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COTVET

Facilitating and Learning Materials

NATIONAL CERTIFICATE LEVEL 1

TRADE AREA:

CASHEW VALUE CHAIN

UNIT 4:

PRUNING AND THINNING IN A CASHEW PLANTATION

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0. Introduction and preliminary notes

In order to run a successful cashew plantation, the plantation will need to be cared for and maintained. Maintenance of the cashew trees will include weeding, pest and disease control, general clean up and pruning and thinning.

If you want to increase the productivity of the plantation then it is best to have high density planting for short durations. This requires thinning to take place to maintain this productivity.

This unit focuses on pruning and thinning on a cashew planation.

LO 1: Demonstrate knowledge of pruning and thinning in a cashew plantation

In order to maintain the health of the cashew plantation pruning and thinning is required.

PC (a) Explain pruning and thinning

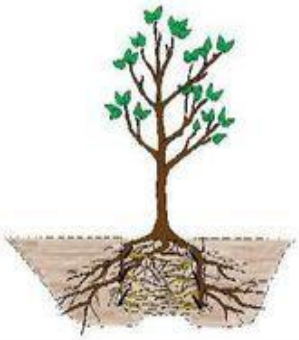
Pruning is the cutting away of dead or overgrown branches or stems. This encourages growth of the cashew trees. Thinning is the process of making or becoming less dense, crowded, or numerous. With the regards to the cashew plantation, this means removing trees or parts of tree.

PC (b) State the importance of pruning and thinning

Pruning and thinning is important for the health of the cashew plantation to ensure optimum growth of the trees. This is especially important in the case of highly densely planted cashew trees as they require a significant amount maintenance.

REASONS TO PRUNE

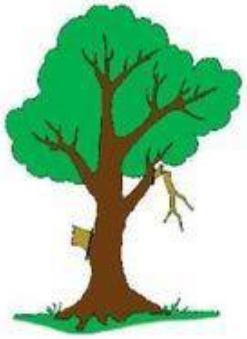
Pruning should be a regular part of all tree and shrub maintenance programs. Proper pruning involves the selective removal of plant parts to train young plants; rejuvenate older plants; improve plant appearance, structure and health; control size; create special forms; prevent personal injury and property damage; and influence flowering and fruiting.



Stop circling and girdling roots. Growing plants in containers, or planting them in compacted soils or restrictive sites, may cause roots to circle. As circling roots enlarge they may girdle (choke) the plants, or fail to adequately anchor them. Prune circling roots at planting, or when they develop in the landscape (unless removal creates large wounds).

Remove watersprouts and suckers. Improper pruning and damage may cause plants to produce watersprouts (in the crown) and suckers (from base or roots). Prune watersprouts and suckers when they appear before their vigorous growth weakens the plants. To "untop" improperly pruned (topped) trees, remove selected watersprouts to re-establish a better branch structure.

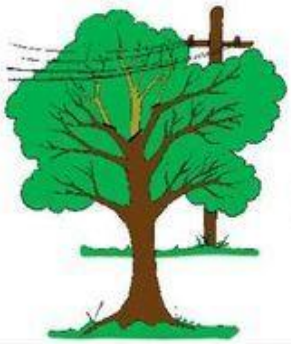
Remove codominant leaders and weakly-attached branches. Damage, improper pruning, or opposite bud arrangement may cause trees to produce codominant (two equal) stems and weakly-attached branches. Prune codominant leaders and weakly-attached branches when young to prevent wounds from breakage. In addition, remove rubbing and crossing branches.



Remove damaged branches. Storms, equipment, people, animals and other pests may damage plant branches. Damaged branches diminish appearance, create hazards and are sites for insect and disease development. Prune when damage occurs.

Create special effects. Plants can be pruned to create special aesthetic, architectural and environmental forms. Special forms include bonsai (dwarfing), topiaries (three dimensional forms) and espaliers (two dimensional forms). Pollards are plants pruned at the same place each year to restrict plant size.

Open and rejuvenate older plants. Excessive internal growth often restricts air circulation through older plants, often increasing pest problems and reducing light penetration. Selectively prune to reduce wind resistance, increase air circulation, reduce pest problems and increase light penetration.



