1. Preparing CA Fields with Ox-Drawn Rippers

Learning Outcomes – Participants will:

1. Appreciate the advantages of ripping
2. Understand the how to detect hard pans
3. Acquire skills necessary for ripping fields using an ox-drawn ripper
4. Know the proper timing and method of ripping for different conditions

Pre-Requisites: For participants to benefit fully from this class they should have covered the following lessons:

1. "Situation Assessment: Why CA?"
2. This module may be used to replace the module on "Minimizing Tillage with Planting Basins," or it may be used in Year 2 of a training curriculum after participants have used hoe-based methods in Year 1.

Timing of this Lesson: This lesson should take place immediately after harvesting the current crop.

References:

IIRR and ACT. 2005. Conservation Agriculture; A Manual for Farmers and Extension Workers in Africa. International Institute of Rural Reconstruction, Nairobi; African Conservation Tillage Network, Harare.

ACT. A Guide for Farmers on Reduced Tillage: Animal Drawn Ripping Option for Smallholder Farmers, Technical Booklet. African Conservation Tillage Network, Nairobi.

CFU. No Date. Conversion from Ox Ploughing to Min-Till Ripping Using the Magoye Ripper. Conservation Farming Unit, Zambia.

CFU. 2012. Ox Conservation Farming: Setting up Ripper and Land Preparation. Conservation Farming Unit Leaflet No. 1. Zambia

CFU. 2012. Ox Conservation Farming: Basal Dressing and Planting seeds. Conservation Farming Unit Leaflet No. 3. Zambia

Materials Needed:

1. Posters: oxen ripping, ripper and ploughed and un-ploughed land
2. Two trained oxen with yoke and harness equipment. If possible, have 2 yokes of different lengths.
3. One moldboard plow frame
4. Tape measure
5. Machete
6. 2 sticks
7. 1 hand hoe
8. Teren rope
9. 2 kg compost or manure and/or ½ kg fertilizer
10. ½ kg seed of a principle crop for the area

Preparation:

1. Review all discussion questions and be prepared to guide the discussion appropriately
2. Test the oxen on the land to be used ahead of time to be sure they are ready to perform the ripping effectively.

Learning Activities (Total time required = 5-6 hours)

II. Introduction: (30 minutes)

A. Show "Ox Ripping" poster

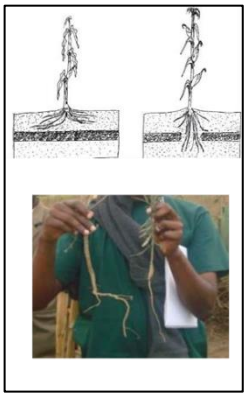
1. What do you see in the top picture?
2. What is different from the way people farm in your village? ***Allow participants to give their observations, but be sure they notice the undisturbed soil and the mulch cover.***
3. What *advantages* are there to using this method rather than using a conventional moldboard plow?
4. How are these advantages related to the principles of CA?
5. What *disadvantages* would you expect with using a ripper compared to a moldboard plow? ***Facilitator should be prepared to discuss challenges and solutions, especially for weed control.***

B. Explain the goal of this lesson:

To learn how to use oxen to prepare land for planting under CA.

III. Identification of compacted soils/plough pans (45 minutes)

A. Show the poster on hard pan



1. What differences do you see between the two plants in the top picture?
2. What are the causes of the shallow root growth on the left? *If they have trouble answering, explain that the roots are unable to penetrate the hard pan in the soil, and hence roots grow shallow and spread sideways.*
3. What effect will this shallow root system have on the growth of the plant?

B. Show the ripping poster

1. What differences do you see between the upper and the lower picture?

2. **Show them a ripper attachment** and explain that the top photo shows the ripping with ripper with wings opening a wide planting furrow, while the lower photo shows the ripping with the ripper without wings opening a narrow planting furrow.

3. **Under which conditions should we use a ripper with wings?** *Softer soils with no hardpan, fields where you will apply manure, root crops, etc.*

4. **Under which conditions should we remove the ripper wings?** *Hard compacted soils, soils with hardpan, fields where you will apply fertilizer, etc.*

IV. Demonstrating the Parts of a Ripper (30 minutes)

A. Show them a ripper before it is attached to a plow frame

1. Describe the purpose of each part of the equipment as labelled

2. Ask a volunteer to disassemble the ripper and attach it to a plow frame. *If none of the participants are familiar with rippers, the facilitator should coach the volunteer through the assembling process. Be sure that both women and men try to assemble the ripper.*

3. Explain the function of the rest of the plow parts including the hitch, tine, chain length and wheel.

V. How to do ripping (2 hours)

A. Initial Demonstration:

1. **Facilitator should demonstrate use of the ripper** or have an experienced ox handler do so.

2. **Precautions to take while ripping**. Summarize safety precautions and demonstrate proper handling of the frame during the ripping process.

3. **Each farmer should be allowed to practice the ripping activity**.

B. Field adjustment of the Ripper - While participants are practicing ripping with the ox team, discuss and demonstrate ways to adjust the ripper's performance in the field ***(see ACT's "A Guide for Farmers on Reduced Tillage: Animal Drawn Ripping Option for Smallholder Farmers" for more information on ripper adjustment*:**

1. **Depth penetration:** Using chain length, hitch point height and wheel height

2. **Width of furrow:** Have some participants use ripper with wings and others without wings.

3. **Ripping pattern (i.e. where to start the first rip line)**: Describe the best ripping pattern and the reasons, especially for sloping ground..

