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EVALUATION OF SEED YIELD AND YIELD COMPONENTS OF TEN GENOTYPES OF GROUNDNUT (*Arachis.hypogaea*L.) IN SOUTH-EASTERN NIGERIA

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ABSTRACT

Ten genotypes of Groundnut (A. hypogaea) were assessed for seed yield and yield components in a randomized complete block design with three replicates at the Research Farm of the Michael Okpara University of Agriculture, Umudike in 2018 and 2019. In each year, the experiment consisted of 30 plots, each measuring 1m by 1m with a distance of 1m separating the plots and blocks. Seeds were planted at inter and intra row spacing of 0.5m to give a population of 40,000 plants ha^{-1}. Data were collected on length of branches plant^{-1}, number of branches plant^{-1},number of leaves plant^{-1}, days to flowering, number of pods plant^{-1}, and weight of pods plant^{-1}, number of seeds plant^{-1}, weight of seeds plant^{-1}, 100 seed weight, pod yieldha^{-1} and seed yieldha^{-1}. Analysis of variance showed that the genotypes differed significantly ($P<0.01$) in vegetative characters (length of branches, number of branches and number of leaves plant^{-1}) days to flowering, reproductive characters (number of pods plant^{-1}, weight of pods plant^{-1}, number of seeds plant^{-1}, weight of seeds plant^{-1}, 100 seed weight), pod yield ha^{-1}and seed yield ha^{-1}. Fisher's Least Significant Difference was used in separating the means of the characters. Number of leaves and number of branches plant^{-1} (Vegetative characters) greatly determined the performance of reproductive characters which translated to higher seed and pod yield ha-^{1}. Correlation studies corroborated this assertion as number of leaves plant^{-1}, number of branches plant^{-1}, weight of pods plant^{-1}, weight of seeds plant^{-1}, number of podsplant^{-1}, 100 seed weight plant^{-1} and pod yield ha^{-1} associated positively and significantly ($P<0.05$) with seed yield ha^{-1}. Path coefficient analysis revealed that weight of seeds, number of seeds and pod yield ha^{-1} were the first three most important individual characters that influenced seed yield ha^{-1}. Based on seed yield, the genotypes JL24, ICGV-15-87281, ICGV89754, JL12 and RMP-91-B could be released to farmers in southeastern Nigeria after further works for commercial groundnut production.

(Keywords: Seed, Yield, yield components, Genotypes, Groundnut)

INTRODUCTION

Groundnut (*Arachishypogaea* L.) is an annual herb in *fabaceae* family (Batioli*et al*. 2011,Tweneboah 2000). It's cultivated type originated from Southern Bolivia and Northern Argentina (Conha*et al*. 2008). According to Hamakareem*et al*., (2016) groundnut was taken across the pacific to the Philippines by the Spaniards before spreading to Asia. The Portuguese imported it into West Africa (Waele and Swanevelders, 2011, Wedejo and Wondewosen, 2017). The genetic diversity of the genus is classified into four gene pools: primary gene pool consisting of *A. hypogaea* and *A. monticola*, secondary consisting of diploid species from section *Arachis* that are cross-compatible with *A. hypogaea*, tertiary consisting of species of section procumbent that are weakly-cross compatible with *A hyprogaea* and the fourth gene pool consisting of the remaining wild species classified into seven other sections (Pasupuleti*et al*. 2013). The wild species are used as forage (Waele and Swanevelder, 2011). *A. hypogaea* is a self-pollinating crop with cleistogamous flowers, natural hybridization can occur to a small extent where bees' activity is high. Flowering begins 17-35 days after seedling emergence depending on the cultivar and environmental conditions. Flowers, simple or compound are borne in the axils of leaves and never at the same node as vegetable branch. One or more flowers may be present at a node (Seabra*et al*. 2019,Manivannan, *at al*. 2020 andMichael *et al*. 2020). The stigma becomes receptive to pollen about 24 hours before anthesis and remains so for about 12 hours more, and the dehiscence of anthers takes place 2-3 hours prior to opening of the flowers in the morning. Fertilization occurs about 6 hours after pollination (Yusuf *et al*. 2017 and Kumar, 2019).

