RESPONSE OF UBI TO INORGANIC AND ORGANIC FERTILIZERS GROWN WITH AND WITHOUT TRELLIS

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ABSTRACT

The system of planting coupled with the application of the right quality and quantity of fertilizer has a great influence on the quantity and quality of the yield of crops. The response of ubi to inorganic and organic fertilizer grown with and without trellis at a given rate of 133 kg.ha of 45-0-0 plus 150 kg/ha or 16-20-0 (i.e. base on soil analysis), five tons of chicken manure and the combination of the two were studied during the regular cropping period of 1991-92 and 1992-93 at farmers field in Tambo, Indang, Cavite.

Results of the study revealed that there is a significant difference on the yield of ubi when grown with trellis and when grown without trellis. The former had a mean yield of 679.67 gm/hill while the latter had a mean yield of 466.0 gm/hill. However, on the kind and quantity of fertilizer used on each system of planting, inorganic fertilizer (chicken manure) when used singly or in combination did not significantly affect the yield of ubi whether grown with or without trellis. However, the application of the combination of inorganic fertilizer (i.e. based on soil analysis) plus organic fertilizer (i.e. 5 tons/ha chicken manure), gave the highest computed yield of 14.84 tons/ha and 10.38 tons/ha on ubi grown with trellis and without trellis, respectively.

INTRODUCTION

Yam, *Dioscorea alata* Linn, locally known as ubi is one of the most widely distributed crop in the tropics. Ubi is considered as one of the high value crops (HVC) in the country today. It is cultivated both in backyard and commercial planting for their edible tubers. It ranks fourth to cassava in area planted under the category of rootcrop.

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The tuber which is often very expensive are utilized in various food preparations like kitchen recipes. pastries, sweets and for ice cream flavorings. This famine crop as it is sometimes called, is a good food substitute for rice and corn. Commercially it is processed into powder, chips and flakes.

Ubi, characterized prominently by its climbing vines is a photosensitive crop. The use of trellises to properly expose the plant foliage and to support the dense foliage of the plant as it matures is a common practice among farmers. It has been reported that the use of trellises will induce tuber growth and gave higher yield due to better sunlight exposure. However, despite the advantage of using trellis in terms of quality and higher yield, it can also be a constrained because of additional input (i.e labor and staking cost/ha).

The solution to the above-mentioned critical factors at farmers vantage point depends on the introduction of improved low input technologies.

OBJECTIVES

The study aims to :

1. Determine the effect of the growth, yield and quality of ubi grown without trellis as compared to those grown with trellis as affected by the different fertilizer treatments.

2. To determine the viability/or feasibility of growing ubi without trellis.

3. To evaluate the crop susceptibility to pest and disease infections.

REVIEW OF LITERATURE

By the growth habit, yams are climbers, hence their vines need support for better display of leaves. Plants that are not provided with trellis yield less than those with trellis (Pido, 1987). Providing the necessary support (trellis) will increase the yield of ubi but the problem on additional

expenses for the procurement of trellis and staking cost especially on a large scale planting are to be considered. Responding to this problem the ultimate solutions would be to grow yams without trellis. Should this be feasible the yield may not be as high as the staked yams, but the reduction in yield will be less than the cost and inconvenience of using trellis as suggested by Onwueme, (1978).

Like any other crop, the response of ubi to fertilizer application depends on the fertility of the soil as well as the species and cultivars used. In general, yams respond well to nitrogen and potassium fertilization. However, results to date indicates that their response to phosphorous is probably slight (Coursey, 1967, Lyonga *et al*.. 1973). This is partly because phosphorus is removed very efficiently from the soil by yams and is seldom a limiting factor (U.S. D.A. 1974 a. 1974 b) and partly because many soils used for yam production are naturally rich in phosphorous.

Nitrogen fertilization, enables the plant to develop a large leaf area as possible, so that when tuber initiation occurs there is sufficient photosynthetic leaf are to make the tuber grow rapidly (Onwueme, 1978). Chapman (1965) found that ammonium sulphate applied at planting, decreased the yield but when applied months after planting yield had increased as aggravated partially by the increased in the leaf area. As it was observed, potassium appears to be particularly needed during the tuber formation (U.S.D.A. 1974 a). Organic manures and compost may also be applied as fertilizer to yam plots, thus improving the soil condition and fertility.

METHODOLOGY

The study was conducted on the farmer's field (Bo. Tambo, Balagbag, Indang, Cavite) for two cropping seasons. The field was alternately plowed and harrowed twice along and across the field length to pulverized the soil and eliminate undesirable weeds. The area was divided into two main plots with three subplots each. The experiment replicated four times. Ubi grown with and without trellis were marked as the main plots and the dosage of inorganic and organic fertilizer treatment as the subplots. The fertilizer treatment were as follows :

T1 = Based on soil analysis
133 kg/ha Urea or 2.66 bags plus
150 kg/ha Ammophos or 3 bags

T2 = 5 tons/ha chicken manure

T3 = Combination of Treatment 1 and 2

Seedpieces were treated with wood ash and fungicides and air dried before planting. The variety used was VU-2 an irregularly shaped tuber with red deep purple flesh.

