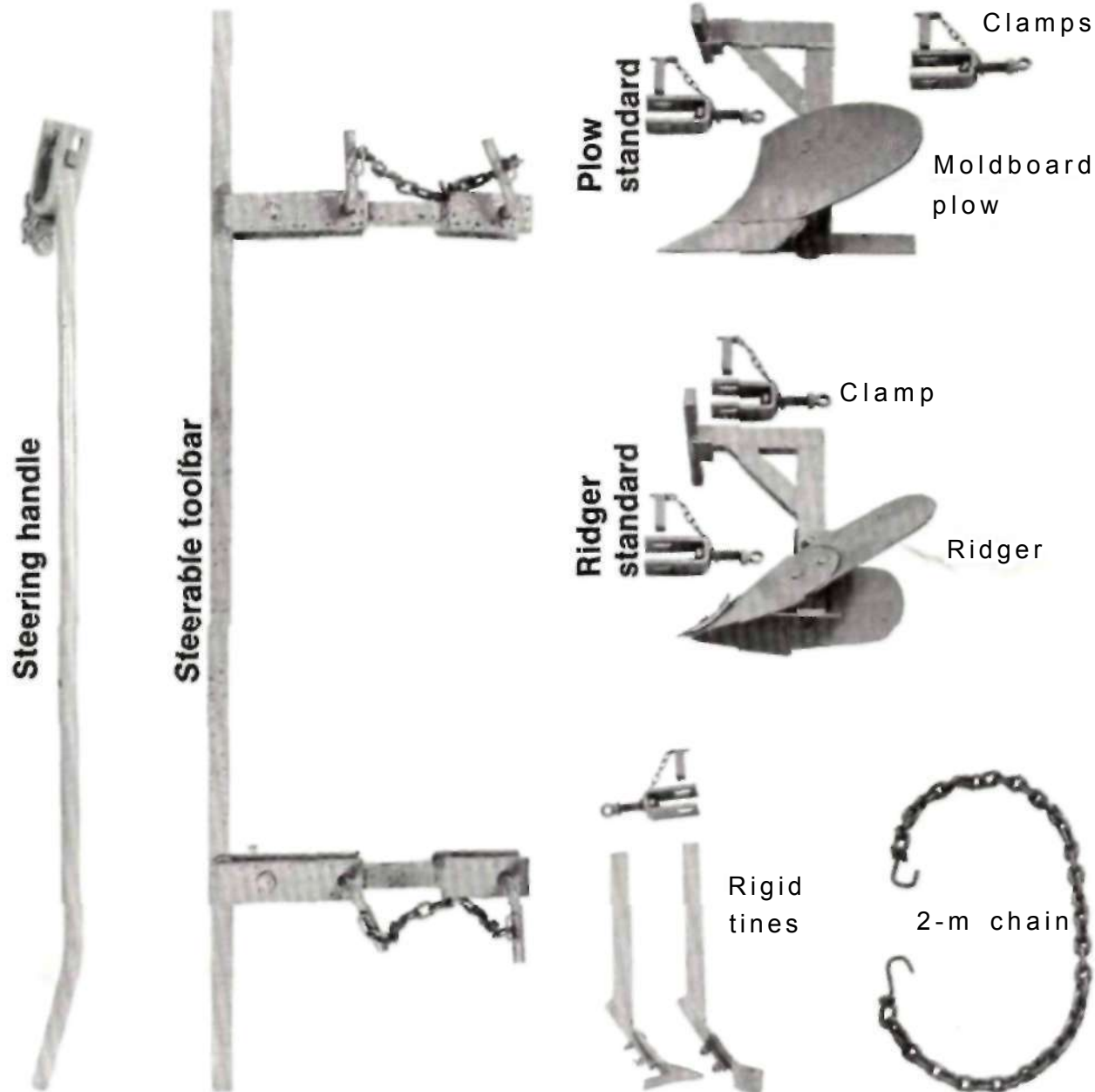
Bolts



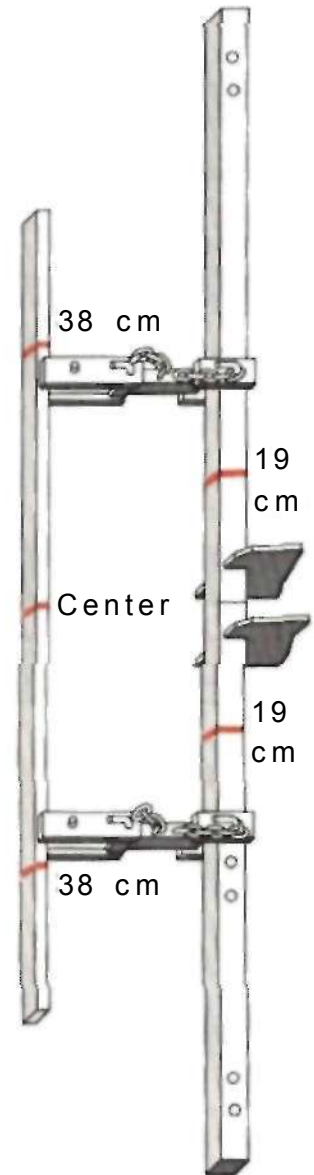
Nuts



# Attachments for cultivation



These markings show the positions of the attachments



# Attachments for sowing

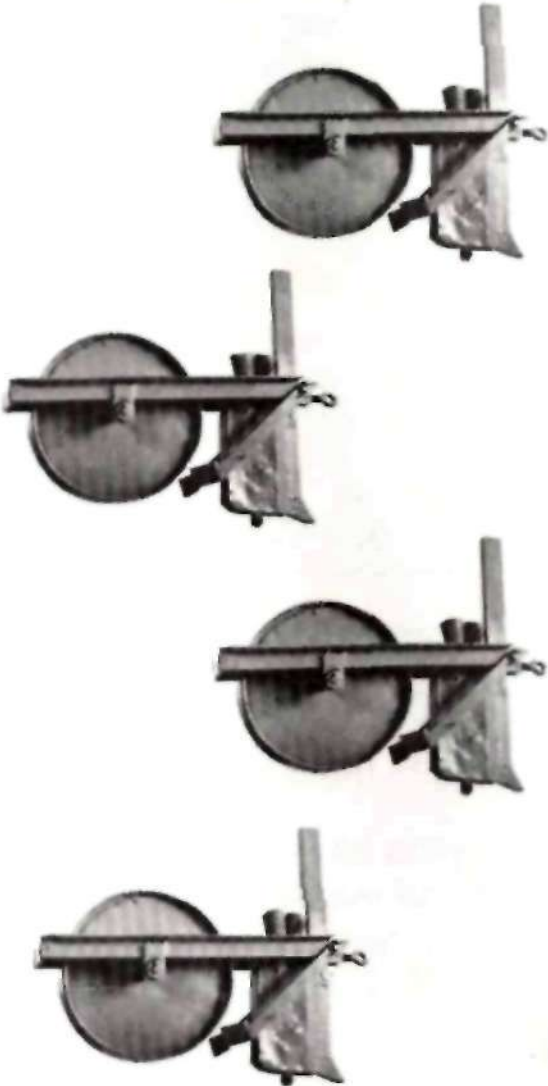
Wooden bowls



Single-row bowl



Furrow opener with press-wheel



## The T-stand

T-stand



Clamp



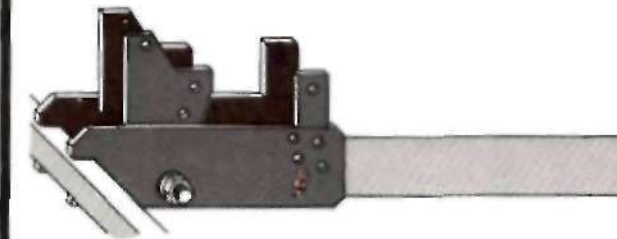
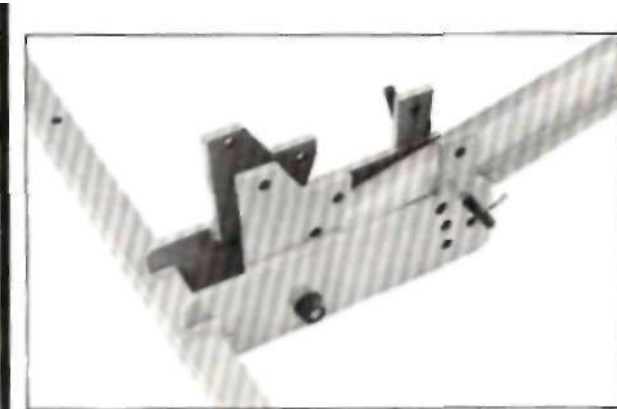
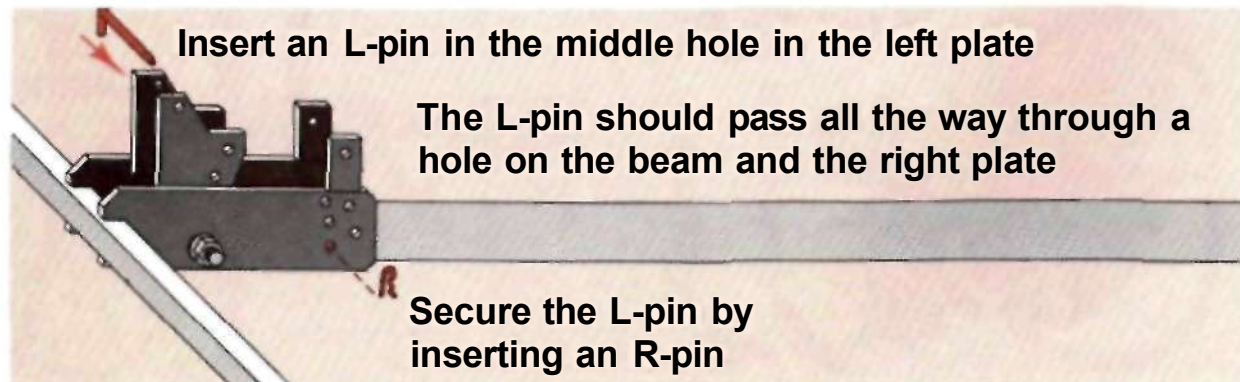
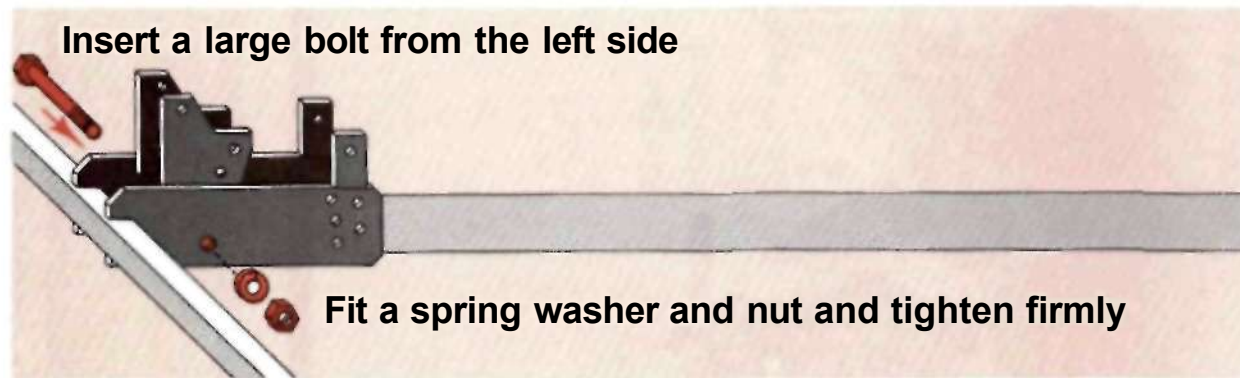
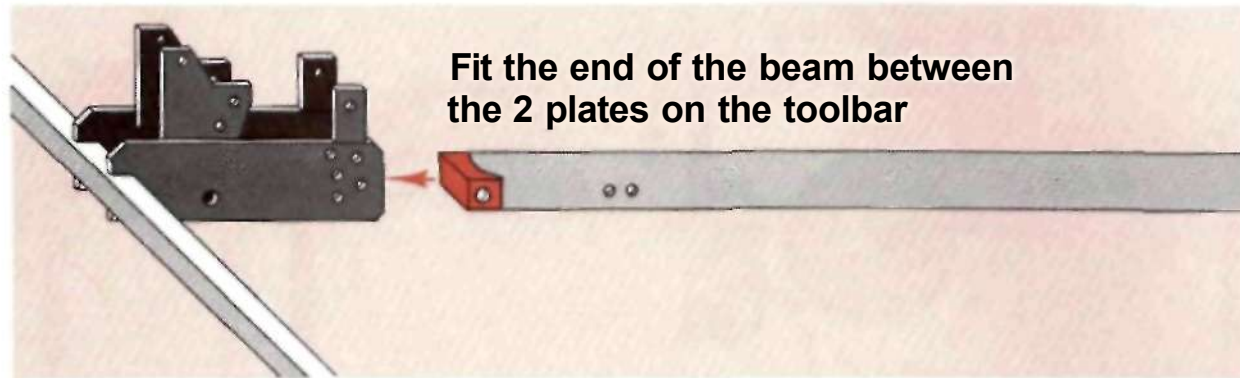
Plastic tubes



# AGRIBAR ASSEMBLY

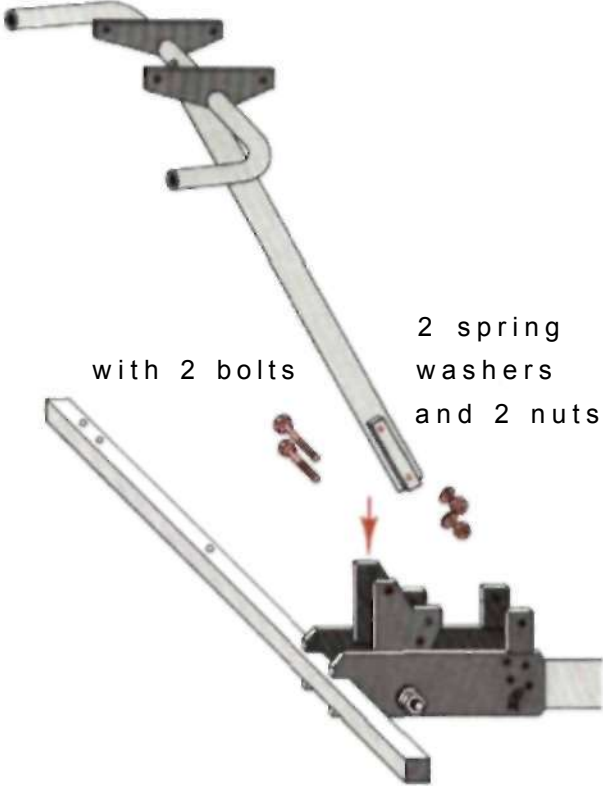
## Fixing the beam to the toolbar

## Adjusting the pitch

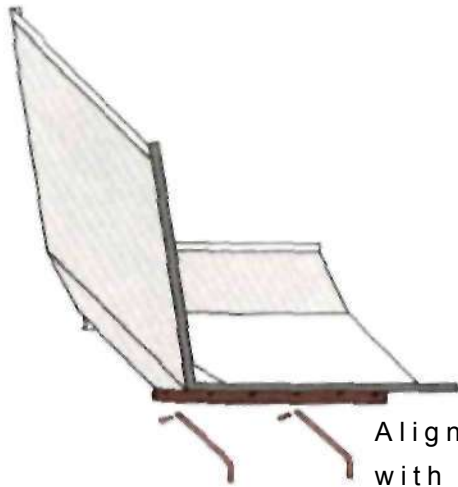


# Fixing the handle assembly

Fix the handle assembly to the plates



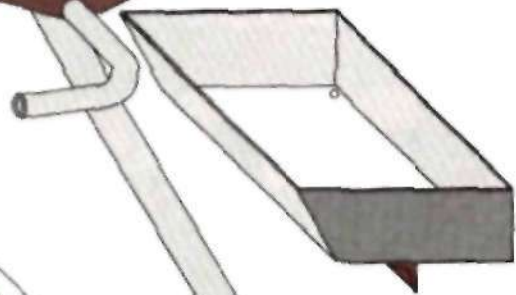
## Fixing the seat to the tool tray



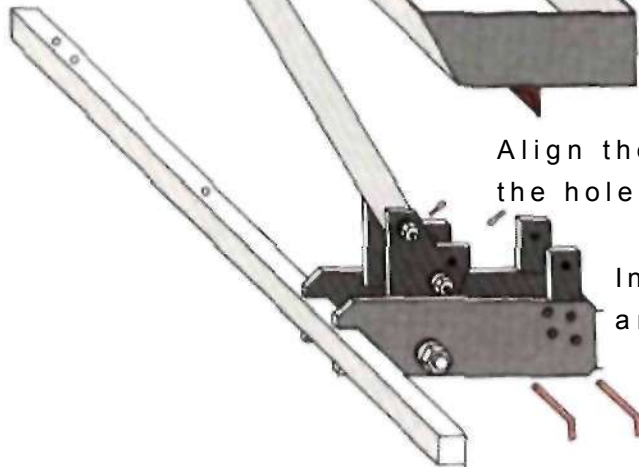
Align the holes under the seat  
with the holes in the brackets on the handles



Insert L-pins and secure them with split pins



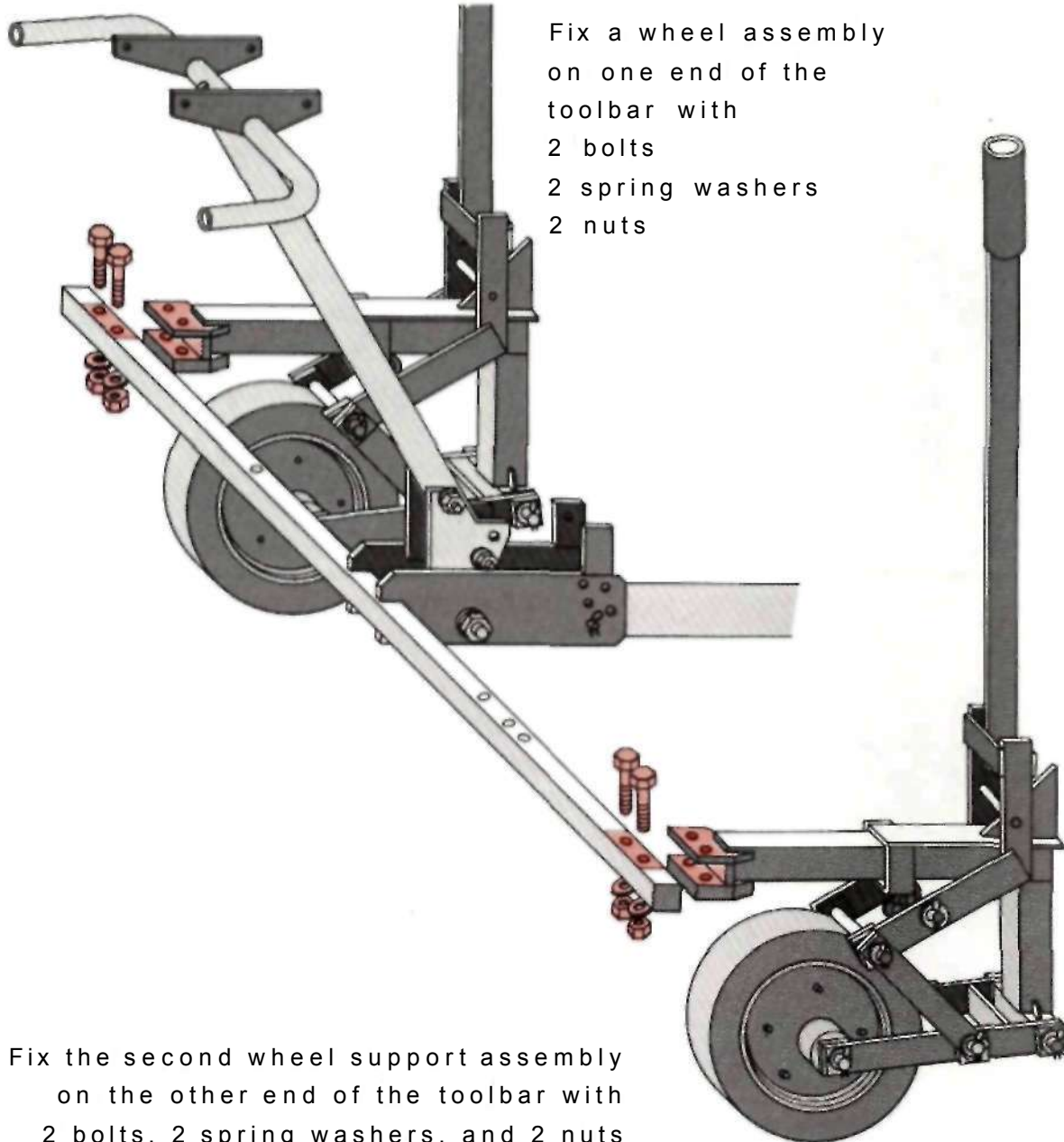
Align the holes under the tool tray with  
the holes in the plates on the toolbar



Insert L-pins  
and secure them with split pins



## Fixing the wheel support assemblies

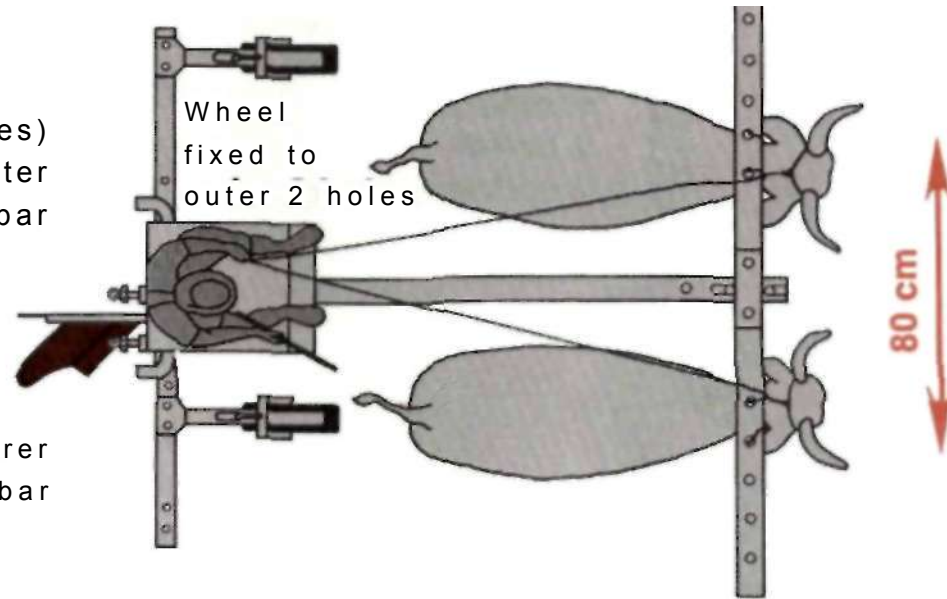


# FLAT LAND: Preparation for plowing

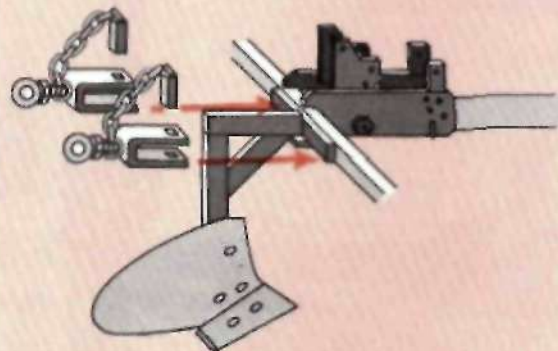
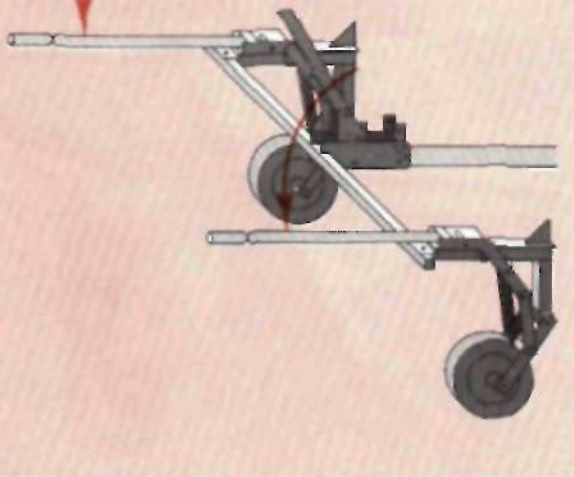
## Plowing of flat land with a single moldboard plow