Depending on the prevailing temperatures, the peg or gynophore carrying the ovary and fertilized ovule on its tips appears in 6-10 days and grows to enter the soil (Positive geotropic) where it develops into pods. The tip orients itself horizontally away from tap roots; (Yadlapalli, 2014), Bamshaiye*et al*., (2011) reported that groundnut is derived from Greek word arachis (legurre) and hypogaea meaning "below ground" referring to formation of pods in the soil. Shalini*et al*., (2016) and Tekle, *et al.,* (2022) reported that groundnut is valued as a rich source of energy contributed by oil (48-50%) and protein (25-28%) in the kernels. They provide 564Kcal of energy from 100g of kernals. Groundnut oil is an excellent cooking medium because of its high smoking point (Yusuf *et al*. 2017). Bodena (2018) reported that groundnut merg fix as much as 190kg nitrogen per hectare, being a legume crop. It helps to improve soil health and fertility by leaving behind N_2 and organic matter in the soil. Groundnut is not produced at commercial quantity in the southeast even with her enormous potentials that could favour its production. Identification of genotypes with high seed yield capacities, determination of the relationship between seed yield and yield components and the yield components that influenced seed yield ha^{-1} most are the objectives of this research work.

MATERIALS AND METHODS

Ten Groundnut (*A. hypogaea* L.) genotypes which included, RRB, SUMNUT 10, SUMNUT 20, RMP 91S (Small seed), RMP91 (big seed), JL 12, JL24, ICGV-8124,ICGV 89754 and ICGV 15-87281 were evaluated for growth, pod and seed yieldha^{-1} in 2016 and 2017 cropping seasons. The experiment was a randomized complete block design with the genotypes as treatment, replicated 3 times and was carried out at the Research Farm of the Michael Okpara University of Agriculture, Umudike (Longitude 07^0 33^1E, latitude 05^0 29^1N and altitude 122m) with temperature of 26^0C, (Meteorological centre, National Root Crops Research Institute, Umudike). The seeds sourced from Agricultural Research and Extension Services (IAR) Zaria, Kaduna State, were planted at a spacing of 50cm by 50cm with a distance of 1m separating the plots and blocks. Nine stands per plot and ten plots per block, on a land area of 19m by 5m. Weeding was done manually using hoe and hand pulling method as soon as they appeared. Data were collected on number of leaves $plant^{-1}$, number of branches $plant^{-1}$, days to 50% flowering, number of pods $plant^{-1}$, weights of pods $plant^{-1}$, number of seeds $plant^{-1}$, weight of seeds $plant^{-1}$, 100 seed weight, pod yield ha^{-1} and seed yield ha^{-1}.

Data were analyzed by one way analysis of variance and significant means separated with the Fishers Least Significant Differences (Snedeco and Cochran 1989, Obi, 2001). Correlation analysis was carried out to determine the relationship between seed yield ha^{-1} and seed yield components while Path coefficient analysis was carried out to determine the direct and indirect contributions of each yield component to seed yield ha^{-1}.of the genotypes in each year.

RESULTS AND DISCUSSION

The physical and chemical characteristics of the soil of the experimental site were taken before planting. The physico-chemical characteristics were analyzed and the result given on Table 1. The soil of the experimental site textural class was sandy- loam.

Table 1. Physicochemical properties of experimental site in 2018 and 2019

Physical characteristics	2018	2019	Method of Analysis
Sand (%)	75.6	74.2	Hydrometer (Jackson, 1962)
Slit (%)	10.3	11.8	Hydrometer (Jackson, 1962)
Clay (%)	14.0	13.9	Hydrometer (Jackson, 1962)
Textural class	sand-loam	Sandy loam	
Chemical properties			
PH (H_2o)	5.8	6.1	pH meter
Organic Carbon (%)	1.12	1.3	Flame Photometric (Kjehahl, 1983)
Total Nitrogen (%)	0.097	0.15	Kjedahl method (1983)
Available P ($mgkg^{-1}$)	33.4	22.7	Flames Photometric (Kjeldah, 1983)
Exchangeable K ($CmolKg^{-1}$)	0.221	0.3	Oxidation method (Kjedahi, 1983)
Exchangeable Ca ($CmolKg^{-1}$)	3.20	4.0	A. A. S. (Kjeldah, 1983)
Exchangeable Mg ($CmolKg^{-1}$)	0.96	1.1	A. A. S. (Kjeldah, 1983)
Cation exchange capacity ($CmolKg^{-1}$)	5.72	7.0	
Base Saturation	83.21	84.9	

Source: National Root Crops Researches Institute Umudike, Abia State, Nigeria.

