Centro Internacional de Agricultura Tropical

Serie 04EC-06.02
May, 1984

Selection and preparation of cassava cuttings for planting

STUDY GUIDE

TO BE USED AS A SUPPLEMENT TO THE AUDIOTUTORIAL UNIT IN THE SAME TOPIC

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Contents

Objectives

The principal objectives of this unit are to train the students to:

1. Identify the principal phytosanitary problems that limit the utilization of vegetative material for planting as well as to prevent dissemination of insects and diseases.

2. Select cuttings suitable for planting, taking into account factors such as age and part of the plant, diameter and length of the cuttings, number of nodes, cutting and cutting angle of the planting material, physical damage, the variety, viability, and storage.

3. Treat selected cutting choosing the most appropriate products according to the ecological location where the work is done.

Introduction

Cassava (*Manihot esculenta* Crantz) is a tropical, perennial woody plant traditionally grown on low fertility soils with little use of inputs. Since cassava is propagated vegetatively, it is very important that the cuttings used for planting be of good quality.

In a cassava plantation it is frequently observed that:

1. at harvest time there are always fewer mature plants than there were cuttings planted.
2. plants of the same variety do not show equal vigor;
3. there are differences in production between plants;
4. root rots are commonly found at harvest time.

The causes of these problems, in addition to certain edaphic and climatic factors, are related to the quality of the cuttings, which basically depends on the sanitary conditions and certain agronomic characteristics of plants from which they originated.

In the past cassava was considered to be a crop resistant to insects and diseases. At present, it is known that both insects and diseases can decrease not only yields per surface area by restricting normal plant development, but also the production of planting material either by attacking stems directly in the field or during storage before the cuttings are planted.

Therefore, sanitary and agronomic conditions of the plants from which the propagation material is obtained determine the quality of the planting cuttings. That is the theme of this study guide which is to be used along with its audiotutorial unit.

1. Sanitary aspects related to the vegetative propagation of cassava

When vegetative propagating material is being selected, the whole plantation that is or has been affected by pathogens that can be disseminated through the cuttings, should be discarded as a source of "seed" material. Plants whose stems have been attacked by insects and mites should also be discarded as these pests can also be disseminated and cause poor germination if infested stems are used for planting material. Two important factors must be taken into account in determining the healthiness of a plantation: the pathologic and entomologic aspects of the crop.

1.1 Phatologic aspects

The stem of the cassava plant is attacked by many pathogens that can induce internal or external rots and cortical or epidermal cankers. Other agents like viruses, mycoplasma and some species of bacteria invade the stalk systemically without showing visible symptoms. Based on their action and location the pathogens attacking cassava plants have been classified as systemic, localized or soil-borne pathogens.

1.1.1 Systemic pathogens

These can be vascular or cortical pathogenic agents. Among the vascular agents are viruses, bacteria, and mycoplasma. Viruses include: Indian cassava, mosaic virus, brown streak virus, cassava common mosaic, and vein mosaic virus. *Xanthomonas manihotis*, which causes bacterial blight, is one important systemic bacterium, and among the mycoplasma is the one causing witches'-broom.

The fungus *Sphaceloma manihoticola*, causal agent of cassava superelongation, is a cortical and/or epidermal pathogen. Although it is not actually systemic in nature, it produces numerous cankers along the stem and these contribute to its high rate of dissemination if infected stems are used for cuttings. Although it has not yet been identified, the pathogen causing frog-skin disease is also in this group.

All of these pathogens partially or totally invade the cassava plant even though in some cases no signs of their existence are present in the mature part of the stem. For this reason, a high percentage of cuttings from sick plants are infected although they appear healthy. These are the cuttings that constitute primary infection foci when carried from one region to another.

In the case of diseases such as African cassava mosaic, virus or India cassava mosaic virus which do not appear to exist in the Americas, it is indispensible to prevent introducing propagation material originating in Africa or India into other growin regions. Where this disease is found, its incidence can be decreased by eliminating sick plants and by utilizing planting material from healthy plants of the affected crops. Although resistant varieties exist, their stem cuttings can be carriers of the causal agent of African mosaic and become a source of primary inoculum in unaffected regions where susceptible are planted.

Although apparently healthy plants can be produced from plants affected with African mosaic by using the meristem culture technique, up to now there is still no method that allows detecting the presente or absence of the causal agent in the host with absolute certainity.

The viruses (cassava common mosaic and vein mosaic) and the mycoplasma (witches'-broom) recorded in the Americas appear to be transmitted only mechanically and in relatively low percentages. For these reasons, it is possible to significantly reduce the inoculum potential and thereby eradicate these diseases by eliminating plants that show their characteristic symptoms.

Every cutting taken from plants with frog-sking disease produces infected plants and at the same time, the disease can be disseminate through infected machetes. To prevent spread of this disease stem cuttings should only be taken from plants whose roots are free of disease symptoms and machetes should be disinfected with soap and water between the time of cutting one plant and the next. However, the best recommendation is not to take planting material from regions where the disease is endemic.

Another systemic pathogen is *Xanthomonas manihotis* a bacterian which causes cassava bacterial blight. It has been demonstrated that healthy plants can be obtained by rooting sprouts originating from cuttings taken from diseased plants in distilled water, (Figure 1). Plants obtained in this manner constitute the basis for producing planting material free if this pathogen. This material can then be multiplied by the rapid propagation system developed by Cock *et al.* (1975) (Figure 2) or by means of traditional systems. The healthy material can be used for planting in fields where cassava has not been previously grown or where the pathogen has been eradicated through crop rotation. This planting material can also be sent without any risk to regions where the disease does not exist.

