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Identification and characterization of the main maize varieties grown in rural environment of North Kabare: South Kivu Province, DR-Congo.

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Abstract

The present research has set itself the objective of inventorying and contributing characterization of the main varieties (accession) of maize grown in South Kivu in the territory of North Kabare, particularly in three localities including Mudaka, Miti and Bugorhe. The results of this study showed that the majority of farmers use old degenerate varieties of maize that they buy in local seed markets for their farm operations. On the other hand, a very small portion of farmer's access seeds from research institutions. The most cultivated varieties are Nyamabunda, Bambou, M'Mboki, Simika and Katumani respectively.

The majority of maize varieties grown in rural areas of North Kabare had varied and diversified agronomic aspects. However, most of these varieties had low resistance to stress, but with an average yield in the field and an acceptable organoleptic appreciation. The maize association with other crops characterizes the most dominant cropping system.

Key words: Maize, Identification, Characterization, South Kivu

1.Introduction

Maize is the third most widely grown cereal in the world after wheat and rice, while it is the world's leading cereal crop when compared to its production (FAO, 2005).

For a long time, maize has been for many people and civilizations a food, a fodder for cattle, a commodity, a building material, a fuel, a medicinal or decorative plant. Its seed, stem, leaves, and ears are degraded, and its bristles have in most parts of the world a commercial value, even if that of the grain remains the most important (Emile, 1974), cited by Mulondwa 2013).

The current importance of maize on the national market is, in fact, due to the impact of the highly productive varieties developed in the 1980s by the PNM (funded by USAID) (Anonyme, 2009).

In sub-Saharan Africa, maize is a first-rate cereal; then, it deserves attention as a component of human as well as animal nutrition. It is the most widely consumed cereal in the form of whole grains, semolina or flours in low-income countries (Gomez, 1987).

This crop extends over a very large area of 40 million ha. Maize along with wheat and rice is one of the most important direct diets of humans. The world production is 600 million tons per year, 40% of which comes from the USA (Ristanovic D, 2001). It ranks 2nd worldwide among cereals after wheat (Dominique, 1990).

Since the 1990s, production in the industrialized countries has tended to stagnate while that of developing countries, and in particular those in Asia, is growing rapidly (Lubunga, 2007).

In DRC, maize is in 3rd place with 168,840 tonnes on an area of 142,570 ha, an estimated value of 1.1t / ha (Anonym, 2009).

For many years in South Kivu province most of the population's diet consisted mainly of foufou made from cassava flour. With the strong pressure of the African cassava mosaic and brown streak, cassava has experienced a dramatic fall in production that has affected the socio-economic life of the people of eastern DRC. This macabre situation has led farmers to a substitute crop that is currently being maize. It is noted today in the region and Bushi in particular, a particular intensification of maize by farmers and consumers for multiple uses in household food security.

Starting from its increased importance in the diet, maize tends to substitute cassava in the eastern part of the country, yet cassava is declared as the main crop of Congolese food. Paradoxically in these days, a gradual decline in maize yield is being observed, to the point that the demand for maize by products is slowly becoming taxable in the markets. This situation requires the population to resort to importation.

In the wake of this situation, it’s advisable with regard to the potential of arable agricultural land available in the country, to identify the main varieties of maize cultivated by farmers to feed thousands of Congolese and to identify their agronomic potential. The results of this study will lead to an intensified introduction or extension of the potential improved varieties in farmers’ areas to increase agricultural production.

Based on observations in agricultural settings, there is reason to believe that farmers' use of degenerate and traditional varieties could be one of the major reasons for the gradual decline in agricultural production of maize.

The present study sets itself as the main approach to make a varietal mapping by the identification and characterization of the main varieties of maize grown in the study area before revealing some constraints related to it.

Thus, some research concerns point to a few questions according to which; what are the main varieties of maize grown by farmers in Kabare North, what are their characteristics as well as their performance on agricultural yield and what are the varieties to offer?

2. AREAS, MATERIALS AND METHODS

2.1. Study field

The territory of Kabare is in the northern part a tape measure for measuring of Bushi. It's located between 28 ° 30 'and 28 29' East longitude and 2 ° 30 'South latitude, at an average altitude of 2,223 m altitude. Mountains characterize its relief and hills located mostly west of Lake Kivu, with soils from the extinct volcano Kahuzi-Biega serving maize production North Kabare.

