Multiplication of Fruit Trees, Spices And Medicinal Plants Through Vegetative Propagation

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The concept of vegetative propagation is that an exact copy of the genome of a mother plant is made and continued in new individuals.

A piece of plant shoot, root, or leaf, can therefore, grow to form a new plant that contains the exact genetic formation of its source plant.

Whereas, sexual reproduction by seeds provides opportunity for variation and evolutionary advancement.
Vegetative propagation aims at the identical reproduction of plants with desirable features such as high productivity.

Superior quality, or high tolerance to biotic and/or biotic stress, and as such, plays a very important role in continuing a preferred trait from one generation to the next.

The most important vegetative propagation techniques for tree species are the propagation by stem or root cuttings, grafting and budding, and various methods and techniques of layering and micro propagation.
Types of Vegetative propagation.

Cuttings

* Cuttings are severed plants pieces with at least one node.
* Various plant organs can be used for cuttings: stem, root of leave cuttings.
* Cuttings are usually placed into a suitable rooting substrate and kept under high humidity until roots and shoots have formed.
* The rooting process can be seen as the succession of the following stages; propagation, induction, rearrangement of tissues, initiation, elongation and development of roots and the development of a new plant as a whole.
Types of Vegetative propagation Contd

* One of the main factors affecting the success of the rooting of cuttings in the tropics is the water status of the plants and the environment.

* If the cuttings and plants are too dry they will wilt, too moist and fungal or bacterial diseases may affect them.

* It is therefore important to control the ambient air humidity of the cutting environment, and this can be achieved using mist or non-mist propagator.

* Once the cuttings have rooted, they can be potted and hardened-off in preparation for their planting in the field.
Grafting

* Grafting entails the union of the stem part of one plant with the root part of another one to form a new plant.

* This happens in such a way that new cells developed as a result of the healing process of the wound.

* It is the technique of choice when a single genotype does not possess the required characteristics, such as nematodes resistance of a rooting system and / or high yield from the above ground parts (wood, leaves, and fruits).
Grafting Contd.

The most important ones are:

- to multiply trees that cannot easily be multiplied through sexual or other asexual methods.
- To replace the existing root system of a tree with a better one, to decrease the time needed by a tree to reach maturity (flowering, fruiting),
- In grafting, cut material from stems and roots are put together
Grafted *G. kola* under weaning shed
Flowering *I. wombolu* under weaning shed
When grafting, or budding agroforestry trees, it is important to consider the compatibility between the plant materials, as well as their physiological age.

The most common grafting techniques for trees species are top wedge grafting, splice grafting, whip and tongue grafting and approach grafting. The most common budding techniques are T-and patch budding.
Budded *G. kola* under weaning shed
Layering

* The term layering is used for all types of propagation in which roots are formed while the stem is still attached to the mother plant.

* Only after the root formation, the layer is detached and planted as a new plant.

* This is a technique of propagation similar to cuttings, with the advantage that the propagules are detached from the mother plant only after roots have formed.
Seedling of *Dennettia tripetala* from air-layering.
The most common layering techniques for agroforestry trees includes, air layering, simple layering and stooling.

In tropical fruit propagation, air layering is the most important technique.

Its multiplication rate is lower than with cuttings, but it can yield larger individual plants.

In order to improve the survival rate of the rooted marcot, leaves are trimmed or completely removed and the shoot partially severed a few days before harvesting.
The most important reasons for vegetative propagation are:

- Maintaining superior genotypes.
- Problematic seed germination and storage.
- Shortening time to flower and fruit.
- Combining desirable characteristics of more than one genotype into a single plant.
- Controlling phase of development.
- Uniformity of plantations.
Maintaining superior genotypes

* Most tropical tree species are out breeders, which means that through the recombination of genes during sexual reproduction, many important characteristics might disappear.

* If a superior individual tree has been identified by farmers or researchers, its generic information can be ‘fixed’ through vegetative propagation.

* Thus allowing the reproduction of the same superior individual generation.
Problematic seed germination and storage

* Some tree species produce seedless fruits (e.g. some citrus cultivars) and need to be propagated vegetatively, others bear fruit very scarcely or erratically.

* Many tropical trees species have recalcitrant seeds that require special and often cumbersome seed handling procedures. In these case, vegetative propagation might be suitable and cheaper alternative to seedling production.
Thank You