International Journal of Sciences

Research Article Volume 10 – February 2021 (02)

Prevalence and Morpho-Anatomical Diversity of Arbuscular Mycorrhizal Fungi Spores, from Soybean (*Glycine max* L.) Rhizosphere in the Agro-Ecological Zone 1 of Cameroon

Richard Tobolbaï[1], Albert Ngakou[2], Steve Tatoukam Toukam[2]

[1]Department of microbiology, Faculty of Science, University of Yaoundé 1, Laboratory of Mycrobiology, BP 812 Yaoundé

[2]Department of biological Sciences, Faculty of Science, University of Ngaoundere, Laboratory of biodiversity and Sustainable Development. Biofertilizer and Bioinsecticide Unit, BP: 154, Ngaoundere, Cameroom

Abstract: This work investigates on the morpho-anatomical diversity of arbuscular mycorrhiza fungus spores native to soybean rhizosphere in the agro-ecological zone I of Cameroon. Arbuscular mycorrhiza fungi spores have been trapped in pot on composite soils samples taken from three areas in each northern region. Soybean have been used as host plant. After 90 days of growth, the mycorrhizal fungus spores have been extracted and the host plant roots stained. Results analysis revealed that the mycorrhization frequency (F) and intensity (I) are higher at Maroua area (F = 4.6%, I = 3.95%) and lower at Guider zone (F = 1.33% and I = 1.22%). For the specific density, the values vary between 1.54% (Guider zone) and 5.2% (Yagoua zone). Regarding the specific richness, the obtained data fluctuate between 3% (Guider) and 8% (Mokolo). The morpho-anatomical characterization of the spores indicated the presence of 9 different specimens: *Septoglomus constrictum*, *Glomus maculosum*, *Glomus manihostis*, *Acaulospora kentinensis*, *Acaulospore myriocarpa*, *Rhizophagus intraradices*, *Ambispora sp*, *Funneliformis mossea*, *Diversispora epigae*. Among these strains, *Septoglomus constrictum* is the most abundant specimen while *Funneliformis mossea*, *Ambispora* sp and *Acaulospora myriocarpa* are the rarest. The agronomic performances of these strains can be evaluated for and ecological production of soybeans in the agro-ecological zone I of Cameroon.

Keyswords: sAgro-Ecological Zone 1, Specfic Density, Specific Richness, Mycorrhization Frequency, Myorrhization Intensity

Introduction

Arbuscular mycorrhizal symbiosis is the most common plant-microorganism symbiosis in plants kingdom (Strullu, 1991). The most appreciable advantage of this symbiosis is the uptake and transfert to plants, of some nutrients which are less available in the soil, mainly phosphorus (Lambers *and* al., 2008). This nutrients acquirement also concerns N, K, Mg, Na, S, B, Cl, (Caris and *al*., 1998). A mycorrhized plant shows a better resistance against environmental stresses, including drought (Subramanian and *al*., 1995), cold (Charest and *al*., 1993), high salinity (Davis and Young, 1985) and pollution (Leyval and *al*., 1995). In addition, mycorrhization reduces the incidence of root diseases and minimizes the harmful effect of some pathogenic microorganisms, (Dehne, 1982). This performance of mycorrhized plants in drawing soil nutrients and resisting to environmental stresses, grants to fungal symbionts a function of biofertilizer and crop protection agent (Dalpé, 2005). However, an appropriate knowledge of the arbuscular mycorrhiza communities structure and diversity, is crucial for the enhancement of their agronomic and environmental potentialities; particularly in tropical agroecosystems (including Cameroon), (Cardoso and Kuyper 2006; Lovera and Cuenca, 2007). In fact, Cameroon has a great climate diversity, due to its geographical position, and which allows it to be subdivided into 5 agro-ecological zones (FAO, 2008). The agro-ecological zone 1 on which our study is focused, covers the Far North region, the North and part of the North of the Adamawa region. This party of Cameroon is characterized by low rainfall, and the period of plant growth varies from 14 to 184 days (FAO, 2009). Among the severall crops cultivated in this area, soybean is cited among the most widely cultivated legumes (FAO, 2009). Due to its exceptional nutritional qualities, the production and consumption of soybean deserve to be encouraged (Anonymous, 2016). Indeed, its grains have a very high fat content (20%) and very good nutritional protein (35%). The are particularly rich in lysine, which is an essential amino acid. Soybean can replace proteins from milk, meat, fish, eggs, (Anonymous, 2016). This work is an analysis of the

Published at: http://www.ijsciences.com/pub/issue/2021-02/
DOI: 10.18483/ijSci.2439; Online ISSN: 2305-3925; Print ISSN: 2410-4477

Richard Tobolbaï (Correspondence)
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prevalence and diversity of endigenous fungi associated with soybeans in agro-ecological zone 1 of Cameroon.

Material and Methods

an intensive degradation, where rainfoll is reduced to 3 months and the dry season lasts at least 7 months. The precipitation varying between 500 and 1000 mm

1. Experimental site

This work have been carried out in the agro-ecological zone 1 of Cameroon which includes the the Far North region, the North and part of the North of the Adamawa region. It is an erea whith per year. The average temperature is 28° c (21° -34°). The plants growth period varies between 14 to 184 days (FAO, 2009).