Kabare is one of the eight territories of the South Kivu province in the Democratic Republic of Congo. The community of Kabare is subdivided into 14 localities of which three (Bugorhe, Miti and Mudaka) are among the areas that characterized our study.

As regards the Bugorhe locality, it is located 30 km from Bukavu city, with an area of 186.5 km^2. Miti's locality on the other hand is located about 25km from the city of Bukavu. Its area is estimated at 186 km2 of which the population occupies only 96.38 km2 and both state and private institutions occupy the remains. Mudaka grouping is located at more or less 20 km from Bukavu city, along Lake Kivu. In the North it is in border with the grouping of Miti in the East by the grouping of Bushumba and Bushwira in its western part (Batumike et *al*, 2011).

2.2. Materials

A survey questionnaire administered to maize farmers, a tape for measuring the size, the grouting stand for the diameter at the collar, a color list for the different colors of grain and maize plant.

2.3. Methods

The present study is carried out in three localities forming part of the territory of Kabare. These are Bugorhe locality, Miti locality and the Mudaka locality.

A field trip was conducted to administer a survey questionnaire to 425 maize farmers accompanied by an interview and a free field observation. Three types of descent were organized: the first at the vegetative stage of the crop in order to evaluate the behavior of the culture at the growth stage, the second at the flowering stage in order to characterize the inflorescences. The last stage was that of complete maturation or at harvest: its purpose was to observe the grains characteristics. The plant height of the plants was taken at the flowering stage, the length and width of the leaves, the numbers of the spikelet's, the size and the color of the male flowers as well as the length of the ears, their color, the color of the silk as well as the size of the ear at maturation and the number of rows per ear.

For data processing, the results were tabulated and coded in Excel and the matrix of individual (different maize varieties) variables subjected to multi-varied analyzes using the SPSS 18.0 Pro software. The Chi-square test was used to verify the statistical analysis (inference of a relationship) between the varieties and their different characteristics concerning the varieties of the maize crop. The contingency coefficient and that of Cramer (C) made it easier to verify the existence of an association between the variables in the sample.

3. RESULTS AND INTERPRETATION

3.1. Description of the respondents

Table 1. Age and seniority of respondents

The table1 presents the results of the average age and seniority of our respondents:

LOCALITIES	AGE OF INVESTIGATIONS		SENIORITY	
	Means	Standard deviation	Means	Standard deviation
BUGORHE	41,58	16,151	9,69	5,767
MITI	46,10	17,822	11,51	6,594
MUDAKA	47,44	16,236	12,66	7,733
TOTAL	45,73	16,732	11,69	7,136

According to the following average table of the age and seniority of the respondents, it appears that for the age of the surveyed the BUGORHE locality recorded an average of 41.58 years, the oldest of which was 57.73. and the youngest was 26.4 years old; that of MITI an average of 46.10 years of which the oldest was 28.2 and the oldest was 29 years old and the locality of MUDAKA an average age of 45.73 years the oldest was 62.46 and the eldest The seniority in the BUGORHE locality averaged 9.69, for MITI the average was 6.5 and MUDAKA 7.7.

Table 2. Gender, study and organization of respondents

The table below presents the results of the gender frequency and the farmer

Variables		**Localities**			**TOTAL**
		BUGORHE	MITI	MUDAKA	
Gender	Female	61,4%	51,0%	49,3%	**52,6%**
	Male	38,6%	49,0%	50,7%	**47,4%**
Study	No level of study	20,8%	18,0%	25,3%	**22,5%**
	Secondary	55,4%	55,0%	54,2%	**54,7%**
	University	23,8%	27,0%	20,4%	**22,8%**
Farmer	Staff	66,3%	44,0%	52,9%	**54,0%**
Organization	Salaried	33,7%	56,0%	47,1%	**46,0%**

Our field surveys show that the majority of our respondents in all localities are women, 52.6% and men 47.4%. For the level of study, the majority of our respondents did the secondary study is 54.7%, a part did the university study and presents on the whole a portion of 22.8% and finally a part is illiterate estimated at 22.5% . Part of the farmers' organization we note that 54% of our respondents work in personal organizations and 46% are employees.

