



## **Jatropha Propagation Methods**

Jatropha can be established from seeds, seedlings or cuttings. Seeds may be planted directly in the field (direct seeding) or pre-cultivated in a nursery to produce seedlings. Low germination rates and high seed death makes direct seeding an unfavorable option in large plantation settings. For seedling production, excessively dry seeds may be soaked in water (scarification) and then placed in growing medium (clean soil, compost, peat or a combination of any of these). Seeds are planted 2-3 inches deep in potting bags or 1

Cuttings of Jatropha will root quickly and readily grow into productive trees. Cuttings may be of various sizes ranging from as wide as 6 inch (15 cm)

gallon pots, watered and set in shade or covered shade house with adequate regular watering regime to ensure that the media does not dry out. Fully hydrated seeds will germinate in 12 to 18 days or in some cases earlier. Germination rates determine the number of seedlings normally available from seeds and these rates under optimal conditions are around 90%. Jatropha propagated by this method will attain average seedling height of 6 to 8 inches (20.2 - 30.5 cm) with eight to twelve secondary leaves in four to six weeks. diameter branches to small branches of less than 1 inch (2.5 cm) in diameter and no more than 6 inches (6 cm) in length

The latter is ideal for large scale production systems and is referred to in recent years as micro-stems. Cuttings grow readily and usually result in higher seedling survival than seeds, that is, survivability is usually close to 100% and will attain a height of 6 to 8 inches (20.2 - 30.5 cm) with 8 to 12 secondary leaves in three to four weeks.

An important consideration during propagation of seedlings is the stimulation of tap root development. Tap roots are the major central roots which grow straight downwards and is the major water seeking system which gives the plant its drought

tolerant capabilities. Seedlings sown from seeds in narrow long sleeves (made of hard paper or plastic) are encouraged to develop longer tap roots which enable more vigorous plant growth and establishment when the seedlings are established in the field. Plants developed from cuttings usually lack tap roots, but preliminary work done in Florida (University of Florida) have shown that a pseudo-tap root will develop if cuttings are started in elongated sleeves. The use of rooting hormones is not recommended as fewer roots have developed with its use.



*Photo 1.1: Sleeve-grown cutting, showing pseudo-tap root development (3-weeks old)*

There are strengths and weaknesses associated with both methods of propagation (from seeds or cuttings) of *Jatropha curcas*. These are outlined in the following table.

*Table 1.2.2 Advantages and disadvantages of propagation from seeds, seedlings and cuttings*

<b>Seeds</b>	<b>Seedlings</b>	<b>Cuttings</b>
Low germination rate in the field and higher seed/seedling loss observed	Average germination rate of 90%	Survival rate close to 100%
High performance variability – Each individual plant will yield and perform differently	High performance variability –Each individual plant will yield and perform differently	Cuttings are clones of the mother plant, so performance is predictable – every plant has the same production potential
Earliest fruit production usually observed at 12-18 months under optimal conditions	Earliest fruit production usually observed at 9 to 12 months under optimal conditions	Earliest fruit production usually observed at 3-6 months under optimal conditions when cuttings are sourced from producing mother plant
Higher plantation wide resistance to disease outbreak due to genetic variability	Higher plantation wide resistance to disease outbreak due to genetic variability	Genetic uniformity can result in higher plantation susceptibility (or immunity) to disease outbreak
Well defined tap root system development	Well defined tap root system development	Pseudo-tap root system or no tap root system development
Sturdier plants due to presence of tap roots	Sturdier plants due to presence of tap roots	Sturdy only with developed pseudo-tap roots. My be more susceptible to high winds

## Summary of advantages and disadvantages of propagation from seeds, seedlings or cuttings

### **(a) Seeds**

When direct seeding methods are used (planting directly into the ground), seeds are the cheapest method of propagation of *Jatropha*. However, due to weed competition, insect damage or other soil borne problems, this method of propagation may result in lower germination rates and less plants growing into seedlings and then to mature trees. Also, because seeds are the product of two parents (pollination), the genetic information of the eventual tree is not easily predicted.

### **(b) Seedlings**

Seedlings are produced from seeds but are grown in small containers (bags or pots) in a more controlled environment such as a nursery shed or greenhouse. Using this method of propagation, non germinated seeds are easily identified and the only plants transferred to the field are developed seedlings which, because of established root

and shoot systems stand a better chance of surviving once transferred to the field. A start-up plantation will benefit from using this method in the initial stages of production.

### **(c) Cuttings**

Cuttings are small thumb sized twigs or branches removed from pre-selected trees (with desirable genetics) and set in soil to grow roots and leaves. The resultant seedlings are planted in the same manner of seedlings as described above. The main difference is that cuttings will perform the same way as the mother plant from which it was derived, and thus the predictable yields of the future mature plant is more certain. Cuttings are genetic clones and will therefore be equally as resistant or susceptible to pest, disease, environmental or physiological problems as the mother plant

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