

SEEDLING EMERGENCE AND GROWTH OF SOME ACCESSIONS OF AFRICAN PEAR (*Dacryodes edulis*) IN DIFFERENT PLANTING MEDIA

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ABSTRACT

Nursery experiments were conducted to evaluate the effects of depulping and non depulping, planting media ,seedling emergence and seedling growth among some accessions of *Dacryodes edulis* seeds with the aim of determining the most appropriate method of obtaining optimum and uniform germination of seeds of this species. Six accessions of *Dacryodes edulis* seeds were collected from two States in Nigeria (Imo and Abia) and were used for this study. Depulping the fruits of *Dacryodes edulis* leads to about 30.0% seedling emerging at 3 weeks after planting (WAP) than where the fruits were not depulped. AC2 depulped had significantly more seedling emerging while non-depulping AC3 and AC6 had the lowest seedling emergence. Planting media significantly affected seedling emergence and seedling growth of *Dacryodes edulis* .The accession AC2 recorded the highest emergence percentage and quicker seedling growth and was significantly ($P<0.001$) different when compared with the other accessions ,while AC4 recorded the least emergence percentage . Rice husk, poultry manure and river sand ratio 2:3:1 recorded the highest effect on emergence and seedling growth and was significantly ($P<0.001$) different from other planting media ,while rice husk, poultry manure and river sand ratio 1:2:3 recorded the least effect on emergence and seedling growth of *Dacryodes edulis*.

Keywords: Depulping and non depulping, Planting media, seedling emergence and seedling growth.

INTRODUCTION

African pear (*Dacryodes edulis*) (G. Don) H.J Lam belongs to the family Burseraceae, and is also known as *Safou* (French), *ube* (Ibo), *elemi* (Yoruba), *eben* (Efik) and *orumu*(Benin) (Kengue *et al.*,2002; Nwokeji *et al.*, 2005).It grows in a wide range of soil type sand are widely distributed in Africa. It is found in Cameroon, Congo (Brazzaville), Congo (Kinshasa), Gabon, Ghana, Equatorial Guinea, Nigeria and Sao Tome,(Onana,2008). In south-east Nigeria, the trees are grown around homesteads and flowering takes place from January to April. The major fruiting season is between May and October (Emebiri and Nwifo, 1990; Kengue and Nyagatchou, 1990). In both rural and urban areas of Cameroon, the fruits are boiled or roasted and then eaten with cassava or maize (Kengue, 1995; Tchatat, 1996).

Fruits are ellipsoidal and their size varies approximately from 4 to 9cm long and from 2 to 5cm wide (Omoti and Okiy, 1987). As a percentage of dry matter, the pulp contains 31.9% oil, 25.9% proteins and 17.9% fibre (Omoti and Okiy, 1987; Ajiwe *et al.*, 1997). It can be an important source of pulp oil, seed oil and even whole fruit oil (Awono *et al.*, 2002).The African pear oil is used as raw material in food industry , the pharmaceutical and the cosmetics industry (soap, perfume, creams) as well as in other branches of industry where fat raw materials are needed. The cake remaining after the production of pulp oil may be useful in the food industry, bakery and baby foods. (Awono *et al.*,2002).

Dacryodes edulis trees are also important for the provision of shade. This medium sized tree is consequently commonly found in home gardens and in smallholder cocoa farms in Cameroun (Leakey and Tchoundjeu,

2001), while in Nigeria, trees are predominantly planted in the compound farm and in crop fields. The fruits, are harvested when they change colour from whitish-green to pink to dark blue – purple - black. The fruits have an attractive, oily, slightly sour taste when cooked, but have a relatively short shelf-life when raw, although this can be prolonged by drying using traditional knowledge. In Cameroon, the fruit is typically roasted, but in Nigeria, the fruits are usually boiled in salted water. It is usually eaten with freshly roasted or boiled maize, cassava or plantain. Recent studies have examined opportunities to extend the shelf life of fruits (Kalenda *et al.*, 2002), and to process the fruits into more durable products (Mbofung *et al.*, 2002).

Although typically propagated by seed, it can be propagated vegetatively by cuttings and by marcotting (air layering) (Mialoundama *et al.*, 2002). Mature marcotts are typically short and bushy in growth, and consequently are planted at 10m - 10m spacing.