3.2. SITE DESCRIPTION

Table 3. Vegetation, topography and geomorphology of the areas

The table below presents the results of the site description on the vegetation, the topography and the geomorphology of our surveys according to the different localities:

Variables Characteristics		**Localities**			**TOTAL**
		BUGORHE	MITI	MUDAKA	
VEGETATION	Any	49,5%	69,0%	100,0%	80,8%
	grass	50,5%	31,0%	0,0%	19,2%
TOPOGRAPHY	angled	31,7%	53,0%	40,0%	41,1%
	Plane	68,3%	47,0%	60,0%	58,9%
GEOMORPHOLOGY	Hill	0,0%	0,0%	1,8%	,9%
	High ground	100,0%	82,0%	98,2%	94,8%
	Plane	0,0%	11,0%	0,0%	2,6%
	Valley	0,0%	7,0%	0,0%	1,6%

According to the site description, we can see that a large part is not covered by vegetation, ie 80% of the study environment. The result shows that the vegetation does not significantly influence the locality surveyed (Chi-square = 125.958 and VC = 153.493). The majority of surveyed fields have topography which is flat or 58.9%. The test shows that the topography does not significantly influence the grouping surveyed (Chi-square = 9.663 and VC = 9.665). With regard to geomorphology almost all of our study environment was made up of high ground or 94.8%, The test shows that the trend is a little different from one locality to another (x2 = 64.547 greater than the critical value = 59.650, p = 0.000 and the contingency coefficient C = 0.363).

Table 4. The color of the soil matrix, the level of erosion and the status and purpose of the farm

The table below presents the results of the site description on the color of the soil matrix, the level of erosion and the status and purpose of the exploitation of our respondents according to the different groupings:

Variables	Characteristics	**Localities**	TOTAL

		BUGORHE	MITI	MUDAKA	
Color of the soil structure	Brown	33,7%	47,0%	45,3%	43,0%
	Grayish	63,4%	53,0%	54,7%	56,3%
	grayish black	3,0%	0,0%	0,0%	,7%
Erosion	Abundant	9,9%	0,0%	0,0%	2,3%
	None	0,0%	5,0%	0,0%	1,2%
	Slight	90,1%	95,0%	100,0%	96,5%
Type of operation	Ordinary field	55,4%	69,0%	69,3%	66,0%
	Experimental	3,0%	23,0%	0,0%	6,1%
	Small fields near houses	41,6%	8,0%	30,7%	27,9%
Purpose of exploitation	Self-consumption	37,6%	17,0%	17,3%	22,1%
	commercialization	60,4%	54,0%	82,7%	70,7%
	Scientific research	2,0%	29,0%	0,0%	7,3%

The color of the soil matrix was 56% more grayish in the clusters. The test shows that the trend is slightly different from one locality to another (x2 = 13.555 greater than the critical value = 12.565, p = 0.000 and C = 0.176). The soil showed slight erosion, ie 96%, the test shows that the trend is slightly different from one locality to another (x2 = 49.216 greater than the critical value = 44.023, p = 0.000 and C = 0.322). Farms were more for the fields with 66%; the test shows that the trend is a little different from one locality to another (x2 = 85.919 greater than the critical value = 85.309, p = 0.000 and C = 0.410). The test shows that the trend is a little different from one locality to another (x2 = 109.665 greater than the critical value = 98.056, p = 0.000 and C = 0.452).

3.3. IDENTIFICATION OF VARIETY VARIETIES OF CULTIVATED MAIZE

Table 5. Different varieties of maize grown in the field

The table below presents the results of the identification of the maize varieties of our surveys according to the different localities

Variables		**Localities**			TOTAL
		BUGORHE	MITI	MUDAKA	
Origin	INERA (NARS)	13,9%	41,0%	20,0%	23,5%
	Market	86,1%	59,0%	80,0%	76,5%
Cultivate	Bambou	6,9%	16,0%	14,7%	13,1%

Ecavel	0,0%	15,0%	0,0%	3,5%
Kahuman	1,0%	0,0%	0,0%	0,2%
Kalonge	0,0%	7,0%	0,0%	1,6%
Katumani	0,0%	8,0%	15,6%	10,1%
Lusheke	23,8%	3,0%	10,7%	12%
M'Mboki	14,9%	8,0%	12,9%	12,2%
M'Roma	2,0%	3,0%	16,0%	9,6%
Musama	0,0%	0,0%	4,4%	2,3%
Nyamabunda	19,8%	10,0%	14,7%	14,8%
Sadvill	3,0%	3,0%	0,0%	1,4%
Shaba	9,9%	18,0%	4,0%	8,7%
Simika	18,8%	9,0%	7,1%	10,3%