Application of chicken manure was done three weeks before planting while inorganic fertilizer were split into two applications. The first application was done prior to planting and the second was applied two months after the first application. The crop was harvested eight months after planting.

RESULTS AND DISCUSSION

A. Yield Response

The results of the experiment for two cropping seasons, 1991-1993, revealed a significant finding. The yield between the main plots (i.e ubi grown with and without trellis) is shown in Table 1. Results showed that there is significant differences between the main plots. Ubi grown with trellis dominated (Yield) the other main plot. Staked plots produces higher yield with a mean yield of 13.59 tons/ha and 9.32 tons/ha for unstaked plots.

On the other hand, looking on the different subplots, it was observed that no significant differences existed among the fertilizer treatments. The mean yield of harvested tubers in gm/hill are shown in Table 2. Treatment 3 (RR inorganic fertilizer + chicken manure) gave the highest mean yield of 742 gm/hill, on staked plots. Likewise, ubi grown without trellis, showed that treatment # 3 (RR/ha of inorganic fertilizer + chicken manure) gave the highest yield at an average of 519 gm.hill.

TABLE 1. Mean Yield of Ubi tubers in tons/ha of each system of planting and each kind of fertilizer

Kinds and Quantity of Fertilizer	METHODS OF CULTURE		FERTILIZER Treatment Means
	with trellis	w/out trellis	
1. Inorganic Fertilizer: 133 kg/ha of 45-0-0 plus 150 kg/ha of 16-20-0	13.48 t	9.08 t	11.28 t
2. Organic fertilizer: Five tons/ha of chicken manure	12.46 t	8.5 t	10.48 t
3. Inorganic + Organic (1) (2)	14.84 t	10.38 t	
System Means	13.59 t	9.32 t	11.46 t

Table 2 : Mean yield of tubers in grams/hill in different treatment on Ubi *

Method of Culture	Kind/Quantity of fertilizer	Mean
With trellis	A. Inorganic fertilizer **	
	133 kg/ha of 45-0-0 plus 150 kg/ha of 16-20-0	674
	B. Organic fertilizer	
	Five tons/ha of chicken manure	623
	C. Combination of A and B	742
	Mean	679.67
Without trellis	A. Inorganic fertilizer **	
	133 kg/ha of 45-0-0 plus 150 kg/ha of 16-20-0	454
	B. Organic fertilizer	
	Five tons/ha of chicken manure	425
	C. Combination of A and B	519
	Mean	466

* Average of two regular cropping season (1991-92 and 1992-93)

** Base on soil analysis

The results, however clearly indicates that the application of fertilizer whether grown with or without trellis has a greatly influenced its production.

B. Germination and Growth Response

One month after planting, 75% of the total seedpieces planted had germinated. The other 15% sprouted 2-3 weeks after the first group and the remaining 10% were replanted due to rotten seedpieces.

The growth response of ubi to fertilization were indeed satisfactory. The sturdy long vines with large and dense foliage are indications that the plants in both main plots had responded well to fertilizer treatments. It was observed that the healthy vine and leaves of ubi grown without trellis are spreading prostrately on the ground, almost covering the field completely in five months after germination.

Bulbils growth on the upper vine nodes was observed six months after germination. The incidence of bulbil on ubi grown with trellis was observed higher compared to those grown with trellis. A total of 23 kg. and 18 kg. of bulbils were gathered for unstaked and staked plots after maturity, respectively.

C. Tuber Quality

The quality of tubers harvested from the main plots varies in terms of size, shape, weight and quantity as shown in Table 3. Ubi grown with trellis apparently produces larger tuber ranging from 250-700 gm/pc than those grown without trellis. Harvested tubers from both the main plots (i.e., grown with trellis and grown without trellis) are acceptable and marketable in terms of sizes and quality which commands the same price. It was observed that ubi plants tends to produce smaller size of tubers weighing 100-500 gm/pc with multiple tubers per plant when grown without trellis. However, harvested tubers of these sizes are often used and more preferred by farmers as planting materials. A small whole tuber when used as planting materials can assure the grower of a non-disease infection sett that grows readily on the field (Onwueme, 1978).