Table 1: Geographical and climatological data of study site

Regions	Sampled zones	Sampled fields	Altituds (m)	Latituds	Longituds°	Rainfalls (mm/year)	Temperatures °c
Adamawa	Ngaoundéré	Field 1	1211	07.27041	13.55515	225-285	12-30
		Field 2	1090	07.41049	13.54827		
		Field 3	1155	07.46221	13.59745		
Far North	Mokolo	Field 1	326	10.58731	14.00415	500-1000	17-40
		Field 2	317	10.7412	13.7986		
		Field 3	371	10.86547	13.89596		
	Maroua	Field 1	408	10.61877	14.35906		
		Field 2	482	10.53025	14.13976		
		Field 3	357	10.53077	14.93538		
	Yagoua	Field1	357	10.28578	14.93538		
		Field 2	357	10.32601	15.24176		
		Field 3	331	10.49614	15.18793		
North	Guider	Field 1	494	9.95649	13.62433		
		Field 2	384	9.92437	13.93035		
		Field 3	298	8.76711	13.35941		
	Garoua	Field 1	247	9.30813	13.8870		
		Field 2	327	9.02162	13.49671		
		Field 3	295	9.31311	13.36625		
	Tcholiré	Field 1	311	8.38526	14.17865		
		Field 2	401	8.41254	14.17865		
		Field 3	297	8.52431	14.10856		

1. Soils sampling

Soils samples have been collected in three zones, randomly chosen per region, considering the accessibility aspect; and in each zone, three fields have been also randomly chosen. The selected field per zone are at least 10 kilometers apart. During the soil collection exercise, approximately 10 kg of soil have been taken between 05-10 cm deep per field. The sampled soil have been mixed up in each zone to obtain a single composite soil.

2. Physico-chemical characteristics of soils samples

The physico-chemical properties of the soil samples have been evaluated using the Palintest Kit with a 5000 photometer. The evaluated parameters are: Sand content, silt content, clay content, pH, conductivity, organic carbon (CO), organic matter (OM), phosphorus (P), Magnesium (Mg2 +) and Calcium (Ca +). These analyzes have been carried out at the Soil-Water-Plants Analysis Laboratory (ITRAD) (Chadian Institute of Agronomic Research for Development).

3. Trapping of mycorrhiza fungus spores

The multiplication of the spores have been realised according to the method of Brundrette and *al*. (1996) adjusted as follows; Soybean seeds have been sown in pot (2 liters capacity). For each composite soil sample type, five pots have been used. The used seeds have been obtained from local farmers and three have been sown per pot. The pots have been placed out of ground contact, sheltered from the wind, and watered directly with rainwater for three months. At this moment, the above-ground biomass have been eliminated, while the roots and the soil substrate have been taken to the Laboratory for analyzes. The roots have been removed, stored in the fridge at 4 ° C while waiting to be analyzed.

4. Roots staining

Fine harvested soybean roots have been thinned according to the method of Hayman, (1970), to assess endomycorrhizal infestation structures. Youngest roots have been cut into 1-2 cm length, they were then successfully washed, inserted into a test tube containing 10% potassium hydroxide, and heated in a water bath at 90°C for 30 minutes to clear the roots. Potassium hydroxide was eliminated then, the solution was filtered through a sieve before neutralization by rinsing with acidified water. Neutralized roots were mixed into cotton blue under a water bath for 15 minutes, filtered again through a sieve and rinsed with distilled water. Some roots were mounted in water for direct observations, while other were mounted in glycerine for later

observations.

5. Estimation of mycorrhization

The mycorrhization estimation parameters were evaluated according to the method of Sghir and *al*. (2013).

a). The mycorrhization frequency

The frequency or percentage of mycorrhization is the number of root fragments that have been found mycorrhized among the total number of the observed fragments.

F (%) = 100 (N-N0)/ N. N is the number of fragments observed and N0, the number of non-mycrhized fragments, (Sghir and *al*., 2013).

b). The mycorrhization intensity

The mycorrhization intensity is the root cortex colonization density by arbuscular mycorrhiza fungi. It is evaluated by attributing each root fragment a score class between 0 and 5 according to the estimation of root cortex colonization by arbuscular mycorrhiza fungi: 0 = No infection, 1 = Trace of infection, 2 = less than 10%, 3 = 10 to 50%, 4 = 51 to 90%, 5 = More than 90%.

I (%): ((95n5 + 70n4 + 30n3 + 5n2 + n1)) / N while n5, n4, n3, n2 and n1 are the numbers of the roots noted from 1 to 5, (Sghir and *al*., 2013).

6. Extraction of arbuscular mycorrhizal fungi spores

The mycorrhizal spores have been extracted according to the wet sieving extraction method described by Gerdemenn and Nicolson, (1963) adjusted as follows: 1. Mix a 500g soil sample in 4 liters of distilled water; 2. Homogenize by mechanical stirring for 15 min (repeat this exercise 3 times); 3. Pass this solution through a series of sieves that have size corresponding to those of arbuscular fungi spores (25-50-100-200-300-400 microns); 4. After rinsing the sieves, recover and mix the residue from each sieve in a 60% sucrose solution, then create a density gradient by centrifugation at 3000 rpm; 5. Filter the supernatant through a 25 micron sieve and collect the spores in Petri dishes.

7. Morphological classification of spores

The extracted arbuscular fungal spores were collected in Petri dishes and placed under a binocular magnifying glass for observation. Using forceps, they were grouped by morphotypes under the criteria of size, color and shape.

8. Determination of spore size

The spores size have been determined according to the method of Walter, (2003) described as follows: a. The spore is mounted on a slide without being crushed; b. A graduated ruler is placed 25 cm from the slide and the lens of the magnifying glass; c. With one eye, the spore is observed through the eyepiece of the magnifying glass, while the other eye is focused on the ruler; d. Carefully superimpose the image of the spore on the graduated ruler to obtain the size of the image in centimeters, the appearant size (Ta). e. Determine the magnification of the loupe (GO):

GO = Objective x Eyepiece. In our case, objective = 5.0 and eyepiece 10, GO = 50. The real size of the object is: **Tr = Ta/GO,** f. The size of the spore is obtained in centimeters and the conversion table have been used to asess the size in micrometers.