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

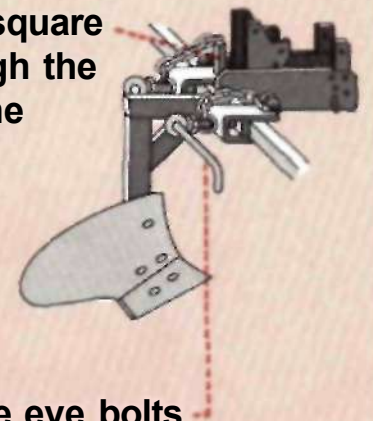


Raise the toolbar by pulling the handles down fully



Slide one clamp on either side of the plow standard

Insert the square pins through the holes on the clamps

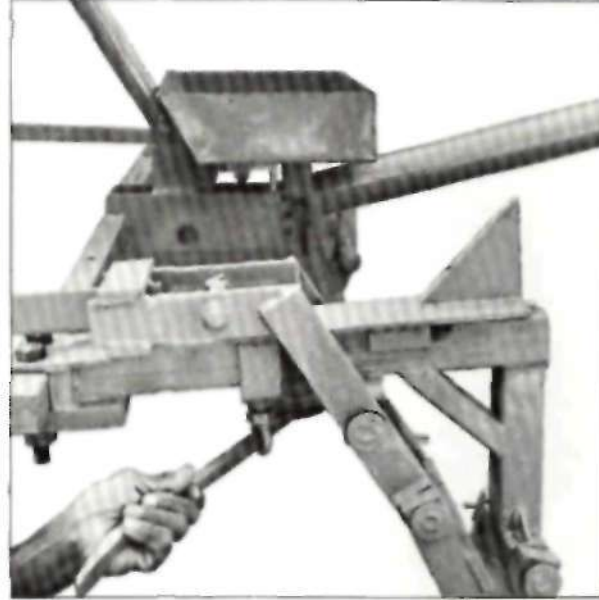


Tighten the eye bolts firmly with a tommybar

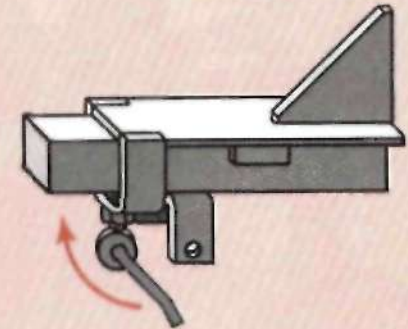
# Hitching

# Depth adjustment

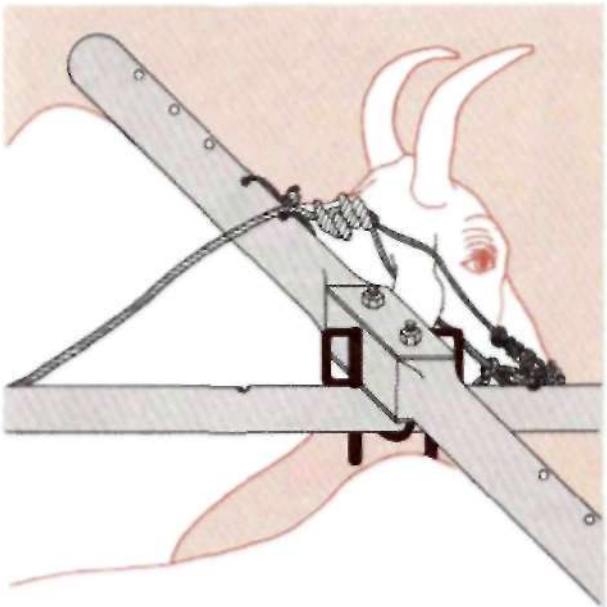
Hitch the bullocks 80 cm apart



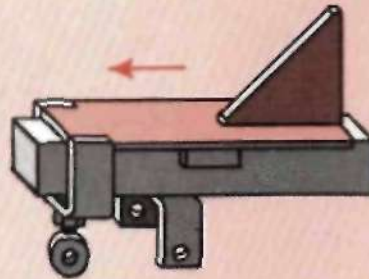
Loosen the eye bolts on either side of the depth adjusters



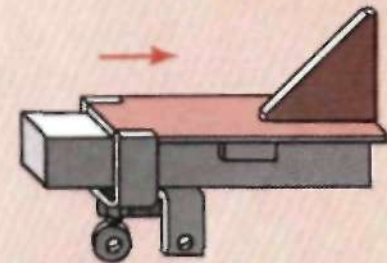
with the tommybar



Slide the depth adjusters:



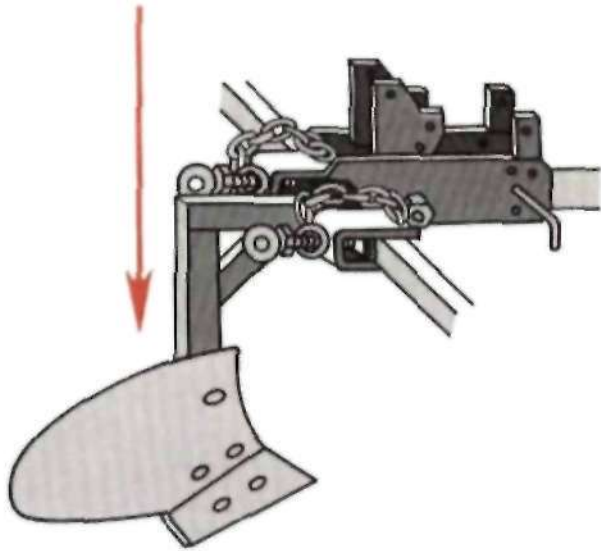
backwards to reduce the depth of working



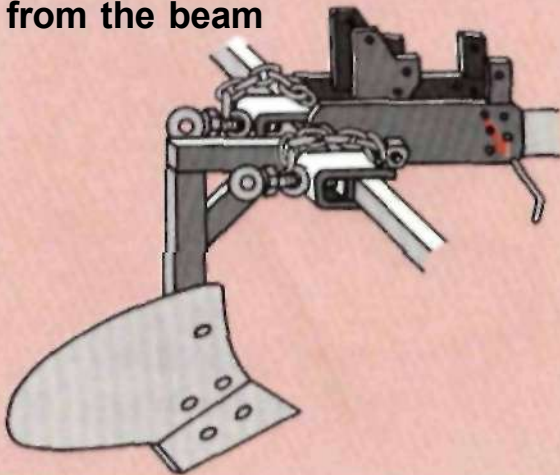
forwards to increase the depth of working

# Pitch adjustment

Check if the plow standard is vertical



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

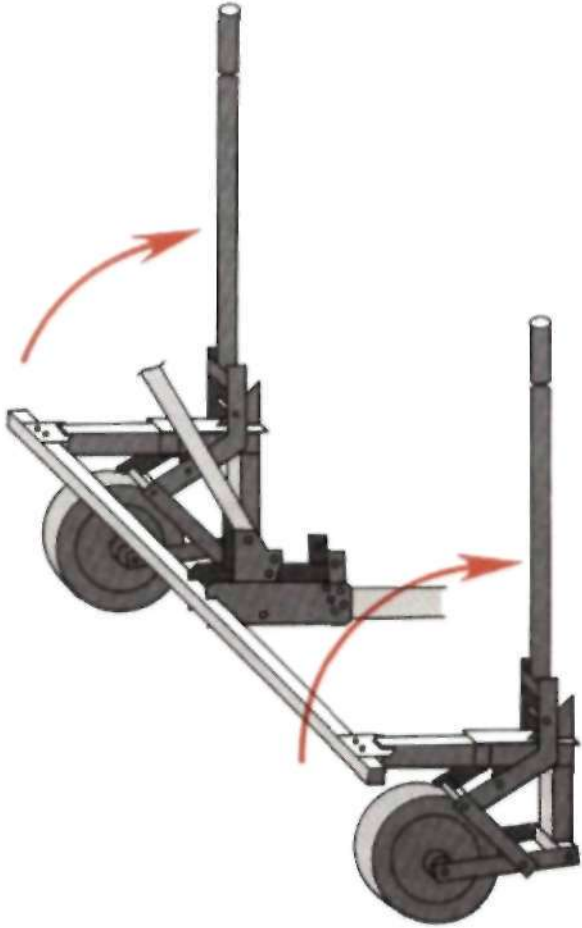


Align the hole in the beam with another hole on the plates to make the plow standard vertical



## 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



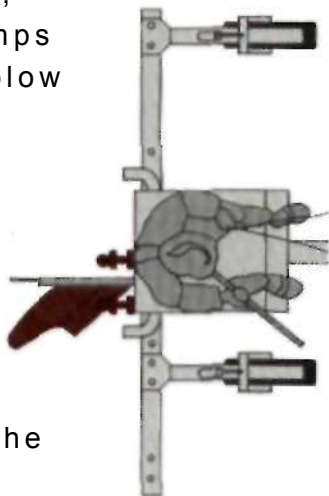


# Width of cut

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

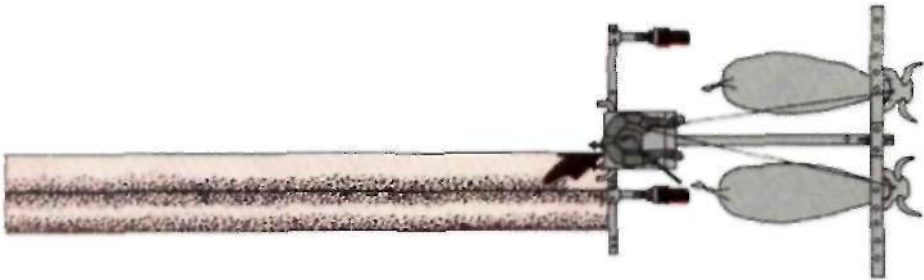
## 2nd pass

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



# 3<sup>rd</sup> pass

Position the right wheel on the plowed land



## Caution

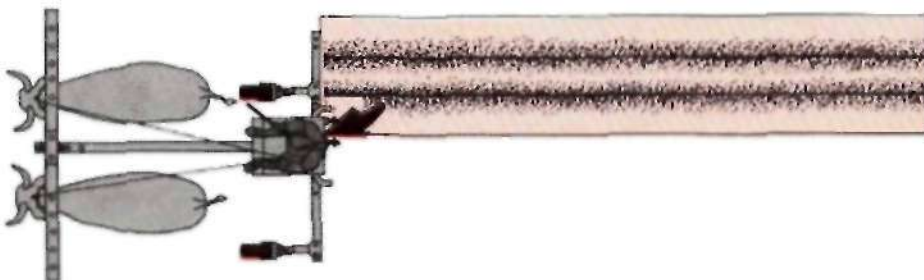
Select the right width and depth of plow to avoid straining the bullocks.

Lift the toolbar fully before turning.

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

# 4<sup>th</sup> 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

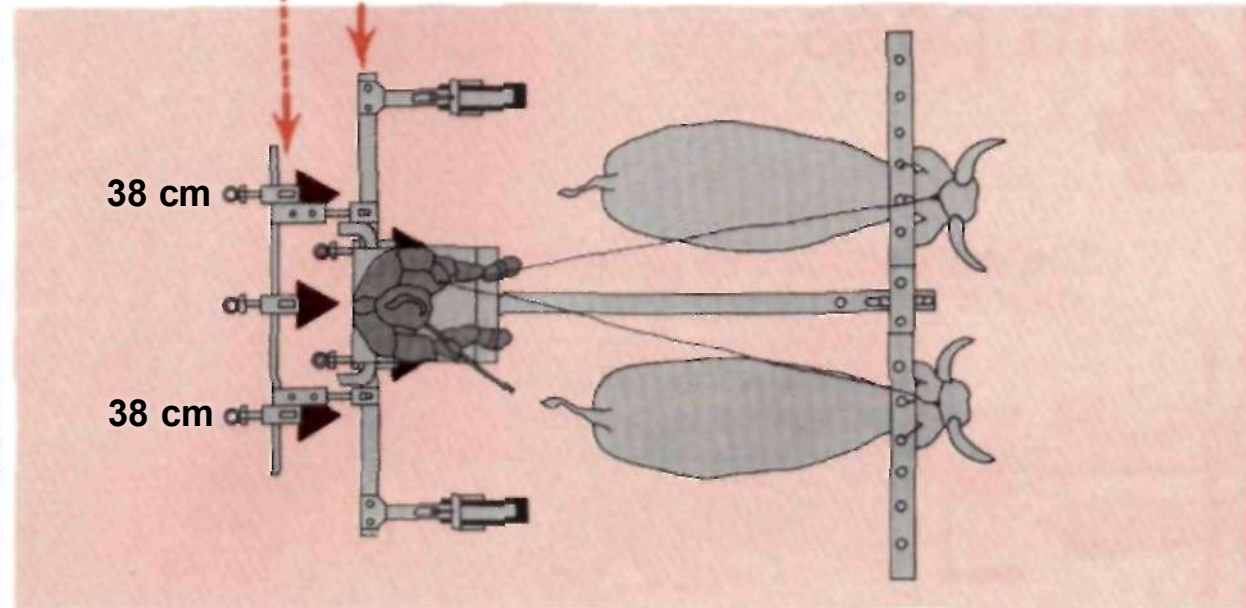
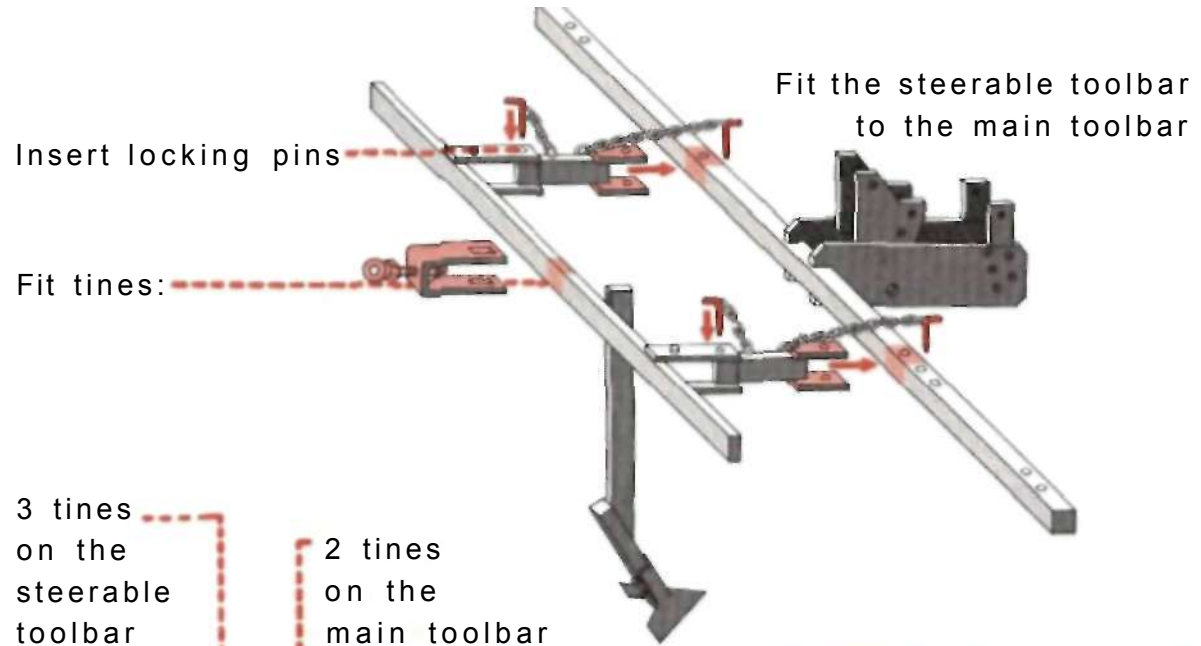
For cultivation, the right wheel can be at end of the toolbar...



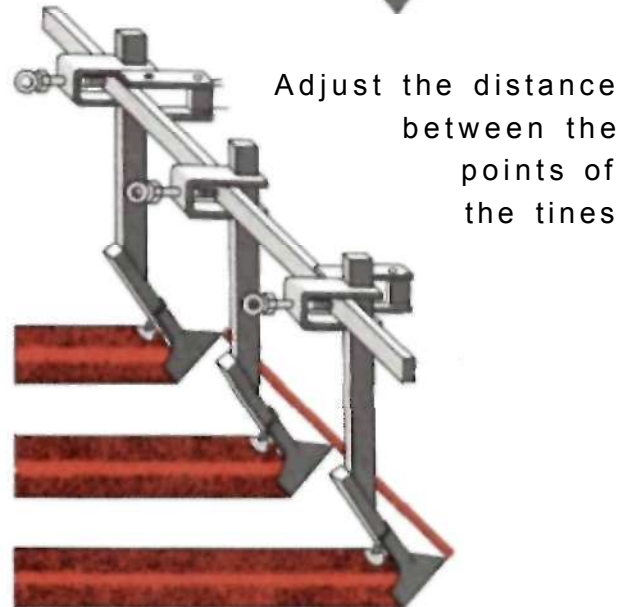
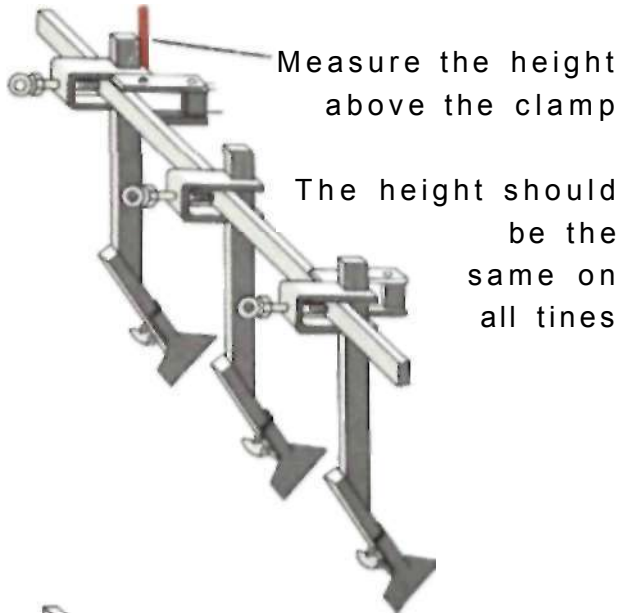
or near the center of the toolbar. This position is preferable because it avoids running the wheels over cultivated soil



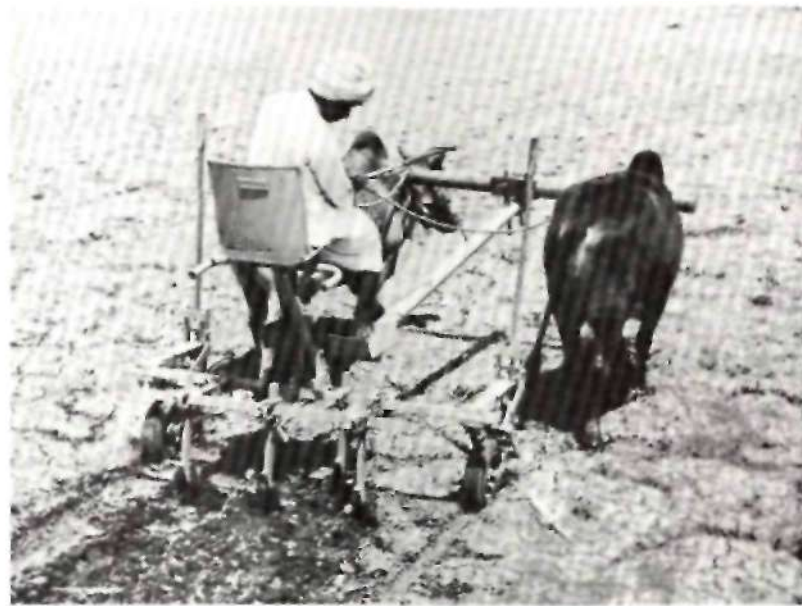
## Cultivation with rigid tines



## Checking the position of the tines

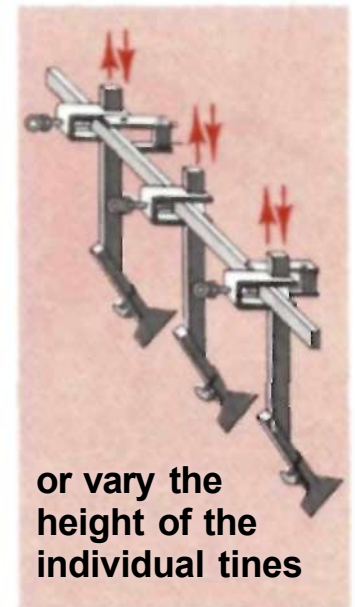
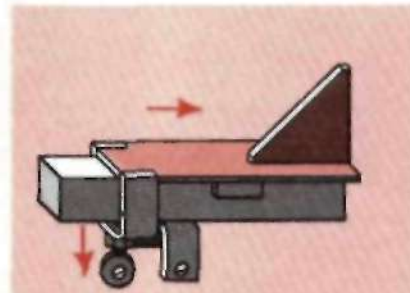
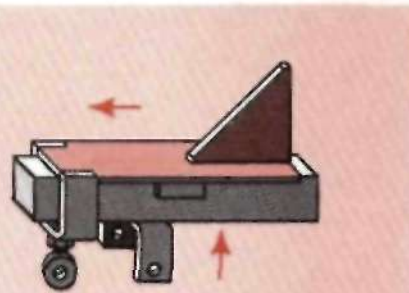


## Checking the depth adjustment of the tines



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

If necessary adjust the depth of working

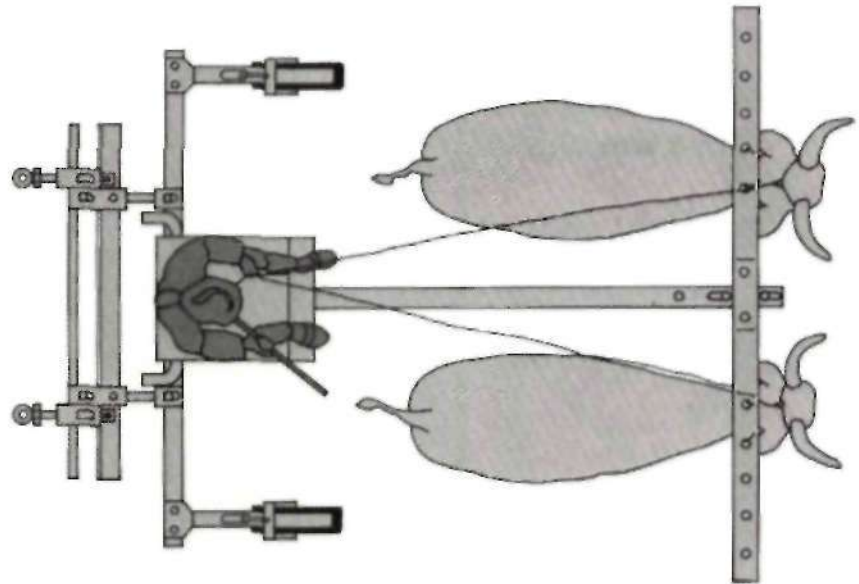


# FLAT LAND: Cultivation with a blade harrow

Fit a steerable toolbar to the main toolbar

Insert locking pins

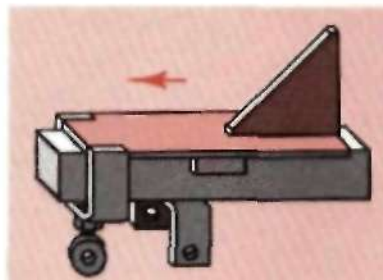
Fit a 120-cm blade harrow to the center of the steerable toolbar