With regard to variety identification; based on our field investigations, we noticed that the majority of our maize seeds come from the market is 76.5% and the small part comes from the agronomic research center (INERA-Mulungu). These results test our hypothesis that the decline in maize yield is due to the inaccessibility of improved maize seeds. The test shows that the trend is slightly different from one locality to another (X_2 = 23.806 greater than the critical value = 22.446, p = 0.000 and C = 0.230).

For cultivated varieties, Bambou, Ecavel, Katumani, Kalonge, Katumani, Lusheke, M'Mboki, M'Roma, Musama, Nyamabunda, Sadvill, Shaba, Simika have been identified. Of these most cultivated varieties were Nyamabunda, Bamboo, M'mboke, Simika and Katumani. The statistical test shows that this trend is observed in all localities (X_2 = 280.050, V critical = 300.127.

3.4. AGRONOMIC CHARACTERIZATION OF CULTIVATED VARIETIES

Table 6. Some characteristics of cultivated varieties

The table below presents the results of the agronomic characterization of the cultivated varieties of maize from our surveys according to the different localities:

Variables	Varieties	Appreciations	Localities			TOTAL
			BUGOR HE	MITI	MUDAKA	
	Roma	Good	27,7%	38,0%	18,2%	25,1%

STRESS RESISTANCE	Selection Massale	Average	12,9%	26,0%	1,8%	10,1%
	Simika	Weak	59,4%	36,0%	80,0%	64,8%
ORGANOLEPTIC CHARACTERS	M'mboki	Good	62,4%	71,0%	72,0%	69,5%
	Shaba	Average	37,6%	29,0%	28,0%	30,5%
DISEASE RESISTANCE	Bambou	Low resistance	13,9%	4,0%	,0%	4,2%
	Simika	Average resist.	19,8%	,0%	,0%	4,7%
	Katumani	Good resistance	61,4%	60,0%	100,0%	81,5%
	Lusheke	Average resist.	3,0%	36,0%	,0%	9,2%
YIELD PERFORMANCE	Ecavel	Good	55,4%	73,0%	65,3%	64,8%
	Sadvil	Low	18,8%	,0%	,0%	4,5%
	Nyamabunda	Average	25,7%	27,0%	34,7%	30,8%
ABILITIES IN ASSOCIATIONS	Simika	Good	62,4%	55,0%	67,6%	63,4%
	Katumani	Average	37,6%	45,0%	32,4%	36,6%

From our field surveys for agronomic characterizations of cultivated varieties, the majority have a low resistance to stress, ie 64%; The test shows that this trend is observed in all localities ($x2$ = 73.671, V critical = 75.551). The majority of these varieties have an organoleptic character with a more or less good appreciation is 69.5% The test shows that the trend is a little different from one locality to another ($x2$ = 3.187 above the critical value = 3.108; p = 0.203 and C = 0.086).

For disease resistance, these maize varieties have an average strength in the middle investigated or 81.5%. The test shows that the trend is a little different from one locality to another (X_2 = 226.188 above the critical value = 208.526, p = 0.000 and C = 0.589). As for the appreciation of the yield, the majority of the farmers consider that the yield is good at 64.8%. The test shows that the trend is slightly different from one locality to another (X_2 = 65.945 greater than the critical value = 59.562, p = 0.000 and C = 0.366).
According to our surveys the varieties adapt to the association is 63.4%. The test shows that the trend is a little different from one locality to another (X_2 = 4,760 greater than the critical value = 4,710, p = 0,093 and C = 0,105).

3.5. BOTANICAL CHARACTERISTICS OF VARIETIES

Table 7. Some botanical characteristics of varieties

a. The color of adventive root, stem and the presence of pubescence on the leaves.