Control size and growth direction. Proper heading (pruning to a bud or side branch) and thinning (pruning entire branches) can control plant size and branch growth directions. Prune to buds or at branch collars, not mid-branch (topping).

Remove potential hazards. Prune branches that interfere with or threaten people and property before problems occur. Monitor plants for potential hazard development.

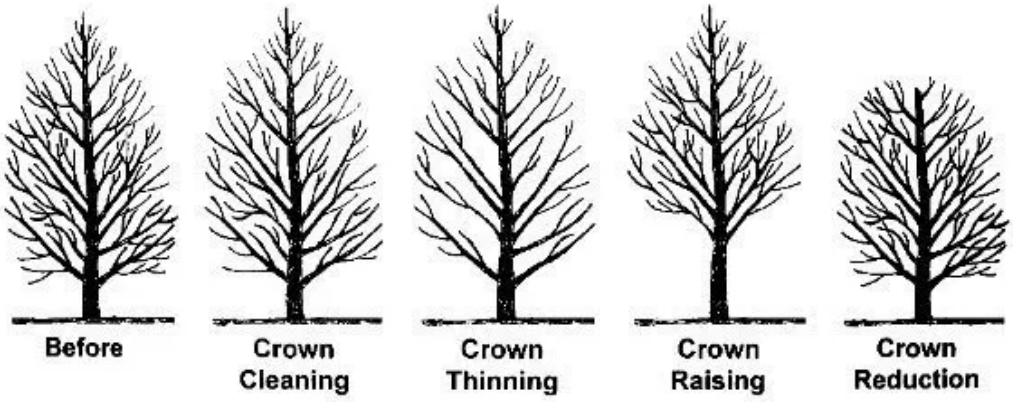
PC (c) State the factors to consider in pruning and thinning

- **Phase of Growth:** Knowing when to thin and prune is really important as this impact directly on the growth of the cashew trees. The various phases of growth (from young saplings to fully grown trees) requires different pruning and thinning techniques.
- **Plant Death:** Dead or dying parts of the trees will need to be pruned or thinned out so that pests and diseases don't spread to the rest of the trees and effect the whole plantation. Specific seasons or times of the year are best for the growth and spread of diseases and if pruning occurs during this time, the open wounds can result in the trees becoming infected.
- **Damage to the Trees:** Plants are highly sensitive to being pruned and thinned and doing these at the wrong time or the wrong manner can impact negatively on the trees and reduce their productivity and potentially kill the trees.
- **Type of Pruning and Maintenance Cycles:** The maintenance plan impacts how often the pruning and thinning takes place as set schedules need to be in place and implemented for the smooth operations of the plantation.

PC (d) Explain the types of pruning

The types of pruning are as follows:

- **Cleaning** is the removal of dead, dying, diseased, weakly attached, and low-vigor branches from the crown of a tree.
- **Thinning** is selective branch removal to improve structure and to increase light penetration and air movement through the crown. Proper thinning opens the foliage of a tree, reduces weight on heavy limbs, and helps retain the tree's natural shape.
- **Raising** removes the lower branches from a tree to provide clearance for buildings, vehicles, pedestrians, and vistas.
- **Reduction** reduces the size of a tree, often for utility line clearance. Reducing a tree's height or spread is best accomplished by pruning back the leaders and branch terminals to secondary branches that are large enough to assume the terminal roles (at least one-third the diameter of the cut stem). Compared to topping, reduction helps maintain the form and structural integrity of the tree.



PC (e) Explain the types of thinning

- **High or crown thinnings** remove poor-quality dominant and co-dominant trees. The remaining dominant trees can then expand their crowns.
- **Low thinnings or thinnings from below** remove intermediate and suppressed trees from the stand.
- **Mechanical thinning (or row thinning)** removes trees within a fixed spacing interval or by strips with fixed distances between them, regardless of the form of each tree
- **Selection thinning** is the removal of poorly formed dominants to favor trees in the lower canopy, and is primarily used when the dominant trees are low-value species or have stems of poor quality.
- **Free thinning**, or crop tree release removes selected trees without regard for their position.

Self-assessment

PC (a)

What do pruning and thinning refer to?

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PC (b)

Why is pruning and thinning important?

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PC (c)

What are 2 factors to consider with pruning and thinning?