In the context of increasing social and economic pressure on forests and natural resources, it has been recognised that *Dacryodes edulis* plays an important role in alleviating the threats on food security caused by disturbances to the balance of nature arising from human activities (Mialoundama *et al.*, 2002).

In this context, it is clear from the number of recent publications and conferences that there is growing recognition of the importance of *Dacryodes edulis* (Okorie, 2001; Kengue, 2002; Kengue *et al.*, 2002a; Schreckenberg *et al.*, 2002b) as an agroforestry tree, which benefits the poor, malnourished and disadvantaged people of West and Central Africa.

A high degree of morphological variability in tree species had been identified (Wuruhiu1999,Silon 2002) , but there is still insufficient fruit quality characterization to understand the selection of suitable individual trees that will meet the need of farmers, consumers and potential food processors and exporters (Leaky ,1999).

There was inadequate information on effects of media on germination and early growth of the tree species for development of growth model and other silvicultural requirement.(Adewusi and Lapido ,2000, Otegbeye,2004 Takayama *et al.*, 2005). Hence, there is a growing concern as to what can be done to develop a silvicultural technique for regeneration of *Dacryodes edulis.*, hence the objectives of this study are:

1. To determine the effect of different growth media on seedling growth in *Dacryodes edulis*.
2. To understand the variation in fruit characteristics among *Dacryodes edulis* accessions.
3. To determine the effect of depulping and non-depulping on seedling emergence among the *Dacryodes edulis* accessions.

MATERIALS AND METHODS

The study was carried out at the Humid Forest Research Station of Forestry Research Institute of Nigeria, Umuahia, Abia State. Umuahia is located on low land rainforest zone of Nigeria, It lies between longitude 7° 32'E and Latitude 5°29' N, at 122 metres above sea level, with annual rainfall ranges of 180mm to 220mm. The air temperature varies from 22° to 32°,while the relative humidity varies from 51% to 86%.

Table 1: Accessions list showing place of collection, State, longitude and latitude

Accessions	Place of collection	State	Longitude	Latitude
AC1	Ugwana	Imo	5°41'N	5° 22'E
AC2	Ahiaeke	Abia	7° 32'E	5°29' N
AC3	Egbelubi	Imo	5°41'N	5° 22'E
AC4	Orlu	Imo	5°7 'N	7°6'E
AC5	Ngwa	Abia	5°25 E	6°14 N
AC6	Okpala	Imo	5°31'N	5° 22'E

Six accessions of *Dacryodes edulis* were obtained from two states Imo and Abia which are the major producing states and used for the experiment.(Table 1).

Experiment 1: fruit characteristics studies for *Dacryodes edulis*

The Fruit length was obtained by measuring the length of the fruit with the aid of sowing thread and metric rule. The width of the fruit was obtained by measuring the diameter of the fruit with the aid of sowing thread and metric ruler. The fruit weight was determined with the aid of sensitive weighing balance. The pulp weight was obtained with the aid of sensitive weighing balance after separating the pulp from the seeds. The seed weight was determined with the aid of sensitive weighing balance after separating seeds from the pulp.

Experiment 2: Emergence and Seedling Growth in different growth media

This study was carried out to investigate the effect of media on emergency and seedling growth of *Dacryodes edulis*. The experiment was carried out as a 5 x 6 factorial in a completely randomized design (CRD), replicated three (3) times. The factor A was the media types while factor B was *Dacryodes edulis* accessions. Media used for this study were Rice husk, poultry manure and river sand in the ratio of 1:2:3, Rice husk, poultry manure and river sand in the ratio of 2:3:1, Saw dust, poultry manure and river sand in the ratio of 1:4:3, Saw dust, poultry manure and river sand in the ratio of 1:2:3 and control. Data were collected on number of leaves, plant height (cm), collar diameter (cm), seedling fresh weight (g), seedling dry weight (g), number of roots and root length (cm).

Table 2: Fruit Characteristics of some accessions of *Dacryodes edulis*

Accessions	Fruit width (cm)	Fruit length (cm)	Fruit weight (g)	Seed weight (g)	Pulp weight (g)
AC1	8.00	5.28	18.30	7.87	10.45
AC2	6.54	4.46	15.78	6.91	8.87
AC3	11.10	7.22	45.17	12.39	32.78
AC4	9.28	6.36	34.19	9.74	24.45
AC5	12.27	6.35	44.54	15.04	29.50
AC6	9.10	4.55	28.02	11.43	16.50
LSD0.05	0.7143***	0.3020***	2.331***	1.271***	2.044***

ns = not significant, * = $P < 0.05$, ** = $P < 0.01$, *** = $P < 0.001$

Data Analysis

Data collected were subjected to analysis of variance (ANOVA), using the GenStat Discovery Edition 3 (GenStat, 2007) and mean separation was done using LSD.

