HOW TO PRODUCE MANY YAMS FROM A TUBER

The yam mini-sett technique

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ABSTRACT

A simple method of propagating many yams from a tuber is discussed below. The yam Mini-Sett technique is an improvement of traditional methods used by farmers in West Africa. The technique was improved upon by the National Root Crops Research Institute, Umdike Nigeria and the International Institute of Tropical Agriculture, Ibadan Nigeria. This method which is currently being practiced in PNG by some farmers with promising results is discussed below.

Key words: *Seedling, cutting, Dioscorea rotundata, staking, harvesting, yield*

INTRODUCTION

The yam mini-sett technique allows you to propagate many yam seedlings, and subsequently many yams from a single tuber, unlike before, where only one, two or a few yams are propagated from a tuber

The yam mini-sett technique is an improvement on traditional farmers' method of big or jumbo yam setts, first by the National Root Crops Research Institute, Umdike Nigeria and subsequently by, the International Institute of Tropical Agriculture (IITA). The technique was introduced to Papua New Guinea (PNG) in the 1990s and is showing great promise and acceptatnce. This paper discusse the yam Mini-sett technique in order to reach as many yam farmers as possible in PNG.

MATERIALS NEEDED

- Saw dust/ dry grass,
- clean and healthy yam tuber(s),
- knife,
- wood ash or fungicide.

Seedling Nursery and Care.

Prepare a seed bed of soil (preferably sandy to silt loam soil) and sawdust or dry grass cuttings in the ratio of 1:1, 2:1, or 3:1 respectively, depending on quantity of sawdust or grass, preferably in partial shade [30-50%] not in thick shade that cuts off light completely or in direct sunlight.

Cutting and Treating Yam Setts

(a) Start with clean and healthy sprouting yam(s), and knife.

(b) Cut the yam into many small cylindrical pieces, about 4-5 cm in length.

(c) Then *mini-sett* each cylindrical piece further into 30-80 gm pieces having 'skin and flesh portions'.

(d) Spray or smear the cut surfaces with wood ash (dry or diluted) or fungicide.

(e) Spread your treated mini-setts in a shaded environment (not in the sun), and allow the cut surfaces to dry for at least 2 hours or even over night (this would prevent or reduce infection).

(f) Experience has shown that you may air-dry your setts without the fungicide or wood ash treatment and still get good results - provided you start with clean and healthy tuber, clean knife and hands and clean environment.

Seeding or Planting in the Nursery.

You may pre-sprout your sets in the nursery, or plant direct. Pre-sprouting is however recommended.

To pre-sprout your sets in the nursery, prepare your seed bed of soil and saw dust in the ratio of 1:1, 2:1 or 3:1 soil/sawdust or dry grass cuttings.

Where there is no sawdust or grass, a good loamy-soils could do.

Make your nursery bed slightly raised above the surrounding ground to allow for drainage. A one-meter wide seedbed of 15-30cm in height is recommended.

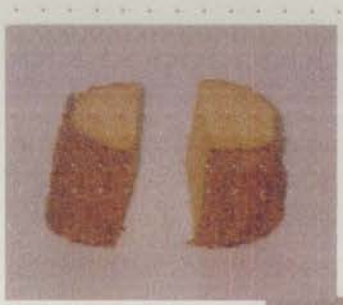
The length would depend on the quantity of mini-setts you have to nurse.

The nursery should be sited in a shady place or you erect shade for it (about 30-50% shade).