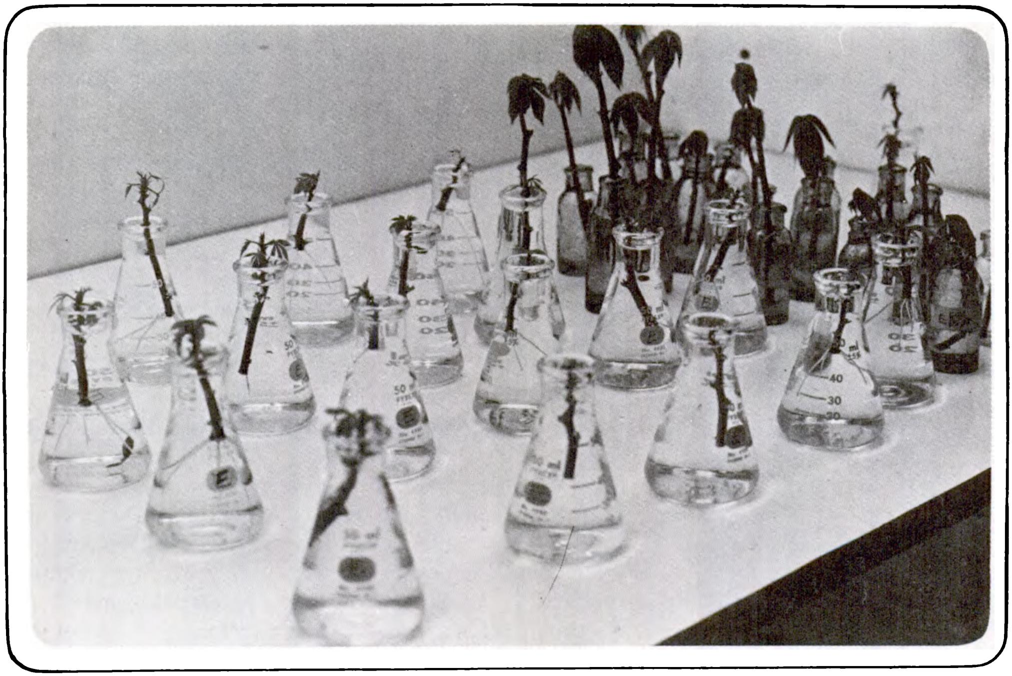


Figure 1. *Rooting of shoots originating from cassava plants attacked by bacterial blight.*

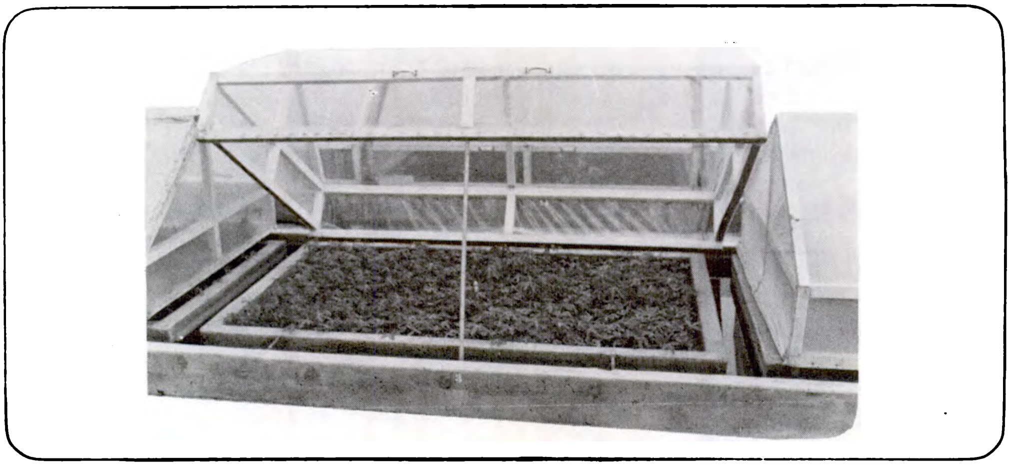


Figure 2. *Rooting chamber utilized in the rapid propagation system for cassava.*

The causal agent of superelongation (*Sphaceloma manihoticola*) can also be disseminated through cuttings taken from diseased plants. To prevent this disease from spreading, only cuttings originating in healthy plantations should be planted. It is possible to eradicate the pathogen by treating infected cuttings with Difolatan (6,000 ppm a.i.) As a preventive measure it is recommended that even healthy cuttings from production areas where this disease is endemic be treated with this fungicide.

1.1.2 Localized pathogens

These are nonsystemic agents (such as *Colletotrichum* sp. causing anthracnose, and *Agrobacterium tumefaciens* which causes bacterial stem gall) that only invade part of the stem. The majority of these pathogens leave cankers or light brown to black necrotic zones on the epidermis of the stem. Others, like *Erwinia carotovora* patovar *carotovora* wich causes bacterial stem rot, also invade the pith region causing a yellowish, reddish or dark brown coloration.

Localized pathogens penetrate into the stem through injuries caused by mechanical means or by insects, or directly or through the stomata, or by invading the petioles. Invasion by these pathogens generally decreases as the stem lignifies and matures.

Every part of the stem that is healthy and without any sign of the presence or attack by localized pathogenic agents can be used as planting material. Consequently, when selecting cuttings, all stem portions affected by these pathogens should be eliminated; these include those parts having cankers, blackened epidermal areas or reddish pith (Figure 3). Tools used to obtain stem cuttings should be disinfected using commercial formol (5o/o) in order to prevent transmiting pathogens.

1.1.3 Soil pathogens

Cassava is attacked by pathogens found in the soil such as *Rigidoporus (Fomes) lignosus, Rosellinia necatrix*, and *Armillariella mellea;* these generally attack forest tress and perennial fruits. *Fusarium* sp. and *Rosellinia* sp. also attack other perennial crops like coffee, banana, and plantain. *Rhizoctonia* spp., *Sclerotium rolfsii, Whetzelinia* (Sclerotinia) *Phytophthora* spp., and *Pythium* spp., are pathogens that attack both cassava and short-cycle herbaceous crops like cotton and beans.

All of these pathogens begin their attack after planting and their penetration occurs through the ends of the cuttings or directly through surface injuries or near the base of the sprouts or on the rootlets. Damage caused by these pathogens can be decreased by treating cuttings for 5 minutes in a mixture containing Dithane M-22 (2,000 ppm a.i.) plus Antracol (2,000 ppm a.i.) per liter of water, or Orthocide and Bavistin each at concentration of 3,000 ppm of a.i.

1.2 Entomologic aspects

Several mites and insects attack the cassava stem reducing production and quality of propagation material. There are also insects found in the soil that attack cuttings after planting and cause injuries or perforations that allow the entry of soil pathogens; insects may also completely destroy the epidermis and buds of the cuttings. Other insects cut the roots and recently emerged sprouts thus impeding normal plant development.