RESULTS

Fruit Characteristics of *Dacryodes edulis*

Analyses of variance for all traits were highly significant ($P < 0.001$). Fruit length varied from 4.46cm – 7.22cm. AC1 had the longest fruits, while AC2 had the lowest fruits (4.46cm), while fruit width varies from 6.54cm – 12.6cm. AC5 had the widest fruits, while AC2 had the narrower fruits (Table 2). Fruit weight, also varied from 15.78g – 45.2g/fruit with AC3 having the heaviest fruits (45.17g), while AC2 had the smallest fruit (15.78g). AC5 had the heaviest seeds (44.54g) and AC2 the least seed weight (15.78g), AC5 had the heaviest fruit pulp while AC2 had the least pulp (8.87g). Bigger pulp and fruit weight is of interest to farmers and consumers alike and therefore will be an important trait for selection.

Seedling Emergence Studies in *Dacryodes edulis*. Effects of depulping and non-depulping on seedling emergence of *Dacryodes edulis*.

Depulping and non- depulping had no significant effect on seedling emergence of *Dacryodes edulis* accessions on 2weeks after planting 2(WAP). The accessions effects and interaction between accession an depulping and non-depulping was not significant($P>0.005$). At 3 WAP, depulping and non-depulping and the

interaction between accession and depulping and non – depulping had significant effects on seedling emergence ($P<0.05$) while the accessions effect was not significant . Depulping the fruits of *Dacryodes edulis* leads to about twice more seedling emerging at 3WAP than where the fruits are not depulped. AC2 depulped had significantly more seedling emerging while non-depulping AC3 and AC6had the lowest seedling emergence.

Table 3: Effects of Depulping and Non-Depulping on Seedling Emergence of *Dacryodes edulis*.

Accessions	2WAP Treatment		mean	3WAP Treatment		Mean
	Depulping	Non- depulping		Depulping	Non- depulping	
AC1	10.0	0.0	5.0	26.7	16.7	21.7
AC2	0.0	3.3	1.7	30.0	23.3	26.7
AC3	0.0	3.3	1.7	20.0	13.3	21.6
AC4	10.0	0.0	5.0	20.0	20.0	20.0
AC5	6.7	6.7	6.7	23.3	16.7	20.0
AC6	0.0	0.0	0.0	26.7	13.3	20.0
Mean	4.4	2.2		26.12	17.22	
LSD 0.05 treatment=4.78 ^{ns}			4.93*			
Accession=8.27 ^{ns}			8.53 ^{ns}			
Treatment X accession=11.70 ^{ns}			12.06*			

ns = not significant, * = $P<0.05$, ** = $P<0.01$, *** = $P<0.001$

Effects of Different Media on Seedling Emergence of *Dacryodes edulis* .

Analysis of variance showed that there was a highly significant ($P<0.001$) media , accessions and media and accession interaction effects. Among the media , control(topsoil) had significantly higher emergence percentage than the other media combinations. AC2 had significantly higher seedling emergence and this

was closely by AC1 while AC4 had the lowest emergence percentage. The interaction between media and accession showed that AC2 had the best seedling emergence in media 5 control(topsoil) while AC2 in media 4 (sawdust, poultry manure and river sand, ratio =1:2:3) and AC4 in media 2(Rice husk,poultry manure and river sand, ratio =2:3:1)had the lowest emergence percentage ratio (Table 3).

Table 4: Seedling Emergence of Some *Dacryodes edulis* Accessions ss Affected by Different Planting Media.

Accessions	Media					Mean
	1	2	3	4	5	
AC1	23.33	26.67	6.67	10.00	20.00	17.33
AC2	26.67	33.33	16.67	3.33	16.67	19.33
AC3	10.00	16.67	10.00	13.33	16.67	13.33
AC4	6.67	3.33	10.00	6.67	16.67	8.67
AC5	6.67	26.67	10.00	6.67	16.67	13.33
AC6	16.67	13.33	23.33	6.67	20.00	16.00
Mean	15.00	20.00	12.78	7.78	17.78	

LSD 0.05 media= 4.367***

Accession =4.786***

Accession X media= 10.70***

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).

ns = not significant , * = $P<0.05$, ** = $P<0.01$, *** = $P<0.001$

Collar Diameter of Some Accessions of *Dacryodes edulis* Seedling at 1,2 and 3 Months After Planting as Influenced by Different Planting Media.