1. Start with clean and healthy spouting yam(s)

2. Cut yams into mini-setts (DAL-Erap)

3. Cut yam into small cylindrical piecies about 4-5 cmm in length. Retail the 'head' and plant as head piece



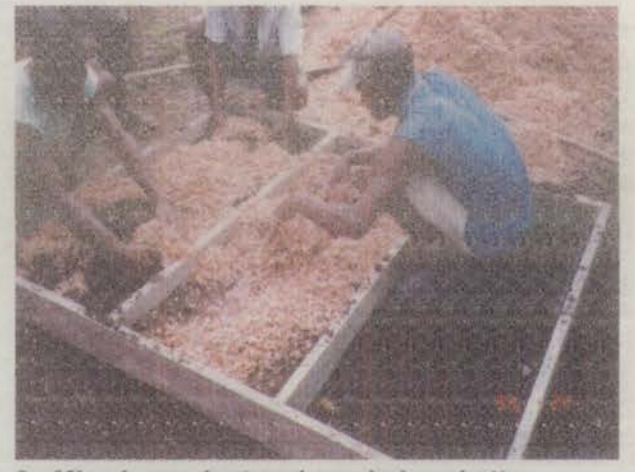
4. Then mini-sett each cylindrical piece further into two

5. Then into 4 or even up 10 pieces depend ing on the size of your yam

6. Mini-setts from each cylindrical piece

7. Air-cure your cut pieces (2-12 hrs) in shade before putting into the nursery

8. Mini-setts showing skin (brown) and flesh (white) portions



9. Mixed saw dust and sand gives better growth medium

(a) (b) (c)

10. Yams in beds: (a) skin side up, (b) skin side side ways, (c) skin side down

Nurse your mini-setts within 2 - 24hrs.

Insert your yam setts side by side into the nursery bed. In any of the three possible ways:

a. with the skin portion up,
b. with skin portion slanted sideways
c. or insert with the skin portion down.

You would find out with experience what method works best for you. Inserting with skin portion up is however recommended (this allows the shoot to easily sprout and come out from the top).

Cover up inserted mini-setts lightly with soil followed with saw dust or grass and water regularly and maintain adequate moisture through the nursery period.

The mini-setts would sprout within 3-8 weeks depending on yam variety, each specific tuber and portion of tuber it came from, as well as your nursery management practices.

Yam seedlings would be ready for field planting (transplanting) about the 3-6 leaf stage about 20-25 cm in height, when the leaves are just unfolding or expanding.

A week before transplanting, reduce the quantity and/or duration of watering. You may also reduce your shade level at this time. This allows for the seedlings to be 'hardened', and thereby reduce the transplanting shock in the open field.

Farm Site Selection

Select sites on your field that are well drained, loamy (sandy loam to silt loam).

However, where water (moisture) availability might be a problem, for a significant part of the growing season, clay loam soils with better moisture may be preferred. Avoid waterlogged sites

Select areas with less stone, and where the soils are deep [a deep soil means you do not meet stones or other obstacles in the soil as you dig downwards].

Whatever site you select, look for sites with moderate to high organic matter since they contribute to soil fertility.

Planting

Dig holes of at least 50cm deep and 25 - 30 cm wide.

Where you have enough labor you may dig holes bigger than this [remember that the bigger your hole, the better your yield].

Put the topsoil [the darker more fertile part] on one side, and the sub-soil on another side. After digging, return the topsoil and other topsoil around and fill back the hole very close to the top. (The idea of digging and filling back is to loosen the soil for easy root/tuber penetration).

As the seedlings get ready in the nursery, loosen the soil gently and remove them carefully with the sett and roots. If the roots are too deep you may cut part of it off, making sure not to damage the other seedlings

Where you have water, you may add water to the soil, for easier removal of the seedlings.

Since all seedlings would nor sprout and be ready on the same day, you may need to transplant in two or three batches within a period of two -three weeks.

Should you for any reason not be able to plant on time, and your seedlings become too old, prune [cut off] the top portions of the vine, leaving only two to three nodes with leaves at planting time. This would temporarily slow growth and later help reduce the transplanting shock, but expect smaller tubers in this case.

For best results, transplant on time, because older seedlings [with fully expanded leaves] perform poorer when transplanted.

Immerse your seedling 5-10 cm deep in the middle portion of your hole and fill up with more soil, but with part of the vine and leaves exposed. Press the soil slightly around the stem.

You stand a better recovery by transplanting when the soil is moist [after it rained], than in dry soil, and transplant in the morning or late afternoon than in the hot sun.

