# The effect of number of nodes per cutting and potassium fertilizer on the growth, yield and yield components of sweet potatoes ( *Ipomoea batatas* Poir)

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SUMMARY

The effects of number of nodes per cutting (3,5 and 7) and different levels of potassium fertilizer application (0, 60 and 120 kg K/ha) on the growth, yield and yield components of sweet potato (*Ipomoea batatas* Poir) cultivar ITS 2 were investigated on Toji series soils which fall within the coastal savanna acrisols. Many of the characters measured increased with increase in node number up to 7-nodes. The 5 and 7-node cuttings established earlier and produced higher dry matter (DM) during the first few weeks of growth than the 3-node cuttings. The 5 and 7-node cuttings also gave significantly higher tuber yields than 3-node cuttings. There was no apparent advantage of the 7-node cuttings over the 5-node cuttings in all the characters studied. Similarly, there were no significant effects due to the number of nodes per cutting on leaf area development at 6 weeks after planting till time of harvesting. Number of nodes per cutting did not have any significant effect on tuber and vine DM yield as well as tuber length to diameter ratio. Potassium fertilization did not have significant effect on any of the characters investigated although it increased tuber DM yield slightly.

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RÉSUMÉ

Amoah, F. M.: *L' effet du nombre de nodosité par bouture et d'engrais de potassium sur la croissance, le rendement et les composants de rendement des patates douces* (Ipomea batatas *Poir)*. Les effets du nombre de nodosité par bouture (3, 5, et 7) et des niveaux différents de l' application d'engrais de potassium (0, 60 et 120 kg K/ha) sur la croissance, le rendement et les compossants de rendement de patate douce ( *Ipomea batatas* Poir) de variété ITS 2 étaient enquêtés sur les sols de séries de Toji qui se comforment aux acrisols savanno-côtièrs. Beaucoup de caractères mesurés s'augmentaient avec l'augmentation du nombre de nodosité jusqu'à 7- nodosité. Les boutures de 5 et 7-nodosité se sont établies précédemment et produisaient de matière sèche (MS) plus élevée pendant les quelques premières semaines de croissance que les boutures de 3-nodosité. Les boutures de 5 et 7 nodosité donnaient également des rendements de tubercule considérablement plus élevés que les boutures de 3 - nodosité. Il n'y avait aucun avantage évident des boutures de 7-nodosité sur les boutures de 5-nodosité dans tous les caractères étudiés. De la même façon, il n'y avait aucun effet considérable due aux nombres de nodosités par bouture sur le développement de l'aire de feuille à 6 semaines après les plantations jusqu' au moment de la récolte. Le nombre de nodosité par bouture n'avait pas aucun effet considérable sur la tubercule et le rendement de la MS de la vigne ainsi que la proportion de la longueur de tubercule contre le diamètre. La fertilisation avec potassium n' avait pas d' effet significatif sur aucun des caractères enquêtés bien qu'elle augmentait légèrement le rendement de la MS de tubercule.

## Introduction

With the exception of cereals, tropical tuber crops are the most important group of staple foods in the tropical world and in some regions tropical tubers constitute the major staple food. The most important of the tropical root crops are cassava (*Manihot* *esculenta* Crantz), yam *(Dioscorea* spp.), cocoyam (*Xanthosoma sagittifolium* Schott and *Colocasia esculenta* Schott) and sweet potato (*Ipomoea batatas* Poir) (Doku, 1966). Important as they are, these crops have hitherto received scanty attention from research workers. Sweet potato appears to be the least recognized by both research workers farmers probably because the crop is considered more as a dessert rather than as a staple food, even though it is comparable to the other root crops in yield and quality. Among other factors, sweet potato is very important in tropical agriculture due to its short growing period of 3 to 5 months (Edmond, 1971), thus permitting the growing of between two and three crops per year. When suitable cultivars, especially those with low sugar content, are found which are acceptable as food, the crop has great prospect of competing with cassava and yam which take too long to mature.

Yield of sweet potato could be improved by the use of good planting materials and the provision of optimum and balanced fertilizer for the crop. Since the crop is reported to have a very high demand for potassium (Edmond, 1971), the study of its potassium requirement should have priority over other nutrients. Studies indicate that Ghanaian soils are generally very low in phosphorus, moderate in nitrogen but inherently very rich in potassium (Brammer, 1960). Since an inherently rich soil may maintain a low potential that crop growth may be seriously restricted, it is better to rely on the results of fertilization trials in the field in order to establish the capacity of a particular soil to give optimum yield of crops. Such knowledge is limiting in potassium fertilization of sweet potato on Ghanaian soils.