Analysis of variance showed that media, accessions and media x accessions interactions effects was significant at 1,2, and 3 MAP . Media 2 (rice husk, poultry manure and river sand at the ratio of 2:3:1) had higher collar diameter at 1 and 2 months after planting.(MAP). Among the accession s at 1MAP, AC2 had significantly higher collar diameter and this was closely followed by AC3 and AC2 while AC4 had very low collar

diameter at 1MAP (Table 5). The interactions between media and accessions at 1MAP showed that AC3 at the control (topsoil) had the best collar diameter while the least was observed in AC1 at media 3 and 4. At 2 MAP, AC2 , had the best collar diameter and closely followed by AC6. The interactions showed that AC3 at the control(topsoil) had the best collar diameter. At 3 MAP , the media 2, was significantly higher ($P<0.001$) than the other media in terms of this trait. AC6 and AC2 had significantly higher collar diameter than AC4 while AC3 at the control (topsoil) had a significant higher collar diameter than other (Table 6).

Table 5: Collar Diameter (Cm) of *Dacryodes edulis* Accessions as Influenced by Different Planting Media

Accessions	Collar diameter at 1month						Collar diameter at 2months					
	Media						Media					
	1	2	3	4	5	mean	1	2	3	4	5	Mean
AC1	0.40	0.47	0.00	0.00	0.50	0.21	0.20	0.90	0.10	0.00	0.67	0.37
AC2	0.87	0.90	0.63	0.30	0.37	0.61	0.77	1.17	0.97	0.57	0.57	0.81
AC3	0.13	0.50	0.00	0.20	1.83	0.53	0.13	0.57	0.07	0.50	2.03	0.66
AC4	0.20	0.00	0.17	0.00	0.40	0.15	0.27	0.13	0.30	0.03	0.90	0.33
AC5	0.20	0.60	0.00	0.00	0.87	0.33	0.20	1.03	0.17	0.17	1.13	0.54
AC6	0.33	0.63	0.57	0.00	1.07	0.52	0.93	0.83	0.07	0.00	1.30	0.75
Mean	0.36	0.52	0.23	0.08	0.84		0.42	0.77	0.38	0.21	1.10	
LSD 0.05 media =0.26***							0.26***					
Accession=0.25*							0.29*					
Media X accession=0.63*							0.64*					

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).

ns = not significant,*= $P<0.05$,**= $P<0.01$,***= $P<0.001$

Table 6: Collar Diameter (cm) Of *Dacryodes Edulis* as Influenced by Different Planting Media

Accessions	Collar diameter at 3months					
	Media					
	1	2	3	4	5	Mean
AC1	0.27	1.13	0.43	0.00	0.88	0.54
AC2	0.87	1.10	1.20	0.63	0.70	0.90
AC3	0.20	0.80	0.30	0.63	2.13	0.81
AC4	0.33	0.17	0.13	0.10	1.03	0.35
AC5	0.27	1.13	0.20	0.23	1.50	0.67
AC6	1.33	1.00	0.83	0.00	1.40	0.91
Mean	0.55	0.89	0.52	0.267	1.272	
LSD 0.05 media 0.28***						
Accession= 0.31*						
Media X accession = 0.69*						

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).

ns = not significant,*= $P<0.05$,**= $P<0.01$,***= $P<0.001$

Number of Leaves/Plant of Seedling of some Accessions of *Dacryodes edulis* Seedlings as Influenced by Different Planting Media at 1,2 and 3months After Planting.

Highly significant media effect ($P<0.001$) was observed for numbers of

leaves/plant while accessions effect was significant at 1and 3 MAP but not at 2MAP($P>0.005$). Significant interaction was observed for this trait at the sampled periods (Table 7 and 8). The results showed that at the sampled periods , control(topsoil) media had

better number of leaves /plant and this is closely followed by media 4 (sawdust ,poultry manure and river sand 1:2:3 ratio) at the 2nd and 3rd months but in the first month after planting media 2 (rice husk , poultry manure and river sand 2:3:1 ratio) had better result than the other media except the control(topsoil).