1.2.1 Mites and insects on the stem surface

Some mite species (*Tetranychus urticae* and *Olgonychus peruvianus*) attack developed leaves of the cassava plant while others like *Mononychellus tanajoa* attack the young

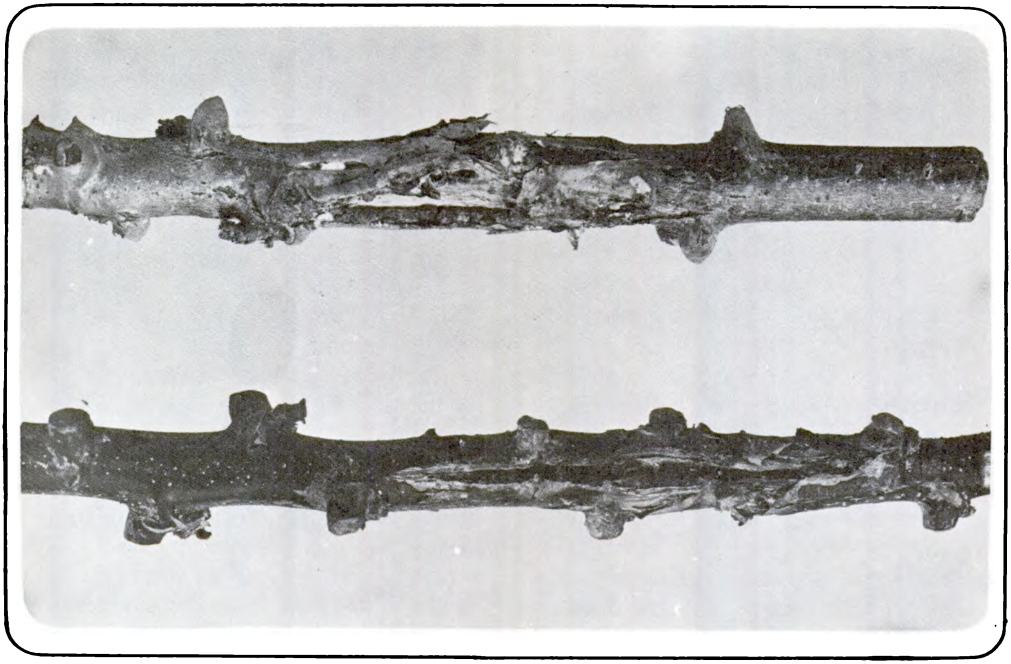


Figure 3. *Cassava cuttings with cankers and blackened epidermal areas.*

leaves and growing points. These pests can be carried to other regions when transporting infested planting material; the mite *Mononychellus tanajoa* was possible introduced into Africa in this manner. Severe attack by mites can reduce the quantity and quality of cuttings produced.

Scale insects (*Aonidomytilus albus, Saissetia miranda, Hemiberlesia diffines*) and the mealybug (*Phenacoccus gossypii, P. herreni, P. manihotae*), also are spread in the above manner. According to the degree of infestation, these insects can reduce cuttings germination as much as 70o/o. Eggs and larvae of other insects such as thrips (*Frankliniella williamsii, Corynothrips stenopterus,* and *Caliothrips mascullinus*), lace bugs (*Vatiga* spp.), and stemborers also can be found attached to the stem surface and are disseminated when transporting affected cuttings.

In order to prevent infestations of mites and insects on cuttings, it is recommended to use insecticides such as Malathion (1,000-3,000 ppm a.i.), Tamaron (2,000 ppm a.i.) or Basudin (2,000 ppm a.i.). These products are applied by dipping the cuttings into the solution for 5 minutes.

1.2.2 Insects located within the stem

Insects that are found within the cassava stem are, in general, boring insects (various species of Coleoptera, Lepidoptera and Hymenoptera). Larvae of these and other insects like fruit flies (*Anastrepha* spp.), shoot flies (*Silba pendula*) and the surface or subterranean stem cutworms (*Agrotis ipsilon* and *Prodenia eridania*) can be inadvertently disseminated to other locations by transporting infested cuttings. Tunnels and galleries made in cuttings by these insects are easily accessible sites for microorganisms that cause secondary rots.

To prevent the planting of cuttings infested or injured by insects, stems from which cuttings are to be obtained should be carefully examined. Each piece of stem that shows external or internal lesions caused by insects (Figure 4) should be discarded and burned. Discoloration of the pith frequently indicates internal damages (Figure 5).

1.2.3 Insects located in the soil

Some insects that attack cassava cuttings after planting are found in the soil; they generally destroy the bark of the cuttings and make tunnels that favor the developmen of microbial rots which cause germination losses and seedling death. The most common insects of this type are: white grubs (Coleoptera of the families *Scarabaeidae* and *Cerambycidae*), termites (*Coptotermes* spp.), and cutworms (*Agrotis* spp.). To prevent their attack insecticides like Aldrin (1.5 kg/ha a.i.) or granulated Carbofuran (0.09 g/plant a.i.) should be incorporated into the soil directly under the cuttings. Against termites insecticides with residual effects like Aldrin, Diel-

