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Identification of adapted varieties of groundnuts (*Arachis hypogaea* L.) in SEKE BANZA area, Democratic Republic of the Congo (DRC)

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ABSTRACT

The present study aimed at identifying the most effective and adapted groundnut varieties to the climatic conditions of SEKE BANZA area, province of Bas Congo, Democratic Republic of Congo (DRC.). Twenty four varieties from IITA /DRC were tested in experimental site of INERA GIMBI. Randomised block design with four replications was used to evaluate grain yields (t/ha), height of plant at the end of flowering(cm), number of days for plant flowering, number of maturity days, stem diameter at the first internodes (mm), *Rosette* incidence disease(%), *Cercospora leaf spots* incidence disease (%), *Rosette* severity (1-5), *Cercospora* severity (1-5). Compared to controls, ten varieties revealed more effective. Evaluated parameters during season A were higher than during season B. Varieties not released have to be listed on national catalogue before their popularization. In SEKE BANZA area, diseases attack level is low mostly in season A. Number of days for plant maturity was correlated to number of days of plant flowering.

Keywords: *Arachis hypogaea* L., illness, effective variety, yield.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) occupies the first row among alimentary leguminous seeds mostly consumed in African countries like DRC (Ndjeuma et al., 2006). It is the fifth-largest oilseed produced in the world after palm nut, soybean, rapeseed and sunflower (Karunakaran et al., 2013). It keeps its character of incoming generation culture for the producers (Nigam et al., 2004). It is a good source of protein and contributes satisfying protein requirements mainly in developing countries (Eapen S. 2003; Okello et al., 2010), and for people whose revenue is so low that it does not allow them to regularly get food from animal origin (Wudiri, 1992; Osseyi et al., 2003). To promote this crop is very important in DRC as a developing country where food needs are growing higher and higher (Dugué et al., 2004; Okello et al., 2014).

Success of a culture requires accurate identification of high yield potential cultivars,

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adapted to specific environment and to determined production systems, resistant or tolerant to environmental stress, resistant to disease and insects attacks (Hossain and Hossain, 2013). Tshilenge et al. (2012) reported that the decrease of groundnut grain yields in the world and particularly in DR Congo is attributed to foliar diseases (mean of 850 kg/ha in DR Congo, low compared to 2500 kg/ha in developed countries). Walliyar (1990) reported the yields losses of 50% - 70 % were recorded in West Africa and up to 50% worldwide. In Bangladesh, groundnut can be attacked by at least 21 diseases (Talukder, 1974; Ahmed and Hossain, 1985; Ahmed et al., 1985). Among the diseases, early leaf spot caused by *Cercospora arachidicola S.* Hori and late leaf spot *Cercosporidium personatum* are the most important foliar diseases of the crop (Meena et al., 2014). In sub-Saharan Africa, the *rosette* disease is the first one which affects groundnuts culture and reduces its production (Naidu et al., 1999).

This culture requires minimum raining of 500 – 600 mm of well distributed rain (Mayeux, 2001). SEKE BANZA area which records an average of 1185.24 mm of rain yearly (Table 2), 88.8% of relative moisture, 28.5 °C of temperature and a productive soil, is an attractive area for groundnuts production. However, drop in yield is recorded. Peasants are not satisfied with grain yield obtained (Table 3) while using their local materials. This urges them to look for most effective materials).

The present study was undertaken to find out the most productive and adapted groundnuts varieties in SEKE-BANZA area, in order to help peasants in increasing their grain yield and their income.

MATERIALS AND METHODS

Experimental site

Investigation was conducted during two seasons: season A (from mid-September to mid-December 2011) and season B (from mid-February to mid-May 2012), in SEKE-BANZA area, in the experimental field of INERA (Institut National pour l' Etude et la Recherche Agronomiques) NGIMBI. This site is located at 5^0 28' 531" western longitude and 13^0 22' 071" southern latitude; 339 m of altitude and is a dry alluvial valley. The region falls within the AW5 climate type according to Köppen classification characterized by two rainy seasons: season A (from mid-September to mid-December), season B (from mid-February to mid-May) and two dry seasons (from mid-January to mid-February; from mid-June to mid-August) (Muderhwa, 2009). The rainfall mean is 1185.24 mm/year (Table 3). Experimental field is an herbal fallow. Its vegetation is the grassy savannah dominated by *Imperata cylindrica*. Its soil is sand-clay, black colored and enriched in humus (SENAFIC, 2011). In season A, the site received an average of 370.2 mm of rain and 92.1% of relative moisture. Temperature was varying between 21.8 and 28.2 °C. During the season B, site received an average of 349.7mm of rain and 85.6 % of relative moisture. Temperature was varying between 25.9 and 30.2 °C.