9. Morpho-anatomical characterization of isolated spores

After the determination of the shape, color and size of spores, they were mounted between slide and coverslip; one part in PVGL (Polyvinyl-Lactic Acid-Glycerol), the other in PVGL-Melzer's Reagent (V:V/1:1) (Koske and Tessier, 1983). Morphological genera determination have been made based on descriptions of Morton and Beny, (1990). The original descriptions of the species as well as the information provided on the website of the International Vesicualar Mycorhizal fungi collection (INVAM) (http: //invam.caf.wv.edu/taxonomy/speciesID.htm) have been used for identification of spores. The morphological characters of the spores described were compared with those of the original specimens description and reference strains.

10. Estimation of arbuscular mycorrhiza fungal spores

a. Specific density

The specific density is an estimation of the spores number in 100g of soil sample. **D (%): N / 100** where N is the number of spores counted and 100, the amount of soil used for their isolation (Sghir and *al*., 2013).

b. Specific richness

Specific richness is the number of different genus of arbuscular mycorrhiza fungal in a given CMA collection.

R (%): 100 (Number of different arbuscular fungus genus) / (Total number of spore counted)

c. Shanonne diversity index

This value permits to assess the diversity level within the identified arbuscular fungi community.

H '= - ∑pi.log2.pi where pi is the portion of the species i in the total number of species (S) in the study medium. **P (i)** is calculated as follows: **p (i) = (ni)/N** where **ni** is the number of individuals for species i and N is the total population (Shanonne and Weaver, 1949).

11. Statistical analysis

The data have been statistically analyzed using the "statgraphics 5.0" program which performs analysis of variance (ANOVA). The results averages from the different localities were separated using the least significant difference (LSD) at the threshold of the probabilities indicated. Pearson's correlation was used to analyze the correlations between the studied differents parameters. The links between the different parameters were determined by the Pearson correlation coefficient.

Results

1. Soils physico-chemical properties

Table 1 shows that all soil samples from the different zones of the three regions have an acidic pH (4.32-5.30). The degree of acidity is higher in the Yagoua zone (4.97) and less important in the Guider zone (5.30) (P <0.001). For the phosphorus content, its value is higher at Ngaoundéré (94ppm) and lower at Garoua (30 ppm) (P <0.001). The granulometric parameters are also variable according to the study zones: It is the Mokolo zone which is the most sandy one (73.20%), while it is that of Ngaoundéré which is the most clayey (56.91%). (P <0.001). Regarding the organic matter, significant difference was observed between the values, lower at Ngaoundéré (0,095%) and Maroua (0,0105%), and similar and higher in the other zones (112-114%), (P <0.001).

Tableau 1 : Physico-chemical properties of sampled soils

	pH	Sand	Limon	Clay	Cond	C.O (%)	M.O	P (ppm)	K (ppm)	Mg2+
Ngaoundéré	5,00 cd	20,28b	23,52d	56,19g	212c	0,055a	0,095a	94 f	330a	185e
Mokolo	5,13d	73,20g	14,84b	11,91a	150,4a	0,067bc	0,116c	43b	405b	60a
Maroua	5,02 bcd	12,86a	42,62f	44,55e	166,4a	0,061b	0,0105b	72d	560d	410f
Yagoua	4,97a	27,78c	25,69e	46,32f	268e	0,066bc	0,114c	43b	365a	115c
Tcholiré	5,02 bcd	71,52f	15,68c	12,79b	232d	0,065bc	0,112c	56c	450c	95b
Garoua	4,98 a	71,10e	14,00a	14,89c	250f	0,065bc	0,113c	30a	450c	180e
Guider	5,30e	57,45d	15,60c	26,93d	175,2b	0,066bc	0,114c	86e	430c	135d
P-value	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001

C.O .: Organic carbon; M.O: Organic matter; cond: Conductivity, Ndéré: Ngaoundéré.

2. Demonstration of endomycorrhizal symbiosis

Thinning and staining of the soybean plants roots revealed the presence of some specific structures which characterized the endomycorrhial symbiosis. Figure 1 shows the structures observed (vesicles : A ; hyphae: B ; endomycorrhiza spores : C). The spores are the structures that have been most observed.