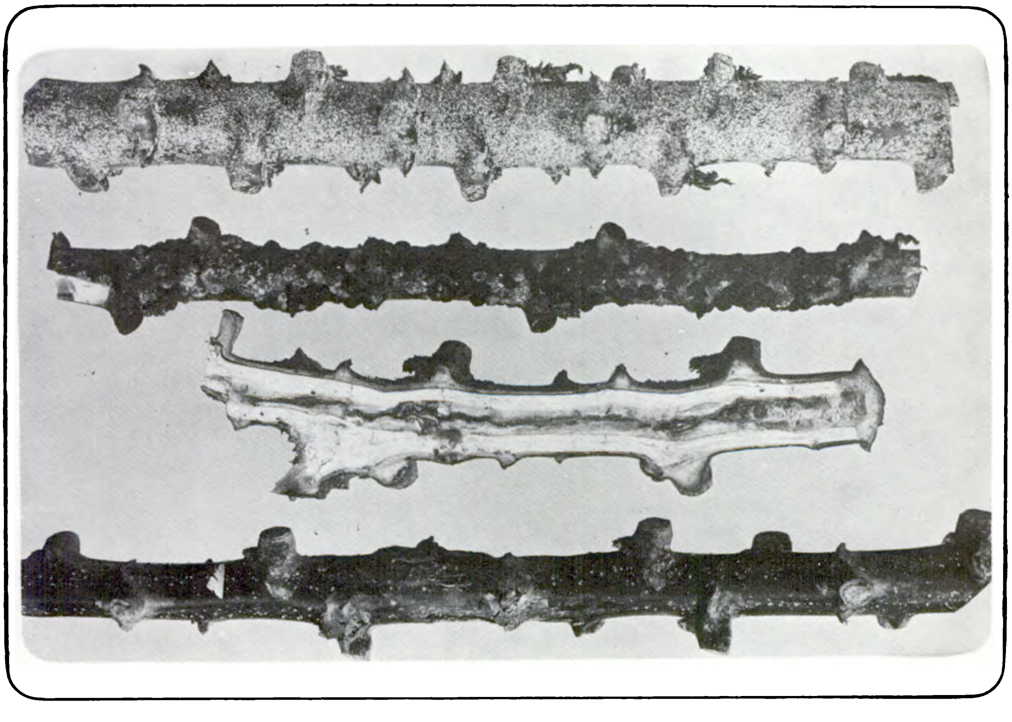


Figure 4. *Cuttings with internal and external lesions caused by insects.*

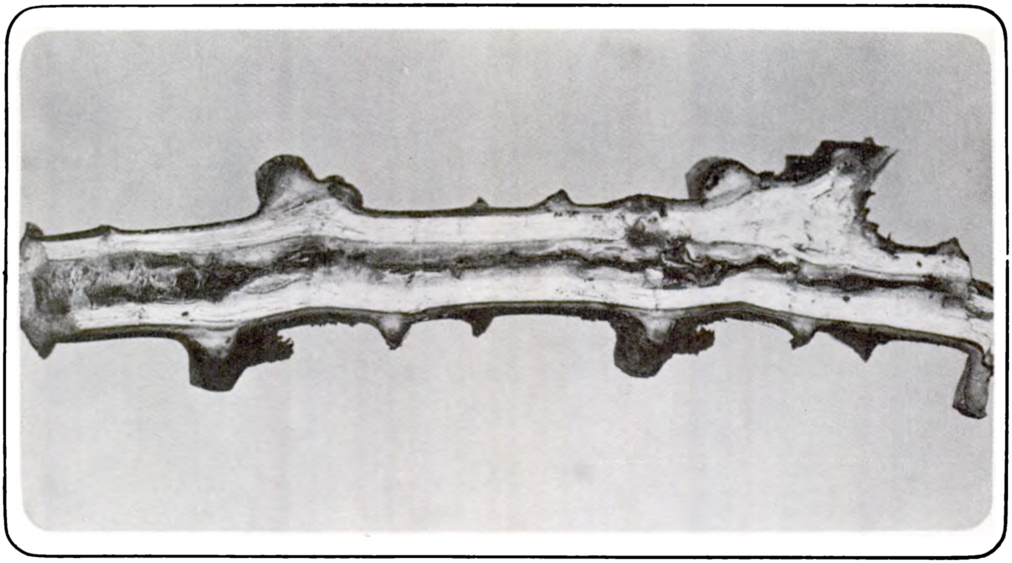


Figure 5. *Cuttings with a discolored pith area.*

drin or Chloridane are recommended. Toxic baits (for example, 10 kilograms of sawdust, 8-10 liters of water, 500 grams of sugar or molasses and 110 grams of Trichlorfon, for 0.5 to 1 hectare) give good results against cutworms.

2. Agronomic and management aspects related to the quality of cassava cuttings

The quality of the cassava cuttings is also determined by the following agronomic factors.

2.1 Variety

Great differences have been observed between cassava varieties in their rooting and bud germination capacities, the number of nodes per meter of stem, and vigor of the plants produced. Differences in bud germination are possibly due to the fact that buds of some varieties are more protected than others. Varietal differences are accentuated by storage of cuttings; differences become greater as the storage period increases. Consequently, varieties with high rooting and germination capacities are recommended for use. These capacities can be determined easily by calculating the percentage of plants per cuttings planted per variety after a short storage period of perhaps 15 days.

2.2 Age of the plant

To obtain good cuttings 8-18 month old plants should be used. Although cuttings from green, inmature plants germinate, they are more susceptible to pathogen and insect attacks. In addition, these cuttings cannot be stored very long because they dry out rapidly due to their high water content. Their succulence makes it easy for many microorganisms (bacteria and fungi) to infect them and cause severe rotting shortly after planting.

When plants are older than 18 months, about two-thirds of the stem is highly lignified and cuttings of this material would germinate slowly and produce nonvigorous shoots. In addition, stems from plants older than 18 months could have a greater number of lesions caused by localized pathogens or by insects (Figure 6), show sprouted buds (Figure 7) or be in the early process of bud germination. These buds are highly susceptible to attack from pathogens. Finally, when older stems are used, cuttings are difficult to cut and transportation costs are increased.

In cases where stems stored for some time are utilized, the cut surface should be checked for exuding of latex; if the latex appears slowly, the material should be discarded because it has dried out. In general, cuttings or stems should not be stored by traditional methods (for more information, see the audiotutorial on Storing Planting Material).

2.3 Appropriate part of the plant for preparing cuttings

This factor is strictly related to the age of the plant. With vigorous varieties under CIAT's conditions, the middle third of an 8-month-old plant can be used (Figure 8). However, as the plant becomes older, the stem accumulates greater reserves which eanbles the use of the upper part of the plant for cuttings. In this case, the upper third of the plant of an 18-month-old plant can be used and the lower basal third discarded. It is the age of the stem that should be taken into account here and not that of the plant, since the age of the stem depends basically on the plant section where the stem piece is located.