Plant materials

Twenty two varieties of groundnuts from IITA (International institute of tropical agriculture) DRC and two local varieties as controls were tested. Table 1 presents these varieties and their respective origins.

Cultural technique

Two seeds were sown at 20 cm x 40 cm and on a depth of about 2-3 cm. Manual weeding was carried out as to keep the field clean. The experiment was a randomized bloc design with four replicates. The plot was ploughed and ridged at a spacing of 1.5 x 1m. Grass plot size (experiment unit) was 2 m long and 1.6 m wide. Trials were performed in 2011 and 2012 years. The seeds were sown in

20 October 2011 for season A and on 28 March 2012 for season B.

Measured traits

Observations were made daily and data on the yield (t/ha) at the end of cultural cycle, the height of plant at the end of flowering (cm), number of maturity days at 50% of plants maturity, stem diameter (mm) at the end of flowering, number of days of plant flowering and incidence disease (%) were recorded and submitted to analysis of variance (ANOVA) using R software. Main effects were separated by least significant difference (LSD) test ranged at 5% level. The Incidence of diseases (%) was calculated following the formula stated below (Subrahmayam et al., 1995):

$$\text{Diseaseincidence}(\%) = \frac{\text{Numberofinfectedleaves/plant}}{\text{TotalNumberof leaves/plant}} \text{x100}$$

Twenty plants in population of 40 plants per parcel were used as sample to collect all data. The Incidence of diseases (%) was collected as soon as manifested. Severity (1-5) was recorded on 60, 70 days after seedling and analyzed by χ^2 test ranged on 5 % level.

The grain yield over (Table 9) of varieties (%), compared to controls were determined by the following formula:

$$\text{GrainYieldover}(\%) = \frac{\text{grainyieldofvariety} - \text{grainyieldof control}}{\text{grainyieldofcontrol}} \text{ X 100.}$$

RESULTS

The mean values for plant height, stem diameter at the first internodes, number of days of plants flowering, number of days of plants maturity, and grain yields are presented in Table 4; the correlations of measured traits are presented in Table 6. The incidence of diseases is presented in table 5. Grain yields over controls are presented in Table 7.

Plant height and stem diameter

The values for stem diameter and Plant height are summarized in Table 4. Plant height is one of selection criteria in breeding. In general, season A presented higher value than season B. Maximum in season A was recorded with ICVG SM 86021 (49.9 cm) variety, followed by G17 (47.9 cm). Maximum in season B was achieved with MGV4 variety (33.7 cm) followed by ICGV SM 86021 (32 cm). The smallest values come from MGV4 (28.4) in season A and from ZUANI (19.7) in season B. Significant differences among accessions were observed ($p \geq 0.05$). The control plant heights were 38.7 cm and 38.5 cm in season A; 20.2 cm and 19.7 cm in season B, respectively for MANDINGU and ZUANI.

The mean high values of Stem diameter were recorded with ICGV SM 86021 variety (0.49cm) followed by ICGV SM 99594 (0.47 cm). The smallest mean value is 0.31cm with 045/04/3 variety. Significant difference was detected among accessions ($p \geq 0.05$).

Numbers of days of plant flowering and Number of days for plant maturity

The values for Number of days of plant flowering and Number of days for plant maturity are summarized in Table 4. Differences in number of days for plants flowering among accessions were significant ($p \geq 0.05$). MGV4 variety got maturity in mean of 41 days after seedling, whereas the 23 other varieties took a mean of 27 days to get ripen.

As with Numbers of days of plant flowering, there were significant differences ($p \geq 0.05$) among accessions for number of days for plants maturity who indicates the duration of cultural cycle. The average ranged from 84 days (018/04/ and 3045/04/3) to 122 days (MGV4). The correlation between number of days for plant maturity and number of days of plant flowering was 0.88 and highly significant.

