

# Evaluation of some botanicals as alternative to chemical fungicide in the rapid multiplication of cassava

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## ABSTRACT

The use of plant extracts (botanicals) standard neem, pepper fruit, uziza and wool ash as local alternatives to chemical fungicides in the rapid multiplication of cassava was studied for two years. The per cent sprout, sprout vigour and per cent fungal soot were found to be dependent on the treatments and were optimized in 2-node cassava stakes treated with standard neem extract. Standard neem extract and Tecto 60 (chemical fungicide) had similar significant ( $P = 0.05$ ) control over fungal soot. The significant growth differences among the treatments with the optimum at standard neem extract indicates the need to adopt neem extract as the best local plant extract as an alternative to chemical fungicides, using 2-node cassava technique in the rapid multiplication of cassava.

## INTRODUCTION

A major constraint to increased cassava production in Nigeria is insufficiency of improved planting materials. However, the use of 2-node stakes for rapid multiplication of cassava stakes [1,2] has reduced this problem considerably. Farmers now multiply their planting materials using this technique. In using this technique, some materials such as transparent polyethylene-bags and chemical fungicides are employed. The fungicides are used to prevent fungal attack on the cut surfaces of 2 – node stakes. Some of the chemical fungicides usually applied are Tecto 60 (Thiabendazole), Benlate –T (Benomyl + Thiram), Apron plus (Metalaxyl + Carboxin + Furathiocarb) and Mancozeb (Dithane M45) [3,2].

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Fungal infection is a serious problem in pre-sprouting nursery operations. In most farms, fungal soot reduces sprout energy, vigour, growth and in severe cases damages or delays the emergence of new buds [4]. The control of fungal infection in most cases has been primarily through the use of chemical fungicides. However, some plant extracts (botanicals) e.g. neem have been found to be effective fungicides. The neem extract has been reported to have insecticidal, fungicidal and nematicidal properties which are useful in controlling pests, diseases and micro-organisms that spoil agricultural produce [5,6,7,8]. Neem leaf extracts have been found to be effective against nursery ants, termites and garden pests [9,10]. Nwuzor [11] controlled *Cylas puncticollis* in sweet potato by applying neem leaf powder in Nigeria. Ginger, cashew, dry chilli pepper, onion scale

leaves and neem seed kernel have been used as surface protectants in the control of cowpea beetle in storage [12,13,14,15]. Stoll [9] and Offor [16] reported that pepper fruit and neem have properties that inhibit the growth of micro-organisms. The non-toxic nature of neem extracts to most parasitoids and predators of rice pest have also been reported [17].

At the rural farm level in Nigeria, the use of fungicides in the pre-sprouting of cassava stems has been difficult to adopt in the rapid multiplication of cassava. This is because the chemical fungicides are scarce, costly when available and unfriendly to man and his environment. These reasons render the adoption of rapid multiplication technique by farmers very slow. In most cases, farmers reluctantly use this technique in multiplying cassava stems. To overcome this problem, this study explored the use of locally available inexpensive and safe plant extracts such as neem (*Azadirachta indica*) leaves, pepper fruit (*Dennettia tripetala*) and uziza seed (*Piper guineensis*) and wood ash as sprout protectants or fungicides against fungal attack on the cut surfaces of cassava stakes as alternative to chemical fungicides.

## MATERIALS AND METHODS

Three plant extracts: standard neem (*Azadirachta indica*), pepper fruit (*Dennettia tripetala*) and uziza seed (*Piper guineensis*) were evaluated against three controls: ash ordinary, fresh water and Tecto 60 (chemical fungicide) using 2-node cassava stakes. The plant extracts were prepared based on the combined procedures of Karim *et al* and Stoll [12,9]. The Tecto 60 was applied at the rate of 10 g per 20 L of fresh water. Standard 1 kg of dried neem leaf powder

was soaked in 5 l of fresh water for 24 h and filtered with Muslim cloth before application. The ash extract was the National Root Crop Research Institute's standard ash and was applied by dissolving one sachet of 1 kg in 5 L of fresh water. Twenty-five 2-node cassava stakes were soaked in the prepared plant extracts and fungicide solution in a plastic container and left to stand for 10 mins, after which twenty-five stakes per treatment were packed into perforated transparent polyethylene bags to a level sufficient to allow for tying the mouth with a rope or string leaving enough empty space inside the polythlene bags for air circulation. The polyethylene bags were laid out under tree shades in a randomized complete block design with five replications per treatment. Estimation of number of sprouts was done by cumulative counting of the new sprouts on the cassava stakes from 4 to 6 weeks after placement in the poly bags and were converted to percentages. Sprout vigour was estimated by measuring the length of the new sprouts using a transparent metric ruler. Fungal soot was estimated by recording the incidence (%) on cassava stakes during the experimental period of six weeks.