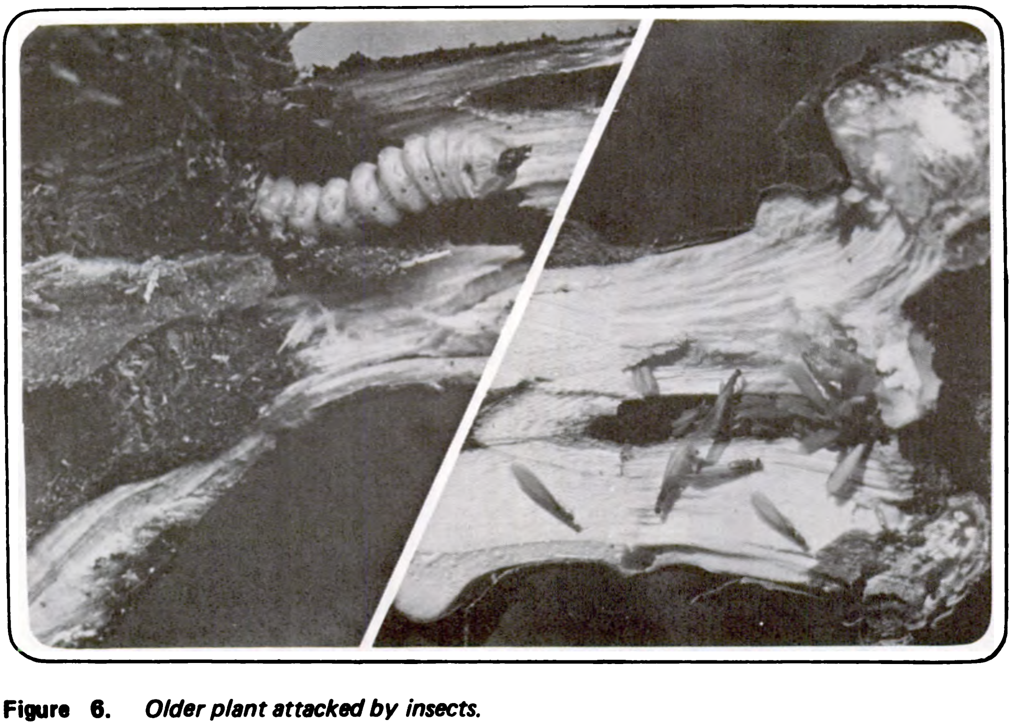


Figure 6. *Older plant attacked by insects.*

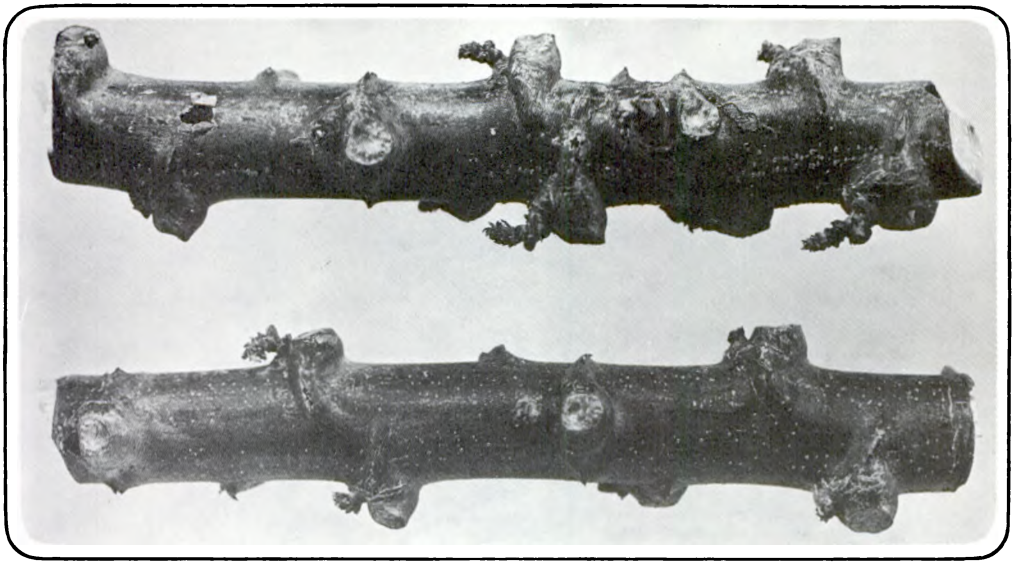


Figure 7. *Old cuttings with sprouted buds.*

Figure 8. *Middle third of a cassava plant which is the ideal part for selecting cuttings.*

2.4 Cutting diameter

Cutting diameter is determined by the age of the plant and the part from which the cutting has been obtained. To determine the appropriate cutting diameter a relationship between the total cutting diameter and that of the pith has been established. A transverse cut is made on the cutting; if the diameter of the pith is equal to or less than 50o/o of the cutting diameter, the material is adequate for planting (Figure 9). As a general rule, it is recommended that the total diameter of the cuttings selected not be less than one-half the diameter of the thickest part of the stem for the variety being used.

2.5 Cutting length

It is possible to obtain a cassava plant from a very short cutting having only one bud, but the possibilities that it would germinate and

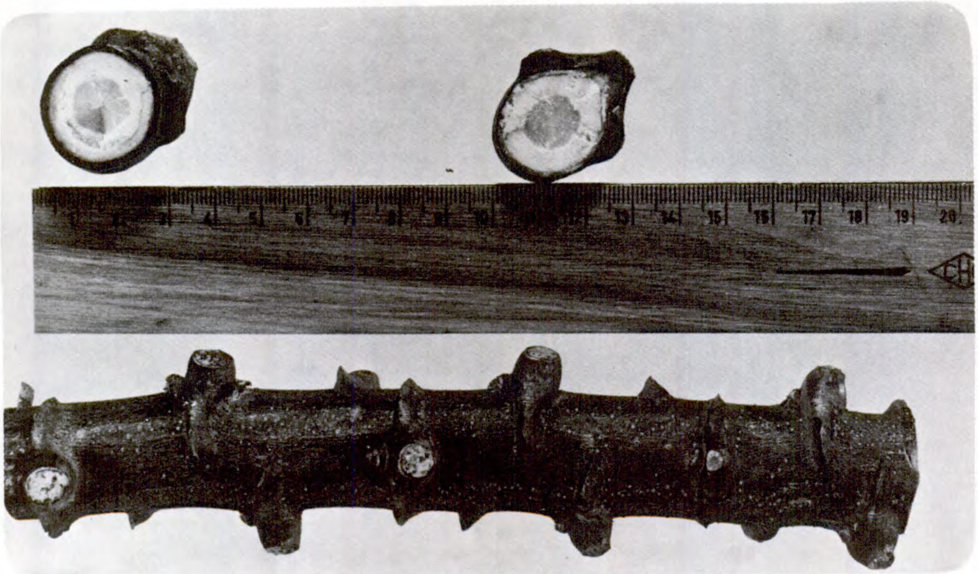


Figure 9. *Example of cuttings with adequate diameters.*

root under field conditions are very low, especially when soil moisture is insuficient. On the other hand, cuttings longer than 60 centimeters are more expensive to handle and transport and will produce fewer cuttings per plant, even though they have better possibilities of germinating and rooting. Thus, the cassava planting cutting should be about 20 centimeters long (Figure 10), unless there are no local research results indicating this length should be varied.

2.6 Number of nodes per cutting

This factor is very closely related to the variety. Cutting 20 centimeters long from stems of the same age and from the same part of the plant but originating from two distinct varieties can have different numbers of nodes (Figure 11).