The soil was slightly acidic with pH in H_2O of 5.8 in 2018 and 6.1 in 2019. The observed rise in organic carbon, total nitrogen and available phosphorus in 2019 was due to the residual effects of application of organic manure, which unlike inorganic manures released nutrients slowly. It was analyzed at National Root Crop Research Institute Umudike, Soil Science Laboratory.The soil was relatively suitable for the cultivation of *A. hypogaea*, (Baughman *et al*. 2015).

Table 2 showed the agro-metrological data of the experimental site in 2018 and 2019. The mean maximum temperatures were 31.75 and 32.22, while mean rainfall (amount) were 193.56 and 171.76 for 2018 and 2019 respectively. The minimum temperatures in both years are also given. The weather conditions were good enough for the production of *A. hypogaea*in Umudike.

Table 2: Mgro-Meteorological Data for Umudike Ecological Zone Showing Means for 2018 and 2019

	2018							**2019**						
	Rainfall		**Temperature (ºC)**		**Relative Humidity (%)**		**Sunshine**	**Rain Fall AMT**		**Temperature**		**Relative Humidity (%)**		**Sunshine**
Month	AMT	Days	Max	Min	0900 HRS	1500 HRS	(HRS)	(MM)	DAY	MAX	MIN	0900 HRS	1500 HRS	(HRS)
January	0	0	34	23	50	31	7	51	2	33	23	68	49	5.7
February	0	0	36	24	62	36	4.7	0	0	35	24	70	38	6.4
March	257	10	33	25	80	66	4.4	80.5	5	35	25	76	54	7.9
April	129.3	8	33	25	79	70	5.1	140.7	8	33	24	79	62	6.3
May	278..4	16	32	25	82	72	5.4	144.8	11	32	24	82	71	7.0
June	354.7	16	29	23	85	72	4.7	274.4	15	31	24	85	79	5.8
July	268.7	15	29	24	89	81	3.9	457.6	19	30	23	88	78	3.7
August	396.2	22	29	24	89	81	3.4	133.1	11	31	23	84	78	4.6
September	312.6	15	29	23	86	77	6.7	263.7	14	30	23	85	73	4.9
October	273.4	7	30	24	80	69	5.8	288.9	10	31	24	82	70	5.6
November	45	2	31	24	83	64	7.4	83	7	33	24	78	65	7.3
December	73	1	33	24	71	51	7.4	40	2	33	24	73	50	7.4
Total	2322.7	112	381	288	986	770	65.4	1957.8	104	387	285	717	582	50.4
Mean	193.56	9.33	31.75	24	78	64.17	5.45	163.14	163.14	32.25	23.7	79.67	64.67	5.6

The results of the analysis of variance (ANOVA) are presented on Tables 3 and 4.Thelength of branches varied from 40.56cm to 60.33cm in 2018 and from 39.33cm to 61.78cm in 2019. SAMNUT 20 had the shortest branches while JL24 branches were the longest in both years. Number of branches plant^{-1} varied from 7.44 to 9.78 and from 8.11 to 11.00 in 2018 and 2019 respectively. SAMNUT 20 also had the fewest number of branches while JL24 and JL12 recorded the highest number in 2018 and 2019 respectively. Number of leaves plant^{-1} varied from 126.81 to 276.70 and from 153.92 to 240.11 in 2018 and 2019. SAMNUT 20 also bore the fewest number of leaves while JL24 and ICGV 8124 had the highest number of leaves in 2018 and 2019 respectively. The ANOVA showed that the genotypes were statistically different ($P < 0.01$) in their vegetative characters {Number of leaves, Number of branches and Days to flowering} performance. The genotypes, ICGV-89754, JL24 and JL12 recorded superior vegetative characters performance than the other seven in both years.