You may mulch [add grass] around the stem, on top of the mound, to conserve moisture, especially when planted in the dry period. Mulch also helps reduce soil temperature, suppress weeds and add organic matter.

You may need to replant mounds with dead seedlings/setts as and when you noticed them. Remove the dead or rotten setts and replace with live ones.

Planting distance of 1m x1m or 1m x 0.5 m is recommended. Note as you reduce your planting distance your may increase your tuber numbers, but with reduced tuber sizes. So the choice is up to you to make.

Weeding

Keep your farm free of weed, as you would do for

11. Transplant at 3-5 leaf stage when leaves are just unfolding

12. Sprouting mini-setts (*a bit late to transplant*)

13. Harvested tubers (Dioscorea rotundata) from mini-setts yams

14. Farmers happy with their harvested yams (Dioscorea rotundata)

your other crops. Remember that weeds compete with your crops and reduce your yield.

As you weed, and remove soil in the process, or where rain and wind reduces your mound size, heap up by adding more soil. Mound size may also affect yield. Average to big mounds give better yield than small ones (you'll determine your optimum mound size in time, based on your own experience).

Staking

Stake your plants [erect them poles for the vines to climb around]. One stake per plant is the ideal, but if that is not possible, a stake for two plants would do.

Stake early, before the vines start spreading on the ground. Staking prevents over-shading and allows for optimum capture and use of sunlight, for making the plant food. Long poles may give you better yield than short poles.

Train your vines to climb on the stakes. Note that the African yam *(D. rotundata)* and the water yam *D. alata* climb from right to left (counter-clockwise), while the lesser yam (*D. esculenta*) climbs from left to right (clockwise). Remember that if you try to train them wrongly, they will not climb.

Harvesting and Storage

The yams are ready for harvesting when the leaves turn yellow to brown. You may allow the leaves to completely dry before you harvest. But in very moist and rainy areas, if you delay harvesting, the yams may start sprouting (germinating), so guide against this by harvesting early.

To harvest, dig gently starting away from the yam and gradually moving towards the yam, so as not to damage the tubers. Note that damaged tubers store poorly and also have lower market value.

Store your yams in shade, in dry and not damp environment. Do not heap on each other, and allow air to circulate. This way your yams would store longer.

Yams have dormancy (a period between harvesting and time of sprouting). This varies with variety, climate and storage conditions. Dormancy period vary, from 1 - 5 months.

Your yam is ready for planting when the dormancy is broken, that is when it starts to sprout.

For market yam, sell before the dormancy is broken. This is because the chemical changes that take place in long term storage and breaking of dormancy affects the taste and food quality of the yam, making it less palatable.

Where to grow your yams

Note that, most yams are tropical crops, and may not do well in high altitude and cold climates. Our experience in Markham valley indicate that temperatures of 20 to 33 ^{0}C seem ideal for cultivation of African yam and the other yams based on the relatively high yields obtained for even mini-setted yams; average of 6 kilograms/tuber. Yams are thus recommended for most of the lowlands tropical regions where soil texture and fertility are good.

Advantage of the Mini-sett Technique

a) It is simple

b) Multiplicative.

c) It reduces on the cost of yam production.

d) You need only a small nursery space for your many seedlings, which also reduces management costs.

e) It allows for good field crop establishment.

f) Gives you a head start, as you may nurse in the dry season and transplant at the onset of the rains and thus also shortens the field duration

Impact of the Yam Mini-sett Technique and the African Yam in the Markham Valley.

In 1999, the FAO /DAL Food Security Program based at DAL-Erap near Lae, trained 11 farmers at Intoap Village in the Yam Mini-sett Rapid Multiplication Technique. They also introduced the farmers to a 'new variety' of yam called the African yam *(Dioscorea rotundata)*. The farmers nursed the mini-setts using the new yam variety and later on divided the seedlings among themselves and planted those in their gardens.