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PC (d)

Explain 3 types of pruning.

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PC (e)

Explain 2 types of thinning.

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LO 2: Demonstrate skills for preparing pruning operation in a cashew plantation

Before pruning can take place, the trees that require pruning need to be identified and the equipment will need to be prepared.

PC (a) Identify trees that require pruning

Prune trees that pose a safety hazard, threaten to damage property, pose a fire hazard, and will have improved health as a result of pruning.

For safety, focus on trees that are in high-use areas of your plantation. To reduce the risk of property damage, focus on trees that could fall on a vehicle, building, or other structure. Pruning trees with diseased and insect-infested branches may help alleviate the problem.

Examine trees once a year and after severe storms, being sure to check all parts and sides. Remove any broken branches lodged in the tree crown. Look for and prune branches with the following:

- Dead wood
- A crack that extends through the bark and into the wood
- A weak V-shaped union with the stem or another branch
- Decay—wood that is soft, or crumbly, or a cavity where wood is missing
- A canker—a localized area of sunken or missing bark

PC (b) Use personal protective equipment (PPE) for pruning

The following PPE is used for pruning:

- Gloves
- Safety Glasses
- Long-Sleeved Shirt
- Long Pants
- Sturdy Shoes
- Hearing Protection
- Safety Harness

PC (c) Select appropriate pruning tools and equipment

The choice of tool depends largely on the size of branches to be pruned and the amount of pruning to be done.

- Use hand pruners on small branches (under 3cm in diameter).
- Cut larger branches (up to 6cm) with lopping shears.
- Use a pruning saw for branches 6 to 12 cm in diameter.
- A chain saw is preferred when pruning branches larger than 12 cm in diameter.
- To cut branches beyond reach use a pole pruner. These can cut branches up to 4cm in diameter.

To avoid the need to use a chain saw, prune when branches are small. Also, a small branch leaves a small wound and generally heals faster.

PC (d) Prepare tools for pruning

To prepare for pruning it is necessary to sanitize the tools. Sanitizing tools helps prevent the spread of disease from infected to healthy trees. Tools become contaminated when they come into contact with fungi, bacteria, viruses, and other microorganisms that cause disease in trees. Pathogens need some way of entering the tree to cause disease, and fresh wounds are perfect places for infections to begin.

Sanitize your tools by using either 70 percent denatured alcohol or a solution of 1 part liquid household bleach to 9 parts water. Before making each cut, immerse the tool in the solution for 1 to 2 minutes, and wipe wood particles from the cutting surface. Bleach is corrosive to metal surfaces, so when you are finished pruning clean tools thoroughly with soap and water.

Tool sanitation is not needed during the dormant season.

With the above information you should be able to prepare for pruning

Situation: You have implemented a new schedule for pruning and need to prepare and select the tools.

Instructions

1. Select and wear the correct PPE for pruning.
2. Gather the appropriate tools for pruning.
3. Prepare the tools for pruning.

Performance Criteria

1. Correct PPE was worn.
2. Correct tools were selected.
3. Tools were prepared for pruning.

Use the checklist to follow the stated steps for preparing and selecting tools for pruning. Rate your own performance critically and honestly after you have completed each activity.

Daily PM Activities	Rate
1. Correct PPE was worn	
2. Correct tools were selected	
3. Tools were prepared for pruning	

Self-assessment

PC (a)

When deciding which trees to prune, what do you look for?

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PC (b)

List 5 personal protective equipment (PPE) used for pruning.

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PC (c)

Which pruning tools can be used for branches 4cm in diameter?

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PC (d)

Describe the procedure for cleaning tools with bleach.

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LO 3: Undertake pruning in a cashew plantation

Once all the tools have been prepared for pruning and the trees needing pruning have been identified then pruning can be undertaken.