Table 3: Mean of seed Yield and Yield Component of Ten Genotypes if Groundnut (*A. hyprogaea*) in 2018 Umudike

Varieties	Length of branches (cm)	No. of branches plant $^{-1}$	No. of leaves plant $^{-1}$	Days to 50% flowering	No. of pods plant^{-1}	Weights pods plant $^{-1}$	No. of Seeds plant^{-1}	Weight of seeds plant^{-1}	100 seeds plant $^{-1}$	Pod yield ha $^{-1}$ Kg	Seed yield ha^{-1} Kg
RRB	58.56	9.20	209.33	33.000	20.48	30.55	25.77	17.89	61.11	3457.6	1995.0
JL24	60.33	11.22	276.70	32.333	23.25	38.14	33.63	23.26	66.67	4279.4	2791.7
ICGV-15-87281	60.11	9.89	202.96	31.000	21.81	35.14	37.55	24.63	68.06	3934.9	2755.1
SAM NUT 20	40.56	7.44	126.81	32.000	23.22	25.66	28.85	16.81	60.00	2877.3	1701.6
ICGV-89754	57.11	10.22	229.59	32.000	24.22	37.77	37.63	27.22	66.67	43338.2	3045.1
JL12	50.44	9.78	243.15	31.667	23.25	36.63	34.44	20.70	63.33	4037.8	2618.9
ICGV-8124	58.44	9.22	204.81	32.000	25.00	28.44	32.07	17.00	64.17	3177.7	1929.6
RMP-91-5	44.00	9.67	229.63	31.667	24.00	35.55	38.22	20.55	63.06	3980.2	2310.7
RMP-91-B	51.89	8.22	189.85	31.667	24.00	32.33	34.45	21.55	66.94	3646.9	2402.4
SAM NUT 10	48.69	8.67	158.40	31.333	22.11	31.37	29.59	19.44	65.56	3515.2	2179.0
LSD 0.05	2.117	0.499	4.708	0.09955	1.238	0.748	0.662	1.198	1.425	71.66	68.85

Table 4: Mean of seed Yield and Yield Component of Ten Genotypes if Groundnut (*A. hyprogaea*) in 2019 Umudike

Varieties	Length of branches (cm)	No. of branches plant $^{-1}$	No. of leaves plant $^{-1}$	Days to 50% flowering	No. of pods plant^{-1}	Weights pods plant $^{-1}$	No. of Seeds plant^{-1}	Weight of seeds plant^{-1}	100 seeds plant $^{-1}$ (g)	Pod yield ha $^{-1}$ (Kg)	Seed yield ha^{-1} Kg
RRB	61.78	9.22	195.07	33.000	21.44	33.40	26.59	16.51	62.5	3433.6	1842.7
JL24	60.89	10.89	221.18	32.333	24.85	33.03	30.66	18.48	64.17	3700.4	2072.0
ICGV-15-87281	60.67	8.67	207.33	31.000	24.77	26.66	29.96	18.74	64.72	3293.9	2090.8
SAM NUT 20	39.33	8.11	153.92	32.667	22.33	24.99	28.03	15.63	60.56	2861.3	1755.1
ICGV-89754	52.67	10.78	237.92	31.667	28.11	32.66	31.14	20.92	67.22	3689.7	2331.2
JL12	57.89	11.00	225.92	31.667	22.70	32.29	29.77	18.22	65.83	3618.9	2043.2
ICGV-8124	59.89	10.56	240.11	32.000	23.33	29.18	30.11	17.74	63.06	3260.9	1989.7
RMP-91-5	40.33	8.67	150.18	31.556	26.89	27.81	33.77	15.77	56.94	3120.2	1771.6
RMP-91-B	45.22	8.56	205.89	32.333	25.92	32.22	30.81	19.18	65.56	3681.9	2137.8
SAM NUT 10	51.78	8.22	162.96	31.000	24.17	27.25	30.66	16.92	65.28	3069.2	1906.1
LSD 0.05	2.001	1.037	3.981	0.099	0.67	0.856	0.484	1.251	1.483	91.02	53.71