The table below presents the results of the botanical characteristics of the maize varieties on the stem root color, stem and the presence of pubescence on the leaves of our respondents according to the different localities:

Variables	Varieties	Colors	Localities			TOTAL
			BUGORHE	MITI	MUDAKA	
Color of adventitious roots	Lusheke	Brown	27,7%	11,0%	26,2%	23,0%
	Selection massale	Green	4,0%	,0%	,0%	,9%
	Mabunda	Green water	68,3%	82,0%	73,8%	74,4%
	M'mboki	Jade green	,0%	7,0%	,0%	1,6%
Rod colors	Katumani	Brown	24,8%	11,0%	23,6%	20,9%
	Mambou	Green water	75,2%	82,0%	76,4%	77,5%
	Simika	Jade green	,0%	7,0%	,0%	1,6%
Presence of pubescence on the leaves	Shaba	Absent	12,9%	16,0%	11,1%	12,7%
	Bambou	Present	87,1%	84,0%	88,9%	87,3%

Of this array of botanical characteristics of varieties, for the color of adventitious root, it is the color green water which was the most dominant is 74.4% The test shows that the trend is a little different from one locality to another (X_2 = 45.236 greater than the critical value = 42.747, p = 0.000 and C = 0.310). As for the stem, it was always the color green water with 77.5%, the test shows that the trend is a little different from one group to another (X_2 = 29.348 higher than the critical value = 27.730; = 0.000 and C = 0.254).

A high presence of pubescence on the leaves was observed, ie 87.3%, the test shows that the trend is a little different from one locality to another (X_2 = 1.499 greater than the critical value = 1.452, p = 0.473 and C = 0.059).

Table 8. The color of the panicle, husks and cobs

The table below presents the results of the botanical characteristics of the maize varieties of our surveys according to the different localities:

VARIABLES	Maize varieties	Colors	Localities			TOTAL
			BUGORHE	**MITI**	**MUDAKA**	
Tassel color	Simika, Bambou	Bisque	37,6%	21,0%	22,7%	25,8%
	Lusheke, Katumani	Plum	24,8%	11,0%	23,1%	20,7%
	Nyamabunda, M'mboki,Sélection Massale,Roma and Ecavel	Sand	0,0%	7,0%	0,0%	1,6%
	Shaba,	Naple yellow	37,6%	61,0%	53,3%	51,4%

Color of spathes	Lusheke et Katumani	Plum	24,8%	7,0%	24,9%	20,7%
	Roma, Nyamabunda, Selection massale, Bambou, Shaba, Ecavel and Sadvil	Water green	75,2%	86,0%	75,1%	77,7%
	M'Mboki	Jade green	0,0%	7,0%	0,0%	1,6%
Color cobs	Katumani et Lusheke	Bisque	1,0%	8,0%	25,3%	15,5%
	Roma	Off-white	2,0%	10,0%	0,0%	2,8%
	Bambou	Preaching	7,9%	0,0%	0,0%	1,9%
	Simika	Naple yellow	6,9%	20,0%	21,8%	17,8%
	M'mboki ;selection massale, Ecavel and sadvil	Ecre	18,8%	9,0%	5,8%	9,6%
	Nyamabunda	Papaya	29,7%	26,0%	18,7%	23,0%
	Shaba	Bisque	33,7%	27,0%	28,4%	29,3%

Starting from this table, the panicles had mostly sand color with 51.4%, the test shows that the trend is a little different from one locality to another (X_2 = 43.498 higher than the critical value = 42.299, p = 0.000 and C = 0.304).

The spathes had mostly the color green water with 77.7%; the test shows the color of spathes does not significantly influence the locality surveyed (Chi X_2 = 35,779 below the critical value = 36,186, p = 0,000) and the stalks had mainly the color preche with 29, 3%. The test shows that this trend is observed in all the localities surveyed (Chi X_2 = 108.451 below the critical value = 113.823, p = 0.000).

3.6. CORRELATION OF QUANTITATIVE VARIABLES

The table below presents the correlation matrix of our quantitative variables of our surveys according to the different localities:

	Crop cycle	Height / stem	No. of leaves on the stem	Leaf length	Sheet width	long pannicululus	long ears	Line / ears	Grain / online
Crop cycle									
Height / stem	**-0,006**								
No leaf / stem	-0,106	**0,034**							
Leaf length	**-0,023**	0,058	**0,050**						
Sheet width	**-0,017**	0,060	-0,101	0,292					
Long pannicule	**0,018**	**0,029**	**0,014**	**0,030**	-0,163				

long ears	**0,016**	0,150	-0,144	0,123	**0,041**	-0,054		
Line / ears	**-0,022**	**-0,019**	0,073	0,232	**-0,036**	-0,325	**-0,040**	
Grain / online	**0,008**	**-0,030**	**-0,005**	**0,016**	0,073	0,075	0,098	-0,099

