GLOBAL JOURNAL OF PURE AND APPLIED SCIENCES VOL. 13 NO. 2 2007 : 157 - 160
 ISSN 1118 - 0579

EFFECT OF AGE AND TIME OF TRANSPLANTING SUCKERS ON THE VEGETATIVE PERFORMANCE OF PINEAPPLE IN THE BASEMENT COMPLEX SOIL OF CROSS RIVER STATE.

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(Received 18 January, 2006; Revision Accepted 9 November, 2006)

ABSTRACT

An experiment was conducted from 2002 to 2003 at Iwuru, near Calabar, Cross River State, Nigeria to estimate the influence of age and time of transplanting of pineapple suckers on vegetative development of the plants. Five different ages (4, 5, 6, 7 and 8 months) milked suckers were transplanted into the field on the first day of each month beginning from April to September, 2002.

The experiment lasted for 18 months after each transplanting. The result showed that time of transplanting and age of suckers at the time of transplanting significantly ($P<0.05$) affected growth and development of the suckers after 6 and 12 months. At one year after transplanting into the field, leaf area, leaf production interval and leaf extension rate were highest in suckers transplanted in September and this was significantly ($P<0.05$) higher than those of other treatments. The 7 – month and 8 – month suckers transplanted had leaf area increases of 498.4cm^2 and 233.2cm^2 respectively after 12 months and these were significantly ($P<0.05$) higher than those of other treatments. The implication of these findings are discussed.

INTRODUCTION

One of the major constraints to pineapple production encountered by farmers is persistent heavy yield losses due to the age of suckers at planting and time of transplanting into the field. The leaf production interval, leaf extension rate and leaf area have a role to play as a photosynthetic apparatus to growth and development of the crop (Ubi, 2004). In addition, the weather condition prevailing immediately after transplanting a crop into the field has great influence on the field performance of the crop, (Mitchell, 1963). Blackman and Wilson (1954) and Humphrey and Robinson (1966) observed an enhanced specific leaf area due to shading. Ubi (2004) in a similar experiment, reported that temperature, light and water stress could cause reduction in stomatal closure and affect biochemical processes of photosynthesis in the leaf. And that as soon as photosynthesis has been affected due to water stress, recovery is often incomplete and usually affect plant growth and development during this period. A part from soil fertility and weather conditions, the agronomic performance of a crop is also highly influenced by the vigour state of the plant and the age at transplanting. (Ubi and Omaliko 2003, Ubi et al, 2005).

The objective of this study was to provide more information on the effect of age and time of transplanting of pineapple milked suckers on leaf area, specific leaf area, leaf production interval and leaf extension rate in basement complex soil of Cross River State, Nigeria.

MATERIALS AND METHODS

The trial was conducted at Iwuru, near Cross River State University of Technology, Akamkpa Campus, Nigeria on the basement complex soil. The experimental site lies between 8°14′E and 8°20′E longitude, 5°14′N and 5°18′N latitude with a rainfall of over 2000 mm in the rain forest vegetation Olvine (1986). The area was previously cropped with maize followed by a three-year fallow in which guinea grass (*Panicum maximum* cv 112) was the dominant fallow species. The area was cleared, the materials allowed to dry for some days, then gathered together and removed. The trial was planted in a 5 x 6 split-plot in randomized complete block design and replicated three times. Main plot size was 3 x 48 m, and sub-plot size was 3 x 12 m with a sampling area of 2 x 2 m. The main plot treatment consisted of five different ages (4, 5, 6, 7 and 8 months). The sub-plot treatment consisted of six dates of planting (April 1, May, 1, June, 1 July, 1 August, and September 1). The pineapple cultivar used was Smooth Canyenne. Five different ages were 4, 5, 6, 7, and 8 months of suckers milked from singe-staged nursery. The transplanting into the field was done on the 1st of every month beginning from April up to September. The experiment lasted for 18 months but observation was taken for agronomic characters at 6 and 12 months. Planting was done at a spacing of 30 cm by 30 cm within rows and 50 cm between rows. Furadan was applied against insects and nematodes at the rate of 3kg/ha.

At the beginning of the experiment, the roots were top dresses with 122.2 kgp/ha and 375 kgk/ha in the form of triple-super-phosphate and muriate of potash, respectively. Compound fertilizer, 12:12: 17:2 (N P K mg) was applied on March 20, 2002 at the rate of 0.14kg/ha. Weeding was done as at when due throughout the study period. Ten suckers were marked within the sampling area for study of leaf production interval, leaf extension rate and specific leaf area. Leaf extension rate was obtained by measuring the extended portion of the marked leaf using a graduated 30 cm metal ruler noting the date that a new leaf first appeared and the initial length taken to determined leaf extension rate. The additional length acquired over the number of days taken to attain the final leaf length was recorded as the mean expansion rate (Wilman and Dong, 1999; Hassan and Leitch, 2000). Leaf production interval was determined from the same marked suckers. This was recorded as the interval between emergence of leaf on the marked suckers and it was followed from appearance of the first leaf and that of the last leaf on the marked suckers. Leaf area was measured using leaf area meter Li – COR model.