The most common method of sweet potato propagation is by the use of vine cuttings (Edmond, 1971). In many places, farmers use any length of cuttings which are available or convenient to handle. Some farmers use short cuttings for planting just because they are easy to handle or in order to economize on the planting materials. Others also take very long cuttings, fold them several times and insert them in the soil. In other places, after harvesting the previous crop, the vines are left on the field to grow again without any organized propagation.

The objective of this experiment was to investigate the growth, yield and yield components of sweet potato as affected by planting vine cuttings with different number of nodes (3, 5 and 7 nodes) and also to ascertain the response of the crop to potassium fertilization.

## Materials and methods

The experiment was carried out on the University farm at Legon on a soil classified by FAO/UNESCO (1968) under the Toji Series which falls within the Coastal Savanna Acrisols. These soils are sandy loam and free-draining. The soil had a *p*H of 5.8, 0.18 per cent $NO_2$-N, 15.0 µ/g available phosphorus and 0.41 cmol (+)/kg soil. The land was ploughed, harrowed and ridges of 2.4 m × 0.6 m × 0.3 m (length × breadth × height) prepared with furrows of 0.4 m wide between any two adjacent ridges. The experiment was a split plot design with fertilizer levels as main plots and node number as sub-plots. The levels of fertilizer investigated were 0, 60 and 120 kg K/ha in the form of muriate of potash (50 per cent K). These were combined with 3, 5 and 7 node cuttings. There were three ridges in each sub-plot. The two outer ridges in each sub-plot served as border rows whilst records were taken from plants in the middle ridge. There were three replicates. Each replicate covered an area of 4.0 m × 27.0 m whilst each main plot and sub-plot covered areas of 4 m × 9 m and 4 m × 3 m, respectively.

Sweet potato cultivar ITS2 was used for the experiment. Cuttings of the various node numbers were prepared from plants which had been grown in the field for 2 months. Eighty-one pieces each of 3-node, 5-node and 7-node cuttings were made from the middle portion of healthy vines. The cuttings were left in the shade for 2 days to accelerate root initiation before they were planted as recommended by Edmond (1971). The cuttings were stripped of leaves leaving only one or two leaves at the upper portion. Planting was done in October of the planting season. Each ridge was planted with three cuttings at a spacing of 0.8 m within and 1 m between rows. The cuttings were inserted into the soil inclined at an angle of about 45° with half to two-thirds of the length buried in the soil with the nodes pointing upwards. The whole field was irrigated shortly after planting.

Fertilizer treatment was split applied in two equal doses by the ring method. The first application was done 2 weeks after planting and the second application was done 4 weeks later. Watering was done daily for the first 2 weeks after planting. Thereafter, watering was done as and when necessary throughout the growing period. About 30 *l* of water was applied to each ridge at every watering period. Weeding was done fortnightly for the first 6 weeks after planting by hoeing. Insect pests were controlled by spraying with "didigam" at a rate of 3 ml per litre of water. Rodent attack on some of the exposed tubers was controlled by periodic earthening-up of all ridges.

The percentage establishment of cutting (as judged by the sprouting of buds) was recorded in each plot daily for the first 2 weeks after planting. Growth measurements were done fortnightly and the records taken were Leaf Area Index (LAI) by using the Punch and Grid method (Watson, 1947). The number of branches on each plant was recorded at each sampling date.

Harvesting was done at 14 weeks after planting. Prior to harvesting, the field was watered heavily for 2 days to facilitate easy digging in order to limit bruising of tubers. Harvesting was done manually after which the tubers were neatly washed and packed for record-taking. Records taken at harvest were:

1. Total tuber yield (kg) per cutting.
2. Weight of marketable (ware) tubers per cutting.
3. Number of marketable (ware) tubers per cutting.
4. Mean weight per marketable tuber. (The marketable tubers were judged by tuber size, length and cleanliness from diseases and pests).

Other records taken were percentage (by weight) of non-marketable tubers per cutting:

5. Fresh weight of shoot per cutting.
6. Tuber dry matter as a percentage of tuber fresh weight.
7. Shoot dry matter as a percentage of shoot fresh weight and tuber length to diameter ratio.