Table5 showed that large exploitable variations among the genotypes in vegetative characters (number of leaves, length and number of branches). InDays to flowering varied from 31.0 to 33 days in 2016 and 2017 respectively. The ANOVA showed that the genotypes were significantly different (P<0.05) their number of days to flowering. In 2018, ICGV-15-87281 flowered earliest while in 2019 ICGV-15-87281 and SAMNUT 10 flowered earliest. The genotype RRB flowered later than others. To carry out proper breeding activities, synchronization of flowering of various genotypes should be achieved through staggered planting.

Table 5: Variance ratio of Agronomical Character of 10 varieties of A. hypogaea in 2018 and 2019

Characteristics	Mean Square Genotype	Mean Square Error	Variance Ratio
Length of Branches	682.721	4.498	151.77**
Number of leaves	258798.40	24.89	1034.97***
Number of branches	17.931	0.28	64.02**
Days of 50% flowering	4.026	0.011	362.33**
Number of seeds/pod	155.409	0.491	316.37***
Number of pods/plant	39.702	0.484	81.99**
Weight of pods/plant	165.607	0.628	263.600**
Weight of seeds/plant	103.105	1.613	63.940*
100 seed weight	81.397	2.471	32.94*
Pod yield KgHq^{-1}	2030153.000	5767.000	352.020***
Seed yield KgHq^{-1}	1453260.000	5324.000	272.97***

Number of pod plant^{-1} varied from 20.48 to 25.00 and from 21.44 to 28.11 in 2018 and 2019 respectively. RRB bore the fewest numbers of pod plants^{-1} in both years, while ICGV-8124 and ICGV89754 bore the highest number of pods in 2018 and 2019 respectively. The ANOVA showed that the genotypes differed significantly (p<0.01) in number of pods plant^{-1}. Weight of pods plant^{-1} varied from 25.66 to 38.14 and from 24.99 to 33.40 in 2018 and 2019 respectively. The ANOVA showed that the genotypes were significantly differently (p<0.01) from one another in their weight of pods plant^{-1}. In both years SAMNUT 20 bore pods with the least weight. JL 24 bore heaviest pods in 2016. In 2017 JL24 and RRB pods were the heaviest.

Number of seeds plant^{-1} varied from 25.77 to 38.22 and from 26.59 to 33.77 in 2018 and 2019 respectively. The ANOVA showed that the genotypes differed significantly (P<0.01) in their number of seeds plant^{-1}. RRB also bore fewest number of seed plant^{-1} while RMP-91-5 recorded most number in both years. The weight of seed plant^{-1} varied from 16.81 to 25.22 in 2016 and from 15.63 to 20.92 in 2017. The ANOVA showed that the genotype differed significantly (P<0.01) from one another in their seed weight plant^{-1}. Weight of seed plant^{-1} was least in SAMNUT 20 while ICGV89754 seeds plant^{-1} were the heaviest in 2018. In 2019 the same pattern was observed. 100 seed weight varied from 60g to 68g and from 60.5g to 67.22g in 2018 and 2019 respectively. SAMNUT 20 100seeds were the least weighty in both years. 100seeds of ICGV-15-89754 were the heaviest in 2017. The ANOVA showed that the genotype differed significantly (P<0.01) in their weight of their seeds. This implies that the genotypes differed significantly in their reproductive characters (Number of pod plant^{-1}, weight of pod plant^{-1}, weight of seed plant^{-1} and 100 seed weight. Very high exploitable variations existed among the genotypes in their reproductive traits. RRB and SAMNUT 20 recorded least reproductive characters performance in both years while JL24, ICGV-15-87281, ICGV89754, JL12 and RMP-91-B recorded superior reproductive characters performance, which were statistically superior toreproductivecharacters performance of other genotypes. A very clear pattern was observed, in that the varieties that had superior vegetative characters performance also recorded superior reproductive character performance. This agrees with the finding of Chinatu and Ukpaka; (2016) in*Piper guineense*, Chinatu*et al* (2017) in *Cucumissativus*.