Grain yields

Grain yields were analyzed in details (Table 4). Considering the two seasons, maximum of grain yields was recorded with JL24 (1.329), followed by 048/04/3 (1.258) varieties. Compared to the control, grain yields (0.903 t / ha MANDINGU and 0.998 t/ha ZUANI), 10 varieties were more efficient (JL24, A1408, 048/043/3, 064/04/2, 018/04/3, 077/04/4, 080/04/1, ICGV SM 86021, G17 and ICGV SM 95523) because their grain yields over is higher than 10% according to IITA (2012). The above varieties have produced respectively grain yields over controls of 40.15%, 17.80%, 32.28%, 31.09%, 28.77%, and 14.24% and 22.76%, 18.44% and 17.70%; compared to MANDINGU and ZUANI. They can be recommendable to famers. There was no correlation between grain yield per hectare and others parameters measured.

Rosette and *Cercospora* disease

Incidences of Rosette and *Cercospora* diseases were analyzed in details (Table 5). In season B, diseases manifested particularly the *rosette* disease and the *Cercospora leaf spot* disease. Significant differences among accessions were observed in level of attack of diseases (Chi-square test). All varieties were sensitive to diseases except COMMON which was resistant to rosette disease. The ICGM SM 95523 variety is very sensitive to rosette (6.5%) of incidence.

Table1: Origin of varieties and their botanical type.

Varieties	Origin	Botanical varieties (types)
A1408	IITA/ DRC	Spanish
CG7	IITA/ DRC	Valencia
COMMON	IITA/ DRC	Valencia
G17	IITA/ DRC	Valencia
ICGM 281	IITA/ DRC	Valencia
ICGM SM 95523	IITA/ DRC	Valencia
ICGV SM 86021	IITA/ DRC	Spanish
ICGV SM 95523	IITA/ DRC	Valencia
ICGV SM 95530	IITA/ DRC	Valencia
ICGV SM 96722	IITA /DRC	Spanish
ICGV SM 99594	IITA/ DRC	Valencia
JL24	IITA /DRC	Spanish
JL24-1	IITA/ DRC	Spanish
JL24-2	IITA/ DRC	Spanish
MGV4	IITA/ RDC	Virginia
077/04/4	IITA/ DRC	Spanish
018/04/3	IITA/ DRC	Spanish
045/04/3	IITA /DRC	Spanish
048/04/3	IITA/ DRC	Spanish
064/04/2	IITA/ DRC	Spanish
080/04/1	IITA/ DRC	Spanish
050/04/1	IITA/ DRC	Spanish
MANDINGU	SEKE BANZA /DRC	Valencia
ZUANI	SEKE BANZA/DRC	Valencia

Table 2: Average of rainfall and number of rainy days in experiment site since 1977 to 2012.

Months	**Average of 25 years (1977 - 2002)**		**Average of 10 years (2002 - 2012)**	
	Rainfall (mm)	**Number of rainy days**	**Rainfall (mm)**	**Number of rainy days**
January	119.44	13.96	145.68	13.1
February	14.,68	12.46	122.86	10.3
March	161.56	15.5	167.98	13.9
April	169.25	15.22	175.52	15
May	60.06	11.74	37.84	10.5
Jun	1.9	4.74	3.5	7.1
July	1.6	5.13	1.82	5.4
August	3.87	6.09	5.38	9
September	14.9	15.88	7.76	12
October	61.1	18.42	81.88	21.8
November	185.48	18.79	245.76	20.33
December	142.08	16.17	189.26	16
Total	**1068.92**	154.10	**1185.24**	154.43
Average	**89.08**	12.84	**98.77**	12.87

Table 3: MANDINGU and ZUANI production in SEKE-BANZA area.

Peasant Organizations (DNGO)	**Production in season A in 2011 (t/ha)**	**Production in season B in 2011 (t/ha)**
MDM	0.87	0.86
LE RURAL	0.75	0.76
ADEM	0.82	0.80
APROFEL	0.89	0.87
CODELU	0.77	0.67
LERURAL	0.55	0.66
GRAB	0.88	0.48
GRAPS	0.91	0.81
GPM	0.56	0.84
Average	0.767	0.741

Table 4: Plants height, Stem diameter, Number of days to 50% flowering, Number of days to maturity and Grains yield.