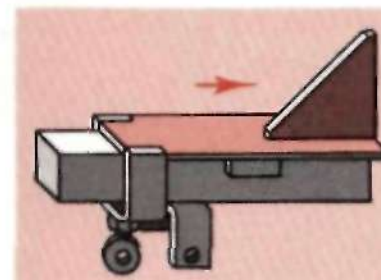
Fix the blade harrow with 2 clamps



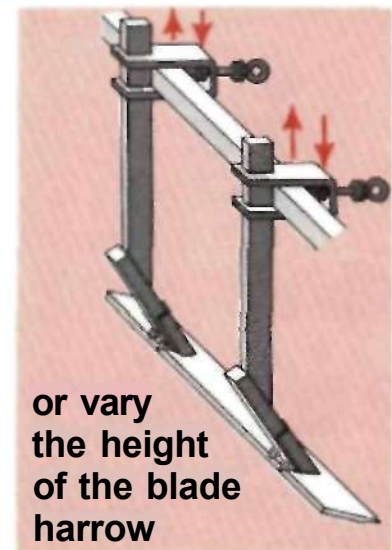
If necessary, adjust the depth of working



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.*

# B R O A D B E D S

## The broadbed-and-furrow system

## Marking the slope of the land

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

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

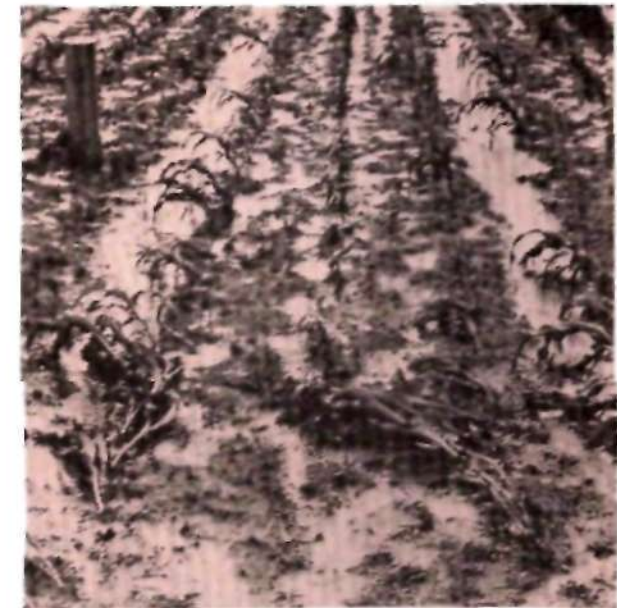


The broadbeds should be on a slope of about 0.4-0.8%  
Mark the key line with pegs (or lime)

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



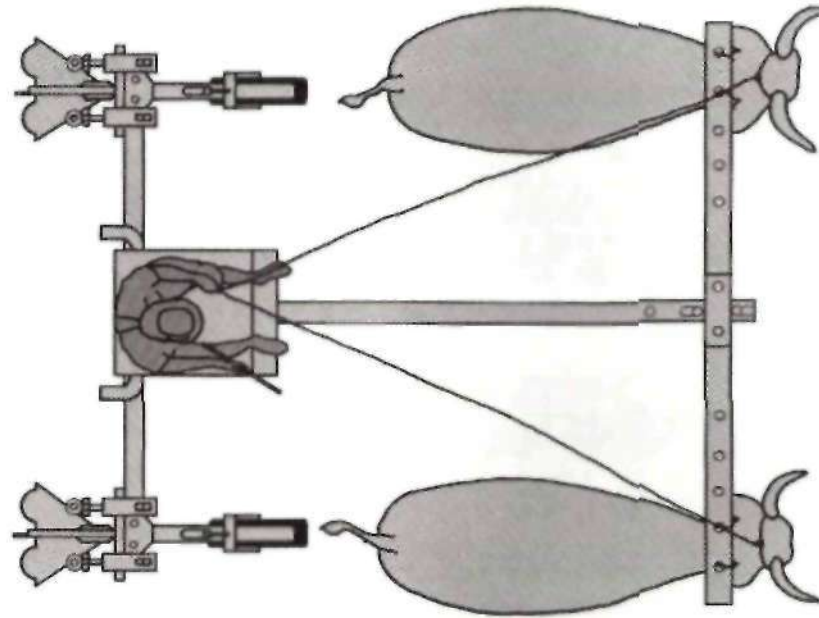
If the broadbeds slope too much the water will run off, causing erosion



# BROADBEDS: Shaping

## Making broadbeds for the first time

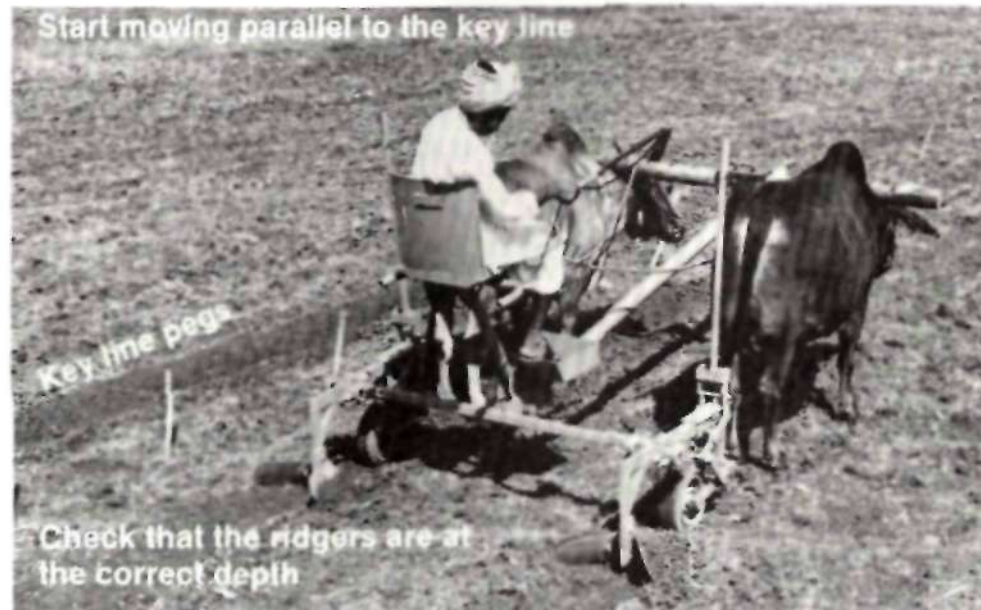
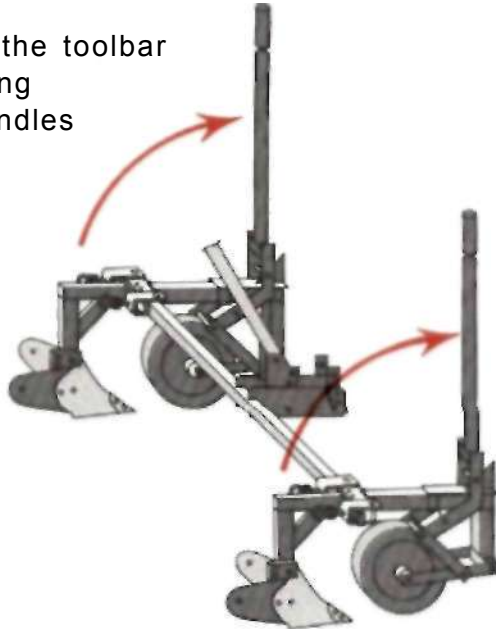
Fit 2 ridgers on the toolbar directly behind the wheels



Hitch the bullocks 150 cm apart directly ahead of the wheels

Take the Agribar to the field

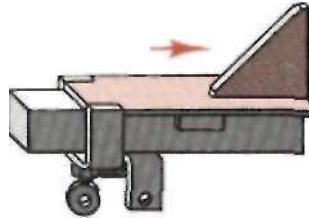
Lower the toolbar by lifting the handles



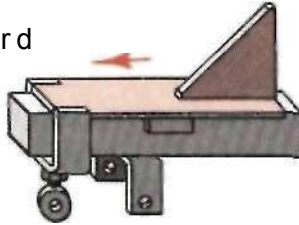


## Adjusting the depth and pitch

Slide the depth adjusters forward to increase the depth of working

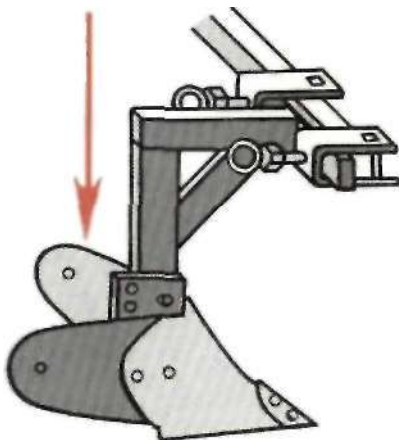


Slide the depth adjusters backward to reduce the depth of working

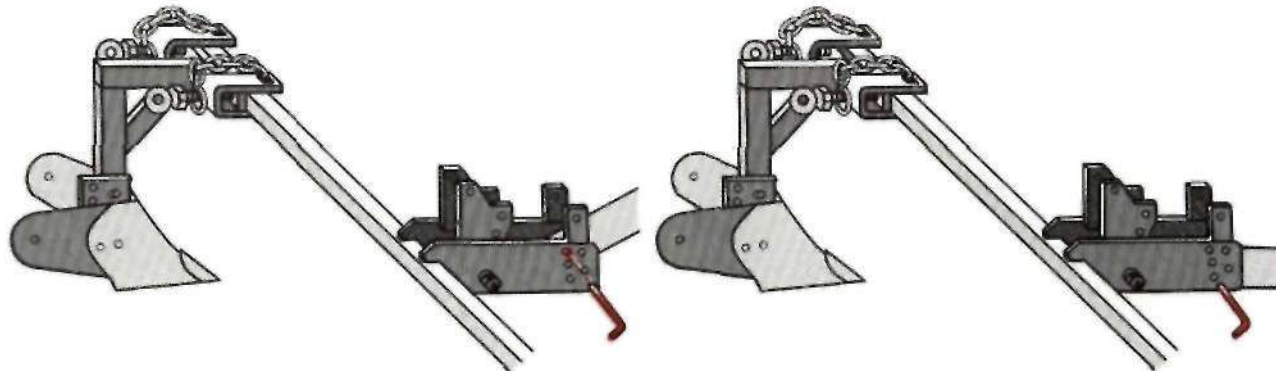


If necessary, adjust the pitch

If the ridger standard is not vertical...

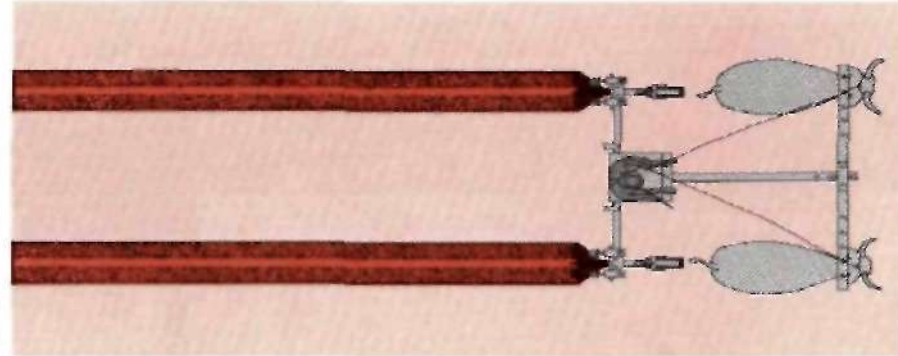


align the hole in the beam with another hole on the plate to make the ridger vertical



# 1st pass

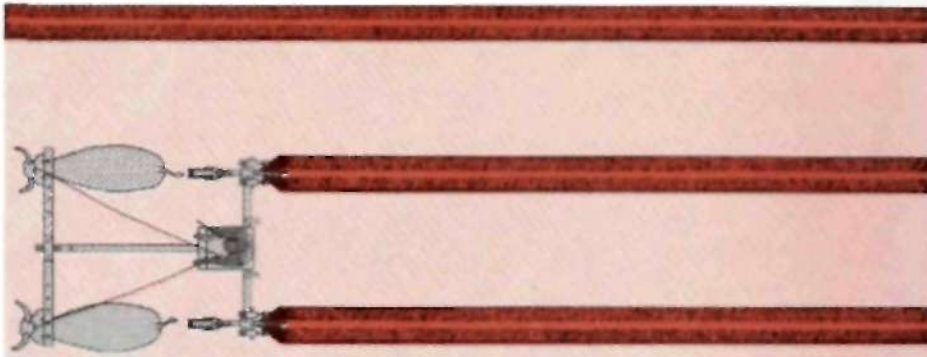
Continue moving parallel to the key line



Lift the toolbar before turning

## 2<sup>nd</sup> pass

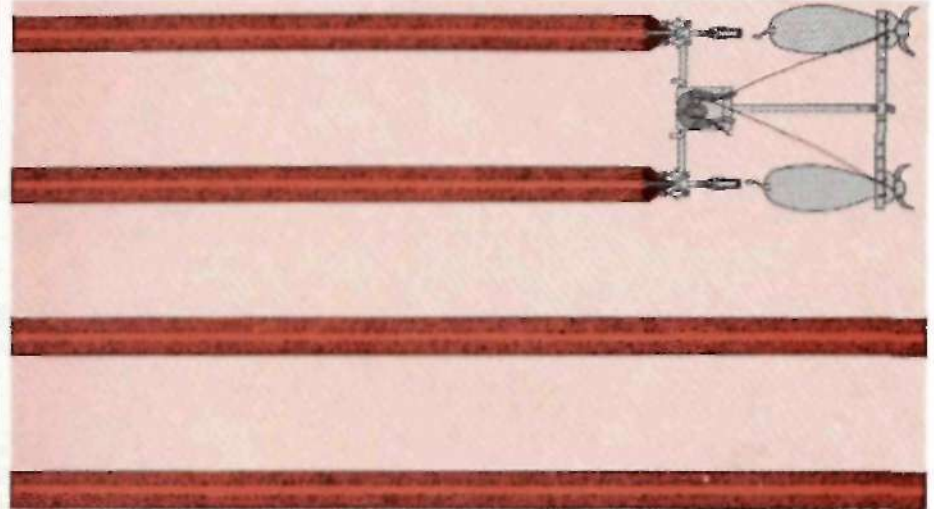
Position 1 wheel and 1 bullock in the previous furrow. Lower the toolbar and start moving



Lift the toolbar before turning

## 3<sup>rd</sup> 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

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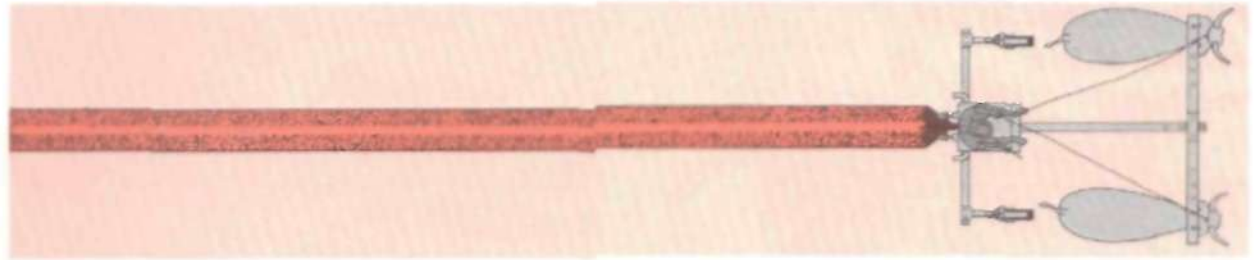
# BROADBEDS: Plowing

Primary tillage on existing broadbeds is done in 4 passes

**1**st pass



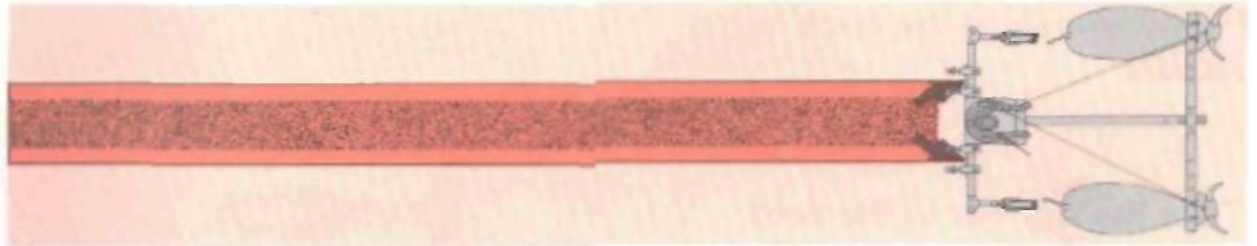
with 1 ridger



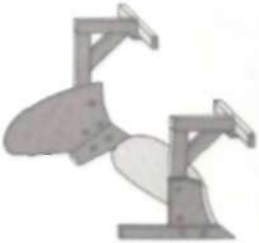
**2**nd pass



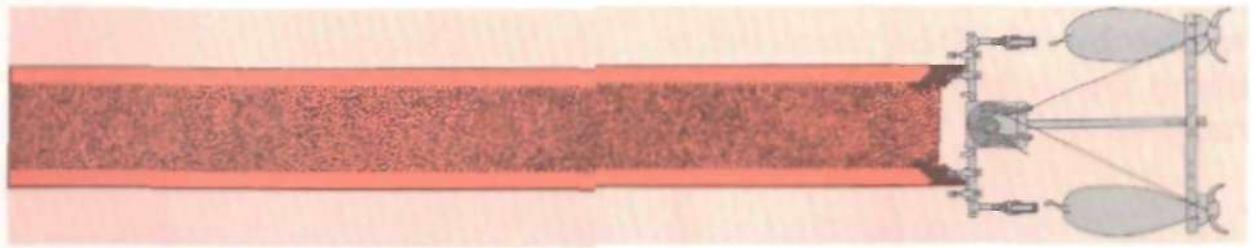
with 2 plows



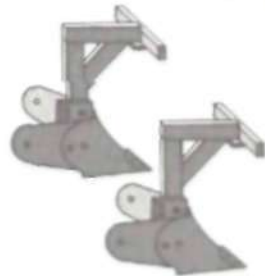
**3**rd pass



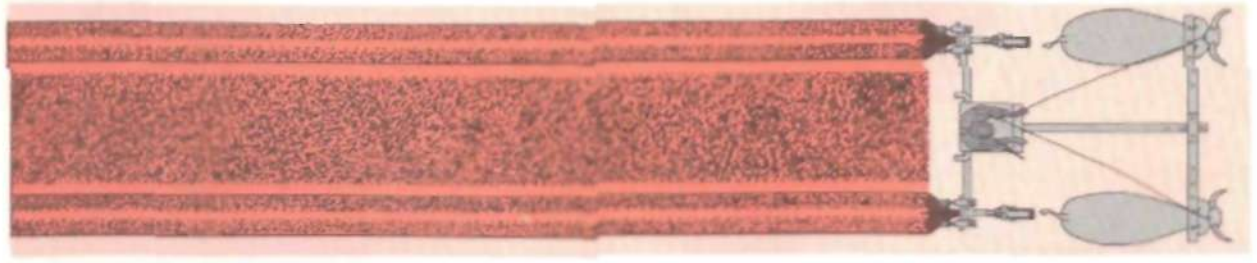
with 2 plows



**4**th pass



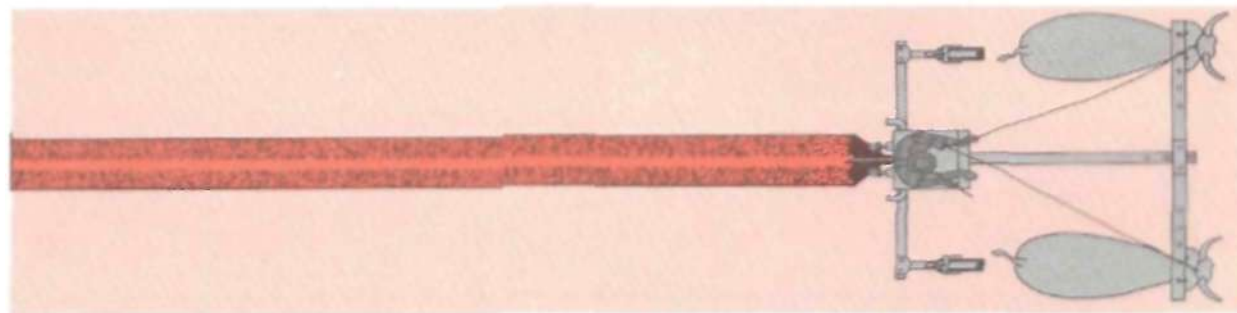
with 2 ridgers



# 1st pass

## Opening the center of the broadbed

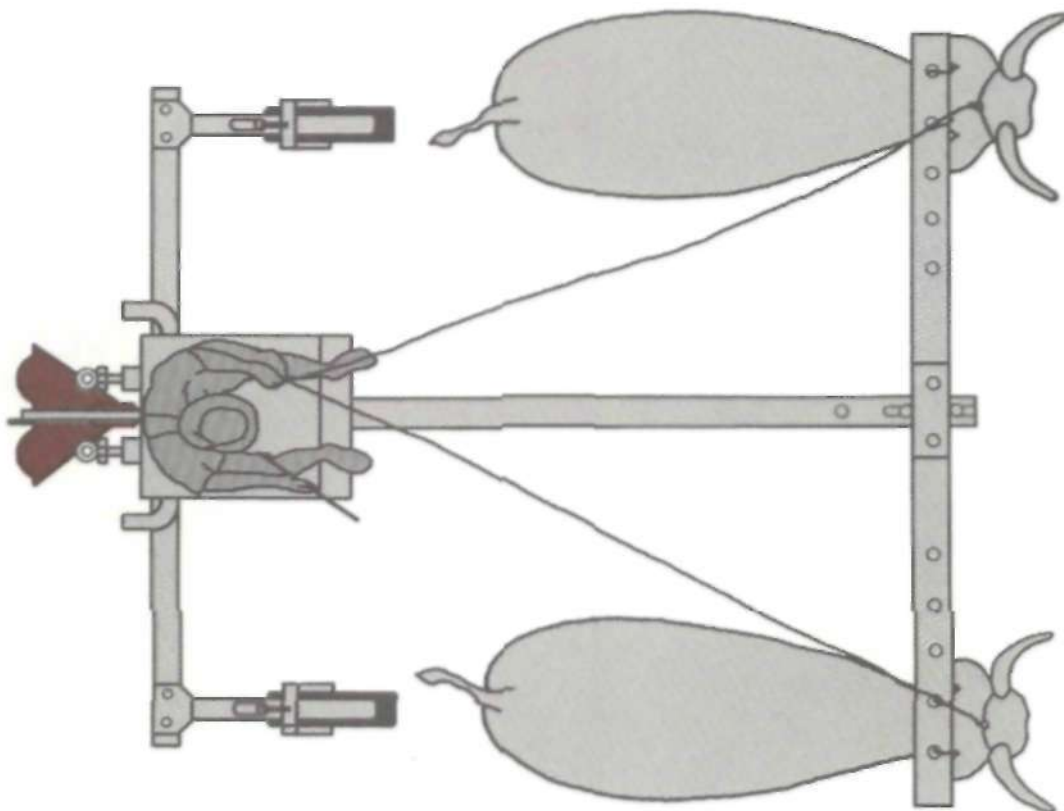
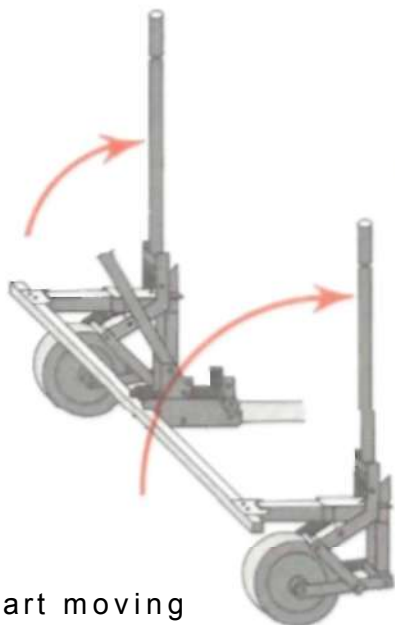
Fit the ridger in the center of the toolbar



Fit the wheels at the ends of the toolbar

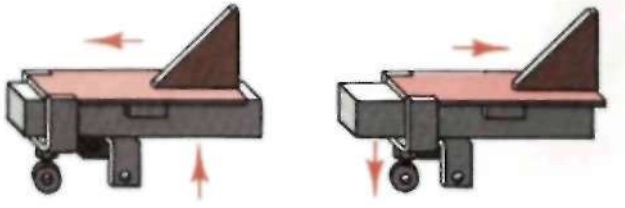
Take the Agribar to the field

Lower the toolbar by lifting the handles...