Each node on the stem has an axillary bud that theoretically can produce a plant. However, it has been found that cuttings of one to three nodes do not root well and bud germination is not good under field conditions. These cuttings dry out more rapidly and pathogens can completely invade them in a relatively short time. In addition, possibilities are greater that when cuttings have few buds, all of them can lose their viability during preparation, transport, and plantings. Long cuttings with more than 10 buds conserve their viability because buds are more numerous. However, as was indicated previously, if longer cuttings are used more propagating material is needed to plant a given area and the probability becomes greater that this material is affected by insects or localized pathogens.

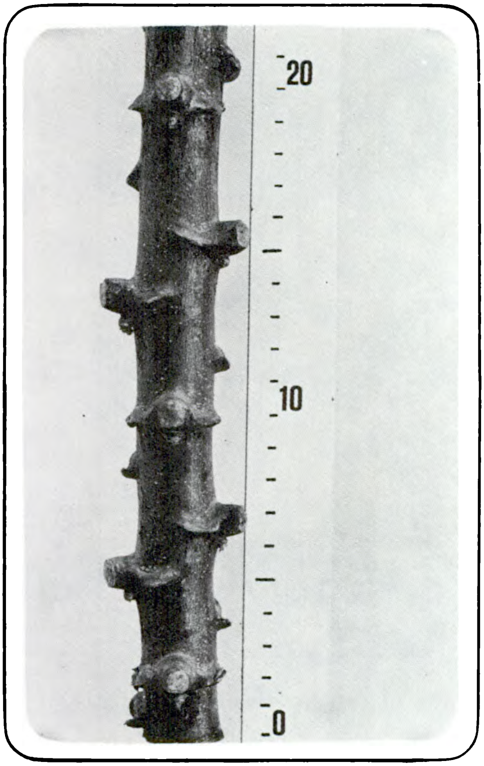


Figure 10. *A cutting of the appropriate length for planting.*

It is recommended to plant cutting having five or more nodes (Figure 12); as these cuttings have more buds they give a better guarantee of producing a plant and if some of the buds are damaged, the others can germinate.

2.7 Stem cutting and the cutting angle

Stem cuttings should be cut with a sharp machete or with a circular saw. If a machete is used, cutting is done in the air as uniformly as possible taking care to avoid tearing the bark or splintering the woody piece. It is most convenient to hold the stem in one hand and make a small cut (Figure 13), then turn the stem 180 degrees and make a second cut to separate the stem pieces (Figure 14). When a saw is used, the stem should be held on each side of the blade with the hands. When cutting the stems, these should never be supported on anything since this causes bruising of tissues and damages the cuttings (Figure 15).

Under good crop management conditions stem cuttings cut either transversely or beveled have both given good yields. However, when cut transversely the cutting is able to root uniformly around the perimeter giving better root distribution.

2.8 Physical damages to cuttings

Any physical damage the cutting suffers can decrease its quality. Physical damages-both to the epidermis and to buds-can occur from striking or friction to the cuttings during preparation, transport, storage, and planting (Figure 16). Each injury provides a new entry point for microorganisms that cause rotting during storage or after planting. Any strong blows against the stems or branches selected for planting material should be avoided during cutting and transporting.

2.9 Storing the cuttings

Cutting storage is treated in detail in another audiotutorial unit that includes both storage and treatment of propagating material. Nevertheless, whenever possible cassava planting material should not be stored since during the course of storage, cuttings are exposed to a series of attacks fron insects and pathogens that reduce subsequent rooting and germination.

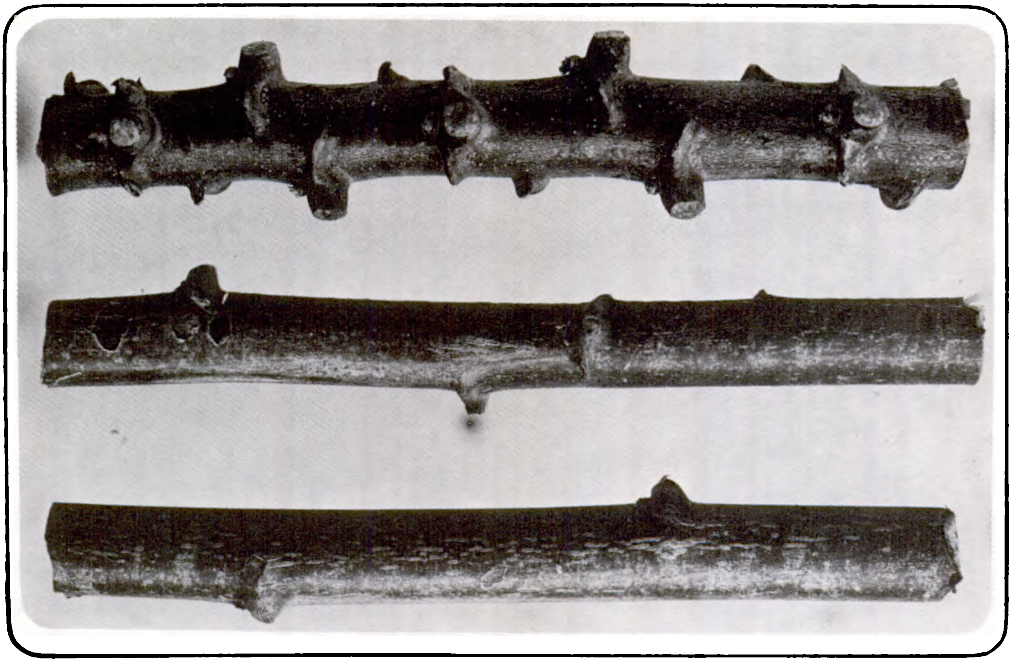


Figure 11. *Cuttings from different cassava varieties showing their different number of nodes.*