N.B .: Bold values represent the threshold where there is a significance

Starting from this correlation matrix, it is found that between the cropping cycle and the stem height there is a negative correlation so the more the cycle increases by 0.006, the height of the plant decreases by 0.006.Between the cropping cycle and the length of the crop. leaves there is a negative correlation, so more cropping cycle increases by 0.023; the length of the leaves that it has it decreases of 0,023. Between the cropping cycle and width of the leaves also there is a negative correlation, therefore also if the crop cycle increases of 0,017 the width of leaf as for him decreases of 0,017. for the cropping cycle and the spur lines there is a negative correlation, the longer the cycle is 0.022, the line number decreases by 0.022.

Also for crop cycle and panicles length, there is a positive correlation so the more the cycle increases by 0.018; the length of panicles also increases, and for the length of the ears it results in a positive correlation so the more the cycle increases by 0.016 the length of the ears also increases by 0.016. Finally, there is also a positive correlation between the cropping cycle and the number of grains per line, the more the cycle increases by 0.008, the number of grains per line also increases by 0.008.

For stem height and number of leaves per stem thegrayish blackre is a positive correlation, plus the height of the stem increases 0.034 plus the number of leaves also increases by 0.034, for the stem height and the number of rows per spike there is a negative correlation, the longer the stem length increases by 0.019, the more the number of lines per ear decreases by 0.019, for the stem height and the number of grains per line there is a negative correlation, the longer the stem increases by 0.030 the more the number of grains per line decreases by 0.030 For the stem height and panicles length there is a positive correlation, the longer the stem lengthens by 0.029, the more the panicles elongates by 0.029.

From this table of correlation matrix, it is noted that between the number of leaves on the stem and the length of the leaves, there is a positive correlation plus the number of leaves increases by 0.050 the length also increases by 0.050; also the number of leaves on the stem and the length of panicles, there is a positive correlation plus the number of leaves increases of 0,014 the length of panicle also increases of 0,014 on the other hand between the number of leaves by stem and the number of grains per line there exists a negative correlation, the number of leaves increases by 0.005, the number of grains per line decreases by 0.005.

From this table of correlation matrix, it is noted that between the length of leaves and the length of panicles, there is a positive correlation plus leaf length increases by 0.030 the length of panicle also increases by 0.030; also between the length of the leaves and the number of grains per line, there is a positive correlation plus the leaf length increases by 0.016 the number of grains per line also increases by 0.016.

From the correlation matrix table, it appears that between the leaf width and the length of the ears, there is a positive correlation plus leaf width increases by 0.041 the length of the ears also increases by 0.041; on the other hand, between the width of the leaves and the number of rows per ear, there is a negative correlation plus the width of leaves increases by 0.036 the number of lines per ear decreases also by 0.036.

It is noted that between ears length and the number of rows per ear, there is a negative correlation plus the length of the ears increases by 0.040 the number of lines per ear decreases also by 0.040.

4. RESULTS AND DISCUSSION

In sub-Saharan Africa, maize is the most widely consumed grain cereal, semolina or flour in the low-income country (Gomez, 1987). Maize cultivation adapts to various soils. In our study area, some results showed that large areas of land were not well covered with other vegetation. The majority of the surveyed lands presented a flat topography, this is justified by the fact that the good cultivable grounds are upstream of the mountains of East Kivu, but also the 3 localities are bordering of the littoral of Lake Kivu. With respect to the geomorphology of our study area, most of the land was highland. The color of the soil matrix was volcanic soils turning gray and showing slight erosion. This is confirmed by the idea of (Ristanovi, 2001), according to which maize adapts well to soils of the varied type. The soils of North Kabare are tributary to the extinct volcano of Kahuzi Biega. This is confirmed (Byerlee, D. et al., 1997) showing that maize is a demanding plant with regard to soil fertility. The best yields are obtained in low-lying, well-drained soils (Dupriez et al.1987) cited by (Mundod Tshiayiji, 2010).