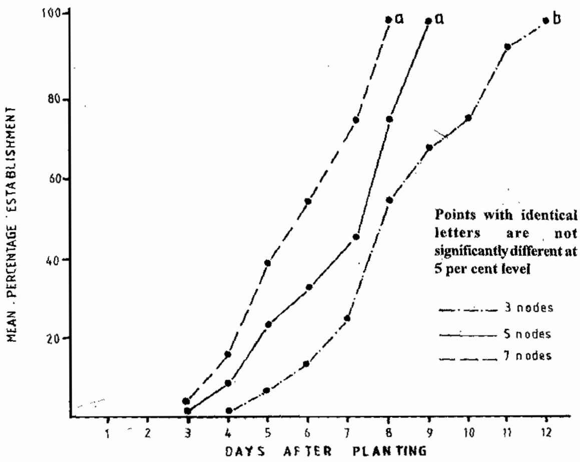


Fig. 1. Percentage establishment of cutting

The potassium content of the tubers and leaves was determined at harvest. Soil chemical analysis was carried out before and after the experiment.

## Results and discussion

*Percentage take of cuttings*

Cuttings began to establish 3 days after planting. The daily percentage establishment recorded increased with increasing number of nodes. By the 12th day after planting, all cuttings had established (Fig.1). This agrees with the finding of Irivine (1969) that cuttings require between 4 and 14 days to get established. The 5- and 7-node cuttings took significantly less number of days to achieve 100 per cent establishment than the 3-node cuttings, but the differences between the 5 - and 7 - node cuttings were not significantly different (Fig. 1). At the time of 50 per cent take in the 7-node cuttings, the percentage take in the 5- and 3-node cuttings were 30 and 12 respectively, while at 100 per cent take in the 7-node cuttings, the percentage establishment in the 5- and 3-node cuttings were 75 and 54 respectively (Fig. 1). This agrees with the findings of Iddrisu (1979), Adu-Baffour (1977) and Gurnah (1974), who observed in sweet potato, yam and cassava propagation respectively that the percentage of cuttings which established increased with increasing node number per cutting.

The increase in the daily percentage establishment with increase in number of nodes per cutting may be due to the fact that with increase in node number, the number of buds increased and these acted as sources of hormones for rooting and sprouting. Also with increase in node number, more nodes were buried and more roots were initiated from the nodes for early establishment.

Earliest establishment were recorded in 5-and 7-node cuttings (Fig. 1) on the 3rd day after planting. By the 8th and 9th days after planting, all 5- and 7-node cuttings, respectively, had established. The 3-node cuttings began to establish 4 days after planting and 100 per cent establishment was recorded on the 12th day after planting.

*Leaf area index*

The rate of leaf production was very high from time of planting up to the 8th week after planting and thereafter declined and became almost constant at the time of harvesting (14 weeks after planting) (Fig. 2). The leaf area index followed the same trend as leaf production; and this agrees with the findings of Kawakani (1978) that the leaf area index of sweet potato increases sharply from the time of planting up to about 16 weeks after planting and thereafter declines. Edmond (1971) and Onwueme (1978) also made similar observations that maximum growth of the leaves and vines of sweet potato occurred up to about 16 weeks after planting. The decline in the rate of leaf production after the 8th week was probably due to bulking of the tubers as photosynthates were partitioned to the tuber for bulking at the expense of the production of lea-ves and vines.

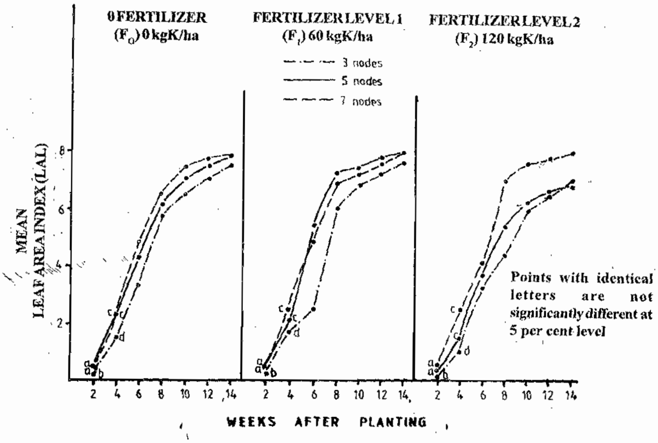


Fig. 2. Leaf area index (LAI)

There were significant differences in the leaf area index (LAI) at the 2nd and 4th week after planting. The LAI for the 5- and 7-node cuttings were significantly higher ($P \leq 0.05$) than the 3-node cuttings during the 2nd and 4th weeks after planting; but differences between 5- and 7-node cuttings were not significant. After the 4th week after planting, there was a slight increase in LAI with increasing node numbers. This is in agreement with the findings of Enyi (1973) that the sett size used for yam propagation affects at least the initial growth.