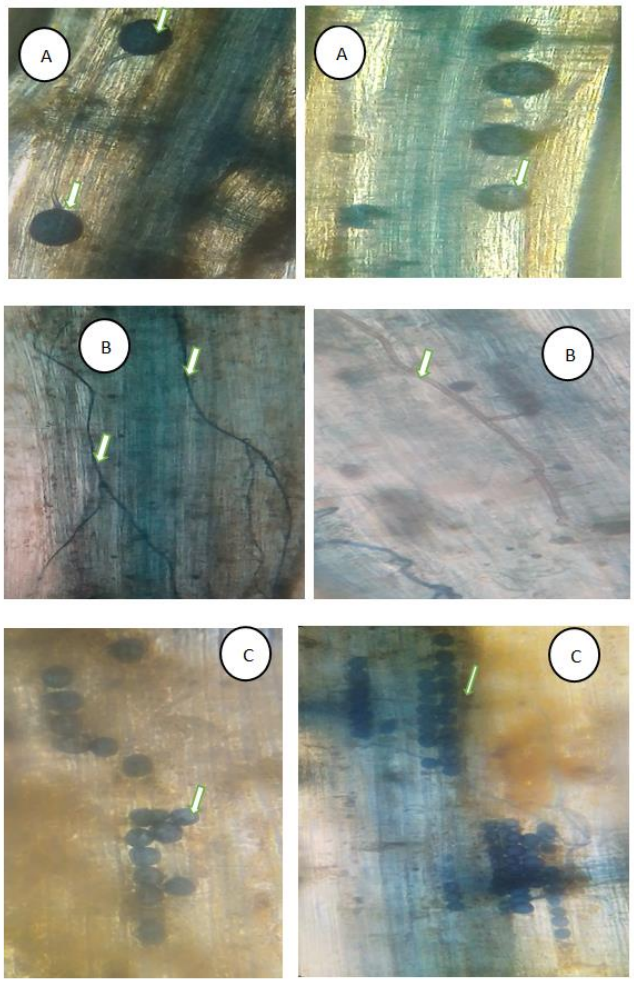
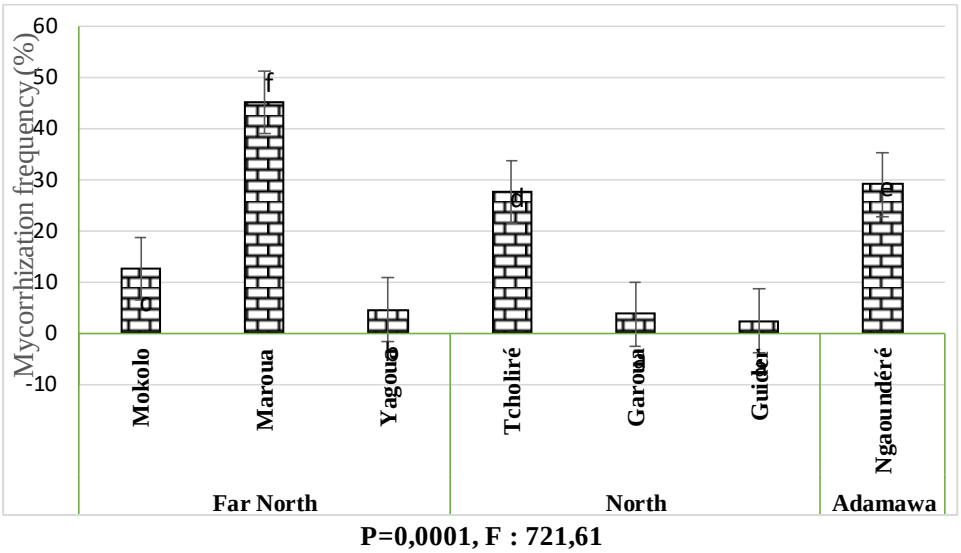


Figure 1 : Mycorrhiztion structures (A : vesicules, B : Hypha, C : spores)

3. The estimation of the mycorrhization

a). Mycorrhization frequency

Figure 2 indicates that the mycorrhization frequency is variable between the different study areas. The highest mycorrhization frequency was observed in the Maroua zone in the Far North (43.66%), followed by those in the Ngaoundéré zone (26.33%) in Adamawa and Tcholiré (25 , 33%) in the North; conversely, the values recorded in the areas of Guider (1.33%) and Garoua (3%) in the North are similar and are lower ($p < 0.0001$). Nadjilom and *al*. (2019) have also obtained similar results on the morphological and structural diversity of the arbuscular mycorrhiza fungi community in rice rhizosphere, grown in the sahelian zone of Chad: Mycorrhization frequency variable between 4 and 7.33%. These observations are lower than those of Gnamkoulamba and *al*. (2018) who recorded mycorrhization frequency values between 57-88% in a study on the diversity of arbuscular fungi in Togo. The variation of the mycorrhization frequency according to the sites can be justified by the history of particular land use of each site which negatively influences their mycorrhigenic potential; soils which have been cultivated for a very long time may see their mycorrhigenic potential greatly reduced, Głodowska and Wozniak, (2019).



P=0,0001, F : 721,61

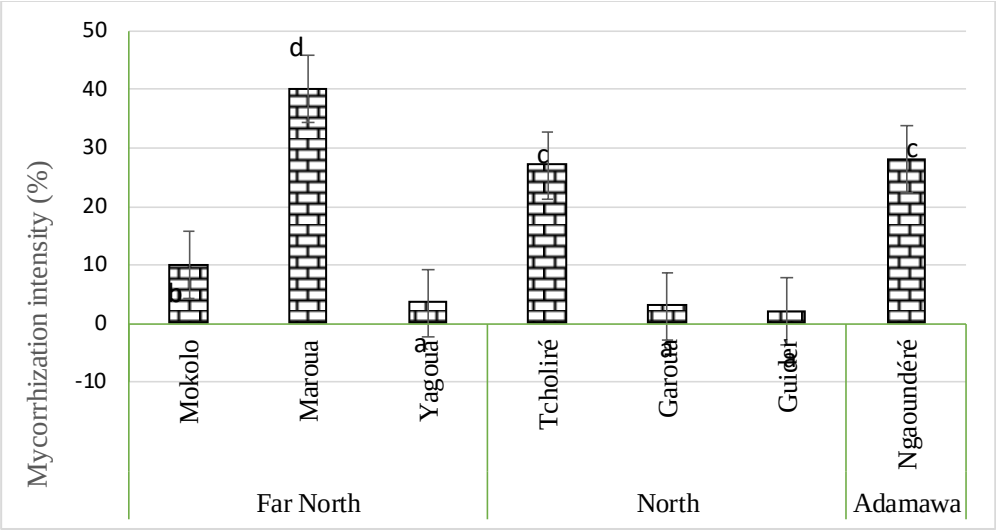
Figure 2 : Mycorrhization frequency

The mycorrhization frequency values are the average of three replications. Bars with the same letter are not significantly different at the indicated probability threshold.

b. Mycorrhization intensity

The variation of the mycorrhization intensity between the different study areas is illustrated in Figure 3. It have been noted that there is no significant difference

between the mycorrhization intensities of the Guider areas (1.22%), Garoua (3%) in the North and Yagoua (3.34%) in the Far North, and are lower compared to the values noted in the other zones. In addition, the intensities of the Tcholiré (24.26%) and Ngaoundéré (26.32%) zones are also similar and significantly lower than the value reported in the Maroua zone (39.55%), (P <0, 0001). Tobolbaï and *al*. (2018) recorded similar mycorrhization frequency values, ranging from 1 to 20% during a study on the diversity of arbuscular mycorrhiza fungi spores associated with maize in North Cameroon. On the contrary, these data are inferior to those of Ouallal and *al*. (2018) in Morocco who obtained an intensity of mycorrhization that fluctuates between 13 and 21% during a study on mycorrhizal fungi of the argan tree.