The pod yield of the genotype varied from 2877.3 to 4333.82 and from 2861.4 to 3700.0kg in 2018 and 2019 respectively. SAMNUT 20 recorded the least pod yield ha^{-1} in both years while JL24, ICGV-89754, JL12 and RMP-91-B performed best. The ANOVA showed that the genotype differed from one another statistically (p<0.01) in their pod yield ha^{-1}. Seed yield ha^{-1} varied from 1701.6 to 3043.1kg and from 1755.1 to 2331.2kg in 2018 and 2019 respectively. SAMNUT 20 in both years had the highest seed yield ha^{-1} while JL24, ICGV-89754 recorded the highest seed yield in both years. Huge exploitable varieties existed in the pod and seed yield ha^{-1} of the genotype, (Table 5).

High vegetative characters performances enforced high reproductive character performance which led to high pod and seed yield. Vegetative character (plant height, number of leaves and number of lateral branches) according to Ajibade and Morakinyo (2000), Chinatu and Okocha, 2006,and Anonymous (2010),determine the amount of photosynthates available to plants for growth and fresh pod yield. Tenebe*et al*., (1995) had reported that growth parameters (plant height, number of leaves and number of lateral branches) are strong yield parameters. Adeniji and Aremu (2007) reported that the proportion of the assimilates (photosynthates) allocated to the reproductive parts during flowering and fruit set go a long way to determine the number of pods, weight of pods, number of seeds and weight of seeds of okra varieties. The findings from this work are that the genotypeswith higher vegetative characters performance influenced higher reproductive characters performance which led to higher pod and higher seed yield in groundnut.

Table 6, showed the relationship between vegetative characters, reproductive characters, pod yield ha^{-1} and seed yield ha^{-1}. Days of flowering had negative but non-significant correlation coefficient – 0.200 and -0.293 in 2018 and 2019 respectively. This implies that time of flowering didn't affect seed yield significantly though they had an inverse relationship. Number of leaves plant^{-1} and number of branches plant^{-1} had positive and significant coefficients of correlation with reproductive characters and also associated significantly with seed yield. All the reproductive characters had positive and significant correlation coefficient with seed yield ha^{-1}.

Table 6: Correlation Matrix of means values of yield and yield components of ten genotypes *A. hypogaea*at Umudikein 2018 and 2019.

Traits	LB	NBP	NLP	DF	NPP 2018	WPP	NSP	WSP	100SW	PYH	SYH
LB	1.000										
NBP	0.145	1.000									
NLP	0.482**	0.751**	1.000								
DF	-0.465**	-0.209	-0.289	1.000							
NPP	0.295	-0.156	0.434*	0.060	1.000						
WPP	0.355	-0.277	0.405*	0.094	O.379*	1.000					
NSP	0.287	-0.356	0.397*	0.134	0.551**	O.734**	1.000				
WSP	0.355	-0.573**	0.384*	0.278	0.602**	0.809**	0.420*	1.000			
100SW	0.755**	-0.086	0.488*	0.278	0.729**	0.555**	0.855**	0.654**	1.000		
PYH	0.388	0.386*	0.419*	-0.104	0.433*	0.984**	0.752**	0.821**	0.603**	1.000	
SYH	0.302	0.494**	0.664**	-0.200	0.558**	0.891**	0.891**	0.951**	0.605**	0.834**	1.000
					2019						
LB	1.000										
NBP	0.235	1.000									
NLP	0.519**	0.415*	1.000								
DF	-0.419*	-0.167	-0.137	1.000							
NPP	0.273	-0.169	0.432*	0.202	1.000						
WPP	0.198	-0.260	0.398*	0.064	0.476**	1.000					
NSP	0.063	-0.245	0.375*	0.012	0.625**	0.628**	1.000				
WSP	0.385*	-0.285	0.383*	0.230	0.684**	0.453*	O.589**	1.000			
100SW	0.592**	-0.134	0.434*	-0.146	0.388*	0.667**	0.614**	0.684**	1.000		
PYH	0.663	0.378	0.424*	-0.172	0.465**	0.983**	0.589**	0.461*	0.650**	1.000	
SYH	0.338	0.362	0.562**	-0.293	0.649**	0.484**	0.643**	0.927**	0.662**	0.821**	1.000