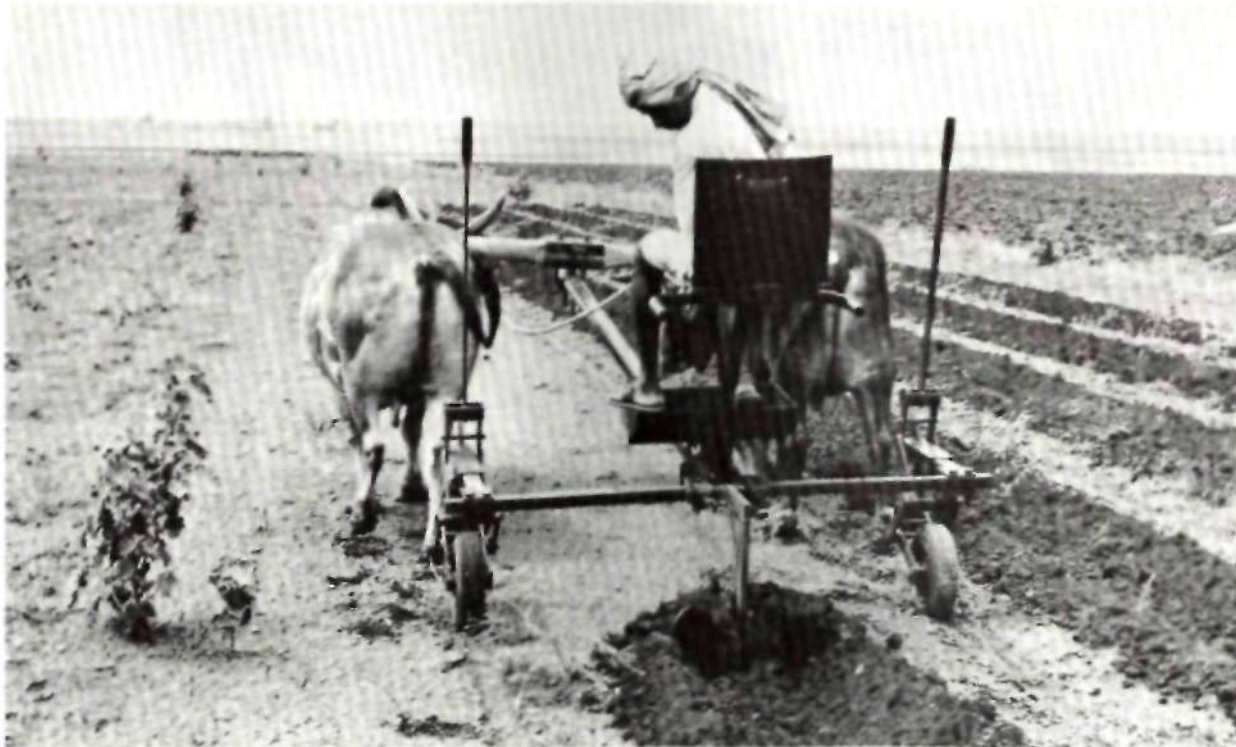
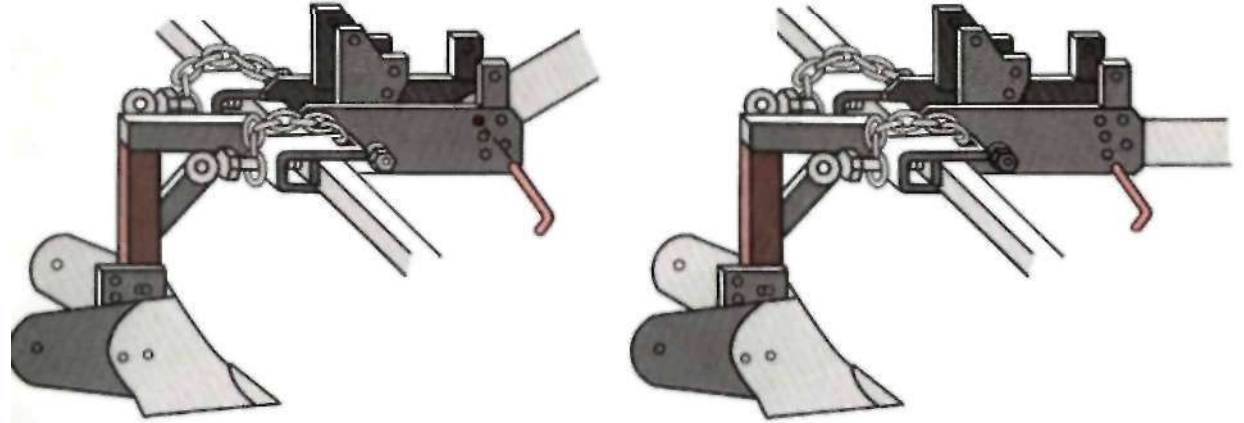
## Adjusting the depth

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



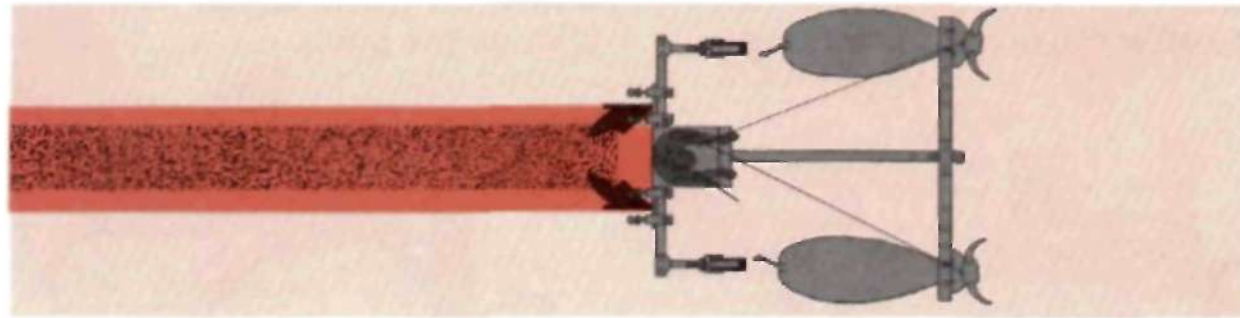
Complete making furrows  
in the center of the broadbeds  
throughout the field

# 2<sup>nd</sup> pass

## Plowing at 70-cm spacing

Remove the ridger

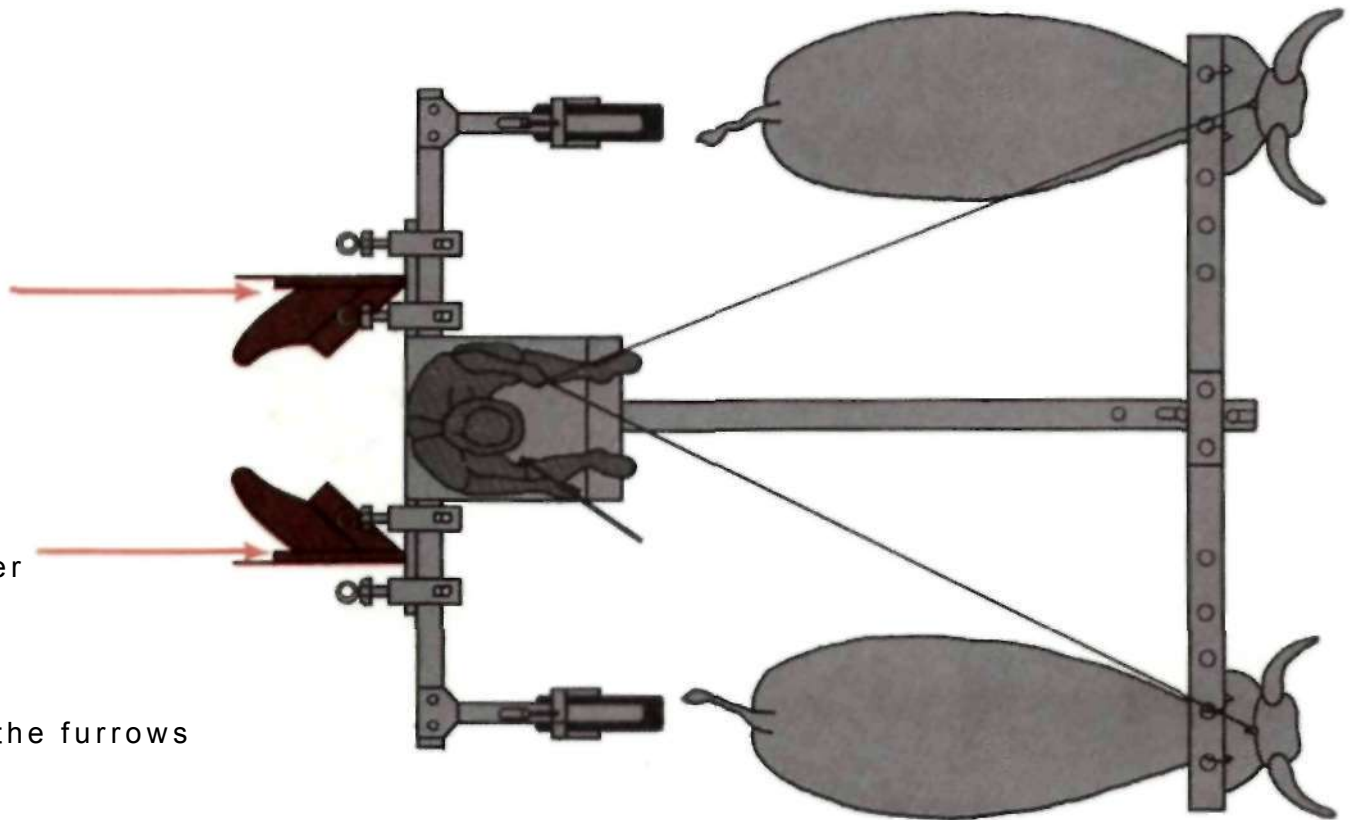
Fit 2 plows  
to the toolbar



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

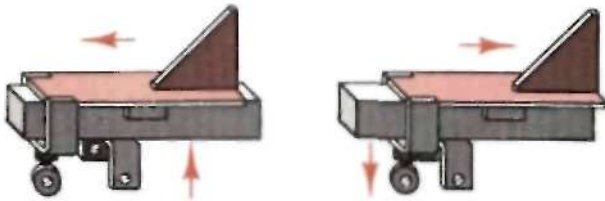


---

## Adjusting the depth

---

Slide the depth adjusters to alter the depth of working

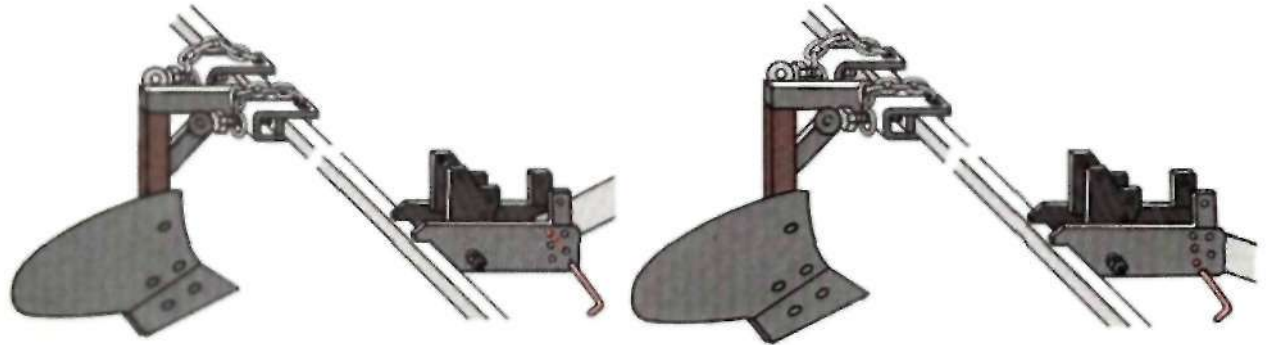


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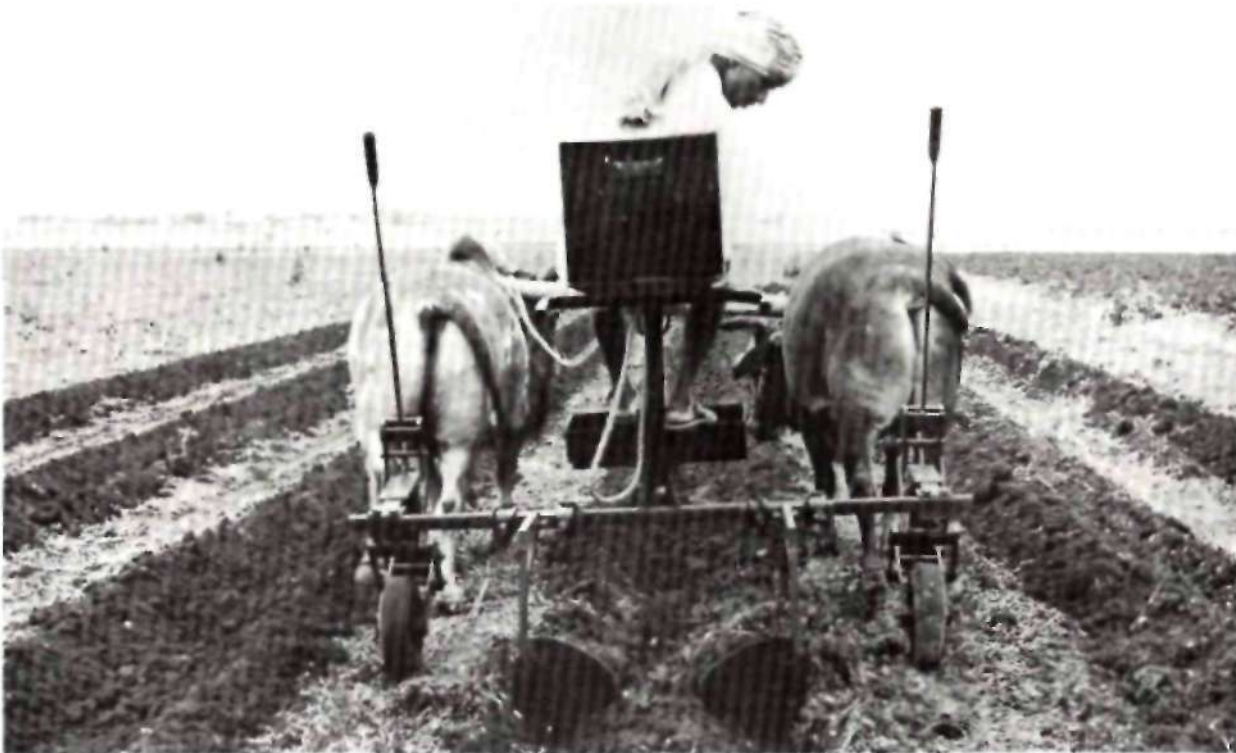
## Adjusting the pitch

---

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.*

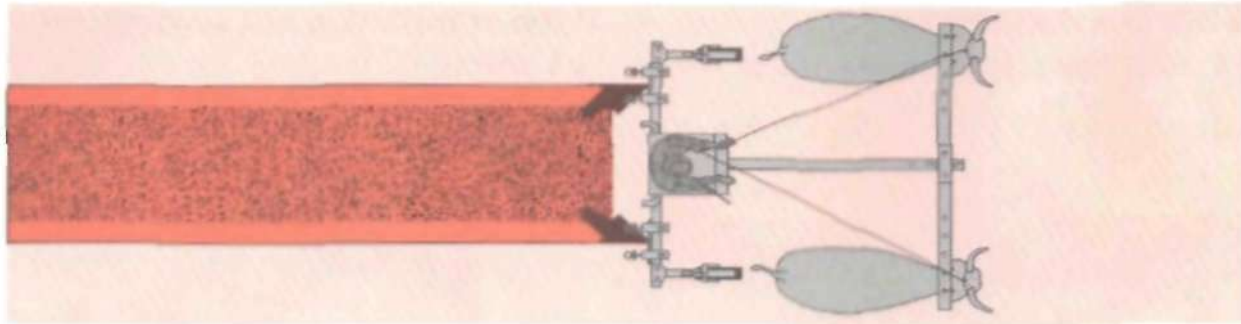
*Tighten the clamps occasionally while working.*



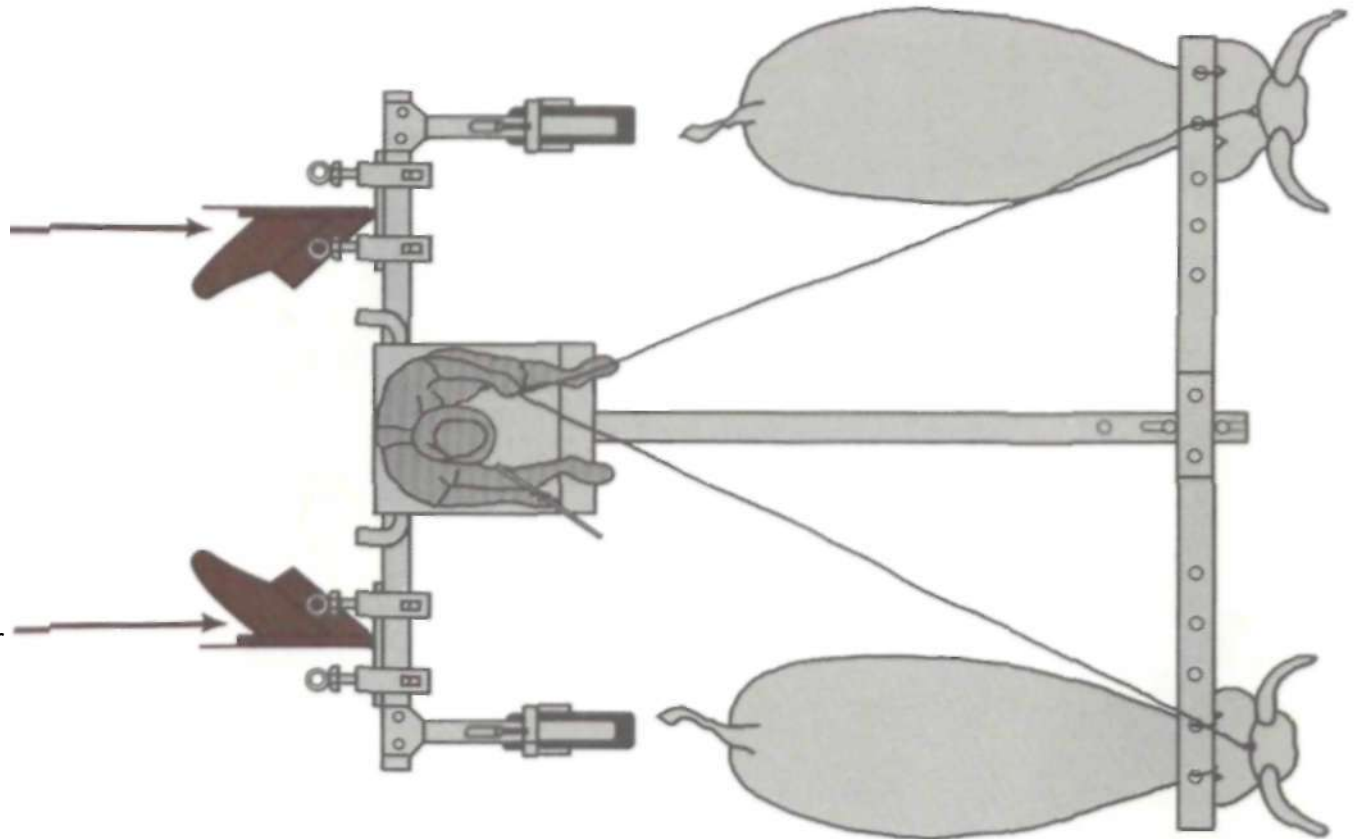
# 3<sup>rd</sup> pass

## Plowing at 110-cm spacing

Change the position of the plows



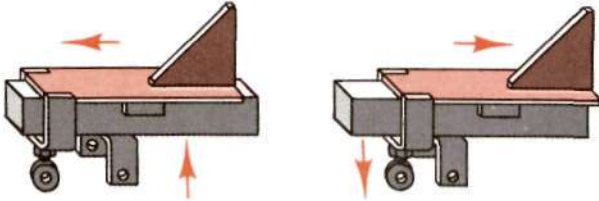
Fit 1 right-hand plow  
55 cm left of the center



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

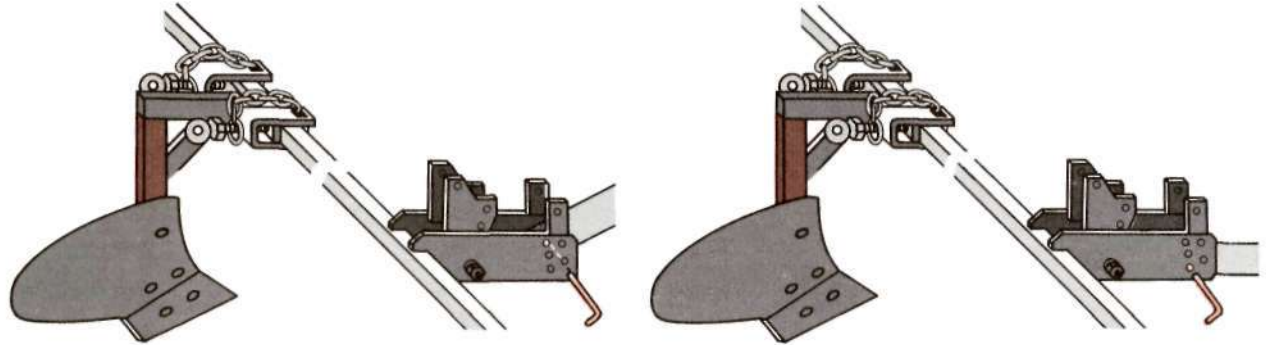
## Adjusting the depth

Slide the depth adjusters to alter the depth of working



## Adjusting the pitch

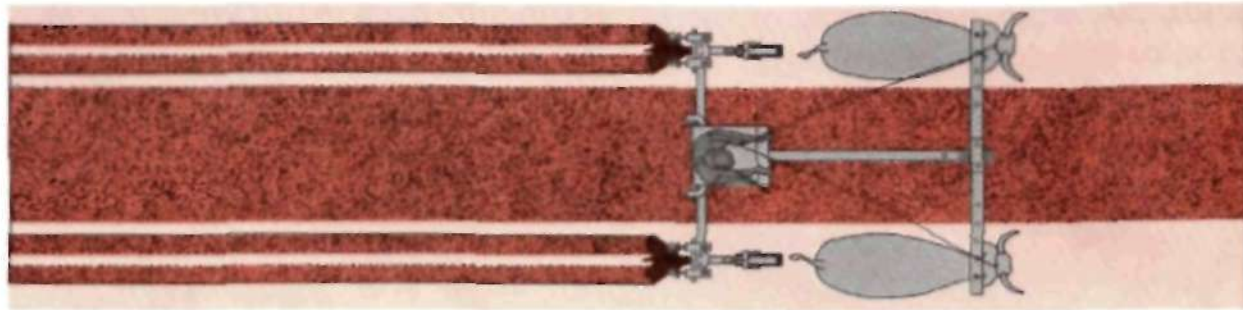
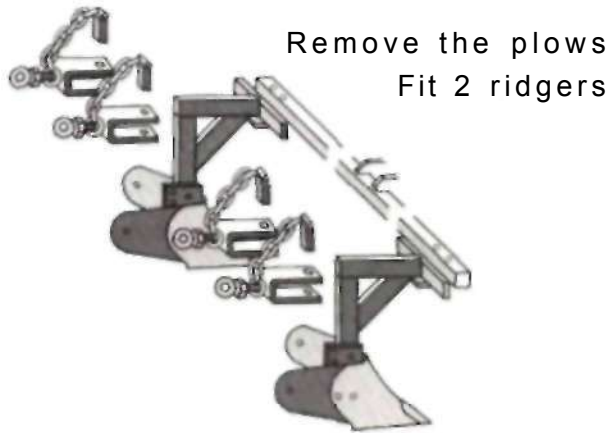
If the standard is not vertical, move the L-pin to another hole to change the pitch



