I.J.S.N., VOL.5 (4) 2014: 649-652 ISSN 2229 – 6441

INTERNATIONAL JOURNAL OF SCIENCE AND NATURE

www.scienceandnature.org

EVALUATION OF MATURED FOWL DUNG (MFD) ON THE EMERGENCE OF SMOOTH CAYENNE PINEAPPLE (*Ananas comosus L. Merr*) PLANTLETS USING TRIMMED SPLIT CROWN (TSC) APPROACH

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ABSTRACT
Field trials were conducted in 2014 to evaluate the influence of matured fowl dung on the plantlets emergence of smooth cayenne pineapple (*Ananas comosus* L. Merr) using trimmed spit crown (TSC) approach. This field trial was conducted at National Biotechnology Development Agency, South West Bioresources Development Zonal Centre (BIODEC) owode Yewa South Ogun State Nigeria opposite snail building. The trimmed split crowns were planted at row spacing of 0.2m x 0.2m giving a plant density of 250,000 trimmed split crown per hectare respectively with three levels of matured fowl dung treatment doses of (T_A) 0.001ton, (T_B) 0.002 ton, (T_C) 0.003 ton and (T_D) 0.000 tons per hectare in a Randomized Complete Block Design (RCBD) replicated four times. Number of days to first twenty (20) sucker plantlet emergence and number of sucker plantlets generated per treatment were taking. Data collected were analyzed by general linear model (GLM), univariate two way analysis of variance (ANOVA) using IBM SPSS software statistical package 21. Fisher's Least Significant Difference (LSD) was used to separate the mean at 95% confidential level. The results showed that different dosage of matured fowl dung (MFD) significantly ($P < 0.05$) affected the days to sucker emergence and number of sucker emergence on the pineapple trimmed split crowns (TSC) thus leading to quicker and higher generation of pineapple plantlets. The dosage of 0.002 tons matured fowl dung (MFD) application per hectare provided the fastest and highest sucker plantlets and therefore considered best and recommended for commercial pineapple farmers, gardeners and horticulturists.

KEY WORDS: Trimmed split crown, matured fowl dung, smooth cayenne pineapple, *Ocimum gratissimum* (Basil)

INTRODUCTION
Pineapple (*Ananas comosus* L., Merrill) is a tropical plant, a monocotyledon and an herbaceous perennial, of the family Bromeliaceae, with about 50 genera and 2,000 known species. In addition to using the fruit as a food, many species are grown for their leaf fibre from which bagging material is produced, and other species are grown as ornamentals. The major obstacle to commercial pineapple farming has been insufficient and lack of uniform planting materials to meet sustainable commercial production need. The federal Government of Nigeria with the assistance of (FAO) is planning to import one million (1Million) suckers /plantlet of MD-2 pineapple variety to support and boost the agribusiness (Ojo, 2014).This is as a result of insufficient planting materials to meet the commercial production need. Pineapple is one of the tropical fruits in greatest demand on the international market, with world production in 2004 of 16.1 million Mt. of this total, Asia produces 51% (8.2 million Mt), with Thailand (12%) and the Philippines (11%) the two most productive countries. America and Africa contribute 32% and 16% of world production, respectively, with Brazil (9%) and Nigeria as low as (6%) also being a major producers (FAO, 2006). It is also one of the food plants that always have been propagated vegetatively. Traditional propagation uses various vegetative parts, organs, or tissues, such as i) suckers originating from buds below ground level; ii) hapas, which are shoots developing at the base of the peduncle; iii) leafy branches arising from buds in leaf axils; iv) slips, which grow out of the peduncle below or at the base of fruit; v) butts or stumps from the mature plant and 6) crowns arising from the upper part of the fruit; (Rangan, 1984, as cited in Kiss *et al.,* 1995). During transplanting, plant leaves are pruned to reduce evapotranspiration and plant shock thus increases the chances of plant survival. Agogbua and Osuji (2011) opined that a pineapple crown has about 15 to 25 buds, beneath every leaf axil of a pineapple crown is a dormant axillary bud (potential sucker).These hidden buds has been exploited by destroying the meristematic region to induce sprouting. Nevertheless, potential sucker sprouting can further be accelerated in a good plant growth medium like organic matter. Compost which is not fully decomposed is considered to be immature. An immature compost is still hot, or smells poorly, or both, and may be risky to use directly on plants. All plants require nutrients to grow. Sustainable crop production requires the nutrients that are removed to be replaced with synthetic fertilizers, manures, municipal wastes or, in a few cases, via the atmosphere. Generally, plant nutrients are either macro or micronutrient. Regardless of whether the nutrient is required in large or small quantities, if the plant does not have a sufficient supply, the growth of the plant will be limited by that nutrient. If nutrients are supplied to crops

