Experiences of Rattan cane (*Calamus deeratus*) propagation trials in Uganda

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Abstract

Rattan cane (*Calamus deeratus*) mainly found in the natural wetland forests and is harvested for use in making of baskets, cords and furniture. While its natural stock levels are decreasing, rattan cane use for the production of various items continues to rise. Previous studies have revealed that the high consumption of this commercial product from its natural reserves is likely to cause a crisis to the handicraft industry due to shortage created by over-harvesting, degradation of wetland forests and the breakdown of traditional and management trade systems. A study was carried out during 1998 to 2001 to investigate the possibilities of propagating rattan cane in Uganda and to formulate guidelines for its propagation in nurseries that are engaged in raising plant seedlings. This was aimed at promoting propagation of this endangered species on peoples' farms and private forests after it was observed that some private nurseries needed information on its propagation. Experiments were done using suckers, cuttings and seeds as planting materials under different conditions. Five months after sowing the seeds, the results showed the following levels of successes: 80% for seeds with completely removed sarcotesta, 67% with partially removed sarcotesta and 43% with intact sarcotesta. Although the suckers showed some levels of survival under nursery conditions, they were susceptible to fungal infections and collar rot disease, which caused losses after about one year. The paper discusses the various media of soils, which give better results, and highlights the success of propagating rattan cane by use of seeds. It also gives recommendations on community propagation programmes.

Keywords: Propagation, nursery, Rattan cane

Introduction

Rattan cane (*Calamus deeratus*) is a spiny climbing plant, which uses natural woody vegetation as a climbing frame. It belongs to the palm family found in the natural wetland forests. Its strength and versatility makes it much valued in the furniture and handicraft industry. Its consumption as a commercial raw material has continued to increase while its natural stock levels are decreasing because it has long been used in the making of baskets, cords, furniture, and in many other uses. The wide range of uses has boosted the rattan cane crafts and furniture industry into a multimillion-dollar industry worldwide with market demands coming from both domestic as well as international markets.

Tuil, (1929), Brown, (1913) and Zieck, (1972) have outlined direct growing by seeds in South East Asia while nursery practices for rattan cane have been reported by Johari and Che Aziz, (1983a, 1983b, 1983c), Darus and Aminah, (1985), Manokaran, (1988) and Tan (1988). The techniques described are suitable mainly for raising a numbers of seedlings for research purpose or for planting by small holders.

Rattan cane is rare as a seedling in commercial and private nurseries in Uganda. A few exceptions nursery called Gardenia in Mukono District made attempts on trials with suckers but with little success. The reasons being that the seeds are difficult to store and they are short-lived with rapid loss of viability. They are also not easy to propagate vegetatively on a large scale. The have a slow grow rate taking 7-10, or more years to mature. Although commercial rattan species are usually not gregarious

and they are not normally tolerant of poor sites, there have been no guidelines to propagate them in the Ugandan environments.

This study highlights the investigating the propagation methods for rattan cane in Uganda so that the local people, private nurseries and farmers can obtain information on how to propagate them in their farms. This will turn rattan cane into a crop, rather than reliance on harvest from the wild.

Materials and methods

The study was carried out in collaboration with Gardenia nursery (a private business in Mukono town), Forestry Resources Research Institute nursery at Kifu (to get an input from technical staff) and Kateete village (with one community member near forested land). Seeds were collected from Mabira conservation forest. Sowing and planting of seeds and suckers, respectively, were done at the mentioned sites. Suckers were collected from natural stands in Budugala, Kasayi, Kateete and Nkombwe forest reserves at different stages of growth. Isolation and identification of pests and diseases were carried out at Kawanda Agricultural Research Institute, Coffee Research Laboratory.

Rattan cane harvesters were used to collect fruits and suckers in the forests where they harvested. The suckers were separated from the clump by careful digging and lifting, while the fruits were cut from the branches. The intact root systems of suckers were washed free of soil to reduce on the bulk that was to be transported while moist to the planting nursery sites. The seeds packed in polythene bags were also transported to the nursery sites, where they were kept cool and sheltered from direct sunlight.