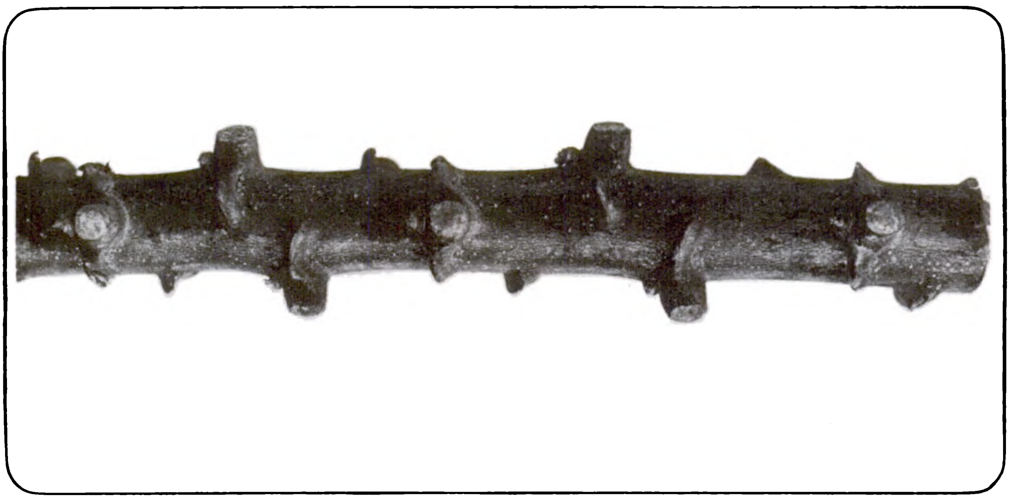
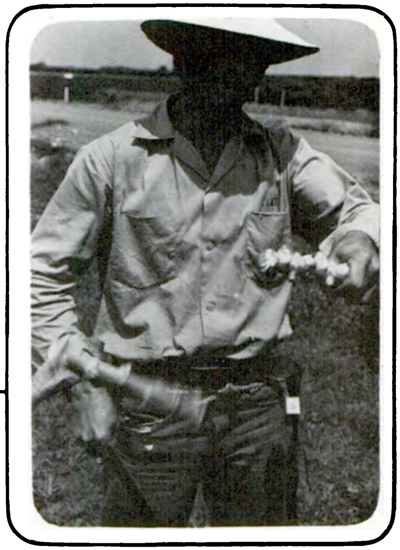


Figure 12. *A cutting that has a sufficient number of nodes for planting.*

Figure 13.
Making the initial cut on a cassava stem.

Figure 14.
Making the final cut to separate the cutting.



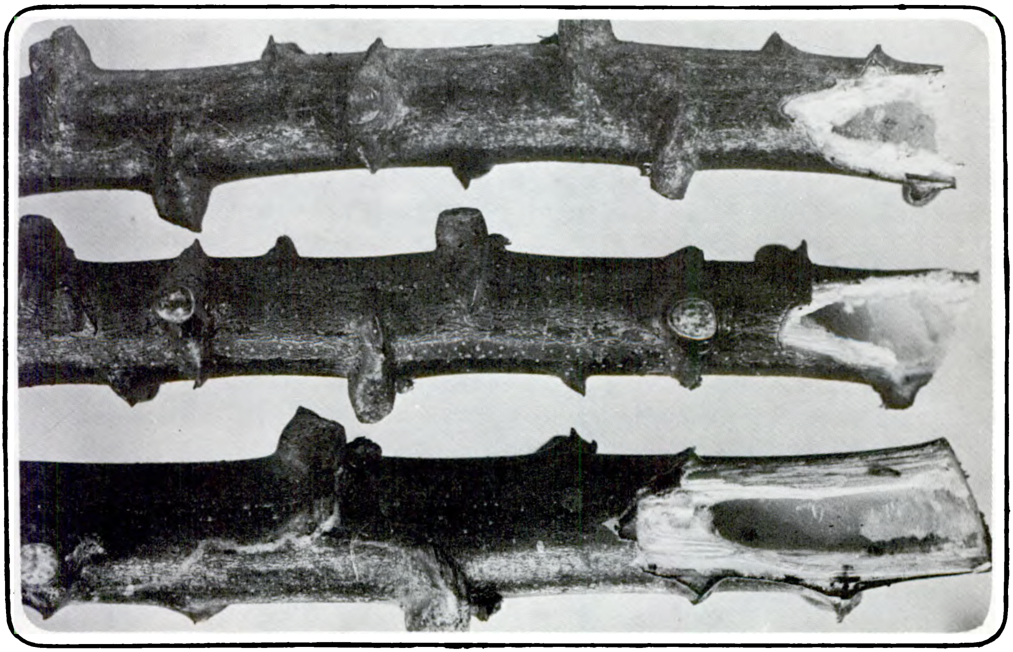


Figure 15. *Planting material showing damage from poor cutting techniques.*

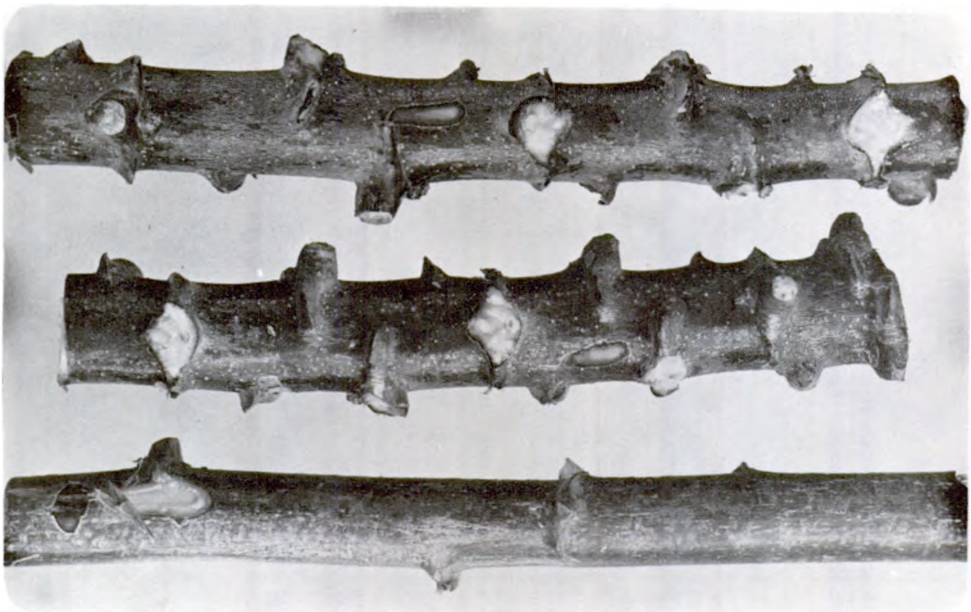


Figure 16. *Cuttings unsuitable for planting due to physical damages.*

2.10 Treating the cuttings

After planting, cuttings are subject to attack from groups of pathogens and insects which live in the soil. These agents generally attack the buds of the cutting and also can penetrate the cutting through wounds or through the base of the sprouts or rootlets. Since it is difficult to develop a variety resistant to this complex of soil pathogens and insects, it is this more convenient an necessary to protect cuttings during their initial phase of development by insuring good rooting and germination and subsequent establishment of the crop. Accordingly, planting material should be treated with a mixture of fungicides and insecticides, the names of which appear in Table 1.

The following precautions should be noted for the mixture listed in Table 1.