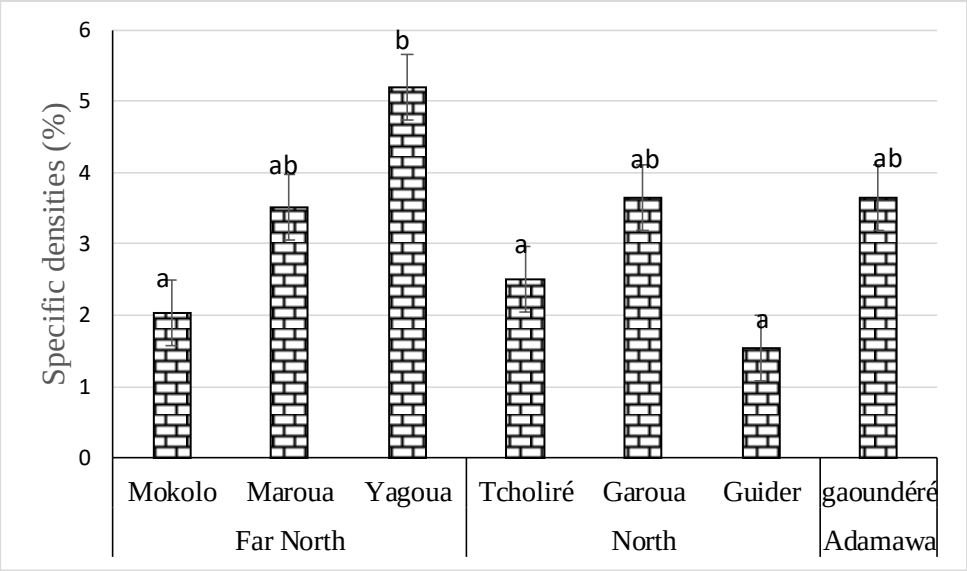
P <0.0001, F = 56.62

Figure 3: Soybean mycorrhization intensity

Mycorrhization intensity values are the means of three replicates. Bars with the same letter are not significantly different at the indicated probability threshold.

5. Specific density

Figure 4 shows that the specific density is variable depending of the study areas. Thus, the sporulation of arbuscular mycorrhiza fungi is greater in the Yagoua area (5.20%) compared to the other study areas (P = 0.0001). The lowest spore densities were observed in the areas of Guider (1.54%), Tcholiré (2.61%) and Mokolo (2.04%) which are not significantly different. The data reported in the areas of Ngaoundéré (3.65%), Garoua (3.87%) and Maroua (3.52%) are similar and are intermediate to the others. Similar specific densities have been reported by Zougari-Elwedi and *al*. (2012) in Tunisia where they recorded specific densities varying from 1 to 3% in the rhizosphere of date palm in the region of Djérid. Our results are lower than those of Ngonkeu and *al*. (2013) who reported a specific density that fluctuates between 15 and 115 during a study on the diversity of arbuscular fungi in Cameroon.



P = 0.0052, F = 1.76

Figure 4: Specific density

Specific density values are the average of three replications. Bars with the same letter are not significantly different at the indicated probability threshold.

6. Specific richness

Analysis of the variation in specific diversity (figure 5) reveals that the highest specific richness is that of the Mokolo zone (8%) in the Far North, ($p < 0.001$), followed by those of Yagoua (5%) and Garoua (5%), different of the data obtained in the areas of Guider (3%) and Tcholiré (3%) which are less. The diversities recorded in Ngaoundéré (4%) and Maroua (4%) are similar and intermediate to the others. These results are lower than those reported by Maurer and *al.* (2014) who obtained a richness that varies between 10 and 21% in Switzerland during a study on the effect of cultivation practices on the arbuscular mycorrhiza fungi community. The low diversity in our case can be attributed to the type of agricultural practices and the nature of the soils. In fact, a low specific richness can be attributed to a complex selection pressure by agricultural practices on the communities of CMAs among which, mineral fertilization, tillage, use of pesticides and monoculture, (Helgason and *al.* (1998).