Finish plowing the field

# 4<sup>th</sup> pass

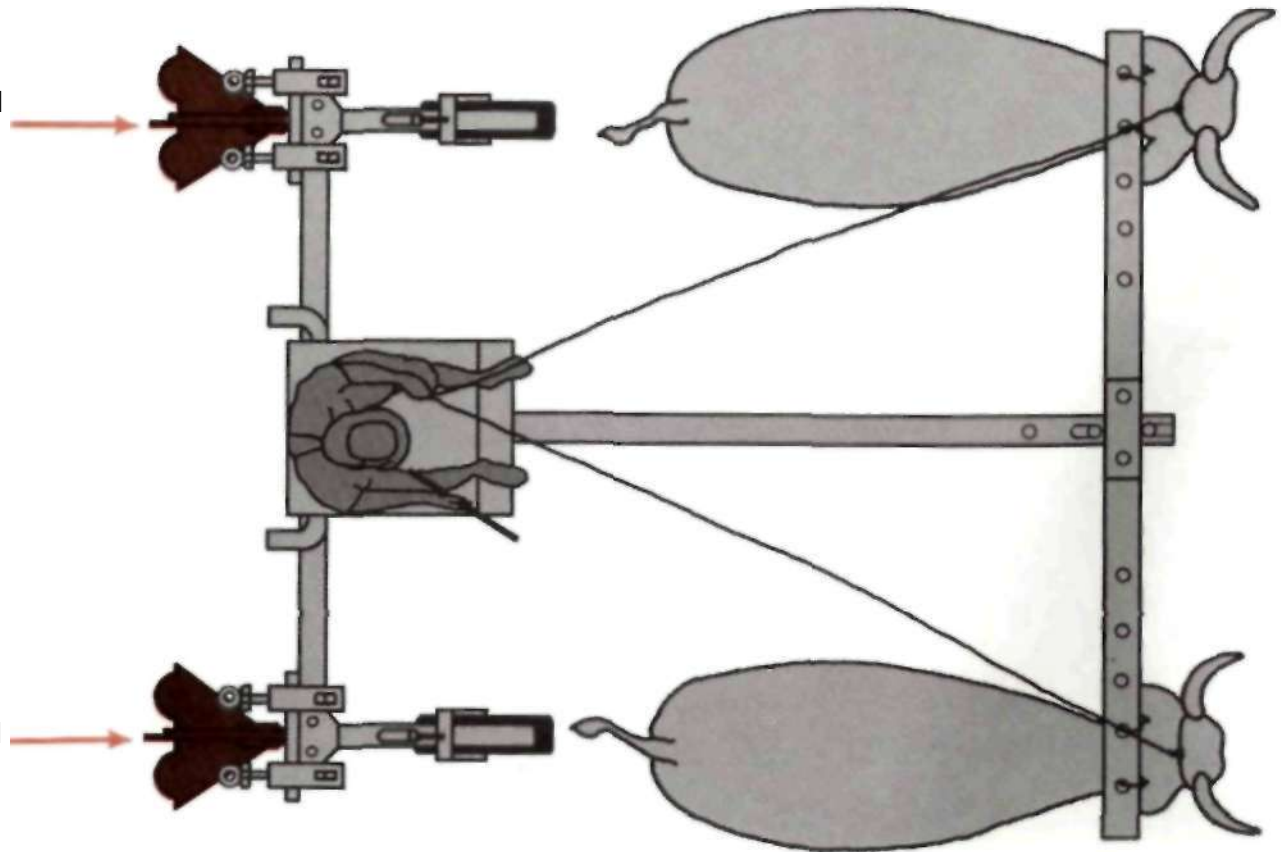
## Tillage in the furrows



Fit 1 ridger behind the wheel  
75 cm from the center

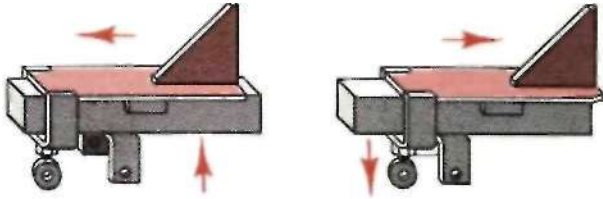
Position the wheels in the  
furrows

Fit 1 ridger behind the wheel  
75 cm from the center



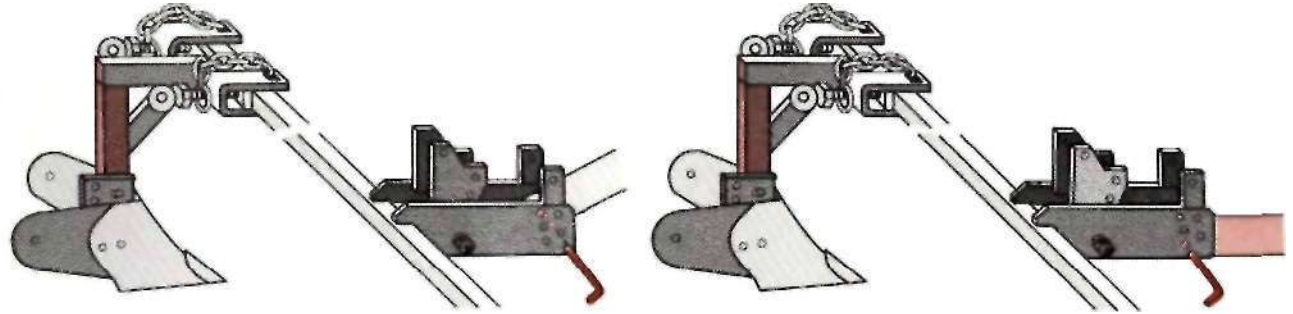
## Adjusting the depth

Slide the depth adjusters to alter the depth of working



## Adjusting the pitch

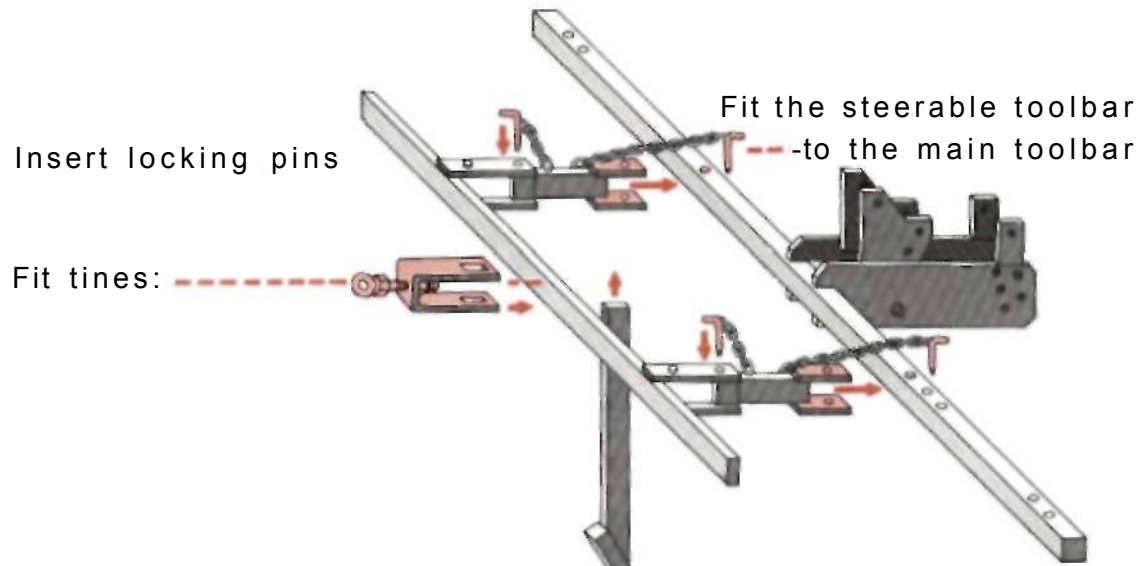
If the standard is not vertical, move the L-pin to another hole to change the pitch



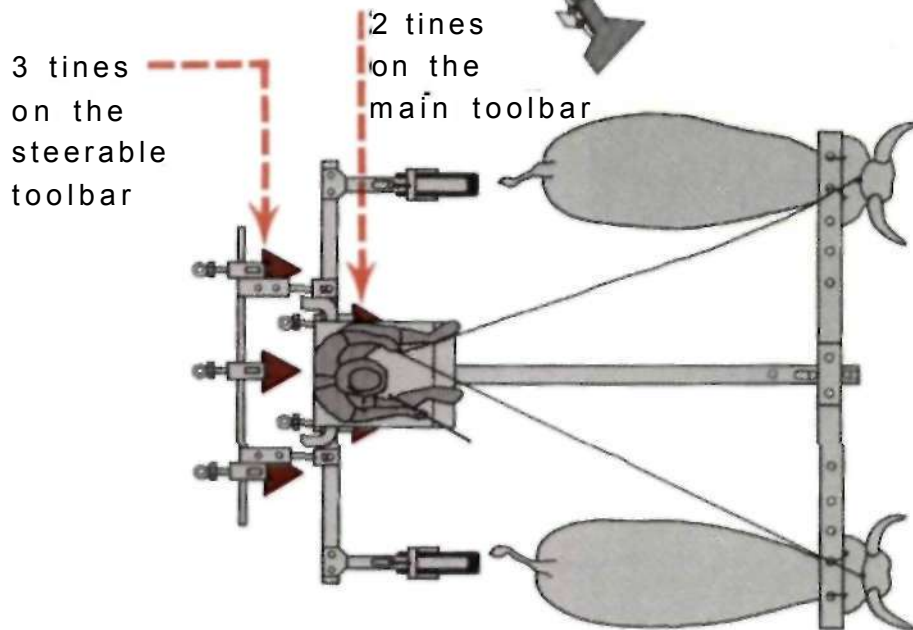
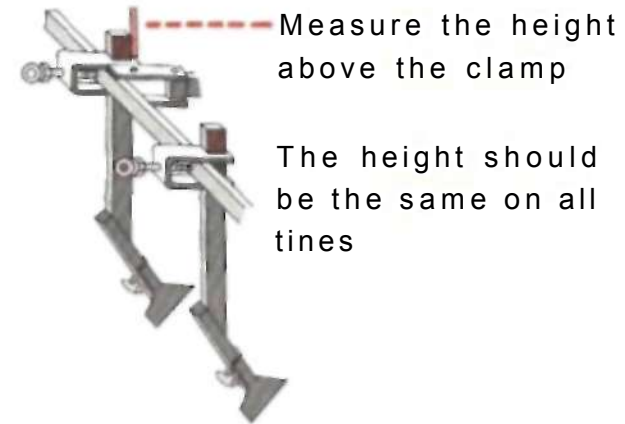
Finish ridging the field

# B R O A D B E E D S : C u l t i v a t i o n w i t h r i g i d t i n e s

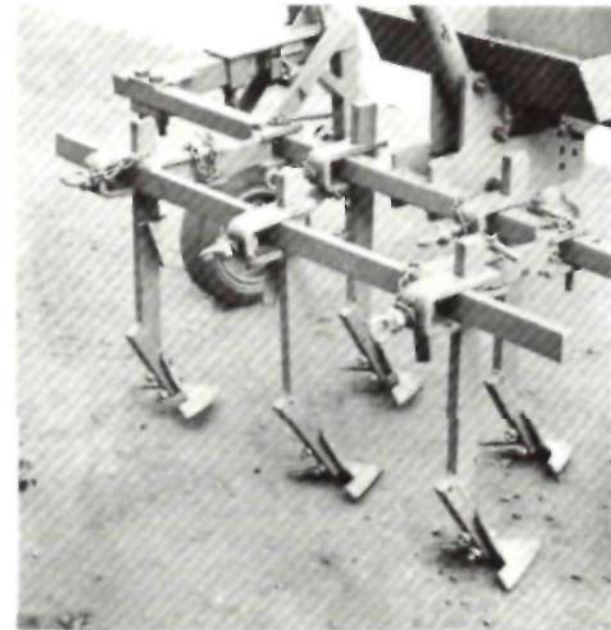
## Fitting the steerable toolbar and rigid tines



## Checking the height of the tines

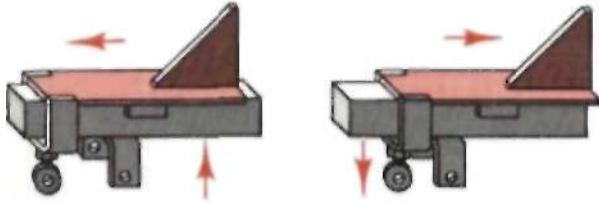


The rigid tines fitted for cultivation



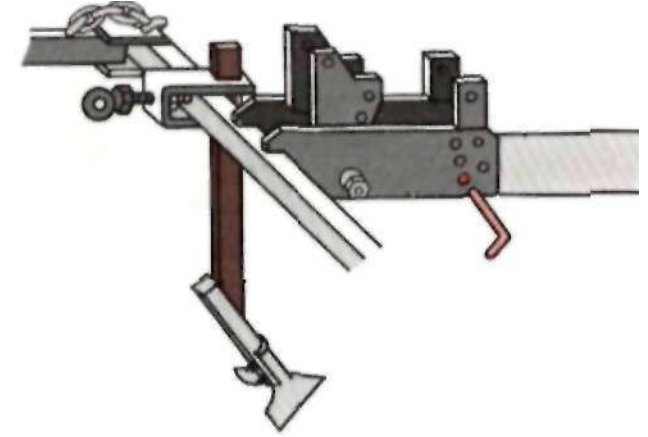
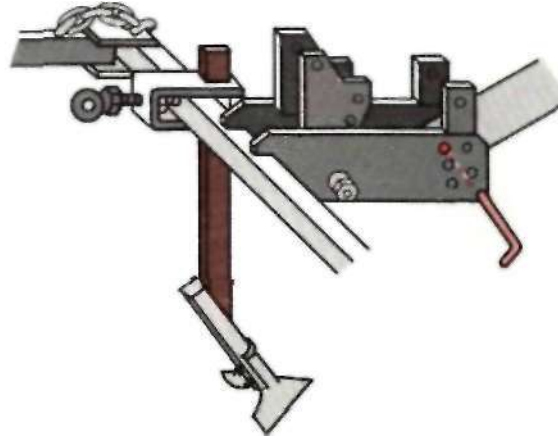
## Adjusting the depth

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

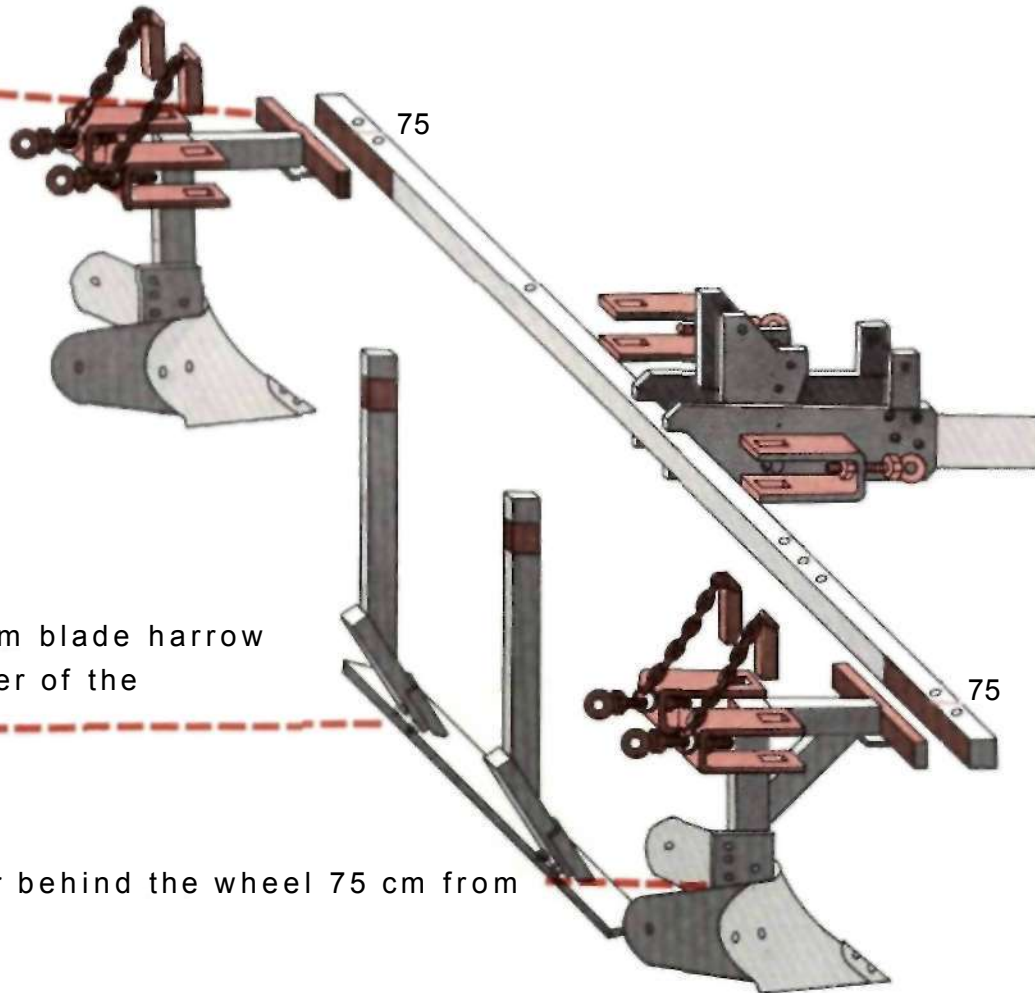


Finish cultivating the field

# BROADBEDS: Cultivation with a blade harrow

## Fitting the blade harrow and 2 ridgers

Fit 1 ridger behind the wheel  
75 cm from the center



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

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

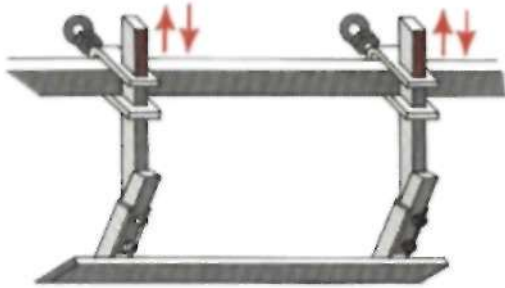


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## Adjusting the depth

---

Adjust the depth by changing the height of the blade

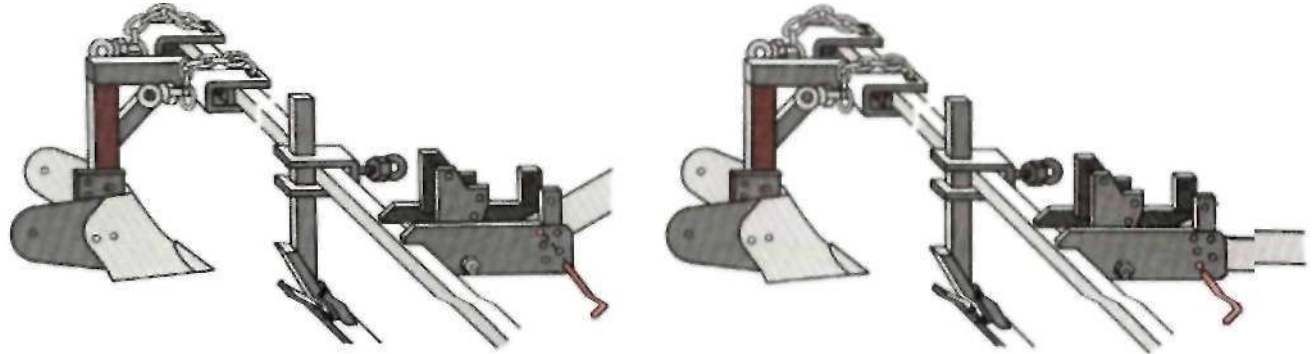


---

## 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.*

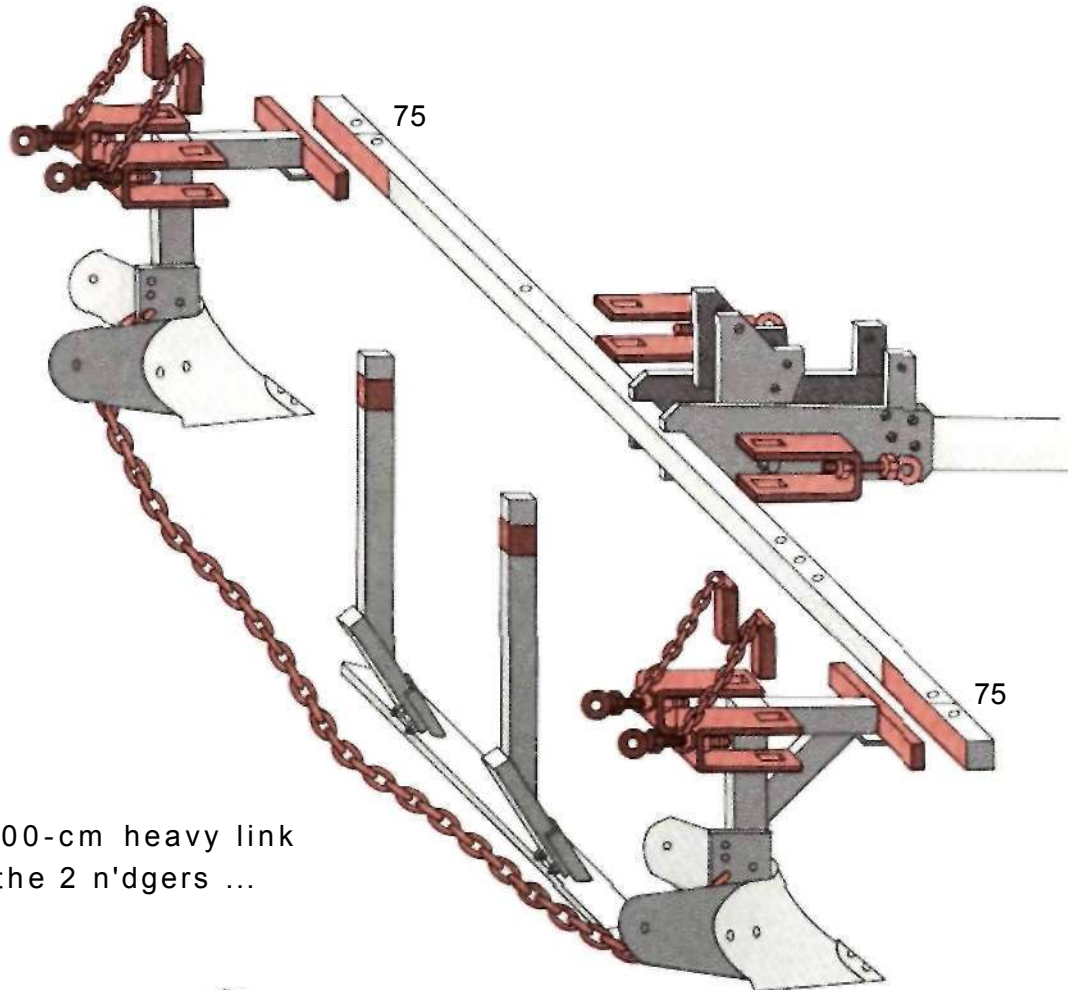
*Tighten the clamps occasionally while working.*



# B R O A D B E D S : S h a p i n g w i t h a c h a i n

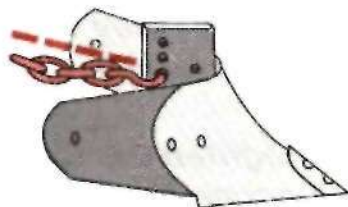
Bed shaping is the last part of seedbed preparation

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

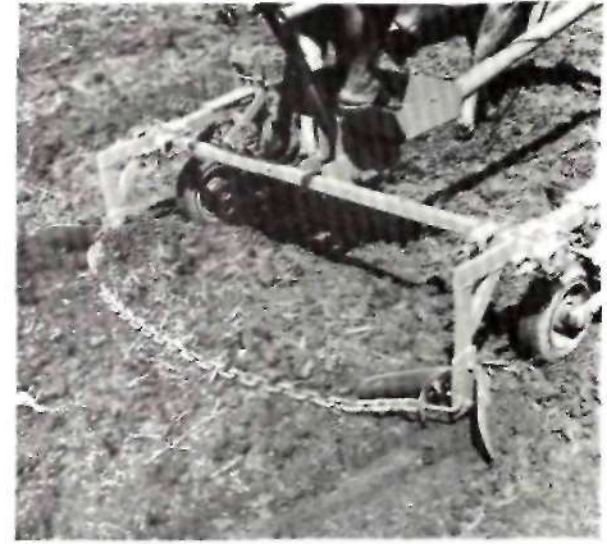


Hook a 200-cm heavy link chain to the 2 n'dgers ...