Among the genotype AC3 had significantly higher number of leaves /plant than the other genotype in the first month after

planting but significantly AC2 was better in the third month and was closely followed by AC6 . The interaction , seems to suggest that AC3 had significantly better leaf number/plant at 1 and 3MAP in the control (topsoil) and in sawdust, poultry manure and river sand in the ratio of 1:2:3 while in the 2 months after planting AC6 in the control (topsoil) had better leaf number in the control (topsoil) though it was not significant from AC3 in the same media (Table 7 and 8).

Table7: Number of Leaves /Plant of Some Accessions of *Dacryode edulis* Seedlings as Influenced by Different Planting Media

Accessions	Number of leaves /plants at1month						Number of leaves /plants at 2months					
	Media						Media					
	1	2	3	4	5	Mean	1	2	3	4	5	Mean
AC1	0.0	5.0	0.0	0.0	5.0	2.0	0.0	10.0	1.0	22.0	11.0	8.8
AC2	11.0	11.0	6.0	2.0	3.0	6.6	13.0	18.0	12.0	11.0	6.0	12.0
AC3	3.0	5.0	0.0	4.0	20.0	6.4	2.0	5.0	1.0	36.0	27.0	14.2
AC4	2.0	0.0	2.0	0.0	7.0	5.5	2.0	2.0	3.0	24.0	17.0	9.6
AC5	2.0	7.0	0.0	0.0	7.0	3.2	2.0	17.0	1.0	7.0	18.0	9.0
AC6	3.0	4.0	6.0	0.0	13.0	5.2	11.0	7.0	14.0	17.0	28.0	15.5
Mean	3.5	5.3	2.3	1.7	9.2		5.0	9.8	5.4	19.5	17.8.	
LSD0.05 media=2.69***							5.71***					
Accession=2.95*							4.40 ^{ns}					
Media X accession=6.59***							13.99**					

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).

ns = not significant ,* = P<0.05 ,** = P<0.01 ,*** = P <0.001

Table 8: Number of Leaves /Plant of Some Accessions of *Dacryode edulis* Seedlings as Influenced by Different Planting Media.

Accessions	Number of leaves /plant at 3months					
	Media					
	1	2	3	4	5	Mean
AC1	2.0	13.0	17.0	24.0	20.0	12.6
AC2	30.0	27.0	17.0	17.0	13.0	17.3
AC3	4.0	4.0	3.0	37.0	36.0	14.0
AC4	2.0	2.0	6.0	9.0	24.0	7.16
AC5	2.0	14.0	1.0	9.0	24.0	8.33
AC6	13.0	11.0	19.0	20.0	33.0	16.0
Mean	8.83	11.8	10.5	19.3	125.0	
LSD0.05 media 6.70**						
Accession=7.32*						
Media X accession=16.41*						

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).

ns = not significant, * = P<0.05, ** = P<0.01 ,*** = P <0.001

Plant Height (cm) of Seedling of Some Accessions of *Dacryodes edulis* Seedling as Influenced by Different Planting Media at 1,2 and 3 Months after Planting

Analysis of variance showed that there was a significant media, accessions and media x accessions effects at the sampled periods ($P < 0.005$). The control (topsoil) media had significantly higher plant height (cm) and this was closely followed by the combination of 2 rice husk :3 poultry manure:1 river sand (media

2) while 1 sawdust :2 poultry manure :3 river sand (media 4) had plants that were not tall. Among the accessions, at 2 and 3MAP, AC6 and AC2 had longer plants but at 1 month after planting AC3 had longer plants. AC3 at control (topsoil) had significant taller plant at 1,2 and 3 months planting (Table 9 and 10).