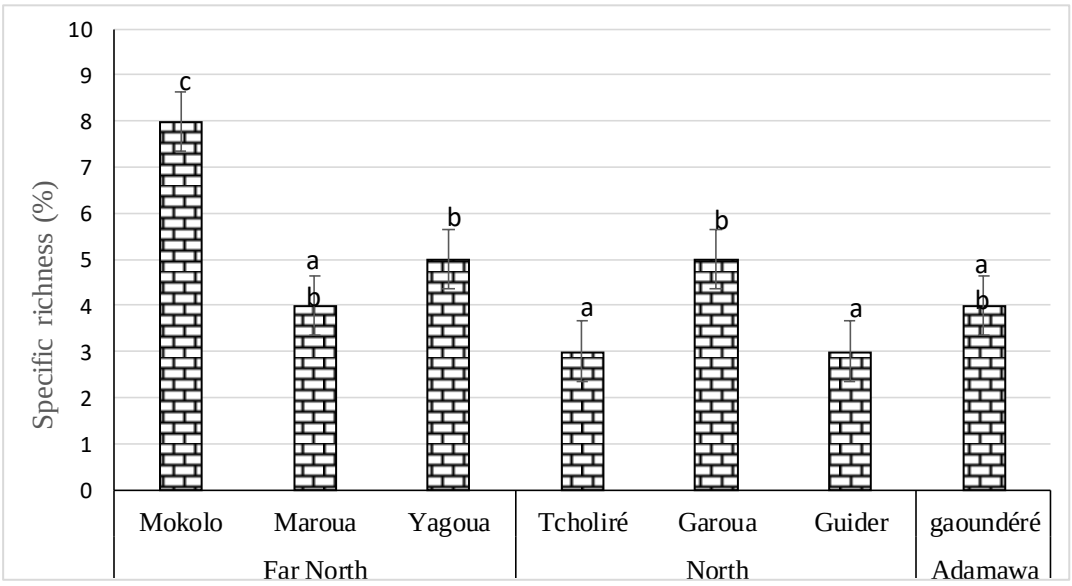


Figure 5: Specific richness

Specific richness values are the means of three replicates. Bars with the same letter are not significantly different at the indicated probability threshold.

7. Correlation between the mycorrhization parameters and the soils physico-chemical properties

It appears that the intensity and frequency of mycorrhization are positively related and the correlation is highly significant (P <0.0001, r = 0.9968). At contrary, there is a negative and significant correlation between the pH and the specific density (r = - 0.8089, P = 0.02). That means that a lower pH affects negatively soil CMA communities. A negative and significant correlation is also registered betwen the mycorrhizal frequency and the organic matter (r = -8061, P=0,027). Thus, when the soils is wthith hight fertility, the role of mycorrhization symbiosis can be less required and even totaly supress, Tacon and *al*. (1999). All the others correlations are not significant.

Table 3: Correlation between density and specific richness and the soils physico-chemical properties

	F (%)	**I (%)**	**D (%)**	**R (%)**
F (%)		0,9968	0,0399	-0,2540
		(7)	(7)	(7)
		0,000	0,9328	0,5826
I (%)	0,9968		0,0335	-0,3007
	(7)		(7)	(7)
	0,000* **		0,9431	0,5123
D (%)	0,0399	0,0335		0,0304
	(7)	(7)		(7)
	0,9323	0,9431		0,9485
R (%)	-0,2540	-0,3007	0,0304	
	(7)	(7)	(7)	
	0,5826	0,5123	0,9485	
pH	-0,3367	-0,3455	-0,8089	-0,0739
	(7)	(7)	(7)	(7)
	0,4602	0,4479	**0,0276****	0,8749
P	0,4234	0,4507	-0,2198	0,6600
	(7)	(7)	(7)	(7)
	0,3439	0,3101	0,6357	0,1067
K	0,4605	0,4223	0,1857	-0,2024
	(7)	(7)	(7)	(7)
	0,2984	0,3453	0,6902	0,6664
Cond	0,6264	0,6503	0,2352	0,3148
	(7)	(7)	(7)	(7)
	0,1323	1138	0,6116	0,4929
Clay	0,3676	0,3670	0,5772	0,2795
	(7)	(7)	(7)	(7)
	0,4172	0,4180	0,1748	0,5438
Sand	-0,5286	-0,5136	-0,5763	0,2623
	(7)	(7)	(7)	(7)
	0,2225	0,2386	0,1757	0,5698
Mg2+	-0,1453	-0,1010	-0,2778	0,2889
	(7)	(7)	(7)	(7)
	0,7543	0,8294	0,5464	0,5297
M.O	-8061	-0,7671	-0,1699	0,2004
	(7)	(7)	(7)	(7)
	0,0286**	0,441	0,7158	0,6666
C.O	-0,6264	0,6503	0,2352	0,3140
	(7)	(7)	(7)	(7)
	0,1323	0,1168	0,6116	0,4929

*** = Very highly significant; ** = highly significant; ns = Not significant; D (%) = specific density; R (%) = Specific richness; P (mm): Available phosphorus; C.O = Organic carbon, M.O : Organic matters ; Cond : Conductivity

8. Morpho-anatomical characterization of endomycorrhiza spores

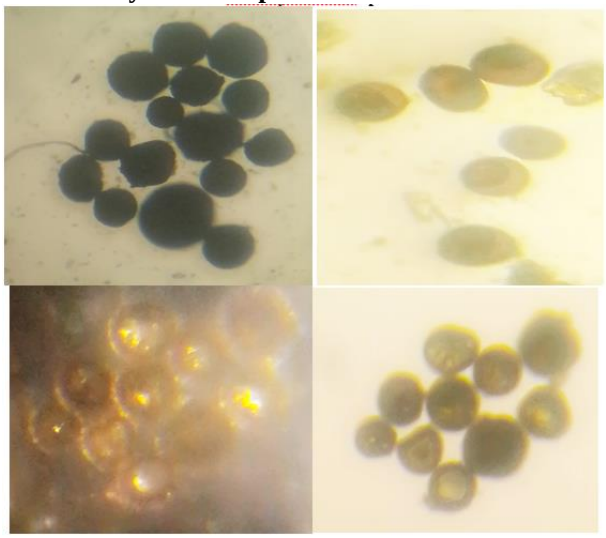
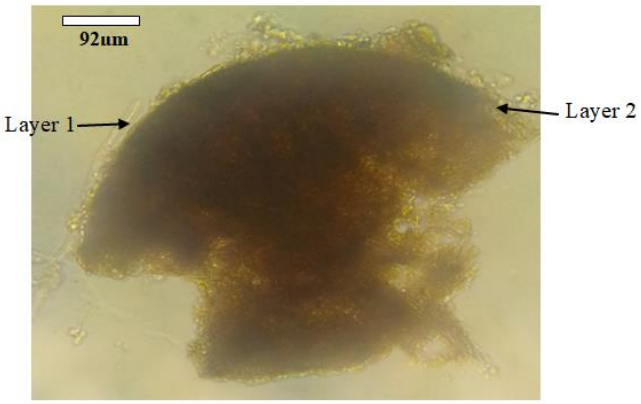