	Plants height (cm)		Stem diameter (cm)		Number of days to 50 % flowering		Number of days to maturity		Grain yield (t/ha)		Grain yield
varieties	A season	B season	A season	B season	A season	B season	A season	B season	A season	B season	average (t/ha)
A1408	41.6	26.7	0.45	0.42	28.7	28.2	89.7	90	1.17	1.054	1.112
CG7	42.2	26.1	0.49	0.46	26.9	26	85.5	85.2	1.125	0.907	1.016
C0MM0N	45.4	25.9	0.55	0.56	27	26	90	89.2	0.842	0.718	0.78
G17	47.9	29.6	0.52	0.5	25.8	26	89.5	90	1.135	1.097	1.116
ICGM 281	43.7	25.1	0.54	0.54	26.7	26	89.5	89	0.93	0.905	0.917
ICGM SM 95523	47.1	27.4	0.52	0.5	29	26.7	89	88	1.065	0.878	0.971
ICGV SM 86021	49.9	32	0.59	0.59	28.7	29	90	89.2	1.26	0.987	1.123
ICGV SM 95523	46.1	30.3	0.51	0.5	27.5	28.7	89	89.7	1.285	1.014	1.149
ICGV SM 95530	42.8	26	0.56	0.55	28.5	27.5	89.5	89.5	1.057	0.845	0.951
ICVG SM 96722	39.9	20.3	0.47	0.46	26.2	28.5	89.2	89	1.022	1.054	1.038
ICGV SM 99594	40.5	24.8	0.57	0.57	27.7	26.2	90,.2	89	1.127	0.793	0.96
JL24	40	27.3	0.44	0.43	29	27.7	87.5	88.7	1.54	1.119	1.329
JL24-1	38.8	21.5	0.42	0.43	29.5	29	88	89.2	1.137	0.816	0.976
JL24-2	39,2	27.8	0.43	0.42	29	29,5	88,5	88,2	1.122	0.787	0.954
MGV4	28.4	33.7	0.46	0.44	42.2	40.2	121.2	122	1.2	0.63	0.915
077/04/4	35.4	23.4	0.48	0.45	30	29	85.1	85.2	1.427	1.178	1.178
018/04/3	38.6	20.8	0.47	0.47	26.3	27	84	85.2	1.252	1.19	1.221
045/04/3	37.6	21.5	0.51	0.52	28.2	27.2	85.7	84	1.215	0.905	1.06
048/04/3	34.2	25.2	0.46	0.43	28.7	27.7	86.7	86.7	1.462	1.054	1.258
064/04/2	38.4	22.5	0.47	0.45	27	27	86.2	86.5	1.38	1.107	1.243
080/04/1	34.7	24.7	0.44	0.45	29	29	85.2	85.7	1.657	0.671	1.164
050/04/1	32.3	20.4	0.48	0.45	25.5	25.4	85.2	85.5	0.94	0.832	0.886
MANDINGU	38.7	20.2	0.47	0.47	24.5	24.5	85.7	87	0.97	0.837	0.903
ZUANI	38.5	19.7	0.49	0.48	28.5	28.6	89.2	89.5	1.077	0.919	0.998
$LSD_{0.05}$	2.3	1.6	0.9	0.7	0.6	0.4	0.4	0.8	0.11	0.09	0.1

Table 5: Rosette incidence and *Cercospora* leaf spots incidence.

Varieties	Rosette incidence (%)	*Cercospora* leaf spots incidence (%)
018/04/3	2.5	3.5
045/04/3	2.75	1.775
048/04/3	1.5	3.125
050/04/1	2.25	2.75
064/04/2	1.75	4.5
077/04/4	1.5	6
080/04/1	3.1	1.35
A1408	3.375	1.65
CG7	3.65	1.525
COMMON	0	2.35
G17	1.575	2.225
ICGM281	4.6	2.1
ICGM-SM-95523	6.5	1.6
ICGV-SM-86021	1.95	3.25
ICGV-SM-95523	1.925	3.05
ICGV-SM-95530	1.5	3.35
ICGV-SM-96772	3	7.9
ICGV-SM-99594	3.35	2.65
JL24	3.25	2.425
JL24-1	1.25	2.3
JL24-2	2	3.175
MANDINGU	3.25	1.625
MGV4	3.25	3.5
ZUAINI	2	2.2
LSD 0.05	0.4	0.8

1: no symptom; 2: less than a half leave stunted; 3: up to a half of leave stunted; 4: yellowing and leaves drying; 5: plant death .

Table 6: Pearson's correlations among some morphological and agronomic traits of groundnuts.