at rates below crop requirements, yields will be reduced and the long term productivity of the land will decline. However, if nutrients are applied in excess of crop requirements and removal, they increase the risk of agronomic problems such as crop lodging. Livestock manure is an excellent source of plant nutrients (Manitoba, 2013). The use of compost tea has been proved to be successful at the root zone of plant (Ted *et al*, 2011). According to Law-Ogbomo and Ajayi, (2009), combination of planting and poultry manure application at a plant population of 62500 and 12 t ha^{-1} had positive effects on all growth parameters of *Amaranthus cruentus* (Linnaeus). Media supplemented with manure gave higher parameters of growth compared to media without manure (Ni Luh *et al.*, 2011). In other vegetable crops, experimental studies have revealed that in tomato plant, as reported by Ibrahim and fadni (2013), organic fertilizer is a good effective amendment for improving the physical, chemical and nutritional properties of the soil and increase crop yield. According to Djilani Gheman and Senoussi, (2013), highest potatoes (*solanum tuberosum* L. var spunta) yield was obtain with the application of poultry manure compared with sheep manure and NPK 15:15:15.

Several studies with and without growth media to influence the growth of pineapple plant both *In vitro* and *In vivo* has been conducted by previous researchers. Micro propagation protocol with BA (5µM) and NAA (3µM) for smooth cayenne pineapple multiplication, shoot elongation and good vigour coupled with the use of non-acid washed river side sand for hardening during acclimatization have been achieved and reported (Inuwa *et al*., 2013). According to Adegbite *et al*. (2014) Pineapple production system using sucker technique has been reported to be more competitive and had a higher comparative advantage than the production system using ordinary crown technique. Hence crown split into four (4) has proven to be a simple macro propagation approach for smooth cayenne pineapple propaggule multiplication (Agogbua and Osuji, 2011). Weerasinghe and Siriwardana (2006) have reported the use of harvested stem to generate planting materials through continuous cyclic multiplication techniques. All these techniques have their peculiar bottle neck ranging from complexity of the techniques, low coefficient of multiplication, high cost of the *In vitro* propagation media (hormone and agar), low technical manpower, lack of constant electricity, low survival rate during various stages and acclimatization problem, thus making the trial ability of these techniques a mirage to rural and commercial farmers to meet up with their planting materials input needs. Nevertheless, so far there is little information on the response of pineapple split crown to organic manure as a field growth supporting media on split crown of smooth cayenne pineapple crown. As such there is need to develop a simpler, environmentally friendly and efficient field multiplication protocol in this respect. The purpose of this study, therefore, is to determine whether matured fowl dung could effectively induce more sprouting of potential suckers in smooth cayenne pineapple using trimmed split crown (TSC) approach.

MATERIALS & METHODS

This experiment was carried out on the land opposite snail house at National Biotechnology Development Agency, BIODEC Owode-Yewa South, Ogun State, Nigeria. The experiment started by june and terminated October 2014. Owode –Yewa is a town located between latitude 6^0 48^1 N, 2^0 57^1 E and longitude 6.8^0 N 2.95 E (Wikipedia).

Fowl dung collection

Fresh fowl dung was gathered from KUNTUS farm a two (2) kilometer farm from the BIODEC centre and hipped for two (2) months to allow it matured before used for the trial.