PC (a) Carry out pre-operational and safety checks on pruning equipment

The tools used for pruning have sharp edges, and pinch points. Examples of injuries that can occur during pruning work include falls, slips, head/eye injuries, strains and sprains. Here are some recommendations to help reduce the risk of injuries during this year's pruning activities:

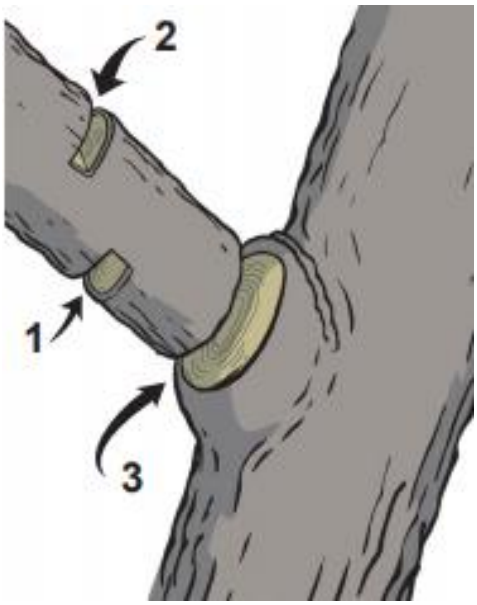
1. **Guides and Manuals** - Before using pruning tools, read and understand the operation and safety procedures in the operator's manual provided by the manufacturer.
2. **Inspection** - All tools and equipment should be inspected prior to using to make sure everything is working properly.
3. **Personal Protective Equipment (PPE)** - Use the appropriate PPE.
4. **Tool Choice** - Choose the tool.
5. **Weather** -Dress for weather conditions and avoid using electric pruning tools or equipment in rainy, wet or dangerous weather conditions.
6. **Ladder Safety** - Follow recommendations on ladder placement, maximum load rating, proper ladder height, and maintenance. Choose the right type of ladder for the job.
7. **Repetitive Tasks** - Reduce the risk of muscle and joint injuries by taking short, frequent breaks when completing repetitive tasks and by doing stretches before, during, and after work.
8. **Power Line** - Be aware of power lines and never prune a tree or branches yourself if it is close to power lines. It is recommended that a professional tree service prune or trim branches or trees too close to power lines.
9. **Slips and Falls** - Reduce the risk of slips and falls by using the 3 points of contact when using a ladder and not over-extending your reach by keeping your body within the side rails.
10. **Emergency Plan** - An emergency plan should be in place in the case of an incident. First aid kits should be easily accessible and the crew leader should be trained in first aid.

As you begin pruning, follow these safety reminders. **The last reminder is to always know where your other hand is located when holding a branch and cutting with your other hand.**

PC (b) Outline the procedure for pruning

1. Ensure PPE is worn
2. Prepare tools
3. Conduct safety checks
4. Select trees and branches to be pruned
5. Making proper pruning cuts

Pruning cuts should be made just outside the branch collar. The branch collar contains trunk or parent branch tissue and should not be damaged or removed. If the trunk collar has grown out on a dead limb to be removed, make the cut just beyond the collar. Do not cut the collar. If a large limb is to be removed, its weight should first be reduced. This is done by making an undercut about 30 to 46 cm from the limb's point of attachment. Make a second cut from the top, directly above or a few inches farther out on the limb. Doing so removes the limb, leaving the 30- to 46-cm stub. Remove the stub by cutting back to the branch collar. This technique reduces the possibility of tearing the bark.



Treat Cut Surfaces with Disinfectant

Pruned ends of branches be smeared with 10 per cent Bordeaux paste to prevent the gummosis and entry of pathogen.

Preparation of 10 percent Bordeaux paste:

For preparing 10 percent Bordeaux paste, dissolve 1 kg of copper sulphate crystals in 5 litres of water and 1 kg of quick lime in 5 litres of water and prepare the paste.

PC (c) Carry Out Pruning

With the above information you should be able to carry out pruning.

Situation: You need to prune your cashew plantation. You have made the necessary preparations and you are ready to prune your cashew trees.

Instructions

1. Select and wear the correct PPE for pruning.
2. Gather the appropriate tools for pruning.
3. Prepare the tools for pruning.
4. Conduct safety checks.
5. Select the trees and branches to be pruned.
6. Make the pruning cuts.

Performance Criteria

1. Correct PPE was worn.
2. Correct tools were selected.
3. Tools were prepared for pruning.
4. Safety checks were conducted.
5. Trees and branches to be pruned were selected.
6. Pruning cuts were made.

Use the checklist to follow the stated steps in pruning cashew trees. Rate your own performance critically and honestly after you have completed each activity.