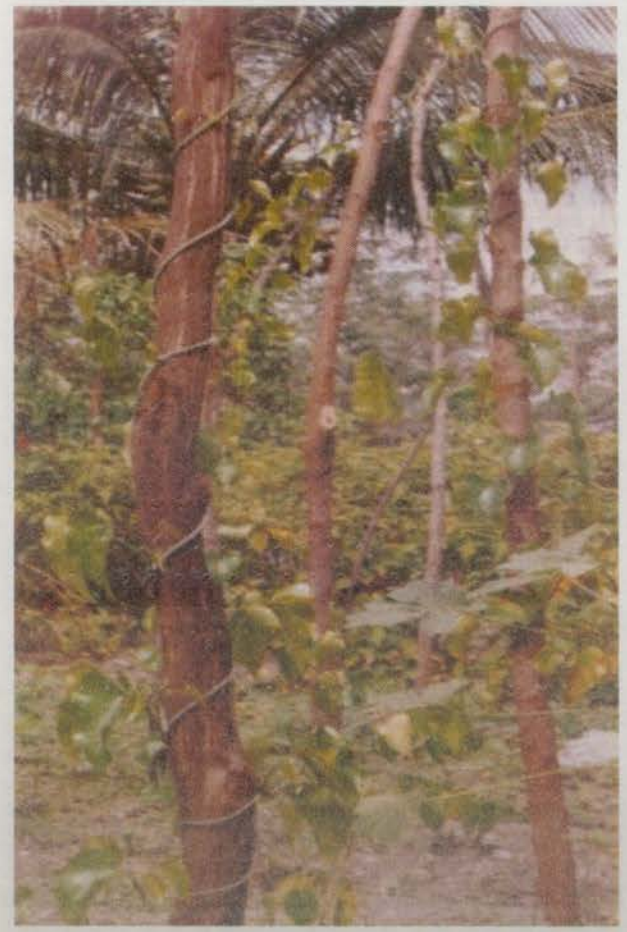
Yam yields were good, and tuber weights ranged between 1-13 kg/tuber, with an average yield of 6.5 kg/tuber. The new variety was also assessed to be very sweet and sweater than the locally grown yam varieties. The 11 farmers shared the yams with their relatives and friends, and the whole village became interested in the African yam as well as the mini-sett technique.

In year 2000/01 crop season the 11 farmers voluntarily trained other farmers, and supplied them yams to plant also. Three hundred farmers planted the yams in the 2000/01 season. The original eleven farmers also increased their farm size on the aver-

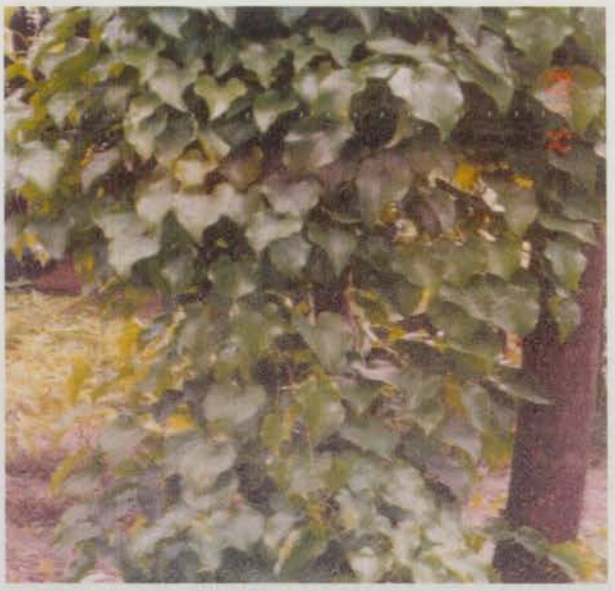
15. Port Moresby farmer in a mixed garden of D. rotundata, D. alata and D. esculenta