Collection and preparation of pineapple crown

A total of one hundred (100) naturally ripped smooth cayenne pineapple crowns of weight ranging from 290 – 297gramme (gm) were collected from pineapple sellers at Oke-Odan market Yewa South and its environs. They were transported to the centre and prepared for the trial by stripping off few lower leaves to expose the axillaries roots. The crowns were then split into four (4) equal parts longitudinally using a sharp knife and the meristems were destroyed. The leaves were trimmed to allow the split crown conserve water and also provide chances for easy detaching of plantlets after sprouting (Figure 1).

FIGURE 1: (**A**) Trimmed pineapple crown (B) Trimmed crown split into four (4) longitudinally with meristem destroyed.

Treatment and experimental design

The trial consisted of four (4) treatments arranged in a Randomised Complete Block Design (RCBD) with four (4) replications. The plot size per treatment was 1m x 1m with 0.6m as size of guard between each experimental plot. The treatments were; (T_A), 0.001ton, (T_B); 0.002 ton, (T_C) 0.003 ton and (T_D) control 0.000 tons of matured fowl dung (MFD) per hectare. The treatment doses were spread evenly and worked thoroughly on the experimental plot and watered moderately five (5) days before planting. Planting was done at an inter row and between row spacing of 0.2m x 0.2m giving a plant density of 250,000 trimmed split crown per hectare (TSC) respectively.

Management practices

Hand weeding was done when the necessary. Macerated leaves of *Ocimum gratissimum* (Basil) was sprinkled on the trimmed split crowns few hours before plating and 30 days after planting as botanical fungicide to prevent root rot diseases infection.

Sucker harvesting and planting

Days to first 1st twenty (20) plantlet sprout from each plot was recorded. Sucker harvesting was done by carefully detaching the sprouted sucker plantlets from the trimmed split crown on each experimental plot, count and recoded. Sucker were collected and planted on nursery bags.. (Figure 2)

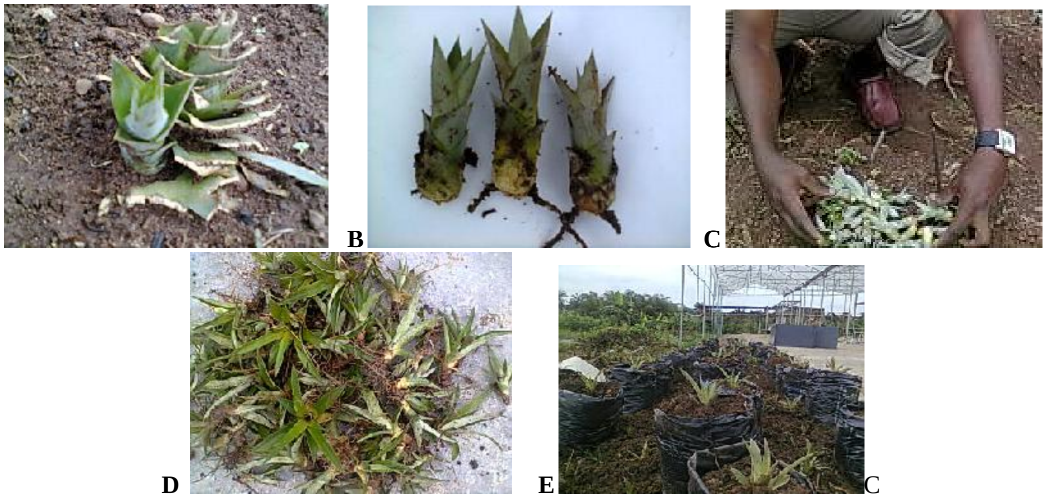

FIGURE 2: (A) sprouted sucker. (B) Detached suckers, (C) Plantlets collected from an experimental plot at a time, (D) nursed plantlets, (C) Plantlets arranged in the nursery shed in polybags..