Table 3. Quality of Harvested Tubers

PARAMETERS	With Trellis	Without Trellis
1. Size *	Medium Large (250-700 gm/pc)	small medium (100-500 gm/pc)
2. Shape	irregular	irregular
3. No. of tubers/hill	2-3	3-5
4. No. of marketable tuber/hill	2	2
5. Average weight of marketable tuber/hill	674 gm/hill	450 gm/hill

Small - 100 gm - 300 gms
Medium - 300 - 500 gms
Large - 500 - 1000 grams

D. Pest and Disease Occurrence

The presence of insect pest and disease on the main plots was observed as early as 50 days after germination as shown in Table 4. Hoppers, *Atractomorpha psittacina* and Yellow beetle *Harmonia octomulata*, were the only insect pests found in the experimental area at a very negligible population and damage.

Cercospora sp. was also noted on the main plots. Infection was recorded on the onset of the wet season (60 days after germination). Infected seedlings exhibited stunted growth with their leaves suffering from circular rust-like infection. Most of the infected plants managed to survive and produce a convincing tuber yield.

However, higher infection were recorded on plots without trellis. This maybe due to the fact that the succulent prostrate vines with their dense foliage causes limited aeration and temperature imbalance near the soil surface that favors the activities of the pathogens.

Table 4 Appraisal of Pest Disease, Weeds Incidence

	Ubi with trellis	Ubi w/out trellis
PESTS	INCIDENCE	
Hoppers	1	
Yellow Beetle	1	2
		1
DISEASE	INFECTION	
Cercospora sp	1	
		2
WEEDS	DENSITY	
Makahiya	1	
Kanlong	1	1
Kamokamotihan	1	2
Olasiman	1	1
Kogon	1	1
		3

Pest damage rating

Score	Degree of Damage
0	No damage
1	1-3 holes/leaf slight
2	4-6 holes/leaf moderate
3	7-10 holes/leaf heavy
4	10 above holes/leaf severe

Weed Density rating

Score	Weed Rating
1	1-5% population - light
2	5-25% population - moderately light
3	25-50% population - moderately heavy
4	50-75% population - heavy
5	75-100% population - severe

Disease infection rating

Score	Degree of Infection
0	No infection
1	1-5% light
2	5-25% moderately light
3	25-50% moderately heavy
4	50-75% heavy
5	75%-100% severe

E. Economic Analysis

The computed yield and observed Marginal Rate of Return is shown in Table 5. It is very evident that application of fertilizer to ubi is beneficial, particularly the recommended rate/ha plus organic manure. Growing ubi with trellis and the application of 133 kg/ha of Urea plus 150 kg/ha Ammophos plus 5 tons/ha chicken manure gave an MRR of 228.7%. Likewise, growing ubi without trellis is also feasible. With the application of 133 kg/ha Urea plus 130 kg/ha Ammophos plus 5 tons/ha of chicken manure an MRR of 246% can be realized.

Table 5 : Tuber and Economic Analysis of Ubi Grown With and Without Trellis as Affected by the Different Fertilizer Treatments

Treatment	Yield t/ha 1/	Gross Benefit P/ha	Treatment Cost P/ha	Net Benefit P/ha	MRR %
With Trellis					
Treatment 1	13.53	55743.6	32486	23257.6	
Treatment 2	12.45	51294	31746.7	19547.3(D)	
Treatment 3	14.86	61223.2	34152.9	27070.3	228.7
W/O Trellis					
Treatment 1	9	37492	22486	15006	
Treatment 2	8.8	36256	21746.7	14509.3 (D)	
Treatment 3	10.5	43260	24152.9	19107.1	246

Computed Farm Gate Price/kl = P 4.12/kl.

Material Cost and Labor Inputs (TVC)

Planting setts - P 10/kl
Stakes - P .50
Chicken manure - P 6/sack
Urea - P 320/bag
Ammophos - P 290/bag

SUMMARY AND CONCLUSION

In the context of crop production, fertilizer application always play a big role. Determining the right kind amount that the soil and the plant needs is of great importance and must be given great emphasis. Based from the different fertilizer treatments, it can be deduce that inorganic and organic fertilizer and mixed supplements when applied to ubi grown with trellis or grown without trellis will not only increase the production but will also save money and labor inputs.

The results of the study also revealed that the production of ubi by growing them without trellis is economically feasible and viable. As demonstrated in this study, farmers can now commercially venture on ubi production with lesser input and labor cost. Growing ubi without trellis is technically feasible/viable, provided that proper culture and management practices are employed.

RECOMMENDATION

Based from the results of the study, the different fertilizers can be used to increase the tuber production of Ubi. However, for a satisfactory/ profitable income with lesser expenses, applying the recommended rate/ha would be the most economical and practical to adopt.

To attain a good results from any crop, following the proper culture and management is always recommended throughout the growing season. Application of organic manures is also advisable to help energize and restore the natural soil fertilizer. Adapting a wise technology will not only save time, labor and financial inputs but will also help maintain the ecological balance. In areas where staking materials are scare, growing ubi without trellis can also be feasible/profitable following the same recommendation.

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