GERMPLASM ACQUISITION AND HANDLING

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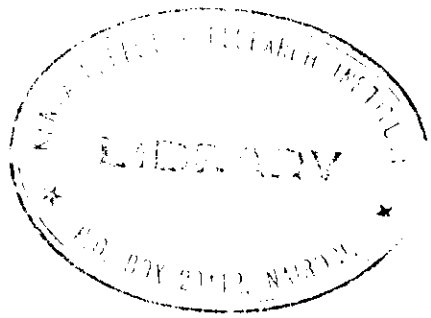
Introduction

It has been the target of the Kenya government to attain an annual planting programme of 200 million seedlings. During recent years, rural afforestation in agroforestry systems has gained much attention and with the increased awareness of the importance of indigenous trees the supply of seed in required quality and quantity has got to be looked into critically.

Some of the most important bottlenecks hindering afforestation programmes today include:

- unavailability of enough seedling in nurseries
- unavailability of seedling of the correct species
- unavailability of enough seeds to set up nurseries
- high cost of seedlings in some areas
- use of low quality seeds



2 Seed Sources

2.1 Seed Orchards: These are specifically planted stands for production of high quality seeds. The orchads are planted from seeds which had previously been selected and maintained in such a way that these is maximum seed procuction from individual trees. A part from being a source of high quality seeds, the orchards acts as known seed sources such that the history of the seeds and trees raised from such seeds can be traced. Technically, the orchards provide seeds of the highest quality.

2.2 Seed Stands: Planted stands of timber or ornamental species which show superior growth and quality can sometimes be selected and designated for seed production. By rouguing out undesirable trees, a seed stand should comprise of only those trees with good growth habits and capable of producing high quality seeds. The stands are also subject to thinning and other treatments to improve their quality.

2.3 Selected Trees: Single seed trees can be selected according to the intended use of the species e.g straight bole for timber, large crown for fodder and high branchiness for fuelwood. These trees would normally be found in mixed natural forests but once selected and marked, they become sources for seed for consequent years. In order to maintain a desired genetic diversity, seeds from several selected trees would be collected and mixed to form one lot. With the increasing emphasis on indeginous trees, selected trees play an important role

as the most reliable source of seeds for some species. In semi arid and arid land, the important species are often scattered over a large area; as such, the phenotypical selection of individual trees has thus remained the only source of seeds. Seeds from selected trees have also been used in establishing seed stands for some endangered species e.g Chlorophora excelsa.

2.4 General Collection: Thus involves collecting seeds randomly from seedling trees. For a long time this system has been the most common practice for seed acquisition and is still important for those trees species wich cover many provenances. Although the genetic diversity in such collection can be maintained by collecting from many trees (15-20). Such seeds do not offer any guarantee on genetic quality especially where very similar species of the same occur mixed together. The method is however the easiest and can be adopted in rural programmes for onfarm social forestry.

3 Seed Collection and Storage

One factor associated with production of low quality seeds can be attributed to collection of either immature seeds or those which are deteriorated and of reduced viability. With the advent of social forestry, farmers are being urged to raise their own nurseries. However, the use of the right seed is the only guarantee of a succesful planting programme.

Seed collection is therefore the most fundamental activity in any planting activity. The success or failure of any programme will depend in the efforts put in the technical aspects of the initial inputs, the most important of these being the seed.

3.1 Collection Methods:

Depending on species, size and time of collection, different methods can be used.

a) By hand from different trees with access from the ground: e.g acac as and low shrubs.

b) For branches out of arms reach, a pole and hook can be used to pull down the branches to enable the collector to reach the seed.

c) By hand shaking the tree and spreading a canvas around the trees e.g Markhamia lutea

d) Climbing the tree and picking mature seeds or fruits. This is difficult in big and tall species and can only be done by trained climbers using special equipment e.g in Pinus, Grevillea and Polyscias spp.

e) Sometimes, seed can be collected from the ground. These are most seeds which fall naturally from the tree after attaining maturity. It is important here that the timing of such collection should be right to avoid picking up deteriorated seeds. In Olea spp, this is an important way of seeds acquisition following feeding activities of birds and monkeys.