The pericarp (or testa) from each seed was first crushed by hand, and the fleshy sarcotesta then rubbed by hand against a gunnysack before being washed off with water. For experimental purposes, sarcotesta was either partially removed or completely removed. The control had the sarcotesta left intact. Processed seeds were sown directly in seedbeds and in polythene bags. Suckers were planted in polythene bags and located under partial shade provided by a forest canopy or a constructed timber frame overlain by palm fronds, bamboo strips and PVC plastic sheeting. A flat or gently sloping area, which provided fertile topsoil for polythene bag filling and reliable nearby water supply, was used.

The germination media used for bag filling included a ratio of 3:1 forest topsoil to sand, sawdust and a control of forest soil. The filled bags were arranged in neat 10 bag wide blocks, which were found to be ideal because they allowed enough space for optimum seedling growth without wasting nursery area. Footpaths of 0.5 - 0.7 meters wide, which separated the blocks, allowed easy access for seedling maintenance and provided space for optimum seedling growth.

Care of seeds and suckers in polythene bags consisted of removal of the weak and dead seedlings, watering regularly, manual weeding, and pest and disease control. Germination readings were taken every two weeks and sucker survival was monitored once a month. Kawanda Agricultural Research Institute (Coffee Research Laboratory) was used to diagnose pests and diseases on roots, stems and leaves of unhealthy seedlings and suckers, which were controlled by tap water agar (TWA) antibiotics.

Results

Experience from seed collection operations in Mabira forest revealed that rattan cane fruits usually ripened between February to May and October to January (Figure 1). Suckers were available at the locations they were sourced from throughout the year. Seeds sown directly in the seedbeds germinated after five months. Seeds sown into polythene bags germinated after two months with different germination media.

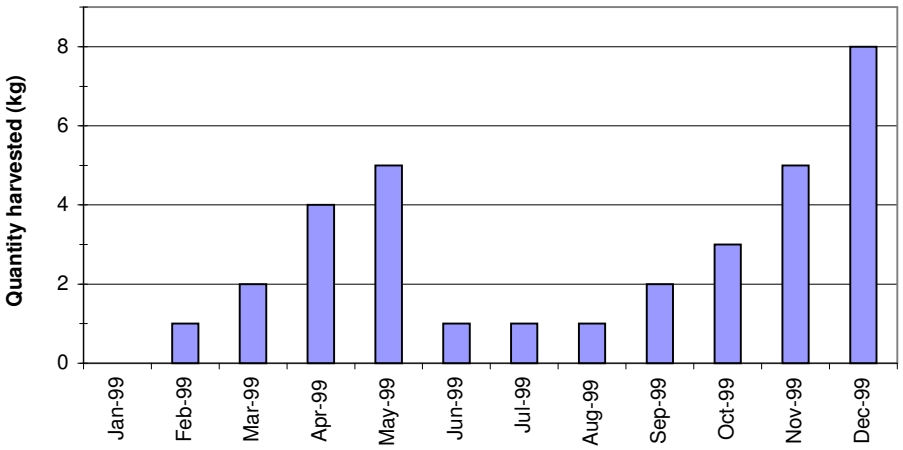

Figure 1. Figure showing number of ripe Rattan fruits collected in different months

Manipulation of the sarcotesta gave different mean seed germination rates of 80, 67 and 43 percent for complete, partial removal of sarcotesta and those left with the sarcotesta intact respectively (Figure 2). These rates were obtained five months after sowing in the 3:1 forest topsoil to sand germination medium. This was achieved from seeds sown directly into polythene bags.

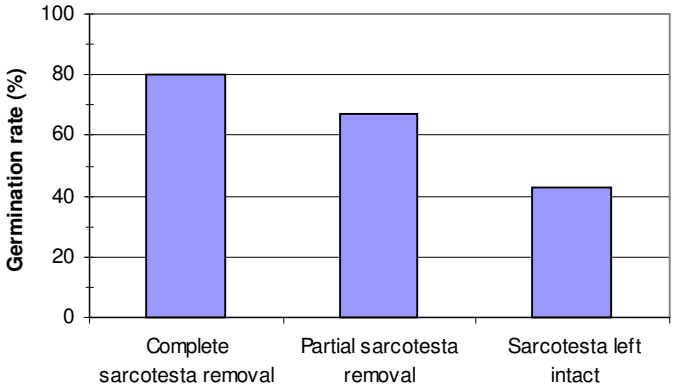

Figure 2. Germination rates of seeds with different treatment

The rates of germination varied with the media used and at the different sites (Figures 3 and 4). Sand and sawdust yielded low values compared to the control and the 3:1 forest topsoil to sand mixture, which gave the best results.

