

# TRAINING MANUAL ON TOPWORKING IN OLD CASHEW FARMS



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## FOREWORD

Cashew is increasingly becoming the nut of choice given its health benefits and the hype it currently enjoys on the global market. This translates as an increase in demand and ultimately high prospects for producing countries. Despite these opportunities, there still exist a number of challenges especially in the area of production. Producing countries, most of them in Africa, still struggle to increase productivity and to ensure that their produce are of high quality and meets international standards. Training has been recognized as one of the most effective tools in addressing this challenge. In this regard, the GIZ/Competitive Cashew initiative (ComCashew) has since 2009 trained over 500, 000 farmers from Benin, Burkina Faso, Ghana, Ivory Coast, Mozambique and Sierra Leone. Capacity development of about 300 experts through ComCashew's Master Training Program also ensures that knowledge and experiences are multiplied throughout the African sub region. Regardless of these efforts, there still remains a gap in the availability and accessibility of high quality training and information materials to promote Good Agriculture Practices as well as good harvest and post-harvest practices.

In response to this ComCashew publishes a number of production manuals to provide useful and practical information for trainers, cashew producers and anyone looking to go into cashew production. The *Training Manual on Topworking In old Cashew Farms*, one of these manuals, highlights the technique of topworking as a way of reviving old cashew farms.

Given the increasing change in trends and improvements in research and technical know-how, revised editions of production manuals are foreseen so as to provide in-depth and up -to -date technical information to promote continuous improvements in cashew productivity. I am grateful to all financial and technical contributors for their support in publishing this manual and look forward to similar collaborations for a sustainable cashew industry.

Hon. George Oduro,

Deputy Minister

Ministry of Food and Agriculture, Ghana (MoFA).

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# **1 INTRODUCTION**

Before 2015, the main challenge for promoting the competitiveness of African cashew producers was how to improve productivity in order to increase the incomes of the actors in the sector. Efforts to remedy this situation have concentrated on building upon important pillars such as disseminating technologies developed in research institutions, developing support structures and promoting vegetative propagation of improved planting materials. Among the good practices that require constant attention to ensure successful adoption of technologies are the dissemination of good practices and the use of proven improved planting materials. In order to adopt good agricultural practices (GAPs) and use improved planting materials to increase yield and supply processing plants in all producing countries, it is important to produce and disseminate technical manuals to provide information support for intervention approaches. Scientific research on model farms and the exchange of knowledge with experts from all regions of the world as well as field observations have shown that the application of GAPs improves quality and quantity of yields by about 30% (iCA, 2013). The use of improved planting materials has tripled and in some cases quadrupled cashew productivity in West Africa. Unfortunately, cashew producers still severely lack access to high-yielding planting materials in production areas. To overcome this situation, it is necessary to accelerate not only the spread of grafted plants for the establishment of new orchards, but also as a matter of importance to rejuvenate existing plantations through appropriate techniques.

Topworking in old plantations is an effective approach that improves yields in old orchards while awaiting more massive planting with high-performance materials.

## **1.1 PURPOSE OF THE TRAINING MANUAL**

This technical manual on cashew topworking techniques has been produced for distribution to the general public and especially to actors in the cashew value chain to satisfy their information support needs in terms of knowledge and skills for conducting cashew topworking.

African countries are confronted with a situation of relatively low cashew nuts yields of 3 to 6 kg/tree compared with those obtained in the world's major producer countries, such as India, Vietnam, Brazil and Tanzania where yields of up to 10 to 15 kg/tree are obtained (Masawe, 2010; Tandjiékpon, 2010). These low yields significantly reduce the production and income of farmers, processors, traders and the national states involved in the cashew industry. This manual will allow users of research-proven information such as technicians, extension workers, producers and other stakeholders involved in enterprises along the cashew value chain to have a technical tool that can serve as a guide in their efforts to

rehabilitate plantations to improve productivity. The manual discusses the main steps involved in using the cashew topworking technique to help increase the productivity of low or non-productive cashew trees.

## **2 WHAT IS TOPWORKING OR CANOPY SUBSTITUTION?**

Topworking or canopy substitution is the replacement of the crown of an underperforming tree by grafting scions with desirable characteristics from elite mother trees on them. The purpose is to improve the productivity of the tree by taking advantage of its well-developed root system.