 Excellent  Okay  Try Again

Daily PM Activities	Rate
1. Correct PPE was worn	
2. Correct tools were selected	
3. Tools were prepared for pruning	

4. Safety checks were conducted	
5. Trees and branches to be pruned were selected	
6. Pruning cuts were made	

PC (d) Treat cut surfaces with recommended disinfectant

Situation: You have just finished pruning and now need to treat and disinfect the exposed surfaces of the cashew trees.

Instructions

1. Treat cut surfaces with disinfectant

Performance Criteria

1. Surfaces were treated with disinfectant

Use the checklist to follow the stated steps in treating and disinfecting the exposed surfaces of the cashew trees. Rate your own performance critically and honestly after you have completed each activity.

 Excellent  Okay  Try Again

Daily PM Activities	Rate
1. Treat cut surfaces with disinfectant	

PC (e) Clean and store pruning equipment after use

Situation: When the pruning has been completed the tools and equipment require cleaning. Once they are cleaned, they then can be stored.

Instructions

1. Clean equipment
2. Store equipment

Performance Criteria

1. Equipment is cleaned
2. Equipment is stored

Use the checklist to follow the stated steps in cleaning and storing tools and equipment. Rate your own performance critically and honestly after you have completed each activity.

Daily PM Activities	Rate
1. Clean equipment	
2. Store equipment	

Self-assessment

PC (a)

What are some of the recommended pre-operational and safety checks?

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PC (b)

1. List the procedure for pruning.

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PC (b)

2. What is the preparation method of the disinfectant?

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PC (b)

3. Describe the procedure for preparation of 10 percent Bordeaux paste

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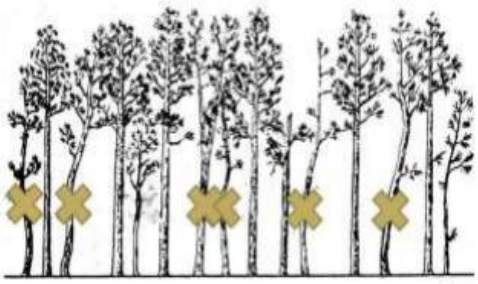
LO 4: Demonstrate skills for preparing thinning operations in a cashew plantation

Thinning requires preparation before it can be commenced. In general thinning occurs when there has been high density planting.

PC (a) Identify trees that require thinning

When conducting thinning the selected trees will depend on the type of thinning chosen to carry out on the cashew plantation.



If using a set planting scheme then the trees to be thinned are predetermined. If there is no predetermined thinning scheme then trees that are sick (pest or disease ridden), overcrowded or unproductive should be thinned.

PC (b) Use personal protective equipment (PPE) for thinning

The protective equipment for thinning is much the same for pruning as the equipment is the same. The more heavy-duty PPE should however be selected for thinning as it involves the removal of entire trees. The protective clothing is as follows:

- Gloves
- Safety Glasses
- Long-Sleeved Shirt
- Long Pants
- Sturdy Shoes
- Hearing Protection
- Safety Harness

PC (c) Select appropriate tools and equipment for thinning

Along with a chainsaw the following is needed: Correct files, mixed fuel, extra oil, chains, bar wrench.

PC (d) Prepare tools for thinning

Read the instructors manual of your tools and prepare them for use. Follow the guides carefully ensuring that safety precautions are taken so that no injuries or accidents occur. Ensure that they are functional, disinfected and free of debris.

Self-assessment

PC (a)

Which trees are selected for thinning?

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PC (b)

Name 3 items of PPE.

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PC (c)

What tools are used for thinning?

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LO 5: Undertake thinning in a cashew plantation

Once preparations have been made and the trees to be removed have been selected, they can then be thinned.

PC (a) Pre-operational and safety checks on thinning equipment

The safety checks are much the same as those covered in pruning, however to operate the chainsaw other precautions will also need to be taken.

You need to take the following precautions as a minimum:

- Chain saws produce toxic exhaust fumes as soon as the engine starts running. These gases may be odourless and invisible. Never use your power tool in an enclosed or poorly ventilated space. Always make sure there is adequate ventilation.
- Check the floor of your workplace. Remember there is a risk of slipping on wet surfaces, uneven terrain or on freshly stripped wood (bark).
- If anyone else is nearby, especially children, keep them at a safe distance.