In terms of the identification of varieties, the results of our surveys have shown that most maize seed is grown in markets and not in research centers. This shows that this behavior can have an impact on the yield of maize production in the country. It was found that out of 11 varieties inventoried, only 5 are more cultivated including: Nyamabunda, Bambou, M'mboke, Simika and Katumani, etc. Of all these varieties identified in the field, we find that none of them is improved, which presages a danger on the decline of production. However, according to (Nyabyenda, 2005), agronomic research programs in Central and Eastern African countries focus on variety selection, plant protection and research on post-harvest technologies. Most of the breeding work was based on varieties introduced from abroad. With the intensification of research, it should be noted that some local varieties have certain characteristics for disease resistance and adaptation to local climatic disturbances (Nyabyenda, 2005).

Concerning certain agronomic characteristics of variety cultivated, the majority presents a weak resistance compared to stress, an organoleptic character having a more or less good appreciation. For disease resistance, these local varieties have average resistance. Yield and crop association show good behavior, only these local varieties require improvement in some agronomic aspects.

Finally, for the botanical characters of the local varieties, the dominant color of the roots was the predominantly green color. The color of the stems was dominated by green. This demonstrates the lack of diversification into genetic material or improved varieties. There was a high incidence of pubescence on the leaves, the panicle had a sandy color and the husks were mostly water green.

6. CONCLUSION

This work aimed to identify and characterize the main varieties of maize grown in South Kivu mainly in the territory of Kabare North, focused on 3 localities of Kabare including Mudaka, Miti and Bugorhe.

Our investigation took place mainly in the locality of MUDAKA, MITI and BUGORHE. Sampling was 25 households per locality at the occurrence of 100 households per locality but for the Mudaka 225 household locality, which made a total of 425 households for the total of our survey. At the outcome of our investigations the following results were observed:

With regard to the age and seniority of the respondents, the age of the surveyed BUGORHE locality averaged 41.58 years; that of MITI an average of 46.10 years and the locality of MUDAKA an average age of 45.73 years. For the seniority in the BUGORHE locality, there was an average of 9.69; for MITI the average was 6.5 and MUDAKA 7.7. The majority of respondents were women or 52.6%. For the level of study, the majority of our surveyors made the secondary study are 54.7%. For the organization of farmers found that 54% worked in the personal organization.

• With regard to the description of the site

For vegetation a large part is not covered with any vegetation representing 80%. The majority of surveyed fields had topography, which was flat at 58.9%, the geomorphology of our study environment consisted of high ground or 94.8%,

The color of the soil matrix was 56% greyish. The soil had a slight erosion of 96%. The farms were more destined for the fields with 66%, with the goal of marketing being 70%.

• For the identification of varieties:

Most of our maize seed came from the market, 76.5% and the small part comes from INERA / Mulungu; the most cultivated were the variety NYAMABUNDA, BAMBOU, M'MBOKI, SIMIKA and KATUMANI.

• For agronomic characterizations of varieties

Majority Cultivated varieties have a low resistance to stress, ie 64%; an organoleptic character having a more or less good appreciation is 69.5%, these varieties have a medium resistance to diseases in the medium is 81.5%. For the performance assessment, 64.8% of the respondents confirmed having a better yield in their fields and 63.4% practiced the association of plants on their farms.

• For the botanical characteristics of varieties.

For the adventitious root color, the green color was the most dominant, 74.4%. For the stem it was always the color green water with 77.5%. The high presence of pubescence on the leaves is 87.3%; the panicle was mostly sand colored with 51.4. The husks had mostly the color green water with 77.7%; and the raids had mostly the cool color with 29,3%.

There was a negative correlation between cropping cycle and stem height, cropping cycle and leaf length, between cropping cycle and leaf width, cropping cycle and spur lines, for stem height and number of rows per ear, for stem height and number of grains per row, the number of leaves per stem and the number of grains per line, the width of the leaves and the number of rows per ear; between the length of the ears and the number of rows per ear.

In addition there is a positive correlation between cropping cycle and panicle length, and for ear length, between cropping cycle and number of grains per row, for stem height and number of leaves per stem, For stem height and panicle length, number of leaves on stem and leaf length, number of leaves on stem and length of panicle; the length of leaves and the length of the panicles; also between the length of the leaves and the number of grains per line, the width of the leaves and the length of the ears.

This work cannot be closed without a recommendation for continuity. We recommend that these surveys be continued in the province and then study the agronomic performance of these different varieties of corn.

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