3rd hole from the bottom



The chain attached for final bed shaping



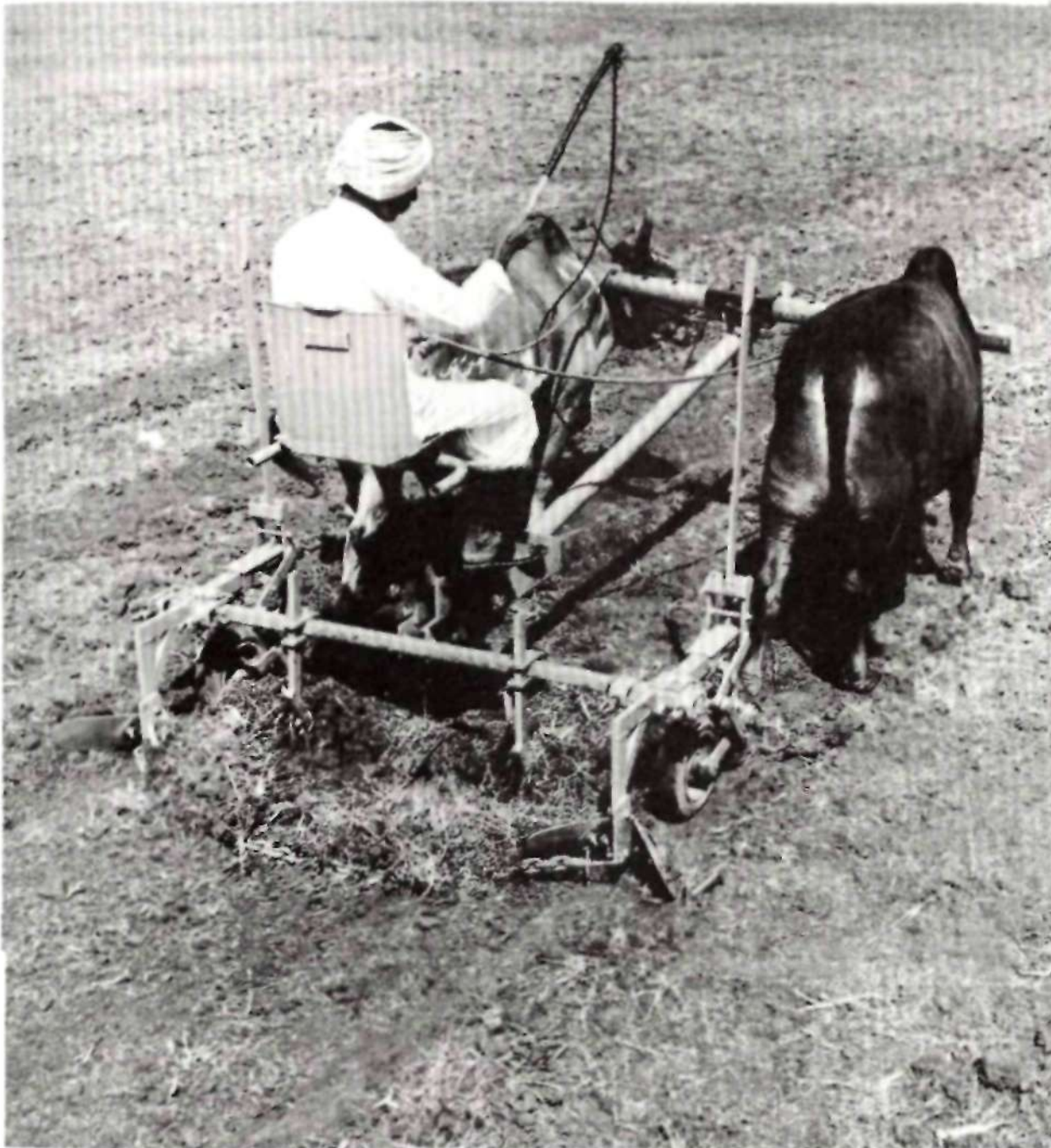
Adjusting the depth



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

Move the hooks to lower holes to increase soil movement



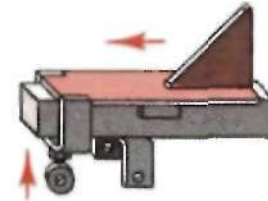


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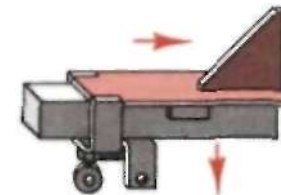
## Adjusting the depth

---

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.*

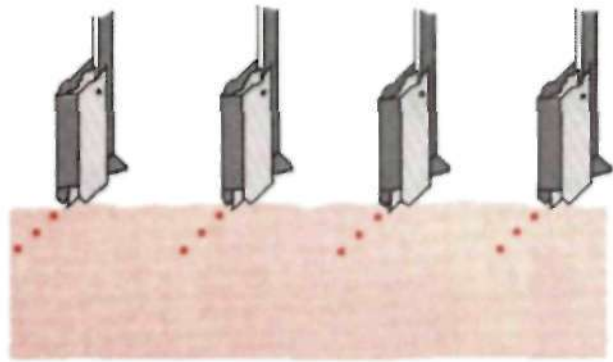
*Lift the toolbar fully before turning.*

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

# BROADBEDS: Sowing and fertilizer application

## Sowing a sole crop

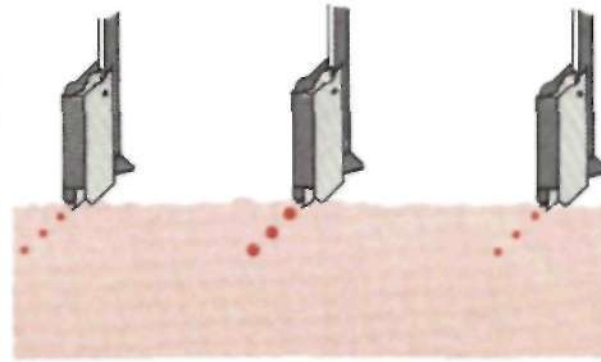
The Agribar can sow up to 4 rows



The Agribar can sow a sole crop at any row spacing

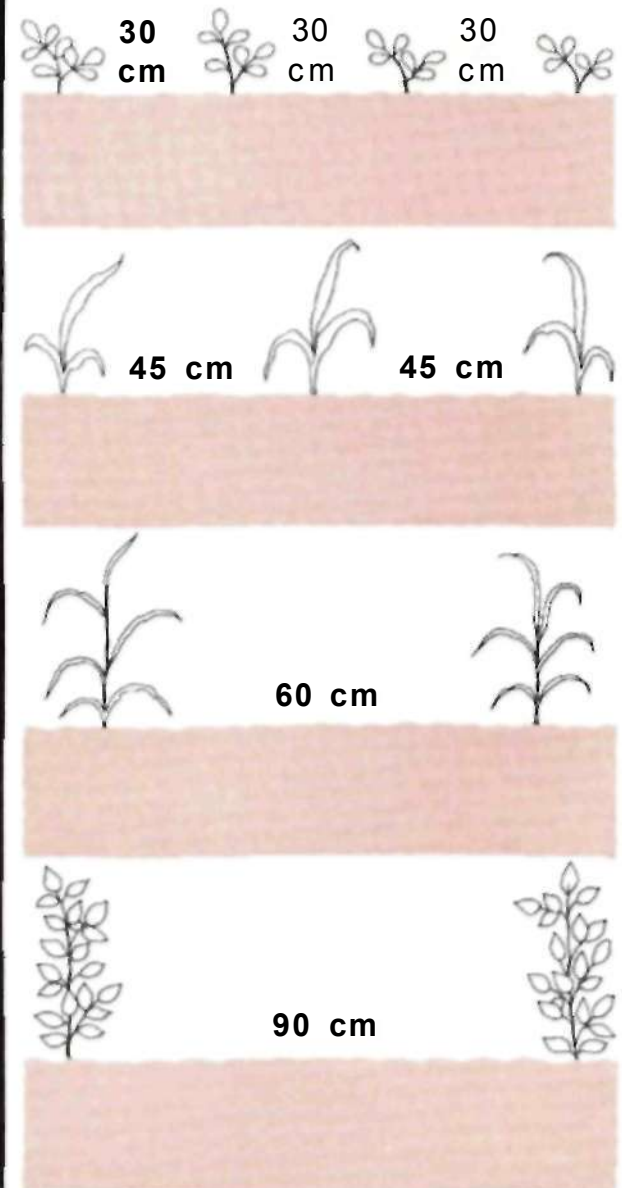
## Sowing an intercrop

The Agribar can sow an intercrop



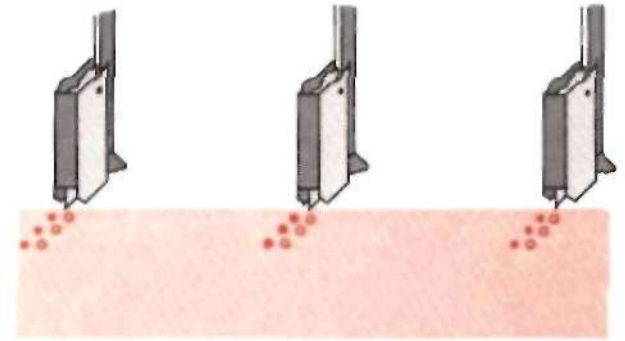
The Agribar can sow an intercrop at any row spacing

## Recommended spacing of rows

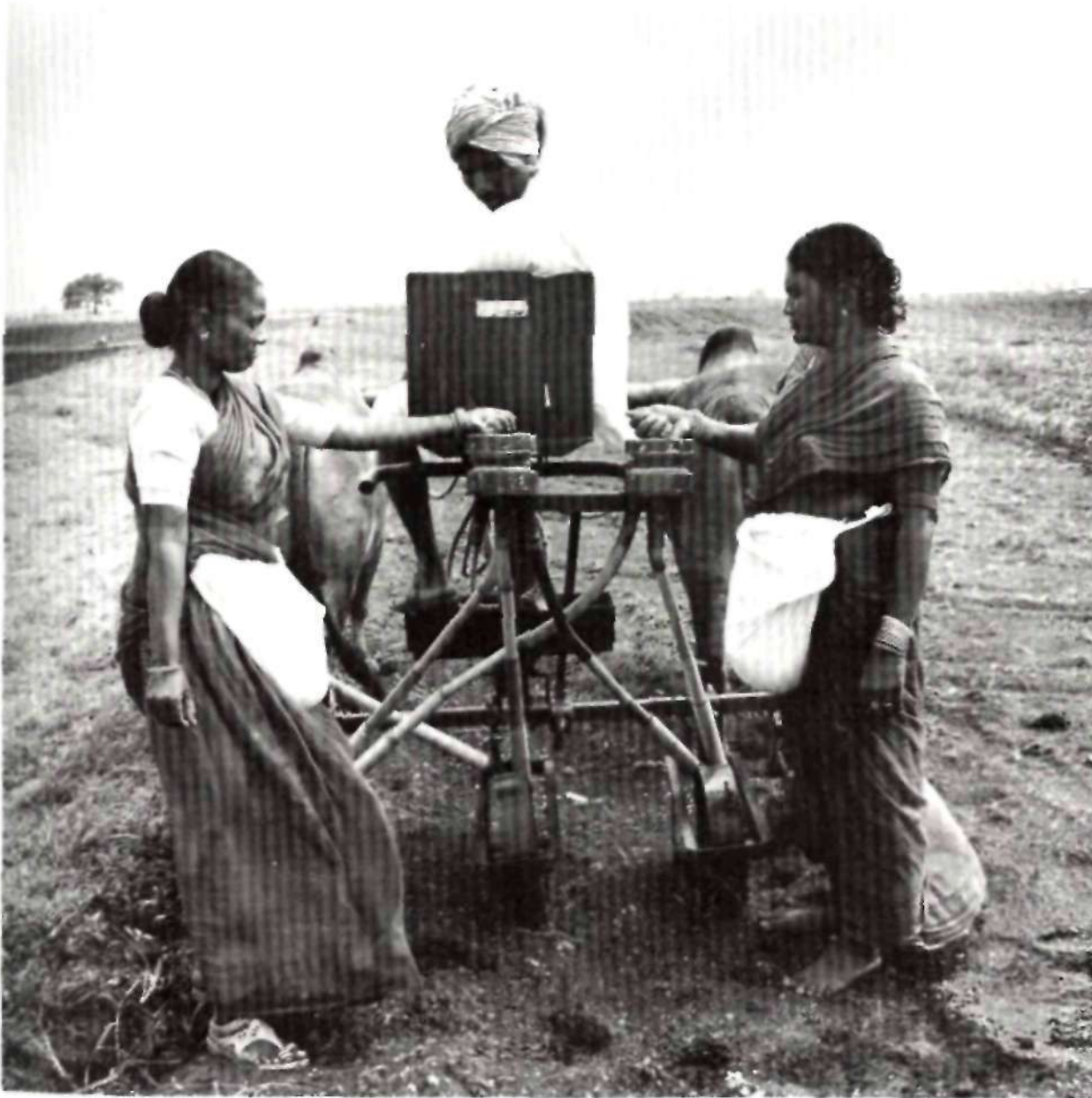


## Fertilizer application

Fertilizer is placed 3 cm to the side of the seed

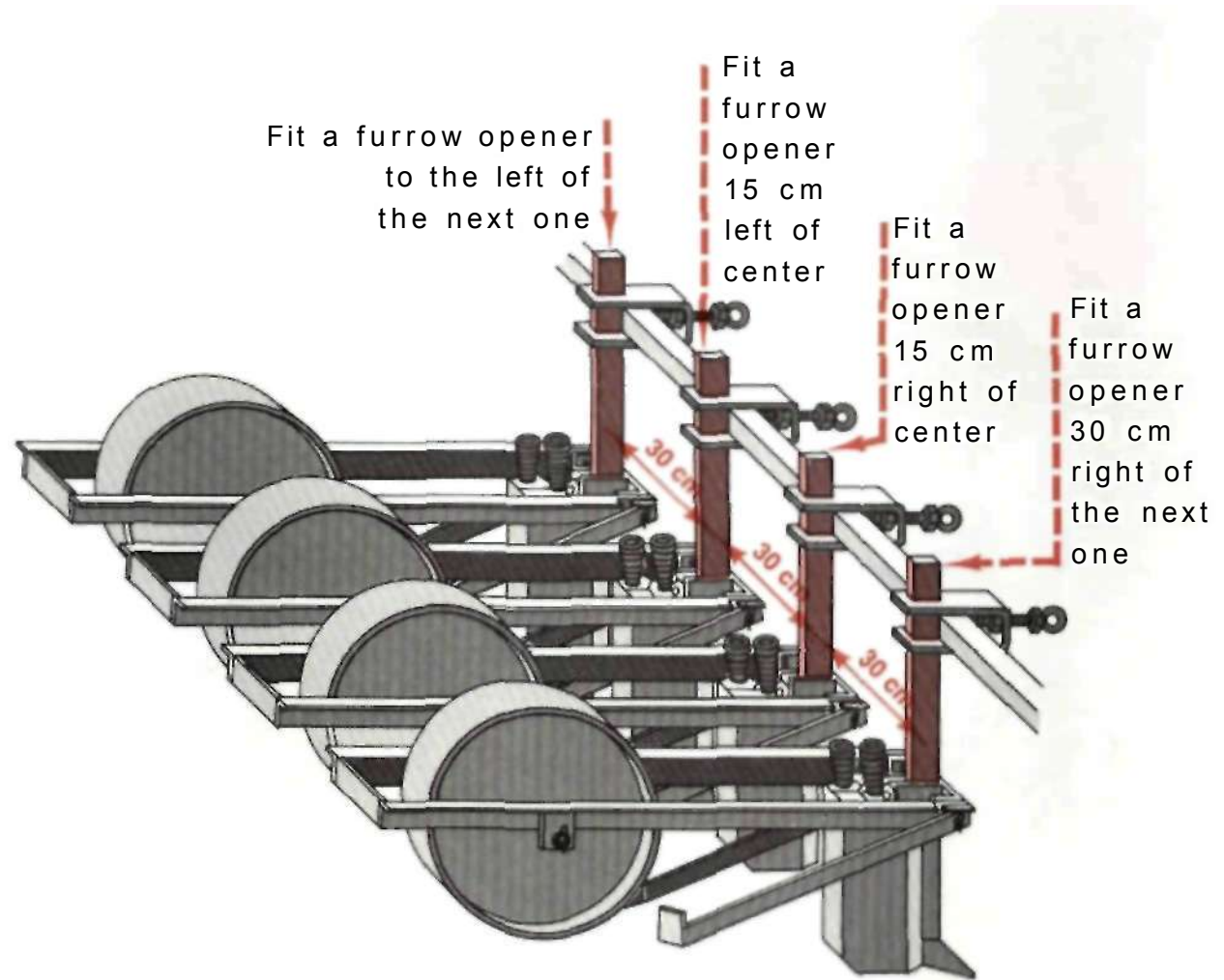
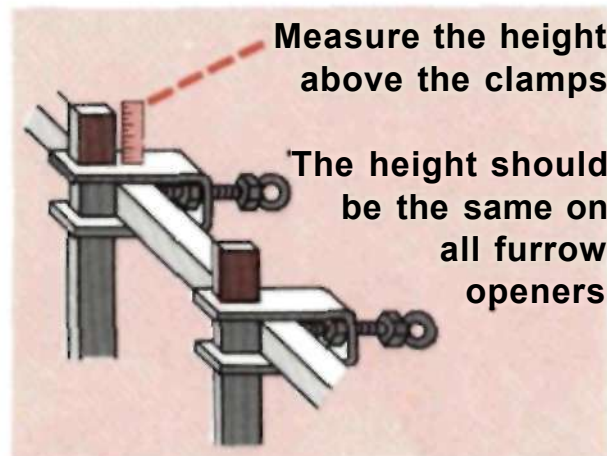
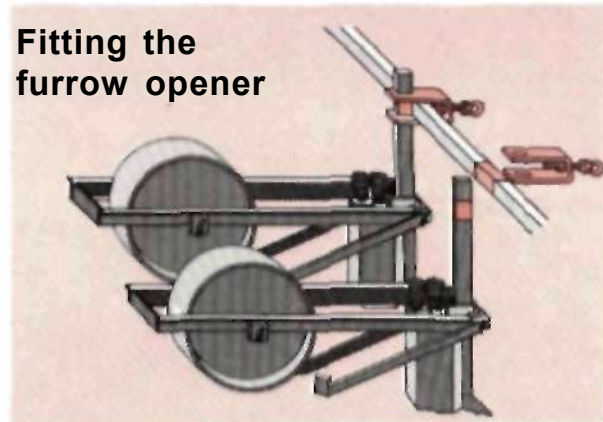
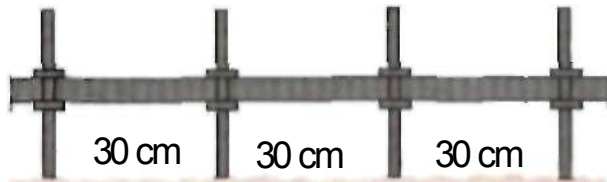