The significant differences in the LAI due to node number in the early stage of growth may be related to the time taken for cuttings to establish, and the number of nodes above ground from where the leaves developed. Due to the earlier establishment and more number of nodes in the 5- and 7-node cuttings, early rapid growth in terms of leaf development was high. The 3-node cuttings had significantly lower LAI during the early growth stages due to the relatively longer time taken to establish. There were no significant differences in the LAI after the 6th week up to the time of harvesting shading, probably because mutual shading was high in the 5- and 7-node cuttings. A greater portion of the assimilates was used in respiration other than for leaf development, so their growth rate reduced while the 3-node cuttings continued to develop more leaves rapidly to increase their leaf area index. During the later growth period, the treatments were affected by mutual shading and this caused a reduction in their growth rates.

The fertilizer treatment did not significantly affect LAI (Fig.2). For all node numbers, 60 kg K/ha of the fertilizer application ($F_1$) slightly increased the LAI. The 120 kg K/ha fertilizer ($F_2$) treatment depressed LAI slightly in the 3- and 5-node cuttings but not in the 7-node cuttings, suggesting that the 120 kg K/ha of fertilizer was probably too high for the 3- and 5-node cuttings which produced relatively less number of leaves and vines than the 7-node cuttings.

The maximum LAI recorded (8) contradicts the findings of Kawakani (1978) that the maximum LAI of sweet potato is about 5. This contradiction might probably be due to the spacing adopted (1 m × 0.80 m) which might have been inadequate for the plants or probably due to cultivar differences. At the time of harvesting (14 weeks after planting), the LAI continued to increase slowly (Fig. 2) probably because vegetative growth was not completed as reported by Warid, Boleid & Musbah (1976) that vegetative growth in sweet potato can continue for about 10 months.

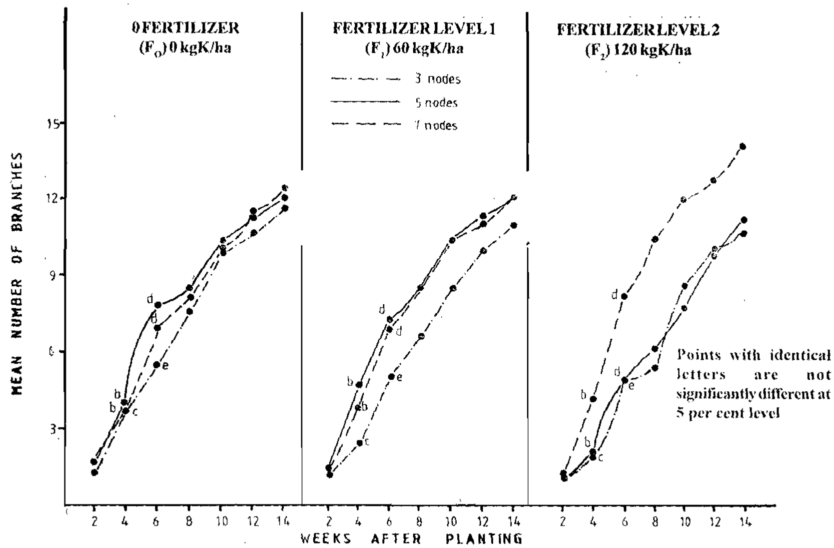


Fig. 3. Number of branches per cutting

*Number of branches*

There were significant differences in the number of branches per cutting ($P \leq 0.01$) at the 4th and 6th weeks after planting. The 5- and 7-node cuttings produced significantly higher number of branches at the 4th and 6th weeks after planting than the 3-node cuttings (Fig. 3). There were no significant differences between the 5- and 7-node cuttings. However, there was a general trend towards increase in number of branches with increase in node number throughout the growth period.

An earlier establishment of cuttings and probably an earlier rapid vine development in the 5- and 7-node cuttings might account for the significant differences in the number of branches at the 4th and 6th weeks after planting. The rate of vine production reduced during the latter stages of growth probably due to high mutual shading and bulking which translocated assimilates into the tubers at the expense of vine production.