4. **Furrow Spacing & length of yoke:** Explain that, since the oxen prefer to walk in the previous furrow, the furrow spacing will be equal to the distance from where the ox is

attached to the center of the yoke. If possible, demonstrate this effect by using yokes of different lengths during the participants' practical exercise. Discuss which yoke length they would use when ripping for planting their main crops.

C. Care and maintenance of tools and equipment (30 minutes)

1. What maintenance practices should be done to the ripper and its attachments?

D. Fertilizing and Seeding in Rip Lines (See Appendix C for ideas on fertilizing and seeding)

1. Demonstrate proper placement of manure and fertilizer in rip lines
2. Demonstrate seeding methods

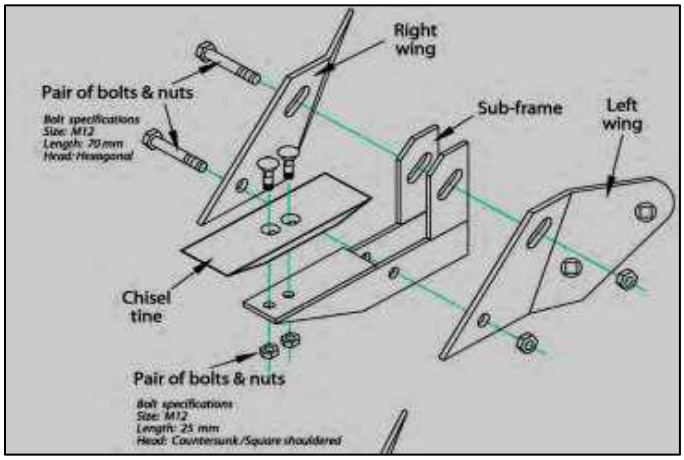
E. Soil Cover

1. Ask the participants to estimate the % soil cover of the field used for demonstration
2. Does this meet their goal for adequate soil cover in their CA fields?
3. If not, discuss and demonstrate the use of supplemental mulch as soil cover.

F. Concluding Discussion (30 minutes)

1. What are the benefits of ripping versus plowing with a moldboard plow?
2. What are difficulties with ripping?
3. What is the best time to do ripping in relation to soil conditions and crop residues? ***(see ACT's "A Guide for Farmers on Reduced Tillage: Animal Drawn Ripping Option for Smallholder Farmers" for information on timing of ripping*****:**
4. What can you suggest to improve on the methods you've been shown?

Appendix A: The Parts of a Ripper & Different Ox Drawn implements for CA



Parts of a Magoye ripper attachment

Ripper Designs include: the Magoye Ripper (top), Subsoiler (middle) and traditional Ethiopian Maresha (bottom).

Discussion of yoke length??

Appendix B: What are Trained Oxen?

An ox (plural = oxen), also known as a bullock in Australia and India, is a bovine trained as a draft animal. Oxen are commonly castrated adult male cattle; castration makes the animals easier to control. Cows (adult females) or bulls (intact males) may also be used in some areas.

Trained oxen are the oxen that have been fully guided on how to be docile, how to carry a yoke, how to obey orders from the handler, how to walk together in pairs or more, how to move on a straight line and turning after reaching the end of the field. They are normally well fed and handled politely by the handler who is also trained to handle the animals.

Appendix C: Fertilizing and Planting in Rip Lines

1. **Compost and/or Manure:** These inputs can be spread in the rip lines as soon as they are finished. For maize and sorghum, apply 500 ml of compost or dry manure for each 1 meter of furrow. For beans and millet use 250 ml per 1 meter of furrow. Cover the material with 1-2 cm of soil to prevent blowing or volatilization. This can be done several months before planting in order to save time once the rains begin. If the furrow has filled with soil since ripping, you may need to rip again in order to create a deep enough furrow to apply compost/manure.
2. **Fertilizer:** Because it is vulnerable to losses from leaching and volatilization, fertilizer should be applied in the furrows just before planting. For maize and sorghum, use a heaping bottle cap of a recommended basal fertilizer for each 1 meter of furrow. Cover with 1-2 cm of soil. If the furrow has filled with soil since ripping, you may need to use a planting stick or machete (panga) to apply the fertilizer.
3. **Wood Ash:** If you have tested your soils and know that they are acidic, wood ash should be applied in a similar fashion to compost, though at a lower rate (e.g. 2 heaping water bottle tops per 1 meter of furrow). Better yet, to save labor, the wood ash can be mixed and applied together with compost or manure.
4. **Cover Crops:** Suppress plants by slashing or spraying herbicides several weeks before ripping. Heavy growth of vining cover crops may need to be cut into smaller pieces to keep it from bunching up on the ripper. Allow the foliage to dry up first, then run the ripper through it.
5. **Seeding:**
    a. **Use teren ropes to maintain consistent seed distance within furrows**. Place the appropriately marked teren rope beside one furrow and drop a seed at each mark. Adjacent furrows can be seeded by looking at the placement of seed in the first row, and dropping seed in the same position. After 10-15 rows, use the teren rope again to re-establish the accuracy of the seed placement.
    b. **Drop seeds individually along the furrow instead of dropping 2-3 seeds like when planting in planting basins.** By spacing the seeds individually, you will reduce competition between plants and increase yields.
    c. **Small seeded crops, like millet or wheat can be sown in a continuous line using a bottle with a hole in the lid**. To avoid over-seeding, small grains can be mixed with sand or soil before seeding with a bottle.
    d. **If the furrow has filled with soil since ripping,** you may need to use a planting stick or machete (panga) to plant large-seed crops like maize or beans. For small-seeded crops, you may need to rip again to create a deep enough furrow for seeding.