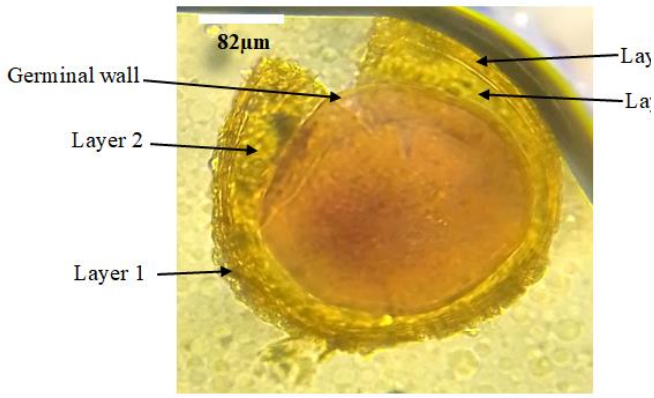
Figure 6 : Freshly extracted spores

a. *Septoglomus constrictum* (Trappe, 1977)

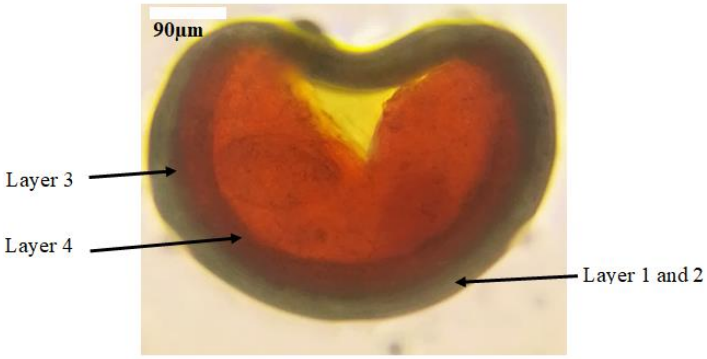


It is a species easies to recognize thanks to the distinctive color of its spores, notably brown-orange to black-brown (Trappe, 1977).

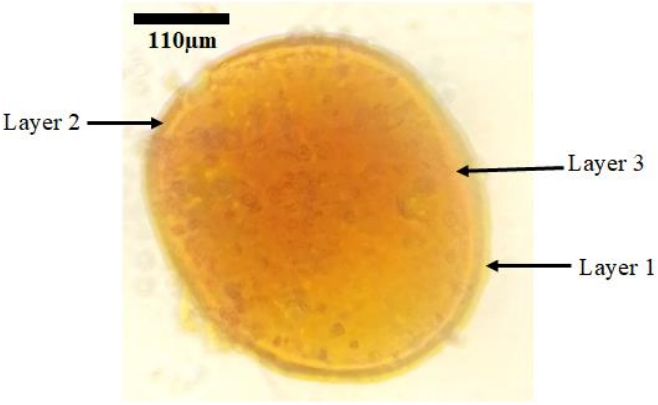
b. *Acaulospora kentinensis* (Kaonangbua and *al*., 2010)



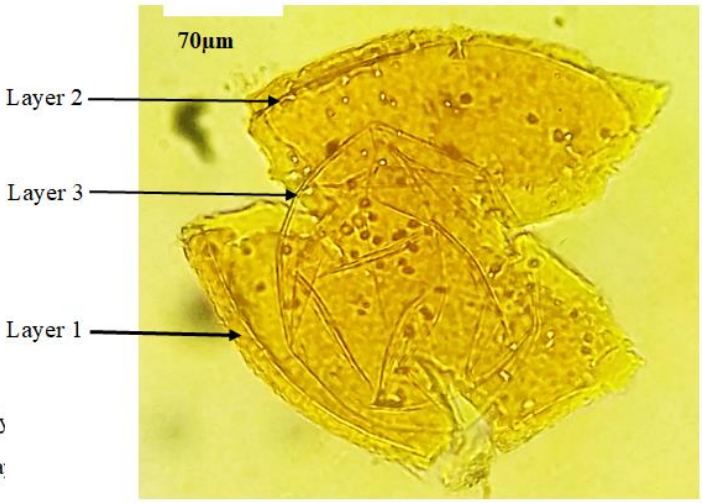
c. *Glomus maculosum* (Mill and Walker, 1986)



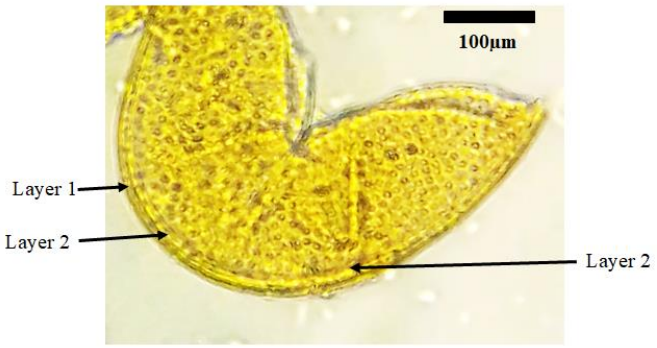
d. *Glomus manihotis* (Schenk and *al*., 1984)