Since Dithane M-45 contains zinc and manganese it would not be necessary to add Manzate 80 to the mixture; therefore, the rate for Dithane M-45 would then be 3.0 g/liter of water.

Vitigran should only be used when there is superelongation disease in the region.

Recently, other chemical products have been found their mixtures can be utilized when cuttings are going to be planted inmediately or when they are to be stored. In the latter case, 100o/o rooting and germination was

Table 1. *Mixture of fungicides and insecticides most utilized because of its efficiency and low cost for treating cassava cuttings.*

PRODUCT		RATE
Commercial name	**Technical name**	**Grams commercial product per liter of water**
Dithane M-22	maneb	2.22
Antracol	propineb	1.25
Vitigran 35o/o	copper oxychloride	2.00
Malathion W.P. (4o/o)	malathion	5.00

* If Malathion 57o/o E.C. is used, the rate is 1.5 cc.

obtained with cuttings treated and stored for 60 days. The most effective mixtures are listed in Table 2.

In mixture No. 1, Malathion should be mixed with water before adding the fungicides in order to prevent incompatibility effects; when cuttings were treated with a solution in which Orthocide and Bavistin were mixed before adding Malathion there was incompatibility between the fungicides and the insecticide which inhibited rooting and germination of cuttings.

In mixture No. 2 the cuttings are first treated with the Orthocide-Bavistin mixture and then with the Aldrin powder. Cuttings should be submerged in the mixtures for 5 minutes and then left to dry in the sun before planting.

In relation to the treatment of cuttings with fungicides, many different tests have shown that:

1. Cuttings are protected against the majority of soil pathogens that attacks cassava for a period of up to 60 days.

2. By treating cuttings with certain fungicides, bud germination is accelerated and increased.

3. Rooting and rapid growth of sprouts is induced.

4. Cuttings can be stored for considerable periods (more than two months).

Table 2. *Two mixtures of chemical products for treating cassava cuttings before planting or storage.*

PRODUCT		RATE	
Commercial name	**Technical name**	**ppm**	**Commercial product per liter of water**
Mixture 1			
Malathion E.C. 57o/o	malathion E.C.	1,000	1.5 cc/liter
Bavistin W.P. 50o/o	carbendazin	3,000	6 g/liter
Orthocide W.P. 50o/o	captan	3,000	6 g/liter
Mixture 2			
Orthocide W.P. 50o/o	captan	3,000	6 g/liter
Bavistin W.P. 50o/o	carbendazin	3,000	6 g/liter
Aldrin 2.5o/o	aldrin	– –	1 g/cutting

3. Summary

It must be remembered that a poor cutting planted under adequate conditions can still produce a plant that is apparently normal and healthy. Nevertheless, this plant may fail to produce or its yield will be lower than the yield of a plant originating from a good-quality cutting.

From the point of view of cassava production, the critical factor is root yields per unit of time and unit of area. To obtain maximum yields, cuttings must be well-selected employing the following criteria and selection methods:

1. Choose healthy plants of a vigorous variety in the cassava plantation; take stem pieces of the correct maturity, between 8 and 18 months old; and cut stem pieces 20 centimeters long, having 5 to 7 nodes and of a diameter not less than half the thickest part of the plant stem.

2. Protect cuttings from physical damage during preparation, transport, and planting.

3. Propagation material originating in regions affected with African mosaic should not be introduced in areas where this disease is not present. Also, introduction of cuttings from regions where cassava bacterial blight and superelongation are present should be prevented. When these diseases exist in the region, only those plantations that remain healthy during rainy periods should be considered as sources of planting material. If there are no such plantings, then material free of bacte-

rial blight should be produced and the cuttings treated with some of the fungicides that eradicate the causal agent of superelongation (for example, Difolatan at a rate of 6,000 ppm).

4. No cuttings should be taken from plants showing symptoms of viruses, mycoplasma or frog skin disease. Each plant with any of these symptoms should be burned.

5. Each cutting should be carefully inspected when prepared; any stem piece showing signs of the presence of localized pathogens (cankers and local rots on the epidermis or in the pith) and damages from insects (galleries, tunnels or epidermal wounds) should be destroyed.

6. Cuttings should be treated with fungicides and insecticides inmediately after being cut from the plant and before storage. Storage should be for as short a time as possible and under optimum conditions.

7. Cuttings should not be planted in soils infested with insects (white grubs, termites, and cutworms) without first applying insecticides around the cuttings and to the soil.

8. Finally, planting should be done when the soil has sufficient moisture. Good agronomic practices should be employed and the soil must be adequately prepared.

Evaluation

Please mark an "X" in the proper colum according to whether the following statements are True or False.

		True	False
1.	*The bacterium **Xantbomonas manibotis** is a cortical systemic agent while the fungus **Spbaceloma maniboticola** is a vascular pathogenic agent.*	( )	( )
2.	*Localized pathogens do not leave dark brown to black cankers on the bark of stems which they attack.*	( )	( )
3.	*Depending on the degree of infestation, insect attacks on cassava cuttings can reduce germination up to 70 percent.*	( )	( )
4.	*Storing cuttings accentuates varietal differences in germination.*	( )	( )
5.	*In order to obtain cuttings of good quality, these should be selected from plants older than 18 months.*	( )	( )
6.	*When cutting the cassava stem one should look for the presence of latex on the cut surface as this helps to determine the germination capacity of cuttings.*	( )	( )

7.	*Young, tender cassava cutting are the best ones for storing.*	*( )*	*( )*
8.	*Regardless of the age of the plant from which cuttings are to be selected, they should always be cut from the middle third of the plant.*	*( )*	*( )*
9.	*A cutting is considered of adequate size for planting when the diameter of the pith is equal or greater than half the diameter of the cutting.*	*( )*	*( )*
10.	*Cassava cuttings for planting should be at least 20 centimeters long and have 5 or more nodes.*	*( )*	*( )*
11.	*When treating cuttings against insect and diseases, they should be submerged for 10 minutes in the fungicide-insecticide mixture and then planted immediately.*	*( )*	*( )*
12.	*The cutting angle of the cuttings should be beveled in order to obtain good root distribution later.*	*( )*	*( )*
13.	*Physical damages occuring on cassava cuttings decrease their quality both due to damaged buds and as entrance points for pathogenic microorganisms.*	*( )*	*( )*
14.	*Rooting and germination of cuttings are not affected by their earlier storage.*	*( )*	*( )*

* *You should have answered at least 10 statements correctly.*

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