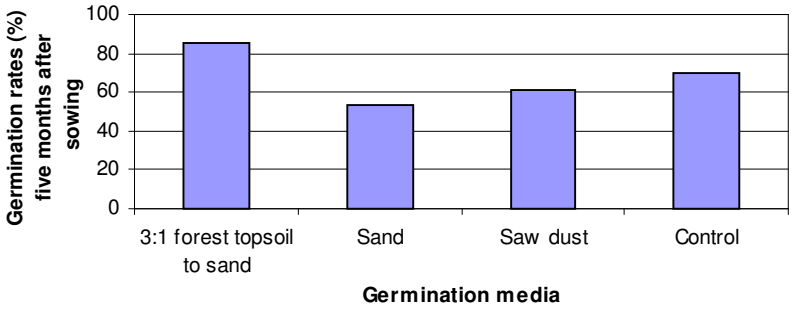

Figure 3. Mean germination rates for seeds with complete testa and sarcotesta removal in different germination media

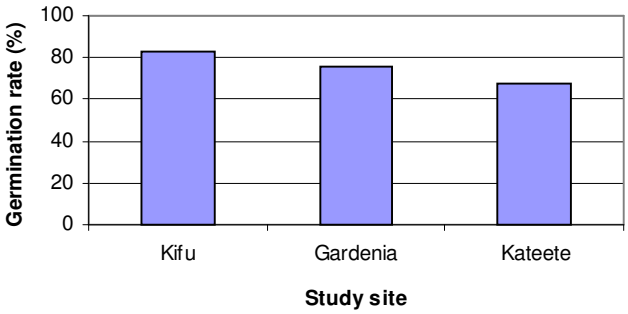

Figure 4. Mean germination rates for seeds sown in 3:1 forest soil to sand mixture with complete removal of sarco testa at the different sites. The differences are significant.

Suckers directly planted in polythene bags did not establish due to infestation with collar rot disease and stress probably from the prevailing experimental conditions (Figure 5). Use of suckers as planting materials was hence not successful because the suckers may still demand from the parent plant before reestablishment or their establishment may require a forest cover micro-conditions that may not be found in nurseries. Pests observed are shown in Table 1 while diseases isolated are shown in Table 2.

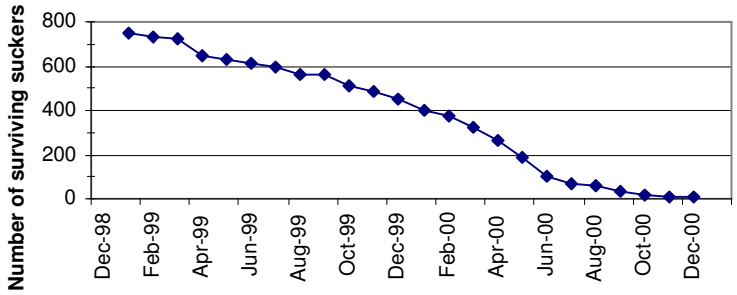

Figure 5. Number of suckers surviving over time

Table 1. Pests identified

Type of pest	Pest identified	Observation
Stem feeding	Beetles (Coleoptera) Mealy bugs (Pseudococcidae)	Found at the base of seedlings and suckers
Leaf feeding	Larval stage of butterflies (Lepidoptera) Crickets Grasshoppers	Seen feeding on leaves
Root feeding	Termites (Isoptera)	Attack is on the root system