In your own interest you should observe the following safety instructions with regard to your starting location:

- Always move at least 3 metres away from the refuelling location.
- Check your working area for any obstacles (such as branches). Always have an escape route available for emergencies. Slippery, uneven or icy surfaces can be hazardous and should be avoided.
- Also make sure there is no-one nearby. However, you should never work alone and you should always ensure that someone else - who can help in an emergency - is within a close distance.

Situation: You need to thin the cashew plantation. You have to prepare the equipment and check they are safe to use before you can carry out the operation

Instructions

1. Select and wear the correct PPE for thinning.
2. Gather the appropriate tools for thinning.
3. Prepare the tools for thinning.
4. Conduct safety checks.

Performance Criteria

1. Correct PPE was worn.
2. Correct tools were selected.
3. Tools were prepared for thinning.
4. Safety checks were conducted.

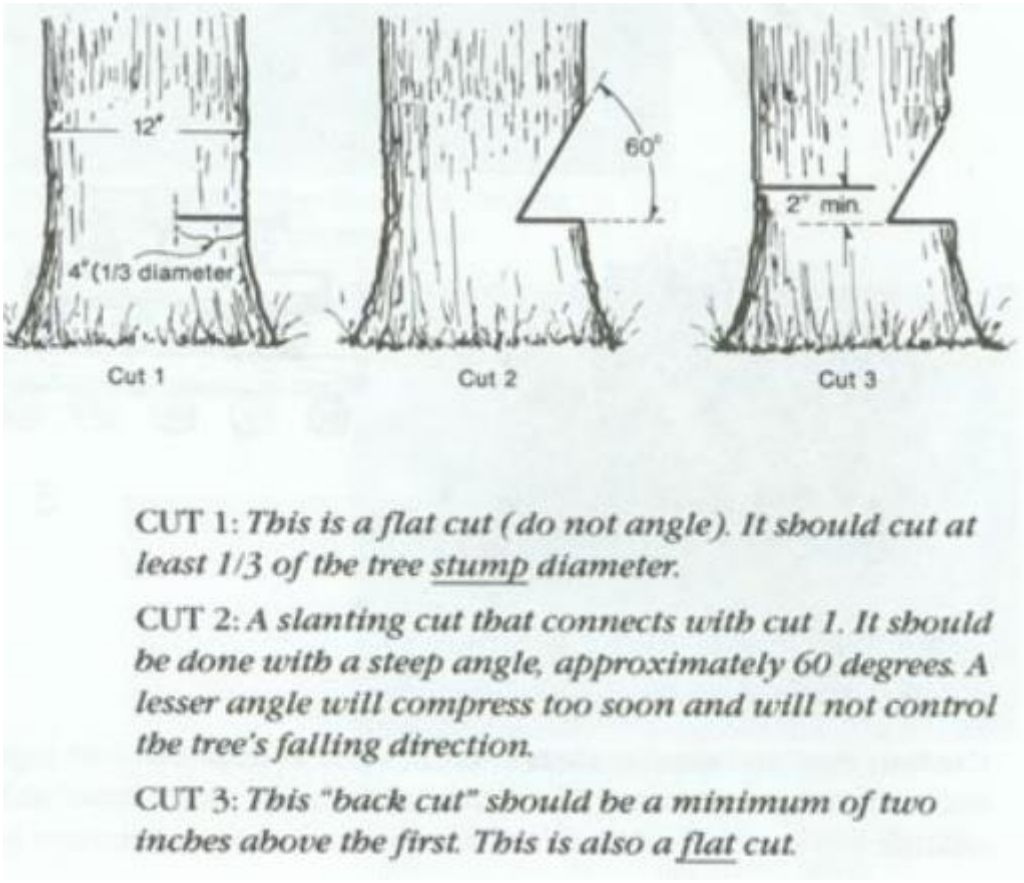
Use the checklist to follow the stated steps in thinning the cashew plantation. Rate your own performance critically and honestly after you have completed each activity.