3.2 Seed Storage:

Seeds need to be stored to provide viable planting material whenever they are required. Seed longevity is variable and will depend on many factors.

- Initial moisture content of seeds
- Relative humidity of storage condition
- Temperature of store
- Physiological state of the seeds
- Pre- storage history of the seeds.

The most important factors, however are the seed moisture content and temperature of the sotre. The technical aim of storing seed is to reduce physiological activity (respiration) to a minimum so as to lengthen the life span of the seeds. When the seeds are finally removed for planting, they should be in almost the same physiological state as they were before storage. It is important to note that seed is at its highest genetic potential immediately after attaining physiological maturity. However if seed must be stored, then some basic principles must be observed.

- Store only seed of high viability (fully ripened)
- Seeds to be stored should be free from mechanical damage, insects and fungi
- In the absence of cold storage facilities, seeds should be kept in hessian sacks or spread in thin layer in a cool dry place.

4 Seed Quality Control

The act of seed quality control is to ensure that the seed used for sowing conforms in every respect to that which is desire. Without such a check system; there would be no guarantee that whatever one sows as seed is not only capable of germinating to produce a normal seedling but also offers no assurance in its genetic quality. Seeds which would appear viable visually, but unable to germinate or produce vigorous healthy seedlings would be useless. The only way to distinguish between dead and living, weak and strong, infected and healthy seeds is through seed testing..

A lot of variations exists during collection and handling of tree seeds due to difference in their size, physiology and morphology. However some general rules has to be followed and maintain if seed has to kept at the highest physiological potential. These includes

1. Only physiologically mature seeds need to be collected, for those are the seeds which has attained the highest genetic potential. Maturity can be determined in various ways depending on the species. Accurate phenological records and the cutting test are useful indicators in assessing maturity.

2. A proper extraction method is necessary to avoid viability losses due to mechanical damage. The risk of mechanical damage and its extent depends on the resistance to seed removal from the pods or mother plant. Experience with legume seeds show that they are very sensitive to mechanical damage which also contributes to reduced storage period.

3. Seeds must be dried to safe moisture levels before storage. Drying is a crucial process and temperatures should in no case exceed 50°C to avoid changes in seed proteins. Effective drying can be attained under conditions of efficient airflow, moderate temperatures (25-35) and low relative humidity.

4. Quality tests like germination capacity; moisture content levels need to be carried out in order to determine the sowing value of the seed lot. These test can be done locally in nurseries; however samples can be sent to the KFSC laboratory for a more comprehensive testing.

5. Role of Kenya Forestry Seed Centre

In order to maintain a continuous supply of high quality seeds to the forest department and other users, the Kenya Forestry Seed Centre with its seven regional collection centres maintains a cold storage facility; capable of holding 10,000 kg of seed. The centre has therefore been regarded as the tree seed bank as it remains to be the only reliable dealers in tree seeds. The centre currently distributes seeds free to the forest department but may need to charge for it in future in order to offset the high costs of collection, processing and storage.

All seeds collected, and distributed by the KFSC are of the highest quality because the handling of the seeds are done within the framework of the approved technical standards. Future attention will be concentrated on the ASAL in a bid to increase provision of more adapted seeds for those areas.

The KFSC strives to conduct relevant research to solve some problems associated with germination, storage and extraction for seeds of species for which there is non or limited technical information. By regular participation in workshops and seminars staff of the KFSC dessiminate useful information on technical

aspects relating to tree seeds.

In order to ensure acquisition of seed of high quality in future, the KFSC has established several seed orchards and seed stands for different tree species in different provenances. The tables below shows the established seed stands; in 1988/89 and the amount of seed collected and dispatched since 1986.

Species	Area	Provenance
Cassia siamea	4 ha	Gede/Jilore
Warbugia ugandensis	1 ha	Muguga
Eucalyptus guandis	2 ha	Londiani
" saligna	2 ha	Londiani
Grevillea robusta	3 ha	Ragati
Dalbergia melanoxylon	2 ha	Kibwezi

Year	Amount Collected	Amount Dispatched	App. seedling raised
1986/87	3,166	2,560	86 million
1987/88	7,184	4,900	100 million
1988/89	7,039	5,531	120 million