The fertilizer treatment did not have any significant effect on the number of branches. However, in the 3- and 5-node cuttings, increasing levels of fertilizer depressed the number of branches slightly (Fig. 3), probably because the fertilizer levels were too high for the crops. This indicates that probably the amount of potash inherent in the soil was adequate for vine production.

TABLE 1

*Effect of Node Number Per Cutting and Potassium Levels on the Tuber Yield (kg) per Cutting*

| *Treatment (no. of nodes)* | $F_0$ | $F_1$ | $F_2$ | *Mean* |
|---|---|---|---|---|
| 3-node cutting | 0.78 | 0.69 | 0.61 | 0.68a |
| 5-node cutting | 0.83 | 1.13 | 0.94 | 0.94b |
| 7-node cutting | 0.90 | 0.91 | 1.30 | 1.04b |
| Mean | 0.84 | 0.91 | 0.95 | |

Means with identical letters in a column are not significantly different at 5 % level.
$F_0$ = 0 kg K/ha, $F_1$ = 60 kg K/ha, $F_2$ = 120 kg K/ha.

The pattern of branch production followed that of the LAI (Fig. 2 and 3) probably because increasing branch production resulted in the production of more leaves.

*Weight of tubers per cutting*

Weight of tubers per cutting increased significantly with increasing number of nodes per cutting ($P \leq 0.05$). The 5- and 7-node cuttings produced significantly higher tuber weight than the 3-node cuttings (Table 1). The difference between the yields of the 5- and 7-node cuttings was not significant. Yield increase due to increasing node number might be due to the fact that with increasing node number, more nodes were buried and so there were more points for tuber initiation. Due to early rapid growth in higher node number cuttings, tuber initiation and bulking began earlier than in lower node number cuttings which translated into higher tuber yield in the higher node number cuttings. Enyi (1973) observed that tuber yield in yam is dependent on the amount, rate and duration of assimilates translocated to the tubers. Differences in plant leaf area per cutting might have contributed little to the differences in total tuber yield during the latter stages of growth since there were no significant differences in the LAI after the 6th week till the time of harvesting. The non-significant differences between the yields of the 5- and 7-node cuttings (Table 1) is in line with the findings of Gurnah (1974) that an increase in the node number beyond five nodes per cutting did not significantly

TABLE 2

*Potassium Content in the Soil, Leaves and Tubers at Time of Harvest*

| *Treatment* | $F_0N_3$ | $F_0N_5$ | $F_0N_7$ | $F_1N_3$ | $F_1N_5$ | $F_1N_7$ | $F_2N_3$ | $F_2N_5$ | $F_2N_7$ |
|---|---|---|---|---|---|---|---|---|---|
| K in soil cmol (+)/kg (soil) | 0.36 | 0.33 | 0.36 | 0.55 | 0.57 | 0.51 | 0.67 | 0.63 | 0.59 |
| K in leaves (per cent) | 1.14 | 0.95 | 0.95 | 0.80 | 0.85 | 0.76 | 0.86 | 0.85 | 0.85 |
| K in tubers (per cent) | 0.84 | 0.46 | 0.38 | 0.35 | 0.40 | 0.72 | 0.32 | 0.65 | 0.48 |

$F_0$ = No fertilizer, $F_1$ = 60 kg K/ha, $F_2$ = 120 kg K/ha
$N_3$ = 3-node cuttings, $N_5$ = 5-node cuttings, $N_7$ = 7-node cuttings.

affect yields of cassava. This might be due to the non-significant differences in their LAI from time of planting till harvesting, resulting in almost the same surface area for photosynthesis.

The fertilizer treatments did not have any significant effect on tuber yield per cutting probably because the inherent potassium content of the soil (0.41 cmol (+)/kg soil) was adequate for the growth of the plants. The second soil analysis which was done after the experiment (Table 2) shows that not more than 0.10 cmol (+)/kg of soil of potassium was taken up by the plants in the control plants. Analysis of the leaves and tubers showed that even the control plants had slightly more potassium in their leaves than the fertilized plots (Table 2). This might be due to the toxic effect of the excess fertilizer applied which hampered the uptake of the fertilizer. All the treatments had almost the same amount of potassium in their tubers (Table 2). Obigbesan, Asboola & Fayemi (1976) obtained similar results in potassium fertilization in cassava. They observed that there was no response to potassium fertilization in cassava in plots whose inherent potassium content was 0.22 cmol (+)/kg soil. The potassium content in the leaves was higher than that in the tubers (Table 2). This is contrary to the observation made by Jacoby (1967) that at harvest about 75 per cent of the potassium taken up by sweet potato is stored in the tubers and about 25 per cent in the leaves. It could probably be due to the excessive intake of the fertilizer by the crops and the excess potassium was stored in the leaves.