	Variety	Plant height	Stem diameter	flowering	maturity	Grain yield
Variety	1					
Plant height	-0,32	1				
Stem diameter	-0,39	0,31	1			
Flowering	0,07	0,02	-0,22	1		
Maturity	-0,08	0,03	-0,05	0,88	1	
Grain yield	0,11	0,41	-0,16	0,05	-0,19	1

Table 7: The yield over controls of tested varieties.

varieties	Grain Yield (average of two seasons) (t/ha)	Grain Yield over MANDINGU (%)	Grain yield over ZUANI (%)	Average grain yield over (%)
A14O8	1.112	23.14	11.42	17.28
CG7	1.016	12.30	2.00	Less than 10%
COMMON	0.780	-13.8	-2.00	Less than 10%
G17	1.116	23.58	11.82	17.70
ICGM281	0.917	1.55	-8.11	Less than 10%
ICGM SM 95523	0.971	7.50	-2.70	Less than 10%
ICGV SM 86021	1.123	24.36	12.52	18.44
ICGV SM 95523	1.149	27.24	15.13	21.18
ICGV SM 95530	0.951	5.31	-4.70	Less than 10%
ICGV SM 96722	1.038	14.95	4.00	Less than 10%
ICGV SM 99594	0.960	6.31	-3.80	Less than 10%
JL24	1.329	47.15	33.16	40.15
JL24-1	0.976	8.00	-2.20	Less than 10%
JL24-2	0.954	5.64	-4.40	Less than 10%
MGV4	0.915	1.32	-8.30	Less than 10%
077/04/4	1.178	30.45	18.03	24.24
018/04/3	1.221	35.21	22.34	28.77
045/04/3	1.060	17.38	6.21	Less than 10%
048/04/3	1.258	39.31	26.05	32.28
064/04/2	1.243	37.65	24.54	31.09
080/04/1	1.164	28.90	16.63	22.76
050/04/1	0.886	-1.88	-11.22	Less than 10%
MANDINGU(check1)	0.903	0	-	-
ZUANI(check2)	0.998	-	0	-

DISCUSSION

This evaluation is important for breeding programs. Identification of adapted varieties of groundnuts in SEKE-BANZA area was the objective of this study. Their use is one of the most effective ways to improve production (Nigam et al., 2004). There were significant differences among accessions for evaluated parameters.

Plant height

Plant height at maturity is an important characteristic in cultivar evaluation. Mean values for plant height at maturity varies from 28.4 cm to 49.9 cm in Season A and from 19.7 cm to 33.7 cm in season B. Bangata et al. (2013) reported low mean plant height in the condition of KINSHASA with the same varieties. Maximum: 17.8 cm with ICGV SM 95530 variety and ICGV SM 95523 variety; minimum: 12.8 cm with ICGV SM 281 variety. The richness of soil in humus should be responsible of this situation. Hossain and Hossain (2013) reported a mean plant height of 44.4 cm with Dhaka-1 variety in BANGLADESH conditions. Growth behaviour of a plant mainly depends on its genetic constitution and prevailing environment conditions (Meena and Yadav. 2014). In general, season A presented higher value than season B. During the test period, quantity of rainfall in season A higher than in season B, and their equitable distribution.

Stem diameter

The stem diameter of plants indicates the capacity of plants to support the weight of production. The mean high values were recorded with ICGV SM 86021 variety (0.49cm) followed by ICGV SM 99594 (0.47 cm). Bangata et al. (2013) reported low values of stem diameter in the conditions of KINSHASA with the same varieties. According to these authors, poverty of the soil of KINSHASA and its sandy texture are responsible of the reduction of stem diameter. The sand-clay texture soil of INERA GIMBI, its richness in humus (SENAFIC. 2011), would favour development of size of stem diameter in this study.

Numbers of days of plant flowering

Differences in number of days for plants flowering among varieties were significant. Ndoye and Smith (1992) in Texas reported that days of plant flowering vary between 34 to 38 days after seedling. Kumar and Abbo (2000) assessed several genotypes in India and reported that the area location influences the beginning of plants flowering (95.6 days in Hisan 29^{o}N, 75.5 days at Gwalior 26^{o}N and 51.3 days at patancheru 18^{o}N) and number days of plant flowering.