All earlier produced and developed leaves on these marked suckers were discarded during the study period. Specific leaf area was determined by dividing leaf area by leaf weight (Ubi and Omaliko 2003).

STATISTICAL ANALYSIS

The data were subjected to analysis of variance (ANOVA) and means compared with Fishers least significant difference at 5% level as outlined by Wahua (1999).

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Table 1: The effect of transplanting dates on the number of suckers that survived leaf area and specific leaf area of pineapple cultivar transplanted into the field

Date of transplanting	Survivals after 12 months (%)	Leaf area (cm^2)		Specific leaf area (cm^2/g)	
		Months	Months	Months	Months
1 April	92.4	30.2	122.1	312.1	486.4
1 May	98.2	131.0	498.4	312.1	486.4
1 June	98.8	153.4	122.1	298.8	486.4
1 July	99.4	161.1	131.0	295.4	458.2
1 August	99.1	233.2	153.4	289.2	446.5
1 September	99.8	498.4	166.1	281.0	419.0
Mean	97.9	201.2	198.9	298.1	463.8
LSD ($p<0.05$)		6.72	7.32	8.97	12.49

Table 2: The effect of age of suckers at time of transplanting on the leaf area of pineapple transplanted into the field.

Suckers age (months)	Survivals after 12 months (%)	Average leaf area (cm^2) Months after transplanting		Average specific leaf area (cm^2/g)	
		6	12	6	12
4	48.5	18.2	38.6	294.0	450.2
5	65.6	24.6	93.4	273.4	361.4
6	99.6	56.3	138.5	269.1	348.0
7	99.8	67.2	156.2	248.1	327.2
8	99.4	86.0	168.1	104.1	185.0
Mean	82.6	50.5	118.9	237.8	334.3
LSD ($P<0.05$)		4.42	6.05	21.0	12.10

Table 3: The effect of time of transplanting of suckers on the leaf area and specific leaf area of pineapple transplanted into the field.

Date of planting	Survivals after 12 months (%)	Average leaf area (cm^2)		Average work on it specific leaf area (cm^2/g)	
		6	12	6	12
1 April	97.9	29	38	2.8	3.1
1 May	98.6	26	37	3.4	3.3
1 June	99.4	24	36	3.8	5.3
1 July	98.7	21	34	4.6	5.8
1 August	98.9	18	33	7.4	7.7
1 September	99.5	18	30	8.5	9.5
Mean	98.8	22.67	34.5	5.1	5.8
LSD ($P<0.05$)		2.0	2.1	1.2	1.5
	P<0.001	2.5	2.6	1.4	1.6
	P<0.001	3.2	3.4	1.6	1.8

Table 4: The effect of age of pineapple suckers on leaf production interval (days) and leaf extension rate (cm/day)

Age suckers month	Average leaf production internal (day)	Average leaf extension rate (cm/day)
4	36	1.60
5	30	2.00
6	25	2.62
7	21	3.30
8	17	4.51
Mean	25.8	2.81
LSD (P<0.05)	2.4	0.40
(P<0.01)	2.6	0.46
(P<0.001)	3.1	0.52

RESULTS

Leaf Area (LA)

The transplanting date significantly (P<0.05) effected the LA and specific leaf area of pineapple (Table 1)

Although all the plants transplanted into the field at different times from 1st April to 1st of September produced measurable LA, the highest LA (93.6 cm^2) was obtained from suckers transplanted on 1st September, while the lowest (30.2 cm^2) was from suckers transplanting on 1st April, 6 months after transplanting. At 12 months after transplanting, highest LA (233.2 cm^2) was obtained from those transplanted on 1st September while the least (122.1 cm^2) was recorded from those transplanted on 1st April. The LA of suckers transplanted in 1st September was more than three-fold that of 1st April planting and almost double that of 1st May planting during the first six months of transplanting into the field. Equally, the LA obtained from suckers transplanted 1st September was more than four-fold that obtained from sucker planted 1st April and more than three-fold that of suckers transplanted in 1st May, 1st June, and 1st July throughout the study period.