TABLE 3

*The Effect of Node Number and Potassium Levels on Tuber Yield and Some Yield Components in Sweet Potato*

| | Fertilizer levels | | | |
|---|---|---|---|---|
| Node numbers | $F_0$ | $F_1$ | $F_2$ | Mean |
| (i) Number of marketable tubers per cutting | | | | |
| 3 | 2.33 | 2.78 | 2.33 | 2.48[a] |
| 5 | 3.31 | 4.20 | 3.89 | 3.80[b] |
| 7 | 3.54 | 3.95 | 3.97 | 3.82[b] |
| Mean | 3.06 | 3.60 | 3.40 | |
| (ii) Weight of marketable tubers per cutting (kg) | | | | |
| 3 | 0.55 | 0.59 | 0.51 | 0.55[a] |
| 5 | 0.87 | 0.88 | 0.68 | 0.81[b] |
| 7 | 0.81 | 0.82 | 0.91 | 0.85[b] |
| Mean | 0.74 | 0.76 | 0.70 | |
| (iii) Mean weight per marketable tuber (kg) | | | | |
| 3 | 0.24 | 0.21 | 0.21 | 0.22[a] |
| 5 | 0.26 | 0.21 | 0.17 | 0.21[b] |
| 7 | 0.23 | 0.21 | 0.23 | 0.22[b] |
| Mean | 0.24 | 0.21 | 0.20 | |
| (iv) Percentage (by weight) of non-marketable tuber per cutting | | | | |
| 3 | 22.89 | 12.23 | 15.58 | 17.23 |
| 5 | 16.51 | 23.15 | 23.95 | 21.20 |
| 7 | 20.97 | 22.51 | 17.42 | 20.42 |
| Mean | 20.12 | 16.63 | 19.62 | |

$F_0$ = No fertilizer, $F_1$ = 60 kg K/ha, $F_2$ = 120 kg K/ha.

*Mean number and weight of marketable tubers per cutting*

The number and weight of marketable (ware) tubers as shown by tuber size, length, cleanliness from diseases and pests increased with increase in node number. There were significant differences due to number of nodes per cutting but not for the fertilizer treatments. The 5- and 7-node cuttings gave significantly higher tuber yields (Table 3) than the 3-node cuttings. This is probably due to delayed tuber initiation and bulking in the 3-node cuttings.

In the 3-node cuttings, there were relatively fewer nodes to serve as points for their initiation; hence, only few tubers were produced. The difference between 5- and 7-node cuttings was not significant although the number and weight of marketable (ware) tubers in the 7-node cuttings were slightly higher than those in the 5-node cuttings. There were no significant differences due to the potassium treatment, but fertilizer level 1 ($F_1$, 60 kg K/ha) gave slightly higher yields than control ($F_0$) and fertilizer level 2 ($F_2$, 120 kg K/ha), probably because there was toxic effect due to higher amount of fertilizer in treatment $F_2$.

*Mean weight per marketable tuber*

Fertilizer treatment did not show any significant differences in node number and mean weight of marketable tuber.

Increasing fertilizer application slightly decreased the mean weight of marketable tuber (Table 3). This was probably because the fertilizer levels were too high for the crops, thus indicating an inherent adequate potassium content of the soil for plant growth. Ngongi, Howeler & Mcdonald (1976) reported that potassium fertilization increased the average tuber weight of cassava and other root crops.

There were no significant differences due to the node number on mean weight per marketable tuber. This may be due to the fact that with increasing node number, more but smaller-sized tubers were produced and the higher tuber number depressed the mean weight per tuber. Holmes & Wilson (1976) observed negative correlation between tuber number and mean weight per tuber.

*Percentage (by weight) of non-marketable tubers/cutting*

The percentage of non-marketable tuber was not significantly affected by either the node number or the fertilizer levels. However, there was a general trend towards an increase in the percentage of non-marketable tubers with increasing node number per cutting (Table 3). This is probably because with more node numbers per cutting, more tubers were initiated which competed for the assimilates, resulting in thin and unmarketable tubers.