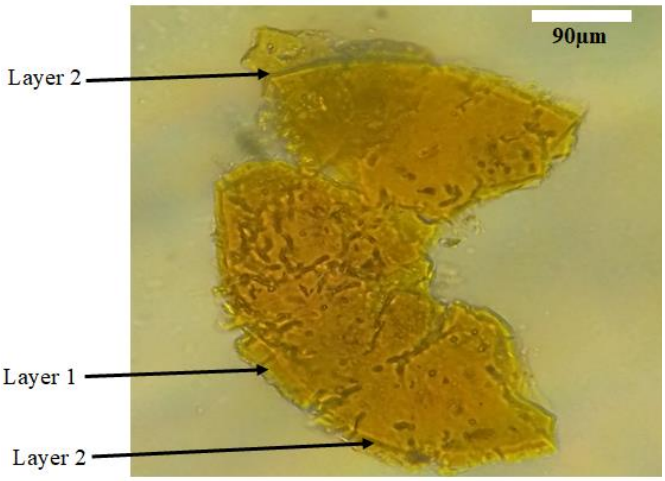
e. *Rhizophagus intraradices* (Schenk, 1982)



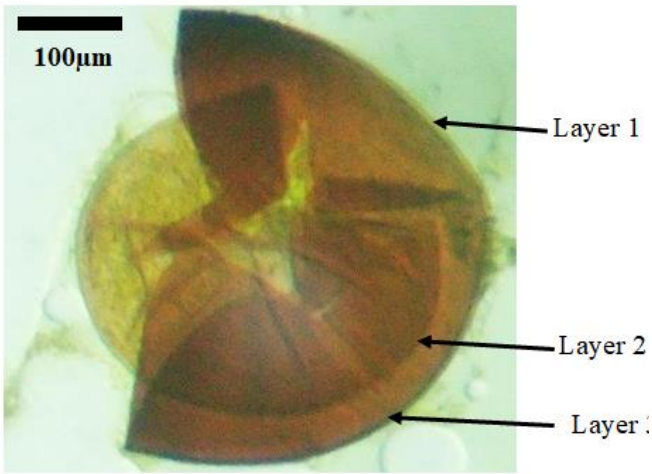
f. *Diversispora epigae* (Walker and Schubler, 1979)



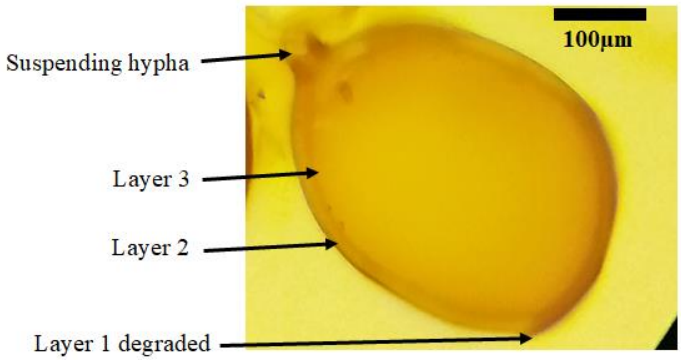
g. *Ambispora* sp (International Vesicular Mycorrhizal fungi collection (INVAM): http://invam.caf.wv.edu/fungi/ taxonomy/species ID.htm)



h. *Acaulospora myriocarpa* (Schenck and *al*., 1990)



i. *Funniliformis mossea* (International Vesicular Mycorrhizal fungi collection (INVAM): http://invam.caf.wv.edu/fungi/ taxonomy/species ID.htm)



9. Endomycorrhizal spores distribution

Table 4 shows the distribution of arbuscular endomycorrhizal fungal spores in the soybean rhizosphere within the study area. It shows that *Septoglomus constrictum* is the most abundant and representative specimen under soybean in the three regions. It is therefore the ubiquitous specimen of the rhizosphere of the plant under investigation in the agro-ecological zone 1 of Cameroon. *Funneliformis mossea*, *Ambispora* sp, *Acaulospora myriocarpa* are the least abundant.

The Shanonne diversity index is high in the Mokolo zone (H '= 0.99), compared to the other zones showing that its diversity is the highest, while this index is lower in the Bénoué (H' = 0.023) meaning that its diversity is the lowest. Similar results were found by Maurer and *al*. (2014) in Switzerland who noted that *Septoglomus constrictum* is the most abundant specimen in cultivated plots. Nadjilom and *al*. (2019) reported similar results, where they indicated that *Septoglomus constrictum* is the most abundant specimen of the rhizophere of rice in the Sahelian zone in Chad.

Table 4: Distribution of spores in the rhizosphere of soybeans in the different departments

	Mokolo	Maroua	Yagoua	Garoua	Tcholiré	Guider	Ndere
G. constrictum	1381	761	928	979	766	638	986
G. maculosum	42	0	1	3	0	0	1
G. manihostis	4	0	5	0	0	0	0
A. kentinensis	7	0	0	1	0	0	0
R. intraradices	23	92	18	22	14	15	3
Ambispora	4	0	0	0	0	0	0
A. myriocarpa	1	0	0	0	0	0	0
F. mossea	0	2	0	0	0	0	0
D. epigae	20	10	25	2	5	8	46
H'	**0,99**	**0,39**	**0,27**	**0,023**	**0,12**	**0,035**	**0,55**

H ': Shanonne's divrsity Index. The values assigned to each specimen correspond to its number at the end of three extraction operations; Ndéré: Ngaoundéré

Conclusion

This work aimed to study the diversity of arbuscular mycorrhiza fungus spores native to the soybean rhizosphere in agro-ecological zone I of Cameroon. The morpho-anatomical characterization of the spores indicated the presence of nine different specimens: *Septoglomus constrictum, Glomus maculosum, Glomus manihostis, Acaulospora kentinensis, Acaulospore myriocarpa, Rhizophagus intraradices, Ambispora sp, Funneliformis mossea, Diversispora epigae*. Among these strains, *Septoglomus constrictum* is the most abundant specimen while *Funneliformis mossea, Ambispora* sp and *Acaulospora myriocarpa* are the rarest. The agronomic performances of these strains can be evaluated for their in the cultivation of soybeans in the agro-ecological zone I of Cameroon.

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