Table 9 : Plant Height of *Dacryodes edulis* as Influenced by Different Planting Media

Accessions	Plant height at 1month						Plant height at 2months					
	Media	1	2	3	4	5	Media	1	2	3	4	5
AC1		10.0	16.3	0.0	0.0	15.7		9.0	35.3	4.3	0.0	27.0
AC2		36.2	35.1	18.0	5.7	9.5		32.0	48.0	32.0	30.5	25.3
AC3		6.7	16.7	0.0	11.7	82.0		8.7	24.3	3.7	19.7	91.7
AC4		3.7	0.0	2.0	0.0	26.3		6.3	6.7	12.0	6.0	58.0
AC5		10.7	21.3	0.0	0.0	34.0		11.0	51.0	4.7	4.5	56.7
AC6		14.3	19.7	23.2	0.0	50.3		32.7	27.7	38.0	80.0	72.0
Mean		13.6	18.2	7.2	2.9	36.3		16.6	32.2	15.9	10.1	55.1
LSD0.05 media=		10.50***						11.58***				
Accession=		11.50*						12.58***				
Media X accession=		25.71*						28.37**				

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).

ns = not significant ,* = $P < 0.05$,** = $P < 0.01$,*** = $P < 0.001$

Table 10: Plant Height of African pear (*Dacryodes edulis*) as Influenced by Different Planting Media.

Accessions	Plant height at 3months					
	Media	1	2	3	4	5
AC1		10.0	35.6	0.0	0.0	30.7
AC2		49.0	56.3	36.7	37.0	28.7
AC3		9.7	29.0	14.3	27.7	102.0
AC4		9.7	9.0	15.0	6.7	69.0
AC5		12.7	54.7	5.0	9.0	59.0
AC6		36.0	34.0	47.3	0.0	82.3
Mean		21.2	36.4	19.7	13.4	62.1
LSD 0.05 media =		12.21***				
Accessions=		13.37***				
Media X accession=		29.0***				

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).ns = not significant ,* = $P < 0.05$,** = $P < 0.01$,*** = $P < 0.001$

Leaf fresh and dry weight (g) of some accessions of *Dacryodes edulis* as influenced by different planting media.

Highly significant media and media x accession interaction was observed for leaf fresh

and dry weight (g) ($P < 0.01$) while the accession effect was only significant for the dry leaf weight ($P < 0.005$). The control (topsoil) seems to have more than twice the fresh and dry leaf weight (g) than the nearest media (9.20g , 3.22g ,

3.08g, 1.37g respectively for the fresh and dry leaf weight). For dry leaf weight, the accession AC6 had the highest leaf dry weight while the leaf was observed in AC5 (Table 11) . The media X accession interaction showed that AC6 in the control (topsoil) had significant higher

fresh leaf weight and is closely followed by AC3 ,AC4 and AC5 in the same control (topsoil) media while the highest leaf dry weight (g) was observed in AC3 and AC6 in the control(topsoil) media (Table 11).

Table 11: Leaf Fresh and Dry Weight (G) of some Accessions of *Dacryodes Edulis* as Influenced by Different Planting Media.

Accessions	Leaf fresh weight Media						Leaf dry weight Media					
	1	2	3	4	5	Mean	1	2	3	4	5	Mean
AC1	1.60	4.63	0.00	0.00	3.27	0.71	2.35	2.35	0.00	0.00	1.45	0.90
AC2	5.80	6.10	5.00	2.83	1.40	21.9	2.19	2.22	1.54	1.20	0.78	1.58
AC3	0.37	1.13	0.00	1.07	15.70	0.16	0.16	0.53	0.00	0.51	5.41	1.32
AC4	0.00	0.90	2.67	0.37	11.10	0.00	0.00	0.33	1.08	0.03	4.15	1.12
AC5	1.10	3.83	0.20	0.70	10.90	0.35	0.35	1.79	0.09	0.05	1.34	0.73
AC6	2.93	2.37	3.47	0.00	12.83	1.22	1.22	0.97	2.34	0.00	5.37	1.96
Mean	1.97	3.22	1.87	0.83	9.70		0.77	1.37	0.83	0.29	3.08	
	LSD0.05 media=1.85***								0.60***			
	accession=0.70ns								0.66*			
	media X accession =4.52***								1.48***			

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).

ns = not significant ,* = P<0.05 ,** = P<0.01 ,*** = P <0.001

Number of Roots of Seedling of Some Accessions *Dacryodes Edulis* as Influenced by Different Planting Media.

Media, accessions and the interaction between media and accessions was significant for this trait (P<0.05). The media combination of rice husk, poultry manure and river sand in the ratio of 2:3:1 had higher root number though it was not significantly different from the control(topsoil) media the combination of sawdust, poultry manure and river sand in the

ratio 1:2:3 had the lowest root number (Table 12). AC1 had higher number of roots /seedling while AC1 had the lowest number of root/ seedling among the accessions. AC6 in rice husk, poultry manure and river sand in the ratio of 2:3:1 (media 2) seems to have the highest number of root/ seedling and this was closely followed by AC3 in the control (topsoil) media (Table 12).