There was a general trend towards a decrease in the percentage of non-marketable tubers with increasing fertilizer levels. This agrees with the report made by Ngongi, Howeler & Fayemi (1976) that potassium increases the percentage of ware tubers of cassava.

*Shoot fresh weight per cutting at harvest*

TABLE 4

*The Effect of Node Number and Potassium Levels on Vine Fresh Weight, Vine Dry Matter, Tuber Dry Matter and Tuber Length to Diameter Ratio*

| | Fertilizer levels | | | |
|---|---|---|---|---|
| *Node numbers* | $F_0$ | $F_1$ | $F_2$ | *Mean* |
| (i) Vine fresh weight | | | | |
| 3 | 0.97 | 1.03 | 0.78 | 0.93a |
| 5 | 1.00 | 1.40 | 0.79 | 1.06ab |
| 7 | 1.34 | 1.55 | 1.49 | 1.46b |
| Mean | 1.09 | 1.25 | 0.99 | |
| (ii) Vine dry weight per cent of vine fresh weight | | | | |
| 3 | 18.73 | 16.02 | 14.92q | 16.56 |
| 5 | 15.43 | 14.54 | 14.72 | 14.90 |
| 7 | 14.32 | 14.57 | 14.45 | 14.45 |
| Mean | 16.16 | 15.04 | 14.70 | |
| (iii) Tuber dry weight per cent of tuber fresh weight | | | | |
| 3 | 31.92 | 34.04 | 37.27 | 34.41 |
| 5 | 27.61 | 32.75 | 29.70 | 30.65 |
| 7 | 37.27 | 31.59 | 33.38 | 31.06 |
| Mean | 29.88 | 32.16 | 34.08 | |
| (iv) Tuber length to diameter ratio | | | | |
| 3 | 2.79 | 2.65 | 2.45 | 2.63 |
| 5 | 2.89 | 2.98 | 3.28 | 3.05 |
| 7 | 2.76 | 3.12 | 3.23 | 3.03 |
| Mean | 2.81 | 2.92 | 2.99 | |

$F_0$ = No fertilizer, $F_1$ = 60 kg K/ha, $F_2$ = 120 kg K/ha.

The 7-node cuttings produced significantly higher weight of fresh vegetative material per cutting than the 3 node cuttings (Table 4). The difference between the 3- and 5-node cuttings was not significant, although there was a general trend towards increasing weight of fresh vegetative material per cutting with increasing node numbers. This might be due to the higher number of vines and leaves recorded in higher node number cuttings.

The potassium treatment did not have significant effect on the amount of foliage produced (Table 4). Fertilizer level 1 ($F_1$) produced the highest amount of foliage while fertilizer level 2 ($F_2$) slightly depressed foliage production.

*Tuber and shoot dry weights*

There were no significant differences in tuber and vine dry weights due to the treatments. However, there was a general trend towards decreasing tuber and vine dry weights with increasing node numbers (Table 4). This might be due to the higher number of tubers and vines produced in the higher node number cuttings without significant differences in leaf area index for a greater period of growth (i.e. from 6th week after planting till time of harvesting).

There was a general trend towards increase in tuber dry weight with increasing potassium levels (Table 4). Similar observations were made by Fujse & Tsvno (1967) that potassium was most important for dry matter production in sweet potato. Potassium treatments slightly decreased the vine dry weight probably due to toxic effect as a result of excess fertilizer stored in the foliage.

*Tuber length to diameter ratio*

Neither the node number nor the fertilizer levels had any significant effect on the tuber length to diameter ratio. Higher node numbers gave slightly higher length to diameter ratio. There was a general tendency towards increase in length to diameter ratio with increasing fertilizer levels (Table 4). This result contradicts the observations made by Edmond (1971) that potassium produces more chunky tubers. Chunky tubers are more desirable than elongated tubers.

## Conclusion

The results of this study suggest that vine cuttings used for sweet potato propagation should have at least five nodes. Cutting with less than five nodes do not give high yields while cuttings with more than five nodes do not give any significant increase in yield and constitute a waste of planting material.

The potassium status of soils classified under the Toji series of the coastal savanna acrisols appears adequate for optimum yield of sweet potato and thus it may not be economical to apply potassium fertilizer to sweet potato grown on these soils.

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