



Title: Giant Bamboo Propagation Using Stem Cuttings On-farm in Kiambu County, Kenya

Target Audience: Crop and Livestock Farmers, Extension Agents, Learning and Research Institutions

Introduction

Kiambu County has a population of about 1,623,282 people with an average density of 638 persons per km². The County covers a land area of about 2,543.5 km². Karumuru village in Kiambu County lies within a latitude -1.08330 degrees and longitude 36.8167 degrees. The mean annual temperature is 24⁰C and rainfall ranges between 600-1,200 mm per year. Livelihood activities in Karumuru village are mostly within the agricultural production systems. Crops grown include: tea, coffee, pineapple, potatoes, bananas, wheat, pyrethrum, maize and macadamia nuts. Animal production include; cattle, sheep, goats and poultry farming. Farmers within Karumuru village have continued to diversify plant types and have introduced crops such as Bamboo. Mr. Ndungu Wamucheru, is one of the pioneer farmers to introduce Giant bamboo (*Bambusa dendrocalamus*) farming in the village. Giant Bamboo is preferred by farmers due to its fast growth, wide range of uses including provision of various products and ecological services. Bamboo ecological benefits include soil erosion control and river bank stabilization while significant uses include: food and fodder, roofing, fencing, fuelwood and furniture.

Objectives

Objectives of propagating giant bamboo are:

- Provision of products for domestic use.
- Enhance income through sale of products.
- Provision of seedlings to establish on-farm for environmental conservation measures.

Approach

Mr. Mucheru acquired bamboo propagation and management skills from a British farmer residing in Thika, Kenya who had a lot of experience on bamboo production and utilization. Multiplication of bamboo seedlings on-farm is undertaken through vegetative propagation by using stem cuttings.

Propagation procedure employed by the farmer:

- Collect cuttings from a mature bamboo stem (culm), which is about 2 years old and with protruding buds. A mature culm should not have a coating of white powdery dust.
- Use a hand-saw to obtain cuttings measuring 20 - 30 cm from the culms. The cut should be made at least 2 cm below the nodes.
- Prepare a mixture of water and rooting hormone in a clean container.
- Prepare a cool spacious area where the cuttings will be arranged to develop shoots and roots.
- Dip each cutting into the prepared mixture of water and rooting hormone.
- Put the same mixture to fill the hollow tube of the cuttings.
- Arrange/place the cuttings in a vertically slating manner (about 45⁰) and cover the parts that will sprout with mulch and soil sparingly. *Grevillea robusta* leaves are preferred due their higher water holding capacity and heat generation and retention.
- Leave the cuttings under shed covered with leaves until they sprout.
- Maintain the water and root hormone mixture in the hollow top part of the cuttings with water-rooting hormone mixture to avoid drying and to ensure faster shooting and rooting. This should be checked once a week for 2 months.
- Maintain the shade until the shoots have developed.
- Prepare appropriate soil mixture and large transplant pots or bags ready for transplanting sprouted seedling
- Fill a planting bag with prepared forest soil mixture half-way, then place the sprouted cutting into each bag, after which you fill the bag with soil while avoiding root damage.
- Transfer the pots to a shaded nursery area and take care of the seedlings for approximately 2-3 months before transplanting in the field or sale.
- Water the plants until they are ready for transplanting.



Giant bamboo clump on-farm

Impact

- Use of stem cuttings ensures production of giant bamboo plants that are exactly the same as the parent plant.
- Bamboo takes a shorter period to reach maturity, and continuously provides material for sale and domestic use.
- Increased income through sale of various products that include seedlings which are sold at Ksh 400 each, bamboo culm of about 20-30 cm sold at Ksh 50 while 1 kg of bamboo shoots for consumption costs about Ksh 400. Other products sold include tea harvesting baskets and furniture.
- Conservation of indigenous tree species as bamboo provides wood products for buildings and fuelwood.
- The propagation technique is easy to learn, enabling many farmers to embrace the technique.
- Planting Giant bamboo on-farm has contributed to soil conservation by controlling soil erosion, acts as windbreakers on the farm, provides fodder and nutritional supplement for livestock, especially pregnant and lactating animals as shoots are rich in calcium.
- Due to its fast growth rate bamboo has high carbon sequestration ability.

Innovations and Success Factors

- Vegetative propagation of Giant bamboo continues to be adopted by many farmers in Kiambu County. Adoption has been enhanced through training of farmers on propagation techniques, who consequently start own nurseries to raise seedlings
- Use of stem cuttings technique is a viable procedure compared to raising bamboo from seed as the plant takes a cycle of 50-70 years to bear seeds after which it dies.
- Propagation may be done in two ways, i.e. the internodes are either buried in the soil (layering) or placed in the soil medium slanted vertically or horizontally.

Constraints

Some of the constraints experienced by the farmer include:

- The seedlings take long in the nursery about one year before they reach maturity.
- There is limited genetic diversity as planting materials is collected from limited number of plants on the farm.
- The survival rate of bamboo seedlings once out planted in the field is very low, at about 20% survival.

- Giant bamboo is not a common variety in Kenya as well as in many parts of Africa, therefore, there is therefore limited information on its propagation techniques.
- Giant bamboo is a cluster forming species that spreads outwards. It therefore occupies a lot of space as it spreads out, displacing annual crops planted on-farm.
- Lack of ready market for bamboo culms (stems) is a major discouragement in the growth of the enterprise.
- Leaves from bamboo do not decompose easily and cannot therefore, be used readily in compost making.

Lessons Learnt

Some lessons learnt include:

- Bamboo takes 50-70 years to bear seeds after which it dies. This means the production cycle would be too long if the seed was to be used for propagation purposes.
- To shorten production cycle vegetative propagation using stem cuttings is applied.
- Giant bamboo is a fast growing species and can deliver desired output to farmers within a short period of time
- Bamboo takes three years to mature once it is planted out in the field, thereby offering quick renewable wood products.
- The deference between a mature and immature bamboo culm is that mature culm does not have white powdery dust and starts to branch heavily at the top.
- Bamboo has many uses and social values, which include:
 - Food, feed and medicinal, i.e., highly nutritious as a source of calcium.
 - Provision of timber for roofing, fencing, ornaments, furniture making (chairs and tables).
 - Environmental services such as soil conservation, shade and windbreak.
- Giant bamboo has strong wood that can produce very resilient poles durable products.
- Due to its fast growth bamboo has high carbon sequestration ability.
- There is need to create awareness on uses and benefits of bamboo so as to motivate many farmers take up bamboo growing.
- Extension agencies need to familiarize themselves with bamboo value-chain to be able to link bamboo farmers to buyers.

Conclusion

The growing of giant bamboo is a feasible enterprise and has got potential to: conserve the environment, increase farmers income, and improve farmers livelihood.

Acknowledgement

The authors acknowledge Mr. Ndungu Wamucheru of Karumuru village, Kiambu County for providing information on Giant bamboo propagation, which enabled the compilation of this manuscript.