Specific Leaf Area (SLA)

The highest SLA 321.1 (g cm^2) was obtained from suckers transplanted in 1st April while the lowest 264.5 (g cm^2) was obtained from suckers transplanted 1st September during the first 6 months of transplanting into the field. After 12 months of transplanting, highest SLA 448.0 (g cm^2) was recorded from suckers transplanted 1st April while the lowest 396.1 (g cm^2) came from suckers transplanted 1st September. The increase of SLA following the first planting date to the last, were consistent. Seasonal effect showed that the date of transplanting had highly significant effect on leaf area increases but tended to reduce the specific SLA. The percent survival was adequate on the average. The results of the effect of Age at time of transplanting on LA and SLA of pineapple is presented in Table 3. The highest SLA of 86.0 (cm^2) was obtained from the 8 months old suckers transplanting into the field while lowest 18.2 (cm^2) was obtained from 4 months old suckers transplanted into the field during the first 6 months of the study. At 12 months of the study, highest LA 168.1 (cm^2) was obtained from 8 months old suckers transplanted into the field while the lowest 38.6 (cm^2), was recorded from the 4 months old suckers transplanted into the field (Table 2).

The SLA recorded during the 6 months and 12 months showed a similar trend, with the 4 months old suckers recording the highest SLA throughout the study period, (Table 3). The data also indicate that for every planting date, the 8 months old suckers had the highest LA while the 4 months old suckers had the highest SLA

The effect of planting date and age of suckers at planting on leaf production interval and leaf extension rate are presented on Table 4. The results indicate that transplanting date and age of suckers at transplanting exerted a highly significant effect on leaf production interval and leaf extension rate after 12 months of transplanting into the field.

The number of days a leaf was produced was consistently reduced with increase in the time of planting. Similarly, after 12 months of transplanting into the field, it took 31 days for suckers transplanted 1st September to produce a leaf while those transplanted 1st April took 38 days. The age effect on leaf production interval was highly significant (Table 4). The 8 months suckers produced a leaf at 17 days on the average while that of 4 months old suckers was more than two-fold that of 8 months. Seasonal trend showed that leaf production was slower early in the season from 1st April and faster later in the season.

Leaf Extension Rate (cm/day)

The leaf extension rate significantly increased with increase in date of transplanting and age of suckers at transplanting into the field.

Table 4. Data for 6 and 12 months after planting on the leaf extension rate showed that plots planted in 1st September had faster extended surface area than those of all other months. The leaf extension rate of plots planted in 1st September were on the average, more than three-fold those of 1st April, May, June and August after 6 and 12 months of transplanting into the field (Table 3). Equally, suckers planted in 1st April and 1st May showed the lowest leaf extension rate on the average while those of 1st September showed almost three-fold that of 1st April and more than double that of 1st May during the study period.

DISCUSSION

From the findings of this study, the age of sucker and the time of transplanting showed a positive effect on the exposure time of the leaf and might have contributed to the pattern of morphological development of the suckers transplanted into the field. The observed reduction in the surface area of the leaf blade as influenced by time of transplanting and age at transplanting earlier in the season correspondingly reduced the photosynthetic activities and may have contributed to the reduction in the leaf extension rate in these suckers. The results of this study agree with those of Langer (1958) Spiertz and Ellen (1972), Ubi and Omaliko (2003) and Ubi (2004).

Suckers transplanted into the field in the months of August and September showed faster growth with shortened leaf production interval with attendant leaf extension rate than others, indicating that the weather conditions were sufficiently favourable to stimulate growth and development than other times (*Batholomew et al 2002*). Indeed, by the end of 12 months in the field it became obvious that the planting dates were exerting a more significant effect on sucker sizes. The result also showed that irrespective of transplanting date, the younger suckers planted on 1st August and 1st September had greater leaf area to sufficiently attract sunlight than the earlier planted ones (*Batholomew et al 2003*). The age effect was highly significantly on leaf area increases and leaf extension but tended to reduce the specific leaf area (Coppens et al 2001). While the differences due to age had become virtually eliminated sucker size differences imposed by planting date were becoming more emphasized and was fully expressed in leaf area, leaf production interval and leaf extension rate later in the season.

CONCLUSION

The results showed that milked pineapple suckers of 4 and 5 months old transplanted into the field will take more time to achieve reasonable growth and development. Suckers planted at ages 7 and 8 months in the months of August and September apparently responded faster to leaf growth and extension, indicating that these periods had favourable weather condition to stimulate growth.

Irrespective of planting date, the leaf production interval and leaf extension rate were faster in the younger leaves of suckers that were 7 and 8 months old than others. This result suggests that good results can be achieved at Iwuru, near Calabar, Cross River State – Nigeria, by limiting transplanting of pineapple suckers to August and September for better growth and development, and greater economic returns.

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