Fertilizer can be applied as a top dressing



# Preparation for sowing BROADBEDS at

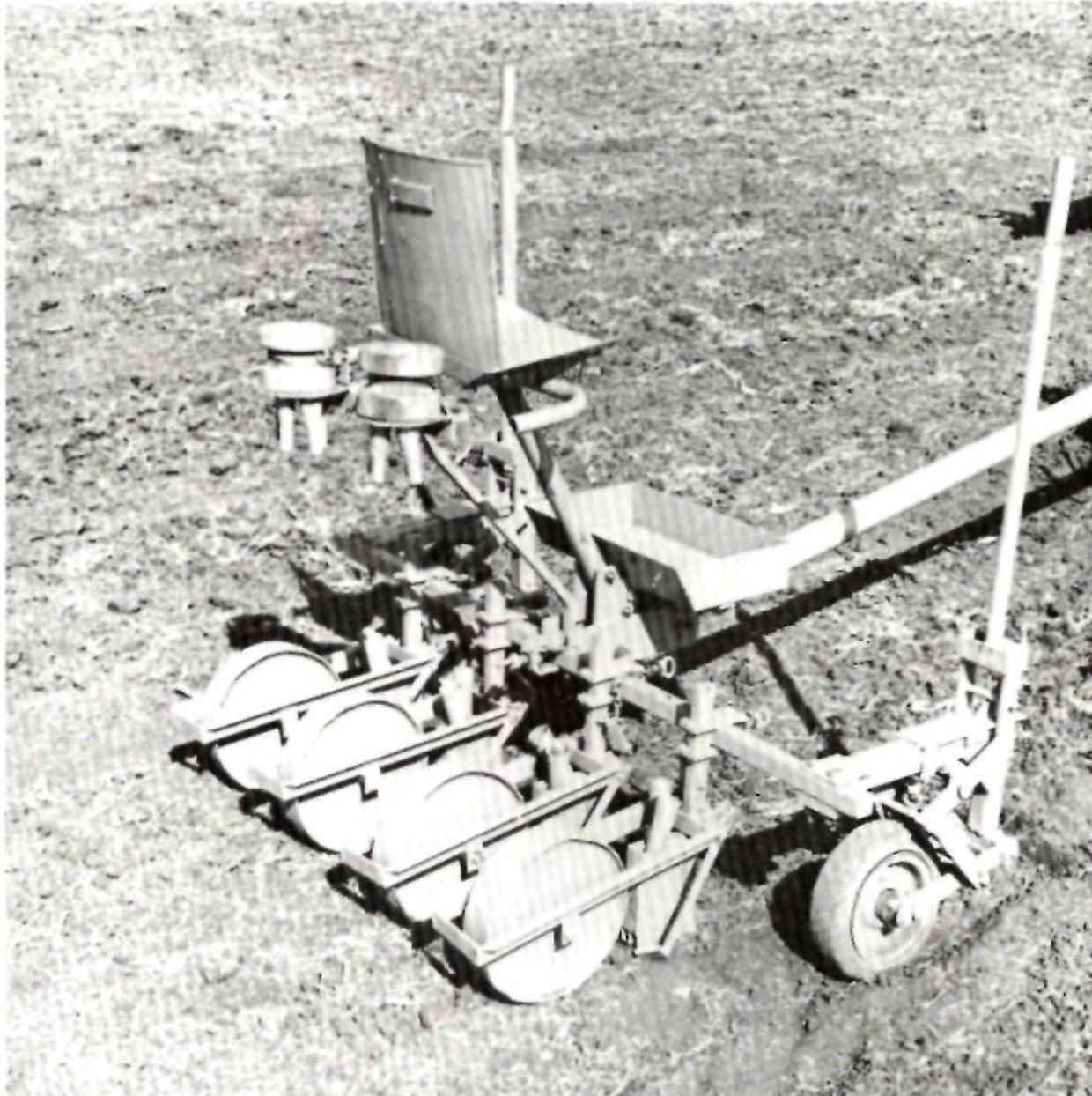
## Fitting the 4 furrow openers



Check that the furrow openers are 30 cm apart

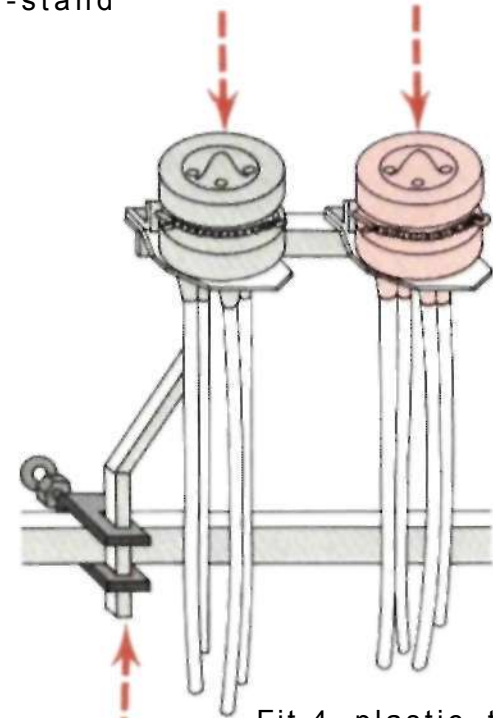
# 30-cm spacing

## Fitting the T-stand



## Fitting the tubes

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

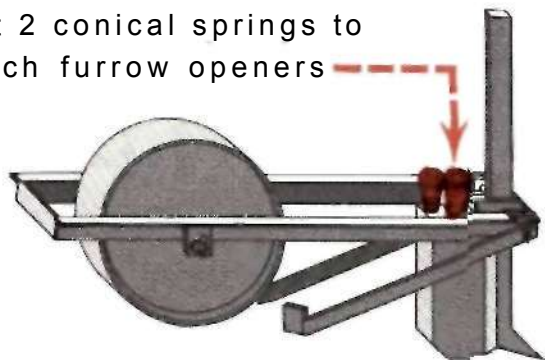


Fit 4 plastic tubes to each bowl

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



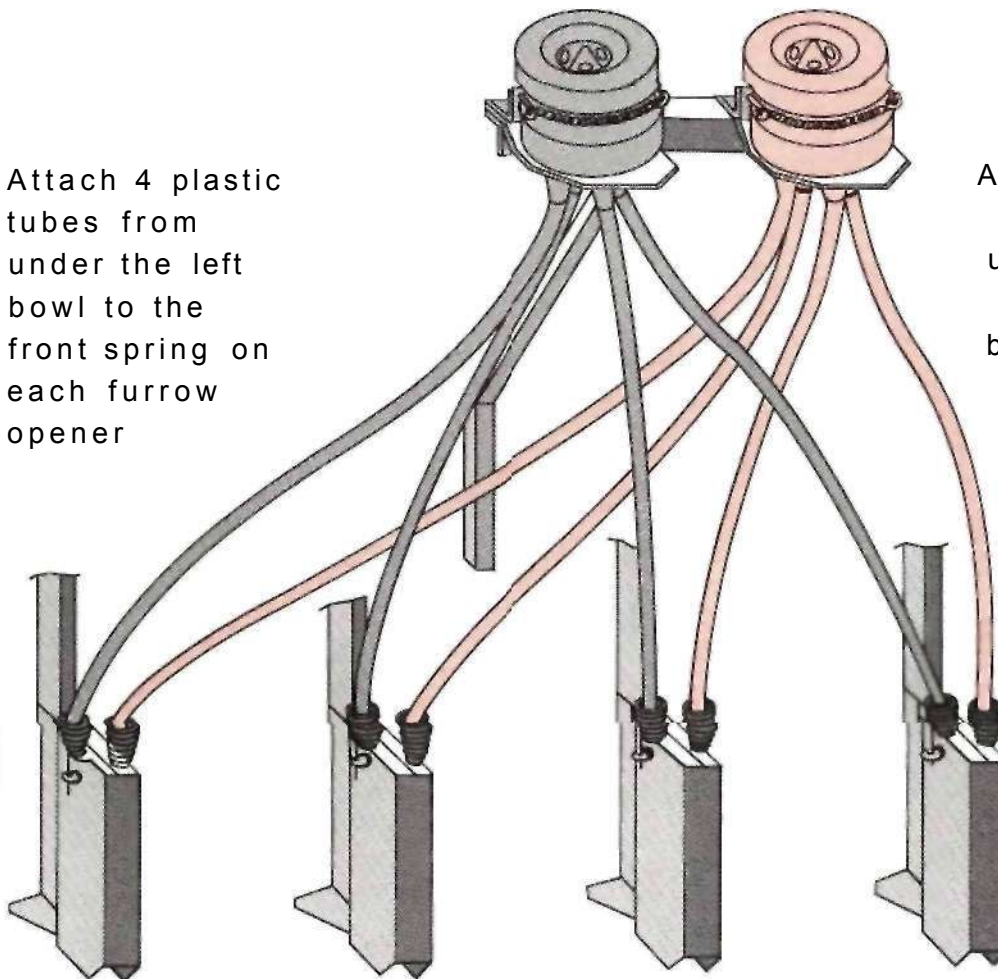
## Fitting the tubes to the furrow openers

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

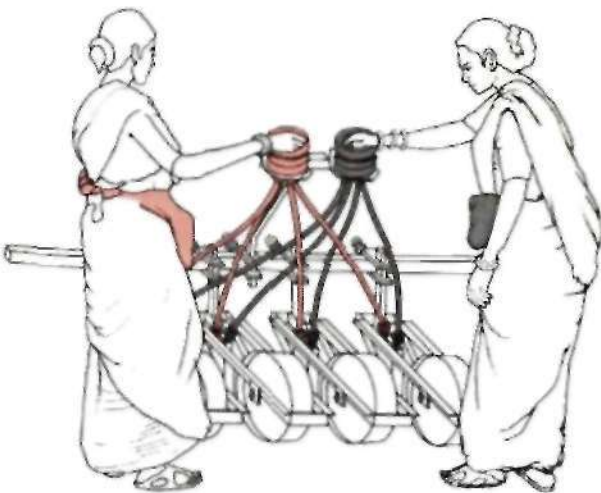


# Sowing BROADBEDS at 30-cm spacing

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

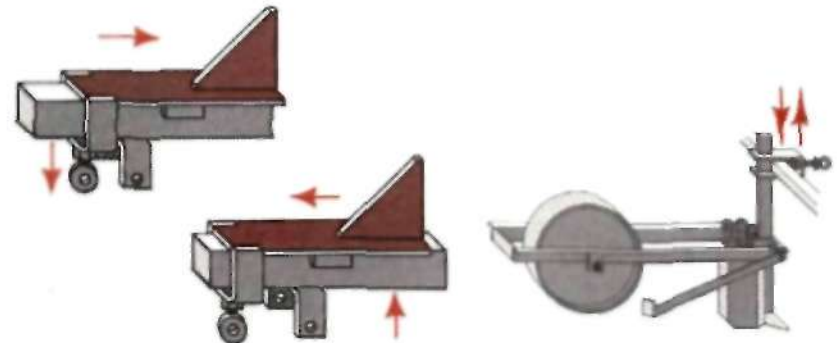


2 persons are needed to drop the seed and fertilizer into the wooden bowls



Check the depth of seed placement in all 4 lines

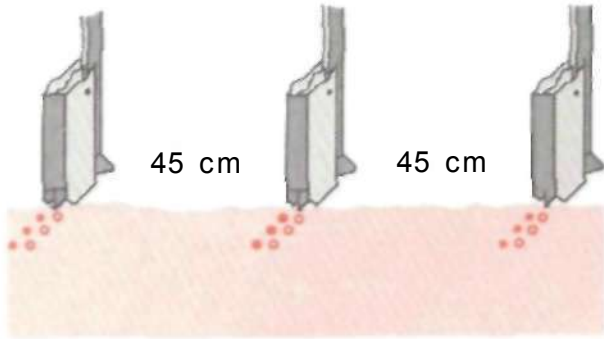
Adjust the depth by varying the height of the furrow openers or by moving the depth adjusters



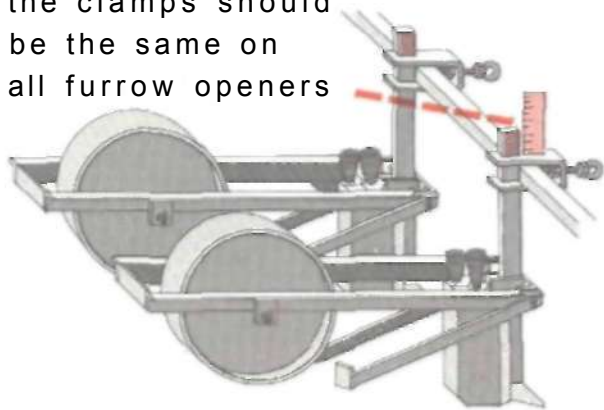


# BROADBEDS: Sowing an intercrop at 45-cm

## Fitting the 3 furrow openers



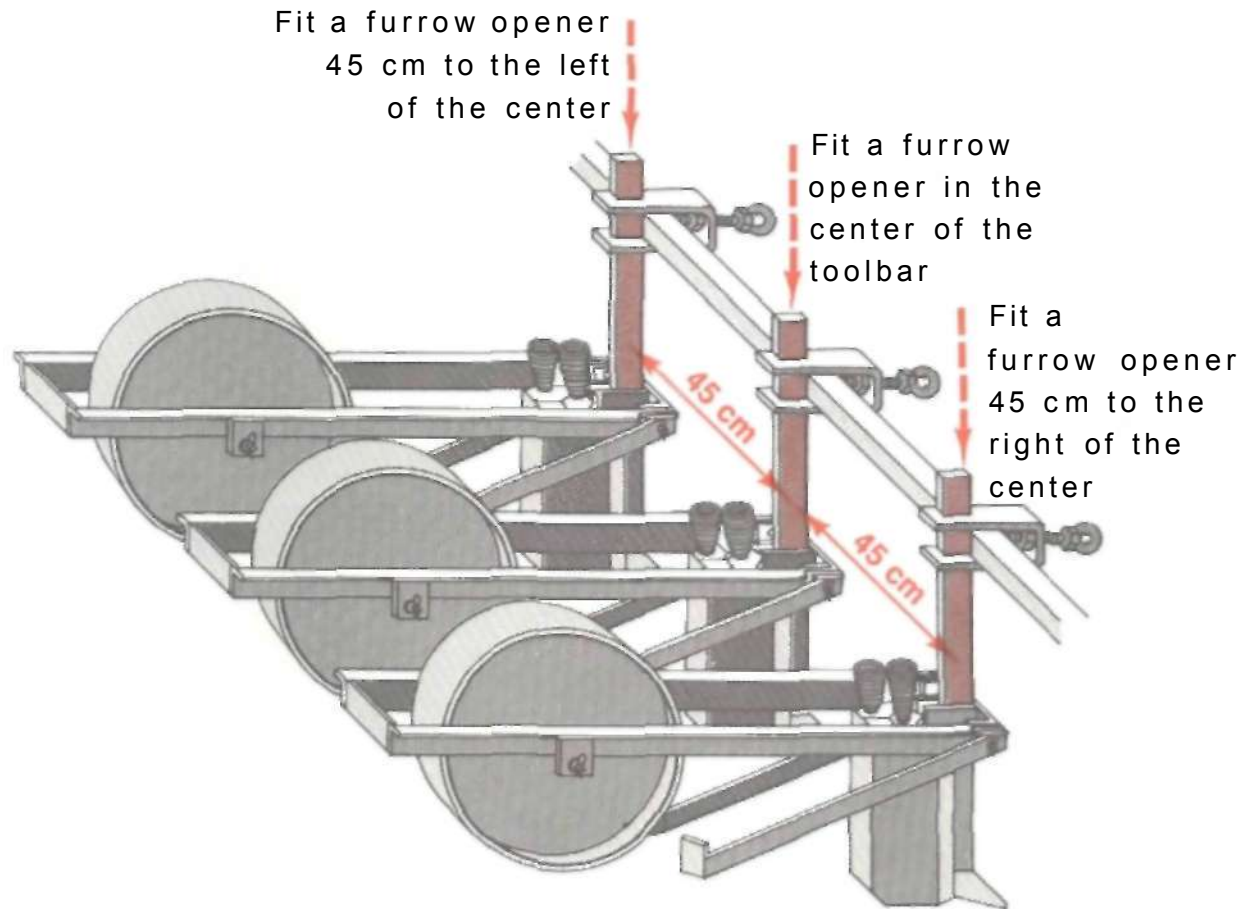
The height above the clamps should be the same on all furrow openers



Fit a furrow opener  
45 cm to the left  
of the center

Fit a furrow  
opener in the center of the  
toolbar

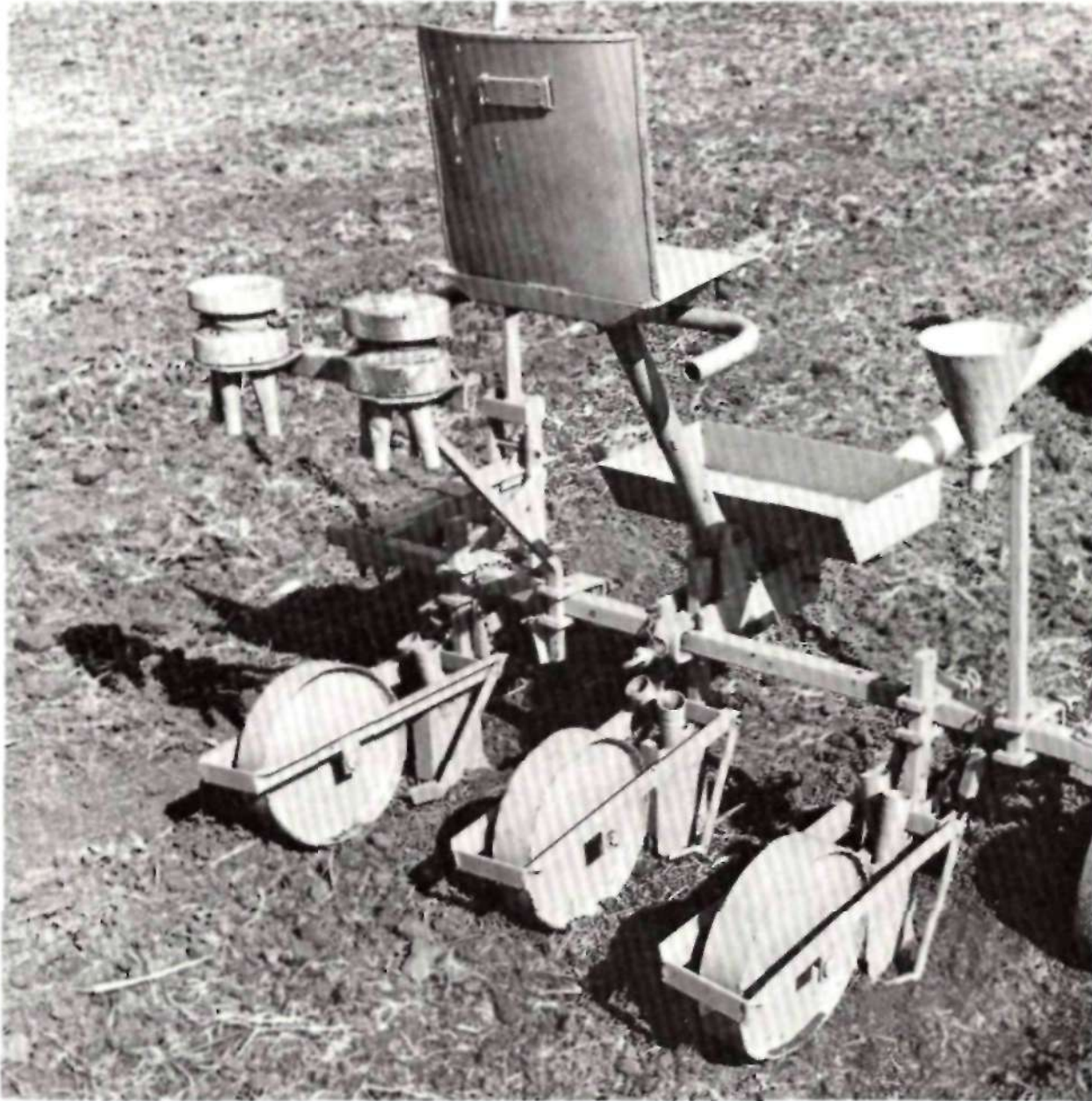
Fit a  
furrow opener  
45 cm to the  
right of the  
center



