Enhancing *Jatropha curcas* Productivity by Canopy Management

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**INTRODUCTION**

Jatropha seed and oil yield is function of planting material used, growing conditions, plant architecture development and maintenance. Jatropha is hardy plant; thrives well in arid and semi arid regions with an average rainfall ranging from 500 to 1200 mm. It has been planted in varied soil types, marginal and waste lands; where in utilization of *in situ* resources by agronomic practices and development and management of canopy by pruning are very crucial for harvesting higher seed for biodiesel production. Building ideal canopy by pruning during first growing season is very important. Pruning is done during winter season when plants are in dormant condition.

**PRUNING IN JATROPHA**

The pruning is a simple cutting off the main stem or the top branches at predetermined height. This pruning induces more number of lateral branches and these branches produce more number of fruits. The number of branches and the number fruits are directly related to the quality and success of pruning. It is an important process to increase the productivity of the plant and to reduce the gestation period.

**IMPORTANCE OF PRUNING IN JATROPHA**

- Induces more new lateral shoots (Figure 2 and 5).
- Increases flower and fruit production per plant.
• Improve bush architecture (Figure 2).
• Increases light penetration into the bush and improves overall fruit quality.
• Helps in better management of pests and diseases.
• Facilitates easy harvesting of matured fruits.
• Pruning helps in removing of diseased, whippy, defunct and moribund branches.
• In addition to higher yield pruning reduces the size of the above-ground portion of the plant this will allow the farmer to take inter cultural operations in inter-space available between the Jatropha plants.

![Figure 1: One year old not pruned plants](image1)  ![Figure 2: First year pruned plant with branches](image2)

**Number of Prunings needed for Jatropha curcas**

It is ideal to keep the plant height of around 2 m for easy harvesting and accommodating more plants per unit area. For developing the plant into a desired design and height; more than two prunings is essential in three years. First pruning should be done within 6 months of transplanting. Second pruning should be completed during winter season of second year of planting.
Table: Comparison between pruned and non pruned plants of 2 YEAR OLD

<table>
<thead>
<tr>
<th>Characters</th>
<th>Non Pruned 2 year old Plant</th>
<th>Pruned 2 year old Plant</th>
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| No. of Branches     | 1. May be less than 2 branches after first year of planting  
2. Less than 4 branches after second year of planting  
3. Figure 1       | 1. 4 to 8 branches after first year pruning  
2. 20 to 32 branches after second year pruning  
3. Figure 2         |
| Plant Growth Rate   | Less growth                                                                                   | Vigorous growth                                                                            |
| No. of Fruits       | 1. 2 to 3 fruit bunches per branch  
2. 6 to 8 fruits per bunch  
3. 48 to 96 fruits per plant | 1. 2 to 3 fruit bunches per branch  
2. 6 to 8 fruits per bunch  
3. 240 to 768 fruits per plant |
| Seed Yield (kg/Plant)| 1. No. of seeds: 144 – 288  
2. Seed yield: 0.10 to 0.25 kg                                                  | 1. No. of seeds: 720 – 2304  
2. Seed yield: 0.75 to 1.50 kg                                                  |

THE CRITERIA FOR PRUNING

The following criteria are important:

- Plants should have attained more than 1.5 inch stem diameter (just above the soil surface; Figure 3 and 4).
- Plant height should be more than 2 feet above ground (Figure 3 and 4).
- The basal stem colour should be silvery whitish at least up to 1.5 feet height (Figure 4).
- Pruning should be done at the height of 1 foot to 1.5 feet from the ground (Figure 5).
- If the plant height and stem girth is less than above mentioned; pinch the shoot tip.
- The basal stem of 1.5 feet height will have 10 to 15 eye buds for establishment of lateral branches.

PRUNING SEASON: Pruning should be done during winter season when plants are in dormant condition. The basic principle behind is that when plants are in dormant condition; mobilization of photosynthates takes place from all leaves to the root and shoot system and all the resources are stored in the main root system. After pruning the new growth will utilizes the stored resources from the root system; still the new branches synthesis their photosynthates. Pruning should not be done when the plant is having more new vegetative growth and it is ideal to prune when the plant is shedding its leaves during winter season.
Basic Principle behind Pruning Time:
Generally a Jatropha plant undergoes dormancy during adverse climatic conditions like low and high temperature; coupled with low soil moisture content. This condition will generally prevail during February to March months in a year and some times it is a region specific. During dormancy, plants sheds their leaves to minimize the moisture loss from plant. Before shedding its leaves; plant translocates all its photosynthates to root system and basal stem portion and preserved for new growth. Plants remain without leaves till it exposes to favorable conditions. During this dormant period; it is ideal to take up the pruning activity. By removing the stems will not affect the growth of new branches because plant has reserved food materials in root system. These stored photosynthates will be utilized during favourable conditions for new growth.

PRUNING OF LATERAL BRANCHES
The lateral branches of the plant also to be pruned (it should have at least 6 to 8 buds) along with main stem. For more details please look at the photo give below (Figure 7 and 8).
PRUNING INSTRUMENT

**Sharp Knife:** Pruning is done with the help of a sharp knife enough to make clean cut ends of stumps (Figure 9). Please keep sharpening the cutting tool after pruning 100 plants. Avoid using secateurs/hedge scissors as they may result in injury to bark and invite entry of fungus/insects into the branch.

SPECIFICATIONS FOR PRUNING CUTS

- A pruning cut can be a point of infection for various diseases and this risk must be minimized. A good clean cut, slant and smooth edged are essential (Figure 12). This will also avoid the risk of damaging the bark on the main stem below the pruned branch.
- There should be no splitting of branches or bark during pruning operation (Figure 12 and 13).
- Improper pruning technique seriously damage or kill Jatropha plants.

PRECAUTIONS TO BE TAKEN DURING PRUNING

- Remove old leaves from pruned stem (Figure 5 and 8).
- Do not hold the Knife loosely as this may result in the knife falling from the hand and cutting oneself. The sharp knife is handled in such way that the angle between plant and knife is almost 45 degree (Figure 10).
- Sharpen the knife after pruning every 100 plants.
- Do not in any circumstances use blunt knifes this will result in uneven cut surface.

PRECAUTIONS TO BE TAKEN AFTER PRUNING

- The cut ends of the stumps should be covered with cow dung or handful of soil; this would prevent loss of moisture, fungal attack and drying of the stumps.
- Do not leave broken and split branches hanging in the field. It is an open invitation for disease and insect pests.
- Put all pruned branches around the pruned stump and which acts as mulch for the plant (Figure 11).

![Figure 11: Pruned materials used as mulch](image)

![Figure 12: Stumps with clean cuts](image)

![Figure 13: Stumps with damaged cuts](image)

**SUMMARY OF PRUNING IN JATROPHA**

- Pruning increases seed yield (Table).
- Jatropha needs minimum three pruning
- Plant with 1.5 inch stem diameter should be selected for pruning.
- Facilitates easy harvesting of fruits.
- Unhealthy, diseased pruned branches should immediately remove from the field.

**REMEMBER:** By using proper pruning practice, plants will have more number of branches which will bear higher number of fruits per plant and this keeps the plant height on check and facilitates easy harvesting. **Safety is paramount; so please handle the sharp knife carefully during pruning.**