## **3 WHY CASHEW TREE TOPWORKING METHOD?**

Cashew tree topworking is an important method used to change the top cover of a tree. It becomes necessary to do this when:

- the nuts produced by the tree are of poor quality;
- one wishes to introduce other genotypes and good materials on the same tree;
- the tree is severely infested by pests such as stem borers;
- the tree yield is very low even after the use of growth regulators;
- the tree was burnt by fire or affected by heat from burning fire;
- the architecture of the tree is not uniform (i.e. when the canopy is very wide and laying down)

## **4 SELECTION OF UNPRODUCTIVE CASHEW TREES FOR CUTTING AND STUMP COVERING**

Cashew topworking begins with the selection, cutting and covering the stump of unproductive cashew trees. The steps involved are:

- Selection of unproductive trees
- Cutting trees or stumping
- Covering the stump with leaves and branches
- Removal of cover and monitoring of shoot development

### **4.1 Selection of unproductive trees**

Cashew trees selected as target trees for topworking must be:

- ✓ Low yielding (less than 8 kg of nuts / tree / year);
- ✓ be bearing small size nuts (less than 7 g / nut) or both;
- ✓ Under 15 years;
- ✓ In condition of active growth;

- ✓ Healthy (free of major infestation in particular stem borer).

Selection involves inspecting the plantation with the farmer who owns the farm and identifying and marking (with the consent of the farmer) trees that meet the criteria listed above. Women (who are often involved in harvesting operations) and other harvesters play crucial roles in selection because they can serve as effective guides in identifying unproductive, infested trees.

The age of the tree is an important factor of success in the operation: The younger is the tree, the greater will be the percentage of success of the operation, with greater successes observed in orchards with up to 15 years of implantation and in plants with up to 1,10 meters of trunk perimeter. From the age of 16 up to the age of 25, there is a gradual reduction in the percentage of success. With trees older than 25 years, graft loss becomes more significant, and operating costs increase. A careful cost/benefit analysis of the entire process is recommended as the basis for decision making.

## **4.2 Cutting trees or stumping**

The next stage after identifying and selecting unproductive or infested trees is cutting or stumping. Cutting the trees or stumping is usually done with a chainsaw. The cut is done 0.5m above the ground. In West Africa countries, chainsaw cutting of trees occurs after the harvest period i.e. April-May. After cutting the tree or stumping, the cut surface of the stump (sectioned part) is painted over with a solution made of a mixture of kerosene and coal powder, or tar or drained oil. The cut surface can also be covered with lime also known as calcium bicarbonate  $\text{Ca}(\text{HCO}_3)_2$  to prevent the cut surface both from drying out and also from insect attack. To summarize, it is important to:

- Select the right trees
- Use suitable tools for cutting, preferably chainsaw
- Properly program the cutting period which must correspond with the rainy season
- Make sure the cutting height is 0.50m above the ground;  
Protect the stump against desiccation and pest attack.



Figure 1: Stumping tree for topworking



Figure 2: Cut surface painted with coal tar, oil or kerosene mixture + coal powder

### **4.3 4.3 Covering the stump with leaves and branches**

After painting the surface, the stump is covered with cashew leaves and branches from the cut tree to facilitate initiation of new shoots. Photo 3 below illustrates the cashew stump coverage procedure after painting.



Figure 5: Stump coverage to facilitate initiation of new shoots release

#### 4.4 Removal of cover and monitoring of shoot development

After painting the cut surface and covering the stump, the following activities should be carried out:

- Inspect the stump regularly to ensure that shade is maintained for 21 to 28 days for good shoot initiation and development
- Remove the shade after 21 or 28 days when signs of new shoot initiation are evident;
- Graft within 45 to 60 days after stumping when shoots are ready



Figure 6 and 5: Removal of cover and development of shoots

## 5 STEPS INVOLVED IN GRAFTING

Grafting involves attaching a prepared scion to developing shoots from the stump. The following are the steps involved in grafting:

- The choice of scions
- Preparation of scions
- The choice of shoots for grafting
- Grafting
- Shading of topworked stump

### 5.1 The choice of scions

The scions to be grafted should come from a mother tree with desirable characteristics or from a scion bank (clonal garden).

A good scion to be used for grafting should have the following characteristics:

- Should have the thickness of a pencil
- Should be straight and be between 12-15cm long;
- Should be greenish brown in color;
- Should be ripe with swelling but without breakage of the terminal bud; and
- Should be clean and free from diseases and pests.

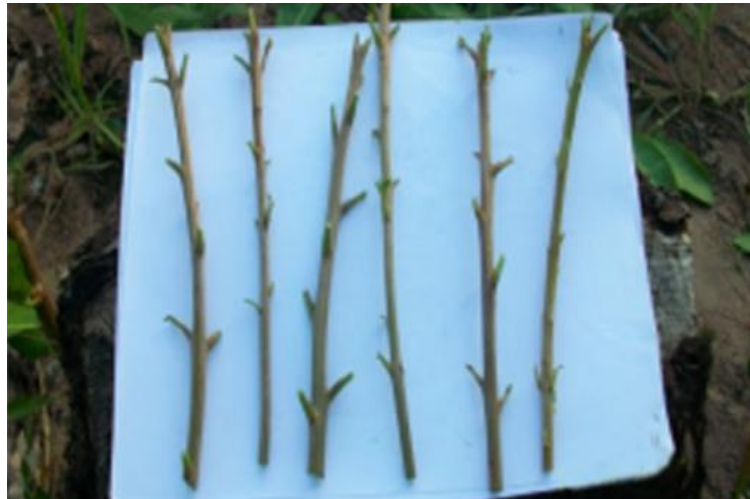


Figure 6: Good harvested scions

**NB:** Scions with internodes should be avoided

## 5.2 Preparation of scions

The following steps should be followed in preparing scions for grafting:

- Pre-condition the scions by removing the leaves 4 to 7 days before harvest preferably with a pruning shears;
- Harvest the scions on the day of grafting. However, if for any reason the scions cannot be used on the same day, keep them in a wet cotton, jute bag or paper for up to 3 days.

**NB:** The longer the time scions are stored before grafting, the less will be their suitability in terms of quality of the scions for grafting.

## 5.3 The choice of shoots for grafting

Shoots must be:

- spaced 15 to 20 cm around the edges of the cut surface
- the thickness of a pencil or of the same thickness as the scion



Figure 7 and 8: Erect and cut shoots for grafting

**NB:** The number of shoots to be grafted will be determined as a function of the area of the stump and the number of germinated shoots

## 5.4 Grafting

The following procedure should be followed in grafting:

- Cut the shoot below the top two leaves



- Use a sharp knife or blade to make a slit 3cm to 4 cm deep passing through the middle of the shoot
- Select the scion of the same thickness and slice bottom part into a wedge or “v” shape 2.5 - 3cm long
- Insert the scion into the split made in the shoot,
- Tie it firmly with a grafting or budding tape;
- Ensure that the top and bottom of the union are fully covered by the tape
- Cover the grafted shoot with a polyethylene cap and tie it underneath the union;
- Graft as many shoots as possible on the stump



Figure 9: Shoot or sprout split in the centre ready for grafting



Figure 10: Slicing bottom part of scion for grafting



Figure 11: Insertion of the scion into the cleft or split made in the shoot for the grafting

## 5.5 Shading of topworked stump

Provide 50% shade for the topworked stump in order to increase the percentage of recovery.

Observe the successful grafts and carefully eliminate the excess grafts. The grafts should be placed 15-20 cm apart and close to the cut surface.



Figure 12 and 13: Shading of the topworked stump with local materials (above) or with black nylon netting (bottom)

- NB:** Successful grafts grow in 10 to 15 days  
Remove shade after 2 to 3 weeks  
Remove all ungrafted shoots and unsuccessful grafts on the stump

## 6 CARE OF TOPWORKED STUMP

The grafted materials should be monitored once every two days for the first 21 days until the apical bud emerges. Shoots that develop below the grafting point should be removed and discarded as soon as they appear until they stop appearing.

The shoots that emerge from the stump must also be removed. It is important to spray with an appropriate chemical whenever signs of parasites and diseases appear.

The plastic cap must be removed when the apical leaves formed touch the end of the cap. Shade should also be removed when the shoot grows. To successfully accomplish all these steps it is necessary to:

- Inspect shoots in order to:
  - ✓ remove new shoots that develop below the union;
  - ✓ drain water from the polyethylene cap;
  - ✓ check for signs of germination that normally occur within the first 10-12 days after grafting
- Remove the polyethylene plug when the leaves of the new shoot are fully developed (about 4-7 days after germination);
- Remove the grafting tape 2-3 months after germination;
- Train (stake) the grafted shoots if necessary to avoid breaks caused by strong winds.



Figure 14: Grafted Shoot Staked

## 7 PROTECTION AGAINST PARASITES AND PESTS

- Soak the soil around the stem with a 60ml / 15 liter of water solution of Dursban to protect the stem from termite attacks in termite endemic areas;
- Control weeds if necessary ;
- Spray Cyperdim (45ml / 15 liters water) to avoid damage to soft shoots caused by sucking sap pests;

**NB:** After canopy substitution of a tree, it begins to bear fruit after 2 years because the root system is already well established



Figure 15: Topworked plants at different stages of development

## **8 ADVANTAGES OF TOPWORKING**

- Rapid growth (with new multiplications)
- A quick return on investment: production can start the same year
- Improvement of yields of trees which, before topworking, had little or no productivity.

## **9 CONCLUSION**

Topworked trees begin to bear fruit after 1 to 2 years. To reap the benefits of topworking, it is necessary to replace all the bad or underperforming trees with selected trees of proven high performances or clones.

Trials have shown that trees top-worked below 15 years old have given the best results and it is advisable to go for top-working of younger trees rather than old trees.

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