Data collected were analysed according to procedure for a randomized complete block design using a Genstat computer programme. The significance of treatment effect was done by Duncan's New Multiple Range Test (DNMRT) at 5 % level of probability.

## RESULTS

The sprouts, sprout vigour and the stakes infected by fungal soot were monitored during the experimental period (2004 and 2005). The number of sprouts, vigour of sprouts and fungal soot were

significantly ( $P < 0.05$ ) influenced by the treatments. The maximum per cent sprout during the two seasons ranged from 88% in 2004 (Table I) to 97 % in 2005 (Table II) and was obtained by 2-node cassava stakes treated with standard neem extract. The minimum percentage sprout during the two seasons ranged from 71.2 % in 2004 (Table 1) to 68.7 % in 2005 (Table II) and was obtained by 2-node cassava stakes treated with standard wool ash extract. The vigour of sprout was significantly enhanced by standard neem extract with sprout length of 3.7 cm in 2004 and 4.3 cm in 2005. The vigour of sprouts was however lower across all other treatments in 2005 but fresh water sustained the lowest vigour of 2.0 cm as shown in Table II. The maximum number of stakes infected by fungal soot during the two seasons ranged from 44 % in 2004 to 52.1 % in 2005 and was observed in the non-treated 2-node cassava stakes (fresh water). The minimum number of stakes infected by fungal soot during the two seasons ranged from 12.0 % in 2004 to 17.3 % in 2005 and was observed in 2-node cassava stakes treated with Tecto - 60.

#### DISCUSSION

Sprout determinants such as number of sprouts, vigour of sprout and fungal soot were dependent on the treatments. Number of sprouts, and sprout vigour were optimized by the application of standard neem extracts while the lowest fungal attack (soot) was obtained by 2-node cassava stakes treated with Tecto 60 (chemical fungicides) and standard neem extract in the two seasons (Table I

and II). This suggests that treatment of stakes with either standard neem extracts or chemical fungicide is necessary for minimizing fungus attack and sprout failure in the rapid multiplication of cassava. Higher per cent sprout, sprout vigour and comparative low fungal soot were obtained in stakes treated with standard neem extract than any other treatment indicating that 2-node cassava stakes treated with standard neem extract resulted in a higher stake sprout performance, lower fungal attack, and sprout failure, relative to Tecto 60 used as the difference chemical fungicide (Tables I and II).

The ability of neem extract and Tecto 60 to reduce fungal attack on the cut surface of 2-node cassava stakes were significantly similar. This suggests that the neem extract is the best local substitute to Tecto 60 in rapid multiplication of cassava. Neem is locally available and environmentally friendly. Similarly, Prakash and Rao [6], Nwuzor [11], Stoll [9] and Offor [16] reported the ability of neem extract to inhibit the growth of micro-organisms in agriculture. In addition, Chelfant et. al., [5] and IITA [1] noted that neem extract is an effective fungicide, insecticide and nematicide in controlling pests, disease and micro organisms that spoil agricultural produce.

In conclusion, the use of neem extract is recommended to farmers as the best local substitute or alternative to chemical fungicide in the rapid multiplication of cassava.

Table I: Number of sprouts, fungal soot and vigour of cassava sprouts as affected by botanical extracts in 2004.

Botanical/Chemical Fungicide	Percent Sprouts	Sprout Vigour (cm)	Fungal Soot (%)
Neem Extract	88.0 a	3.7 a	15.2 b
Pepper Fruit Extract	85.6 ab	2.5 b	25.6 b
Uziza Extract	79.2 bc	2.3 b	12.8 b
Ash Extract	71.2 d	2.3 b	13.6 b
Tecto 60-chemical fungicide (control I)	81.6 abc	2.8 b	12.0 b
Fresh Water (Control II)	75.2 cd	2.9 b	44.0

Mean separation in columns by DMRT at 5 % level

Table II: Number of sprouts, sprout vigour and fungal soot as affected by botanical extracts in 2005.

Botanical/Chemical Fungicide	Percent Sprout	Sprout Vigour (cm)	Fungal Soot (%)
Neem Extract	97.0a	4.3a	16.7b
Pepper Fruit Extract	90.4ab	3.1b	22.4b
Jziza Extract	72.6b	3.0b	18.3b
Ash Extract	68.7c	2.9b	20.4b
Tecto 60- Chemical Fungicide (Control I)	87.4ab	3.4b	17.3b
Fresh Water (Control II)	79.7d	2.0c	52.1a

Mean separation in columns by DMRT at 5 % level

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