 Excellent  Okay  Try Again

Daily PM Activities	Rate
1. Correct PPE was worn	
2. Correct tools were selected.	
3. Tools were prepared for thinning	
4. Safety checks were conducted	

PC (b) Outline the procedure for thinning

1. **Size-up**: Determine where you want the tree to fall. A leaning tree or a tree with branches only one side may fall only one way. Is it safe for the tree to fall where it "wants" to go?
   If so, cut it. Sometimes certain trees require cutting before other ones in order to avoid them getting stuck or "hung up" together.
2. **Clear-out:** Clear your cutting area. Cut off limbs that are close to the ground, so they won't snag you clothes or hinder your cutting. Trim back any brush overhanging your work area.
3. **Three-cuts:** Use a three-cut method for safely cutting trees as shown below.



4. **Escape route:** Always have an escape route that you can take when the tree begins to fall. It should be well away from the trees falling direction and back to one side. Some trees have been known to "kick back" from falling directions.
5. **Hang-ups:** Occasionally, trees get stuck on other trees as they are falling. These "leaners"require SPEACIAL PRECAUTION because they can fall anytime! Sometimes rolling the tree will prompt it to fall. A safe way to handle this situation is to winch or pull the tree with a chain and vehicle until it comes free and falls.
6. **Jack-straw:** When trees are cut without regard to where they will fall, they often become tangled, making limbs and clean-up very difficult. To avoid jack-strawing, cut and fell your trees in the same direction. You will find it is worth the extra effort when it comes time to consolidate the wood products and clean up the slash.

PC (d) Cut trunks and clean farm after thinning

After thinning you will need to remove the fallen trees and debris. There are four main methods of doing this depending on the available equipment and machinery. These methods are as follows:

- Chipping
- Piling and Burning
- Lopping and Scattering
- Loading and Hauling

Chipping

Chipping involves using a machine to reduce the trunks and branches into small wood chips. These chips decompose easily and can help preserve soil moisture and aid in plant development. They also have a very low fire risk.

Piling and Burning

This involves packing tight piles that are twice as high as they are wide for them to be burned. It is important that these piles are located at a safe distance from the remaining trees as well as other potential fire hazards.

Lopping and Scattering

This is one of the easiest and cheapest methods of farm clean up after thinning. The cut down trees are cut into much smaller pieces and scattered over an area.

Loading and Hauling

Loading and hauling is the most expensive of the options as in involves loading up the cut down trees and transporting them via vehicles to a place to be dumped or stored.

A combination of these techniques can be used when cleaning up the farm after thinning as they can be useful for certain things. Hauled logs can be sold or used as firewood, wood chips can be used as mulch for the trees and excesses can be scattered or burned.

PC (e) Clean thinning equipment after use

Clean the equipment used to thin the trees to keep it free of bacteria and fungi. The equipment will also need regular maintenance to ensure that they work effectively. Keep machinery well-oiled and store the tools safely.

Situation: When the thinning has been completed the tools and equipment require cleaning. Once they are cleaned, they then can be stored.

Instructions

1. Clean equipment
2. Store equipment

Performance Criteria

1. Equipment is cleaned
2. Equipment is stored

Use the checklist to follow the stated steps in cleaning equipment after use. Rate your own performance critically and honestly after you have completed each activity.

 Excellent  Okay  Try Again

Daily PM Activities	Rate
1. Equipment is cleaned	
2. Store equipment	

Self-assessment

PC (a)

List 2 safety precautions when using a chainsaw.

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PC (b)

What are the steps for thinning?

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PC (d)

What are the different methods of cleaning up the farm after thinning?

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Reflection on your learning in this unit

You will write **short reflections** of your learning and actions relating to the knowledge you have learnt and the practical skills you have developed.

Tips for writing your Reflection/Reflection Journal: You should write in your Reflection Journal within 24 hours of completing your practical session to record your experiences while they are fresh in your memory. Use the **'What, So What, Now What Model'** to guide your writing.

Answer the following questions:

What happened **to**…? (Describe what happened when did what you did)

So What did I learn from that? (Give at least 2 examples)

Now, What can I do better in future? (How can I improve next time?)

What did you learn to do?

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What difficulties did you face in this unit?

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What can I do it better in future?

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How long did it take you each time you did it?

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Attempt 1.....

Attempt 2.....

Attempt 3.....

References:

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