Number of days for plant maturity

Significant differences were observed ($p \geq 0.05$) among accessions for number of days for plants maturity who indicates the duration of cultural cycle. The correlation between number of days for plant maturity and number of days of plant flowering was 0.88 and highly significant. With Dhaka-1 variety, Hossain and Hossain (2013) reported high mean value (167 days to get maturity) in Bangladesh conditions. Nobody (2004) classified groundnuts in 4 groups: the very early, the early, the later and the oil one. It means varieties that get ripen respectively at less than 100 days, at 105 days, at 122 days and at 126 days after seedling. Comparing ours results to the above classification, MGV4 variety would be oil. According to Khalfaoui (1999), 90 days after seedling at 75 % of groundnuts in maturity is one of the criterions of precocity. Thus, all our varieties are early, except MGV4. For this author, cultivars with a cycle varying between 75 and 95 days after seedling are early, type Spanish and Valencia; varying from 95 to 100, are half-early type Virginia; 120-150 days, are later. Compared to the above author classification, Twenty-three varieties in this investigation are early; only one is later (the MGV4 variety).

Grain yields

The evaluation of agronomic traits is important for breeding program particularly groundnut varieties are adapted to the specific agro-ecological regions and the phenotypes are highly influenced by environmental

factors (Li and Nelson. 2001). Compared to the control, grain yields (0.903 t / ha MANDINGU and 0.998 t/ha ZUANI), the result of present study show that 10 varieties were more efficient (JL24, A1408, 048/043/3, 064/04/2, 018/04/3, 077/04/4, 080/04/1, ICGV SM 86021, G17 and ICGV SM 95523) because their grain yields over is higher than 10% according IITA (2012). The above varieties have produced respectively grain yields over controls of 40.15%, 17.80%, 32.28%, 31.09%, 28.77%, and 14.24% and 22.76%, 18.44% and 17.70%; compared to MANDINGU and ZUANI (Table5). They can be recommendable to famers. The level of grain yields depends probably on the specific environment. Naidu et al. (1999) reported lower grain yield in Malawi with the same varieties. For example, JL24 produced 1.329 t/ ha at Gimbi and 0.34 t / ha in Malawi; the CG7 variety produced 1.016 t / ha in Gimbi whereas in Chitedze it produced only 0.23 t / ha. With the same varieties, Bangata et al. (2013) reported high grain yield in the condition of Kinshasa. JL24 produced 2.9t/ha in Kinshasa, G17 produced 1.5 t/ha in Kinshasa whereas 1.016 t/ha at Gimbi, ICGV SM 96722 produced 1.5 t/ha in Kinshasa whereas 1.036 t/ha at Gimbi. Jan de Graaff et al. (2011) reported also high grain yields: 12.5 t/ha, 9.2 t/ha and 6.8 t/ha respectively for JL24, G17 and A1408 in different countries of Sub- Saharan Africa.

Rosette and *Cercospora* disease

All varieties were sensitive to diseases except COMMON which was resistant to rosette disease. The ICGM SM 95523 variety is very sensitive to rosette (6.5%) of incidence. Naidu et al. (1999) reported that incidence of rosette varies from 4% to 67%. JL24 variety was attacked at 67%, CG7 was attached at 53% at Chitedze in Malawi. But less than the above values in this study (3.65 and 3.25) respectively for CG7 and JL24 were recorded. Natarajan and Sachithanantham (1986) reported that *Cercospora leaf spot* disease can cause losses of grain yield in order of 35 % until 80 %. Tshilenge et al. (2011) showed that the attack level of *Cercospora* depends on varieties. These authors indicated high incidence (beyond 80%) with 9 among 24 varieties used in the conditions of Mont Amba in Kinshasa. Tshilenge et al. (2012) reported that JL24, ICG9998, ICGM 281, A65, A1408 and G17 varieties are more sensitive to *Cercospora leaf spot* in conditions of Ngandajika, on scale varying from (1-9) . The high sensitive varieties on *Cercospora leaf spots* were 077/04/4 and ICGM SM 96772, respectively (6% and 7.9%) of incidence. The sensitivity should depend on each variety and each environment. Results on diseases revealed the sensibility of varieties on *Cercospora* and rosette, but the level was low, less than 10%. COMMON variety was resistant to rosette disease. Genetic constitution of each variety and the eco-climatic conditions would influence the development of growth parameters (Li Z and Nelson R. 2001; Hossain and Hossain. 2013).

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