16. Note leaf shape of D. alata

17. Note the vine of D. alata climbs from right to left up the stake (support stick)

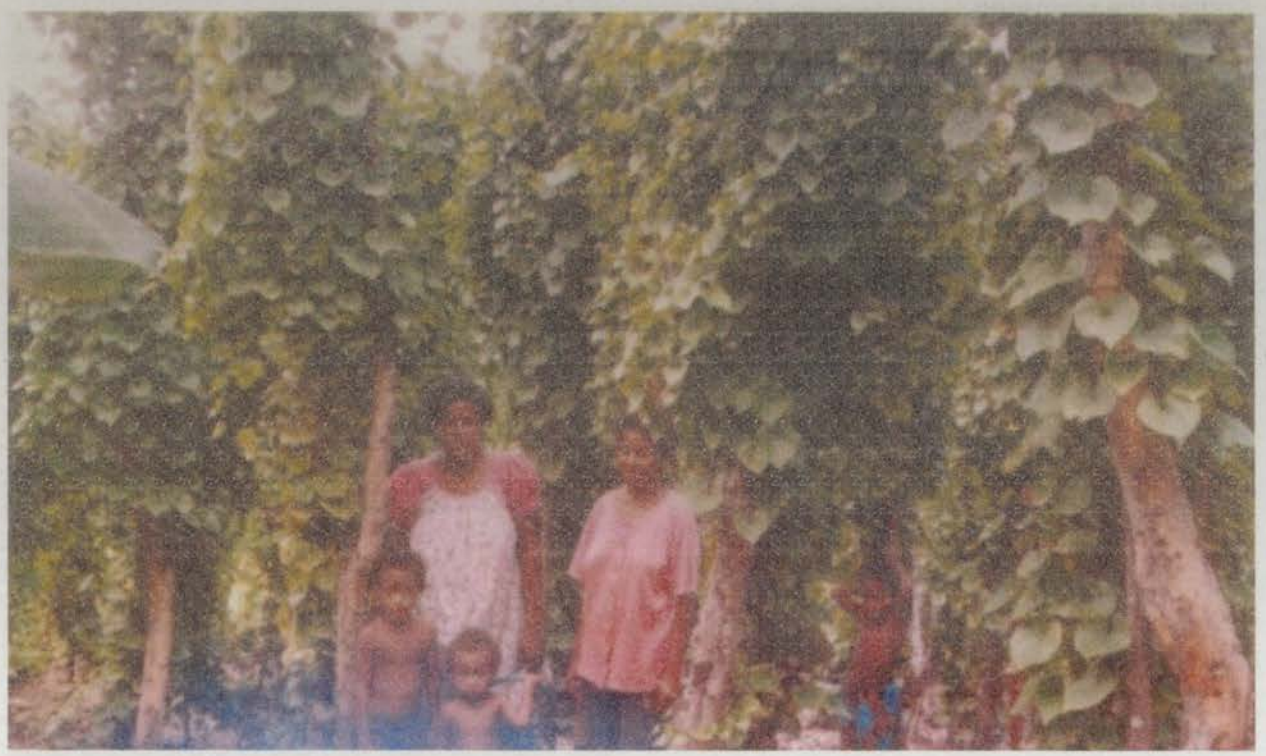


18. D. rotundata vines climb from right to left



19. Note D. rotundata leaf shape

20. Leaf shapes



21. Garden of D. esculenta with farm farmers and children. The vine of D. esculenta climb from left to right.

age by 400% over the 1999/2000 crop season. Harvest data showed that bigger tubers weighing 10-20kg/tuber are common.

Yam yield data ranged from the equivalent of 49,000 to 75,000 kg on per hectare basis In income terms at sale price of at least K1/kilogram of yam, farmers would get between K49,000 -K75,000 farm gate price/ha. for their yams. If yams are sold at K2/kg tuber, the income would double. Labour use at Intoap yam garden is all family labour, just like for the other garden crops. Thus yams particularly the African yam [D. rotundata] shows promise in the Markham Valley and is being promoted.

The community interest in the new yam is very high and many more farmers are acquiring the yams for planting later this year.

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