Table 12: Number of roots/ plant of seedling of some accessions of *Dacryodes edulis* as influenced by different planting media.

Accessions	Number of roots /seedling Media					
	1	2	3	4	5	Mean
AC1	6.00	7.00	0.00	0.00	6.00	14.2
AC2	14.00	16.00	8.00	10.00	6.00	10.8
AC3	1.00	6.00	0.00	2.00	19.00	5.6
AC4	0.00	8.00	3.00	1.00	14.00	5.2
AC5	1.00	20.0	1.00	4.00	9.00	7.0
AC6	9.00	10.00	11.00	0.00	8.00	7.6
Mean	5.2	11.2	3.8	2.8	10.3	
	LSD 0.05 media=3.70***					
	Accession=3.70***					
	Media X accession=9.05***					

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).

ns = not significant ,* = P<0.05 ,** = P<0.01 ,*** = P <0.001

Root Fresh and Dry Weight (g) of Seedling of some *Dacryodes Edulis* Accessions as Influenced by Different Planting Media.

Media, media x accession interaction effects was highly significant ($P < 0.001$) for root fresh weight (g) while accession effect was only significant for the root dry weight (g) (Table 13). The highest root fresh and dry weight was observed in the control (topsoil) and this followed by the media combination of rice husk, poultry manure and river sand in the ratio of

2:3:1 while the media combination of sawdust, poultry manure and river sand in the ratio of 1:2:3 had the least root fresh and dry weight (Table 13). AC6 had closely followed by AC2 and AC3 had the highest root dry weight among the accessions. AC3 in the control (topsoil) media followed by AC6 and AC4 in the same media had the highest root fresh weight and similar trend was also observed in the root dry matter (Table 13).

Table 13: Root fresh and dry weight (g) of some seedling of some *Dacryodes edulis* accessions as influenced by different planting media.

Accessions	Root fresh weight(g)						Root dry weight(g)					
	Media						Media					
	1	2	3	4	5	Mean	1	2	3	4	5	Mean
AC1	0.93	3.75	0.00	0.00	2.50	1.40	0.41	1.56	0.00	0.00	1.03	0.61
AC2	3.20	4.90	3.90	2.33	1.07	3.80	1.38	2.20	1.77	0.71	0.22	1.26
AC3	0.40	1.53	0.00	1.03	12.13	3.02	0.12	0.51	0.00	0.34	4.25	1.04
AC4	0.00	0.73	1.63	0.33	6.17	1.77	0.00	0.24	0.50	0.14	2.61	0.70
AC5	0.83	2.63	0.13	0.67	5.43	1.94	0.39	1.74	0.05	0.14	2.32	0.93
AC5	2.23	1.50	2.20	0.00	8.63	2.91	0.96	0.65	0.78	0.00	4.96	1.47
Mean	1.27	2.48	1.31	0.78	5.99		0.55	1.15	0.52	0.22	2.57	
LSD 0.05 media=1.395***							0.68***					
Accession=1.529***							0.73***					
Media X accession=3.418							1.64***					

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).
ns = not significant , * = $P < 0.05$, ** = $P < 0.01$, *** = $P < 0.001$

Stem Dry and Total Dry Weight of Some Seedlings of some *Dacryodes Edulis* Accessions as Influenced by Different Planting Media

The media, accession, media x accession effects was significant ($P < 0.05$) for the stem dry and total dry weight(g). The control (topsoil) media had significantly higher stem dry weight and similar trend was also observed in the total dry weight. The control (topsoil) media

was followed by the media combination of rice husk poultry manure and river sand in the ratio of 2:3:1 (Table 14). AC6 had higher stem dry weight (g) and total dry weight (g) among the accessions while AC3, AC6 in the control (topsoil) media had higher stem dry matter. Similarly AC6, AC4 and AC3 had the highest total dry matter .
in the control (topsoil) media (Table 14).