Data collection and statistical analysis

Data on days to first (1st) 20 sucker sprout were taking by randomly marking split crown with visible sucker plantlet sprout using different conspicuous label daily until 20 sucker sprout were counted per plot. Data on the number of suckers produced per treatment were firstly taking fifty (50) days after planting (DAP) and subsequently 20 days interval by carefully detaching the sprouted sucker's plantlets from the planted trimmed split crown (TSC), count, recorded, planted in nursery bags and arranged in the nursery. Data were analyzed by General Linear Model (GLM) univariate two way Analysis of Variance (ANOVA) using IBM SPSS soft ware statistical package 21. Fisher's Least Significant Difference (LSD) was used to separate the mean at 95% confidential level.

RESULTS & DISCUSSION

All the treatments reduced the number of days to sucker sprout. The reduction was more severe with treatment T_B (26.86 days) followed by T_A (27.47 days). This is an improvement over the report of Agogbua and Osuji (2011). There was no significant difference ($P > 0.05$) in the effect of T_A and T_B on the number of days to pineapple plantlet sprout (Table 1). Significant difference ($P < 0.05$) was observed in the number of plantlets produced 50, 70, 90 and 110 (DAP) with the highest value from T_B (17.0, 19.75.and 17.50). Least value was recorded from T_D (9.5, 12.75) and T_C, 12.50 and 13.25 respectively. There were also significant different ($p<0.05$) in number of plantlets produced 130 and 150 (DAP) (Table 2). This observation is consistent with the finding of NiLuh Putu *et al.* (2011) who reported that planting media supplemented with manure gave the highest parameter of growth thus quickening the growth of pineapple plant. The total number of plantlets produced was 1324 with the highest (397) from T_B and least (267) from T_D (control) (Table 3).

TABLE 1: Mean number of days to first (1st) 20 sucker sprout per treatment

Fowl Dung	MEAN	LSD	
T_A	27.47	c	
T_B	26.86	c	
T_C	44.78	a	
T_D	34.67	b	
		Mean	33.45
		C .V(%)	4.77
		P-value	0.000
		F- value	109.604
		SEM	0.399

Mean with different letter are statistically different at 95% confidential level using the Least Significant Different (LSD)
SEM - Standard error of the Mean

TABLE 2: Mean number of plantlets produced (DAP) by trimmed Spit crown of (*A.comosus* L Merr)

	Number of plantlet sprout over time (DAP)						
Fowl dung	50	70	90	110	130	150	Mean
T_A	14.25b	18.00b	16.50b	18.25b	12.25b	10.50b	14.96
T_B	17.00a	19.75a	17.50a	19.75a	14.75a	12.25a	16.83
T_C	12.75c	15.25c	12.50d	13.25c	10.75b	9.00c	12.25
T_D	9.50d	12.75c	13.75c	14.75c	10.50b	5.50d	11.13
Mean	13.38	16.44	15.06	16.50	12.06	9.31	
C.V (%	12.52	10.84	6.48	9.47	12.68	13.66	
(P- value)	0.001	0.002	0.000	0.001	0.012	0.000	
(F- value)	13.93	11.94	22.84	14.86	6.51	20.33	
SEM	0.419	0.445	0.244	0.391	0.383	0.318	

Mean with different letter are statistically different at 95% confidential level using the Least Significant Different (LSD), SEM - Standard error of the Mean

TABLE 3: Total number of plantlets generated after 150 day after planting (DAP)

Fowl Dung	Number of suckers
T_A	366
T_B	397
T_C	294
T_D	267
Ground Total	**1324**

CONCLUSION & RECOMMENDATION

Base on this finding, (T_B); 0.002 ton ha^{-1} of matured fowl dung (MFD) is recommended for researchers, commercial pineapple farmers, horticulturist and gardeners to induce more sprouting of pineapple latent plantlets using trimmed split sucker approach. More advantageously, fowl dung is readily available and unused in commercial poultry farms and it does not have the tendency of making the soil acidic since it is moderately available and improved the physical properties of the soil. The approach will ensure faster and more plantlet generation on the field therefore guarantee sustainable mass production of pineapple suckers to further meet the need of commercial pineapple farming.

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