Check that the furrow openers are 45 cm apart

# spacing (cerealand pigeonnea)

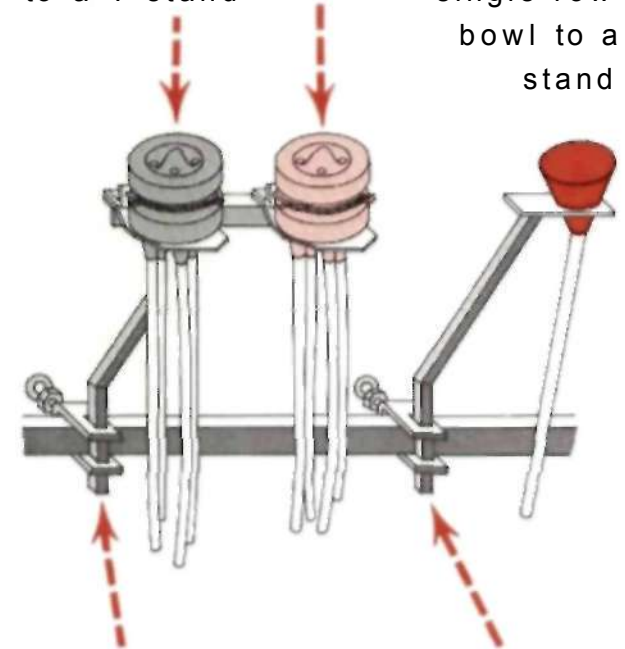
## Fitting the T-stand and single stand



## Fitting the tubes

Fit 2 wooden bowls  
to a T-stand

Fit a  
single-row  
bowl to a  
stand

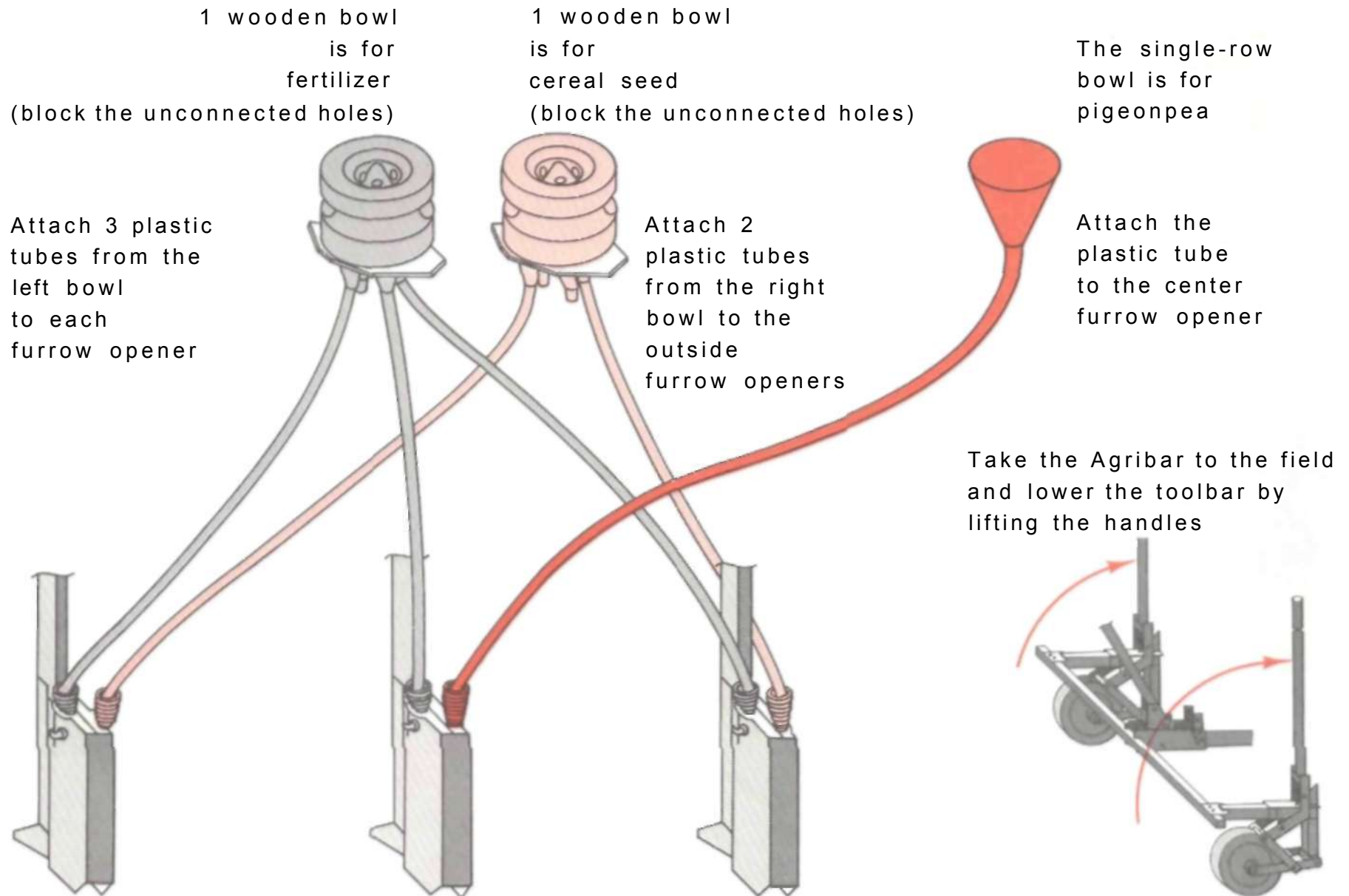


Fit a T-stand  
near to the  
center of the  
toolbar  
with a clamp

Fit the  
single-row  
bowl stand  
to the  
right side

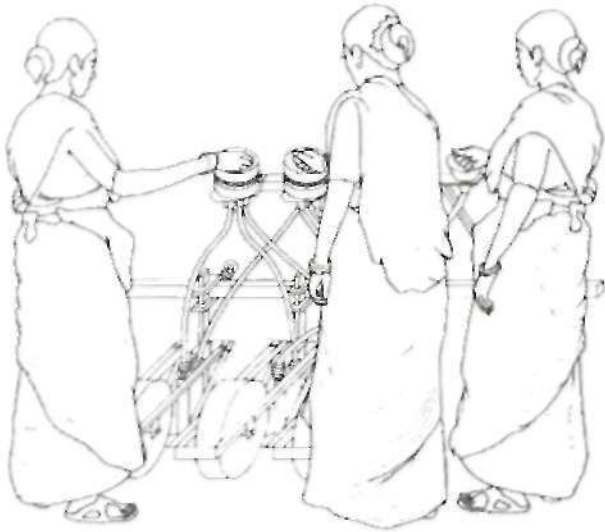
Fit 1 tube  
to the bowl

## Fitting the tubes to the furrow openers



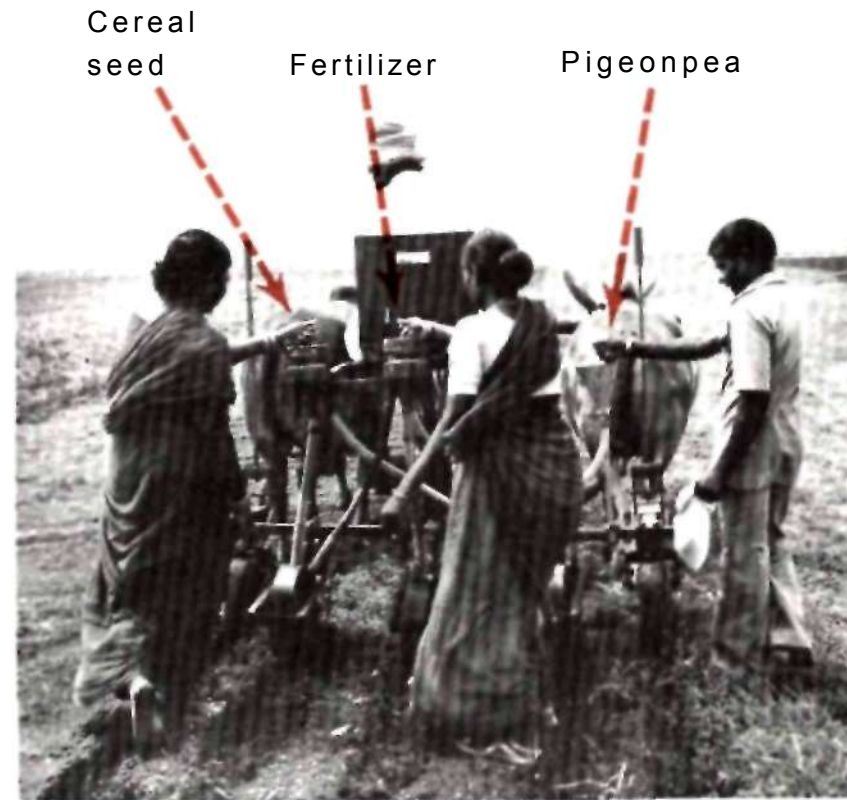
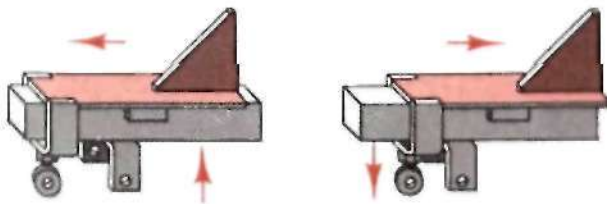
# Sowing cereal and pigeonpea with fertilizer

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.*

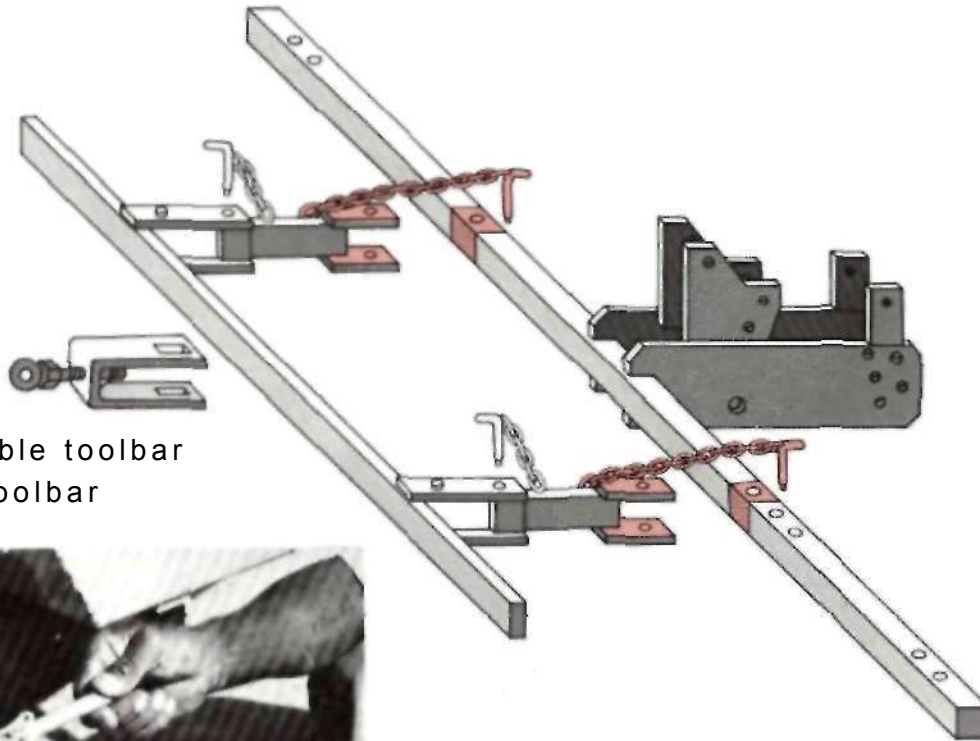
*Apply recommended quantities of seed and drop them evenly into the bowls.*

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

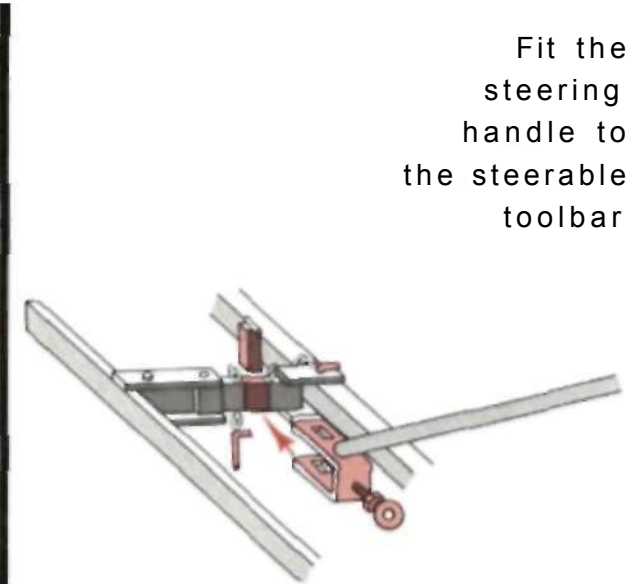
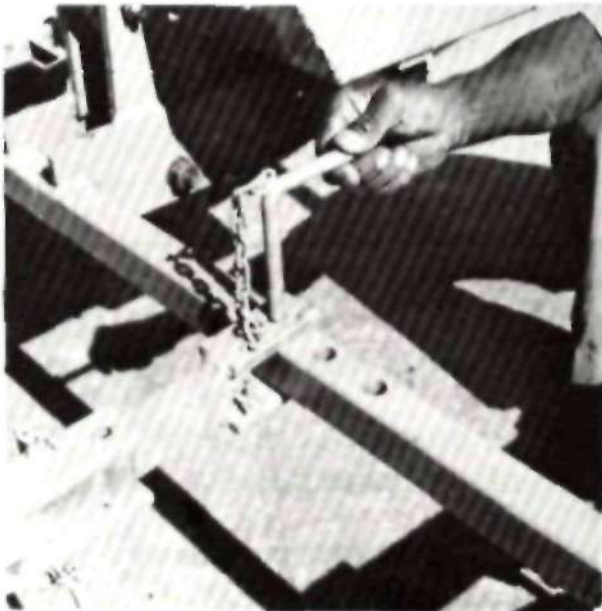
# BROADBEDS: Interrow cultivation at 30-cm

## Fitting the steerable toolbar

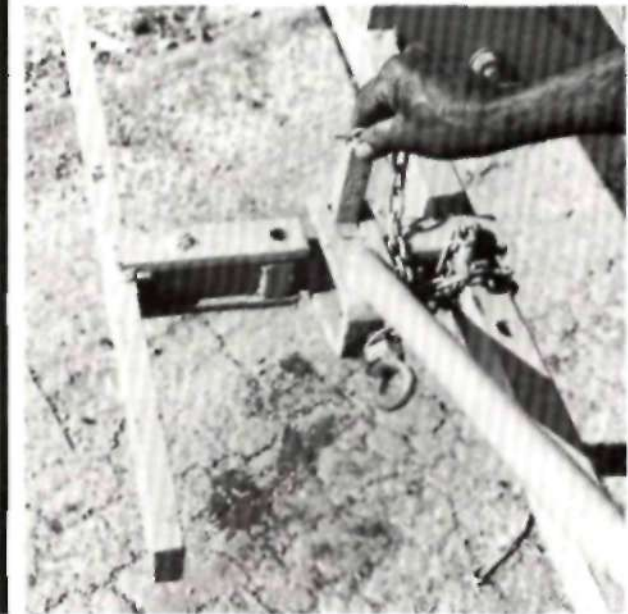
## Fitting the steering handle



Fit the steerable toolbar to the main toolbar

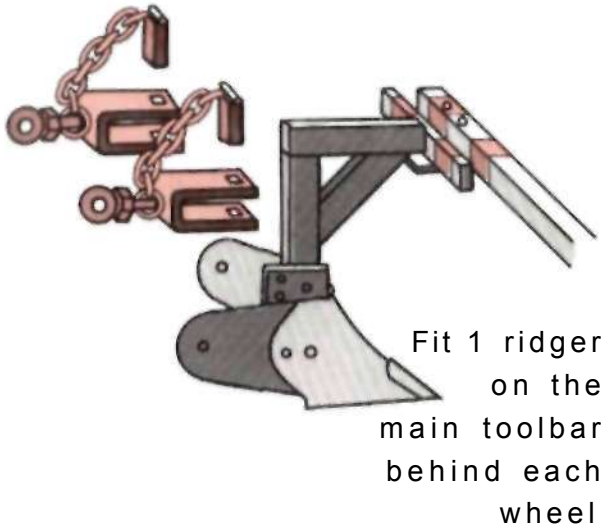


Fit the steering handle to the steerable toolbar

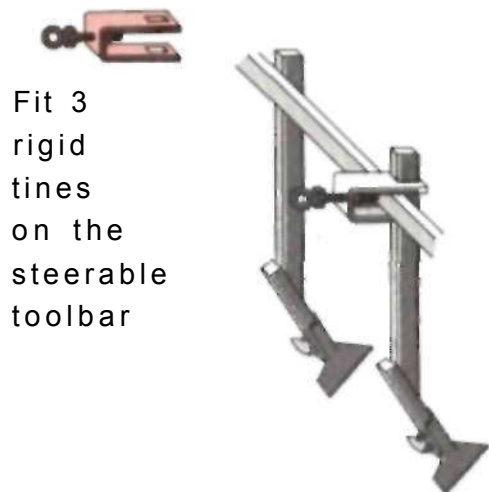


# spacing

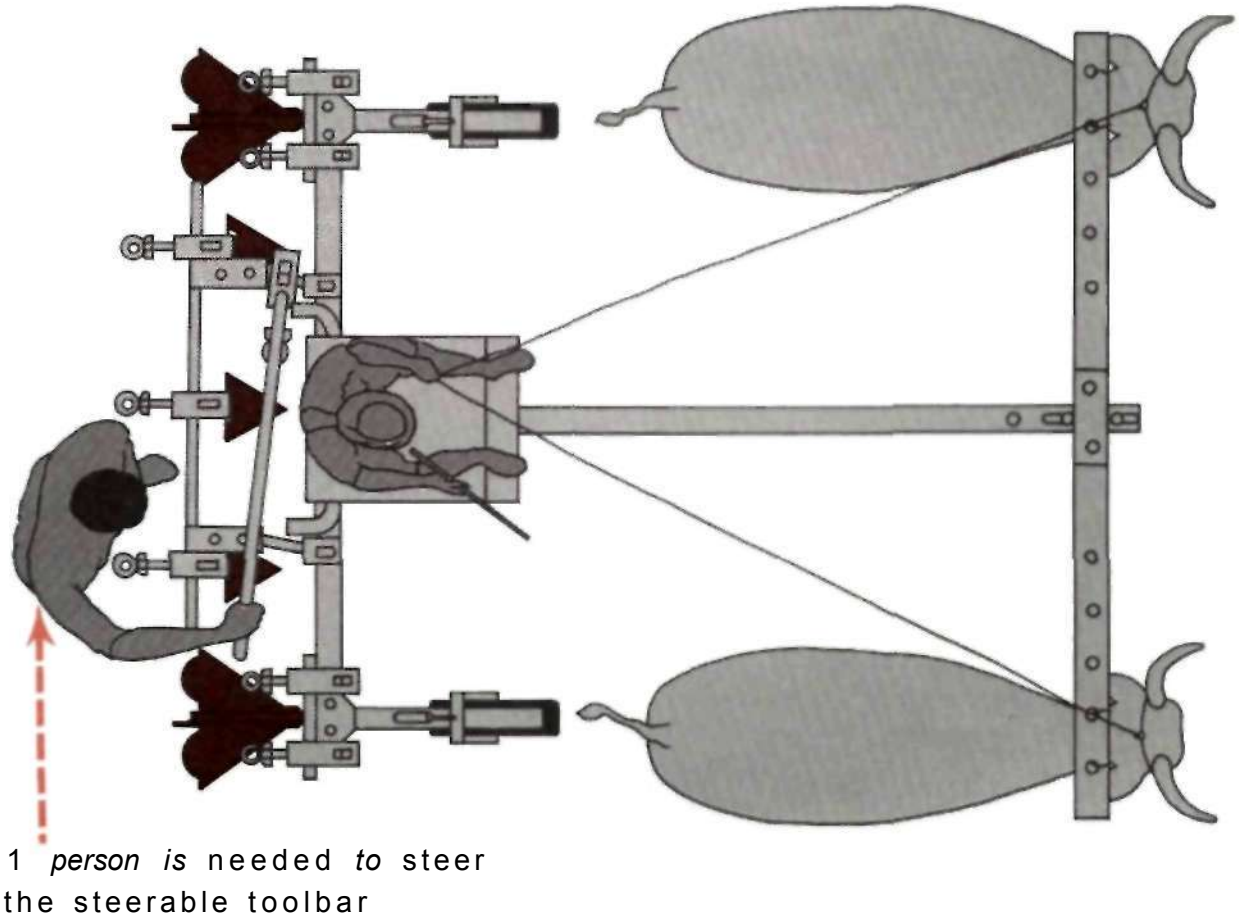
## Fitting the ridgers



## Fitting the rigid tines

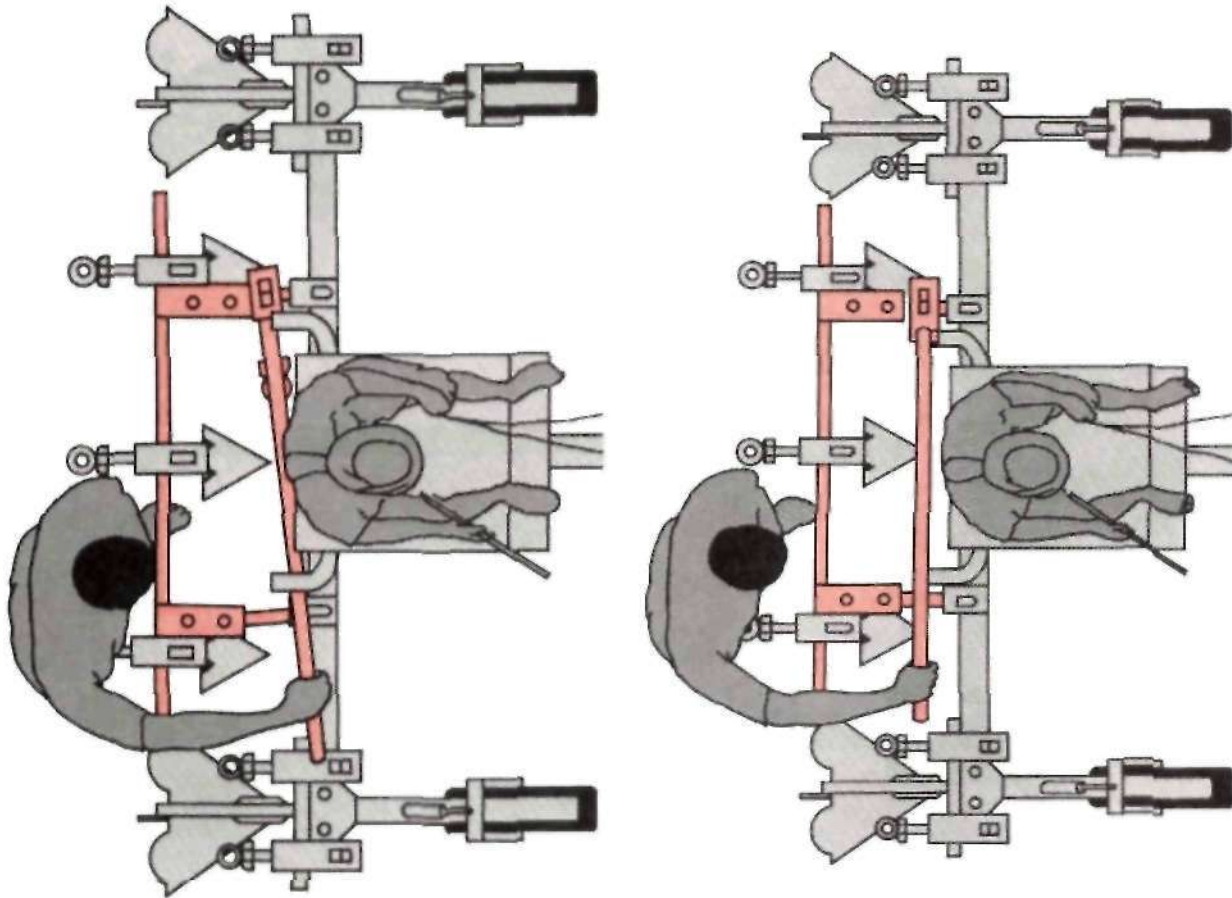


## Position of the ridgers and tines



## 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...



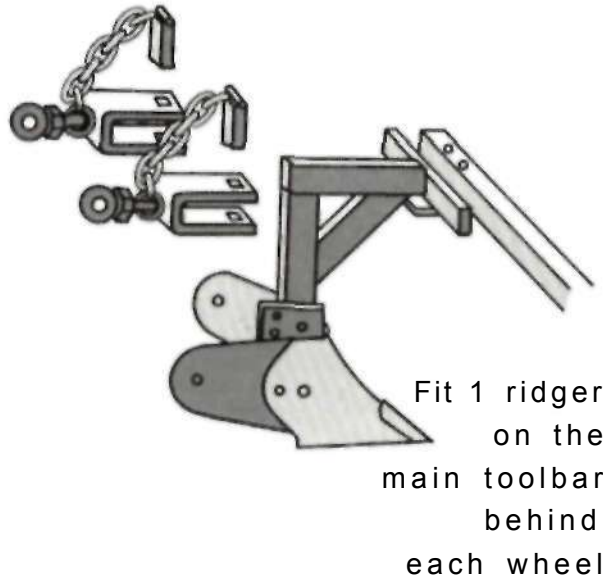
or by changing the height  
of the tines





# BROADBEDS: Interrow cultivation at 45-cm

## Fitting the ridgers

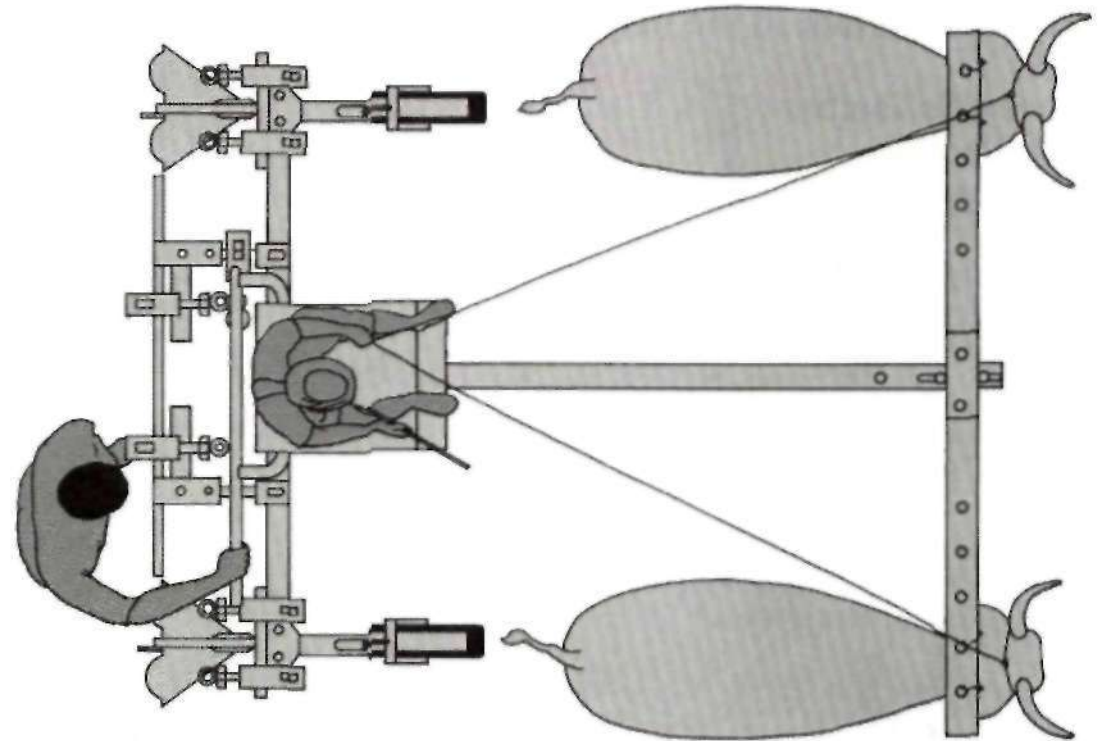


## Fitting the rigid tines



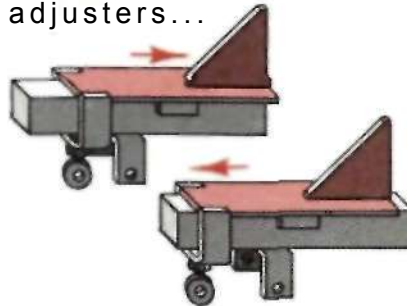
Fit 2 rigid tines on the steerable toolbar

## Position of the ridgers and tines

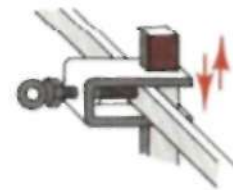


1 person is needed to steer the steerable toolbar

Adjust the depth by sliding the depth adjusters...



or by changing the height of the tines



Lower the toolbar by tilting the handles



# spacing

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## **Caution**

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*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.*

Operator's Notes

[Empty rectangular box for notes]



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