Table 14 : Stem dry and total dry weight of some seedlings of some *Dacryodes edulis* accessions as influenced by different planting media

Accessions	Stem dry weight (g)						Total dry weight(g)					
	Media						Media					
	1	2	3	4	5	Mean	1	2	3	4	5	Mean
AC1	0.36	2.89	0.00	0.00	1.85	1.01	1.50	6.80	0.00	0.00	4.30	2.52
AC2	2.17	3.33	2.07	1.39	0.23	1.84	5.74	7.75	5.38	3.29	1.23	4.68
AC3	0.58	2.19	0.00	0.75	7.30	2.17	0.84	3.23	0.00	1.59	12.17	3.59
AC4	0.00	0.80	1.27	0.27	5.94	1.66	0.00	1.70	2.84	0.43	12.70	3.53
AC5	0.98	2.13	0.27	0.55	5.14	1.81	1.72	5.64	0.41	1.12	8.81	3.56.
AC6	2.06	1.71	3.16	0.00	6.76	2.74	4.24	3.34	6.81	0.00	17.09	6.17
Mean	1.03	2.18	1.13	0.49	4.53		2.34	4.47	2.47	1.07	9.04	
LSD 0.05 media =	0.940***						2.15***					
Accession =	1.029*						2.36*					
Media X accession =	2.303***						5.28					

Key :1=Rice husk, poultry manure and river sand, ratio = 1:2:3, 2=Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,4= Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil).

ns = not significant ,* = P<0.05 ,** = P<0.01 ,*** = P <0.001

DISCUSSION

Studies was carried in the nursery as a trial to evaluate the effects of depulping and non depulping and soil type growing media on the emergence and seedling growth of *Dacryodes edulis*. Depulping the fruits of *Dacryodes edulis* leads to about 30.0% seedling emerging at 3WAP than where the fruits are not depulped. AC2 depulped had significantly more seedling emerging while non-depulping AC3 and AC6 had the lowest seedling emergence.

Soil media were Rice husk, poultry manure and river sand, ratio = 1:2:3, Rice husk, poultry manure and river sand, ratio= 2:3:1, 3=Saw dust, poultry manure and river sand, ratio = 1:4:3 ,Saw dust, poultry manure and river sand, ratio = 1:2:3 and control (topsoil). AC2 in rice husk , poultry manure and river sand ratio 2:3:1 had the highest on seedling emergence, while AC2 in sawdust ,poultry manure and river sand ratio 1:2:3 had the lowest on seedling emergence. This study equally provide quantitative data on the variability of *Dacryodes edulis* fruit traits. The high level of intraspecific variability is typical of an outbreeding tree species, and suggests that there is considerable opportunity for selection of elite trees for multiplication as cultivars (Leakey *et al.*, 2002).). The continuous variation in the fruit size (length, width) as well as the fruit weight and pulp weight in this study and similar study in Nigeria (Anegbeh *et al.*,2003), questions the validity of the suggestion that there are discrete

varieties of *Dacryodes edulis* (Okafor 1980, 1983; Okorie 2001). The variability in the fruit characteristics is important for further domestication of the species, whose flesh is consumed as a nutritious staple food. The extend of variability in fruit mass was found in this study . The evidence of continuous variation found in the fruit of *Dacryodes edulis* and other indigenous trees such as *Irvingia gabonensis* (Atangana *et al.*, 2001, 2002), probably represents the normal variability arising from out breeding, and is in contrast with the suggestion of Okafor (1983), who postulated the existence of two varieties with different fruit sizes.

There is a great diversity of variation of genetic and horticultural interest which exist in *Dacryodes edulis* to warrant the initiation of a selection and improvement programme since *Dacryodes edulis* has been found to be cross – compatible (Rambaldi, 1984), the continuous and overlapping trend of variation observed could be attributed to several generations of natural crossing between the different fruit types.

The significantly higher germination percentage on *Dacryodes edulis* seedling was recorded on control (topsoil) could be attributed to high nutrient content and greater porosity when compared to the other media consequent upon the greater space for air and water which are the basic conditions for seed germination.

The result from this study is in line with the findings of Okunomo *et al.*, (2004, 2009) who obtained higher germination percentage in topsoil with *Dacryodes edulis* and *Persea*

Americana respectively, citing the presence of adequate nutrients for germination and growth in topsoil. Bradbeer (1988) also reported that seed dormancy could be reduced by planting in different growth media thereby improving its germination.

CONCLUSION

The accession AC2 with rice husk, poultry manure and river sand ratio 2:31 recorded the highest effect on emergence and seedling growth *Dacryodes edulis*.

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