Table 2. List of diseases identified

Observed disease	Causal organism	Symptom
Leaf spot	*Collectotricum* sp., *Pestalotiopsis* sp., *Curvularia* sp., *Phomopsis* sp.	Necrotic spots on leaves
Leaf blight	*Collectotricum gloesporiodes, Glomerella cingulata*	Brown spots develop into brown lesions on leaves
Shot holes	*Curvularia* sp., *Pesfalofiopsis* sp., *Phomopsis* sp.	Brown spots on leaves enlarge to form gray lesions
Collar rot disease	*Fusarium oxysporum, Fusarium solanii*	Rot at the collar region, wilting and finally die back

Discussion

Seeds, suckers and mature fruits were collected from Mabira forest and separated according to the mother plants. The amount of material collected depended on the fruiting and rhizome pattern of the mother plants and prevailing weather conditions. Fewer seeds were collected during the rainy seasons because of accessibility problems caused by high levels of flooding. The suckers were available throughout the year but seed collections were best in the months of February to May and October to December when a lot of fruits are mature.

Seeds sown directly into the beds took longer to germinate than those directly sown in polythene bags. This is attributed to differences in nutrient levels of the germination media used. The seeds that were directly sown in polythene bags recorded germination after two months. Seeds with the pericarp and sarcotesta completely removed gave the best germination rates in the germination medium with 3:1 forest topsoil to sand because of a balanced nutrient mix in the medium rendering minimum disturbance to the seedling after germination.

Suckers took long to adapt to the nursery conditions because of the stress due to differences in temperatures at the experiment sites and the forests. Smaller suckers in terms of basal diameter and height however, survived longer. Since seeds were more successful in terms of survival than suckers, it is advisable not to bother with suckers.
Little control of pests was necessary in existing nursery experience. However, this does not mean that no serious pest problems will ever occur and so knowledge of potential pest problems is essential in the event that pest outbreaks occur. When crickets, grasshoppers, mites or termites are suspected to be a problem, application of insecticides may be necessary when the rattan plants are young. The bases of the plants are sprayed with *malathion* (0.7 grams active ingredient per litre water) to control crickets and a similar foliar application can be used to control grasshoppers. *Amitraz* can be applied as a foliar spray in nurseries at a dilution rate of 0.2 grams active ingredient per litre water when spider mite infestation is detected. This is a fairly selective fungicide and is less likely to affect natural enemies of the mite than a broad-spectrum insecticide such as *malathion*. A soil drench of an insecticide can be used to prevent attack by termites.

Care in handling young rattan plants helped to prevent injuries and minimised the risk of infestations by *Rhynchophorus schach*. Although the *Cerambycid mesosa* has so far only been found infesting rattan planted under forest cover, it may yet cause problems in plantations and should be considered a serious threat to the plants since it causes direct damage to the canes. One possibility for control of this pest when the rattan plants are still low is to remove yellowing leaf sheaths before the beetle has an opportunity to infest them. This, however, would be difficult when the plants grow higher. Chemical control of the insect would be difficult because of the burrowing habits of the larvae.

Integrating good sanitary practices at the nursery with appropriate chemical control best controls diseases of rattan. Optimum fertilizing and weeding are also recommended as they promote better growth, making the plants less susceptible to diseases. The potting mixture should not be too high in clay as this tends to retain excessive moisture in the pot. A mixture of systemic fungicides such as Metalaxyl with Mancozeb is effective but costly.

Conclusion

Planting materials for rattan must be availed once there is a demand for the cane seedlings. Planting materials can be obtained from the natural forests. In this respect, it is recommended that the preferred planting material should remain the seed.

The germination medium of 3:1 forest topsoil to sand showed the best germination rates at the different sites. This is due to the favorable aeration and water holding capacities the mixture offered to the seeds before and after germination.

The preferred treatment to seeds should remain complete pericarp and sarcotesta removal but care should be taken not to damage the emerging embryos.

Direct seeding in polythene bags is recommended because it saves labour and damage costs to transplanted seedlings after germination.

It is recommended that strategic research be carried out on the germination process and, pest and disease control. The nursery should be located under a forest canopy since experiments in this condition gave the highest germination rates. Knowledge on nursery techniques should be widely disseminated to farmers to encourage rattan cane cultivation.

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