***implies the correlation is significant at 0.05, ** correlation is significant at 0.01, LB= Length of branch, NBP= Number of branches plant^{-1}, NLP= Number of leaves plant^{-1}, DF= Days to flowering, NPP= Number of pods plant^{-1}, WPP= Weight of pods plant^{-1}, NSP= Number of seeds plant^{-1}, WSP= Weight of seeds plant^{-1}, SW= Seed weight, PYH= Pod yield hectare^{-1}, SYH= Seed yield hectare^{-1}**

This showed that increase in number of leaves and branches plant^{-1}led to increase in all the reproductive character which led to increase in pod and seed yield ha^{-1}. This agrees with the findings of Shoba*et al*., (2012) in groundnut.

From Table 7, weight of seed plant^{-1} (0.641 in 2018, 0.599 in 2019) was the single reproductive factor that influenced seed yield. Weight of prods plant^{-1} (0.406 in 2018, 0.375 in 2019) most importantly reproductive factor that directly influenced seed yield ha^{-1}. Pod yield ha^{-1} was the third most important factor that directly influenced seed yield. This implies that Agronomic practices and other factors that could improve the performance of weight of seeds plant ha^{-1}, weight of pod plant^{-1} and pod yield ha^{-1} will lead to increase in seed yield of these genotypes. Based on seed yield, the genotypes JL24, ICGV-15-87281, ICGV89754, JL12 and RMP-91-B could be released to farmers in southeast after further works for commercial groundnut production.

Conclusion:

Increased groundnut production is very viable in South East. Agronomic practices that improve vegetative characters performance would lead to improvement in reproductive characters performance which will translate to increase in pod and seed yield ha-1. Increase in performance of number of leaves plant-1 and number of branches plant-1 will lead to increase in weight of seeds plant-1, weight of pods plant and pod yield plant-1 which will lead to increase in seed yield ha-1. The genotypes **JL24, ICGV-15-87281, ICGV89754, JL12** and **RMP-91-B** could be released to farmers in southeast after further works for commercial groundnut production

Table 7: Estimates of direct and indirect effects between seed yield components for 2018 and 2019

		Indirect effect			**2018**				
TRAITS	**PYH**	**WSP**	**100SW**	**NSP**	**WPP**	**NPP**	**NBP**	**SYH**	**Direct effects on SYH**
PYH	1.000								0.410
WSP	0.942	1.000							0.641
100SW	0.803	0.859	1.000						0.046
NSP	0.665	0.881	0.865	1.000					-0.223
WPP	0.949	0.935	0.792	0.861	1.000				0.406
NPP	0.836	0.915	0.865	0.942	0.823	1.000			0.142
NBP	0.484	0.436	0.433	0.323	0.489	0.254	1.000		0.256
SYH	0.956	0.995	0.863	0.885	0.950	0.915	0.474	1.000	-
					2019				
PYH	1.000								0.330
WSP	0.586	1.000							0.599
100SW	0.576	0.859	1.000						0.197
NSP	0.484	0.626	0.332	1.000					-0.181
WPP	0.976	0.612	0.591	O.661	1.000				0.375
NPP	0.812	0.652	0.426	0.745	0.302	1.000			0.061
NBP	0.544	0.402	0.562	0.594	0.495	0.369	1.000		0.179
SYH	0.639	0.924	0.866	0.611	0.637	0.540	0.574	1.000	-

Residual effect= 0.34, NB= Number of branches plant^{-1}, NPP= Number of pods plant^{-1}, WPP= Weight of Pod plant^{-1}, NSP= Number of seeds plant^{-1}, 100w= 100 weight, WSP= Weight of seeds plant^{-1}, PHY= Pod yield ha^{-1}, SYH= Seed yield.

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