Influence of Pig Manure on the Yield of Maize Variety Obatampa in the Prefecture of n’Zérékoré

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Abstract:
During 2019, an organic manure test was carried out in the Prefecture of N’Zérékoré with the aim of upgrading pig manure by producing the Obatampa variety maize. The test was carried out on a ferralitic soil with a Limono-clayey-Sandy texture, with a pH (water) 5.28; Assailable N = 0.00075 meq / 100gr of soil; Assailable P = 0.24 ppm; Assailable K = 4.83meq / 100gr of soil. The experimental set-up used is that of complete randomized blocks with four (4) repeats and four (4) variants, D0 = control; D1 = 10t / ha; D2 = 15t / ha; D3 = 20t / ha, on elementary plots of 2m x 4m (8m²). The form of organic fertilizer used was pig manure. The plant material chosen is the Obatampa variety of maize from Ghana, introduced in Guinea through the non-governmental organization (NGO) Sassakawa global 2000 (SG 2000). Phenological observations were made on emergence (j), three leaf stage, panicle formation, heading and maturity. The biometric evaluations covered the height of the stems, the length of the ears, the average number of seeds per ear, average weight of 1000 seeds and the yield. The climatic data (1625mm) recorded during the test period were generally favorable for the cultivation of maize. The statistical analyzes were carried out by the SPSS-LSD method at the 0.5% threshold and the Origin 8 software is shown. D3 rate = 20t / ha gave the highest yield 5.80t / ha and an Economic Index (RVC) of 3.49.

Key words: Maize, obatampa, pig manure, Yield, N’Zérékoré.

I. INTRODUCTION

To achieve food self-sufficiency for the growing world population, it is important to master certain parameters essential for the intensive production of food products in general and cereals in particular. Maize is one of the most popular cereal crops in the world. In world production according to Bespal (1984), it occupies more than 102.5 million hectares, including more than 20 million in West Africa. According to the FAO (1979) cited by the same author, world maize production was 394.2 million tons, of which about 3.6 million tons were in West Africa. Guy Rouane (1990) specifies that this production rose in 1981 to 452 million tons, more than rice (414 million tons) and almost as much as wheat (458 million tons). Today, According to the site (www.planetoscope.com / cereals - 2013) corn is the first cereal produced in the world ahead of wheat. World maize production in 2013 was 839 million tons compared to 653 million tons for wheat. According to Cresta and al. (1994) in southern Benin, maize provides populations with 60% of total food energy. Almost all of the maize is produced in the traditional way on small family farms. The yields obtained in the order of 600 to 700 kg / ha, are not only extremely low, but could fall further under the effect of increasingly frequent climatic disturbances. the same logic Adjahoussouand al. (2009), expresses that the threat of a food crisis is therefore persistent and the solutions recommended by decision-makers tend to promote the intensification of agriculture on the model of developed countries. In Guinea, as in some countries in West Africa, maize is one of the staple grains in the diet of rural populations. Its national production in 2016 was 748,639 tons (ANASA-2016). It grows well in all parts of Guinea and is less demanding than rice. Maize is the most energetic cereal (Charcosset and Col 2009) due to nutritional benefits (high starch content, presence of protein, amino acids, minerals (TE

mus and SA Tanumihardjo (2011). It is an important source for pig nutrition whether in the form of grain or wet grain corn silage thanks to its high digestible energy content and low protein content (Yara France 2020). The maize obatampa variety was introduced in Guinea at through the non-governmental organization (NGO) Sassakawa global 2000 (SG 2000) in collaboration with SNPRV (2002). This variety, whose advantages far exceed those of other varieties of maize (presence of lysine and tryptophan), A, E, C and a series of mineral salts and microelements. The use of pig manure in Guinea in soil fertilization is not widely practiced because of certain cultural constraints. However, in Forest Guinea, pig farming is a sector that concerns almost the entire population, mostly Christians; what motivated the Guinean government to install digesters to produce energy in some families. The use of this cheaper pig manure, the first of its kind in Guinea in soil fertilization, is an opportunity to be seized not only to increase crop yields in this part of Guinea but also to contribute to waste management, the health of the population, recovering pig waste by fertilizing the land and especially increasing the production of corn in rural areas. We hope that these first results obtained on the influence of pig manure on the yield of maize variety obatampa will serve as a basic tool for future researchers in this field.

II. MATERIALS AND METHODS

2.1. Materials

2.1.1 The site
N’Zérékoré prefecture located between 7 ° 22 'and 8 ° 34' North latitude and between 9 ° 04 'and 10 ° 16' West longitude. It covers an area of 3,632Km² with a total population of 396,949 inhabitants and a density of 109 inhabitants per km² [40].

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The climate of the test site is of the Equatorial Guinean type, with an alternation of two seasons, a rainy from May to November and a dry season from December to April. The annual rainfall varies between 1600 and 2000mm. This climate is the basis of important areas of agricultural production. The vegetation is characterized by dense forest in the South and savannah in the North. The flora is varied and consists of wooded savannah and islands of forests and dense forests [40]. The meteorological data used during the test period are from the N’Zérékoré meteorological station, located about 4.5 km south of the test, and were favorable for maize production. The experimental set-up was mounted on a ferrallitic soil with a silty-clay-silty texture with an apparent density of 1.09g/cm³ and a porosity of 60.12% good overall.

2.1.2 Soil and Pig Manure
The physical and agrochemical analyzes of the soil and of the pig manure were carried out at the SENASOL-Conakry laboratory. Overall, these results reveal that the soil is poor in organic matter, with a content of 1.56%, moderately poor in assailable elements N assailable = 0.00075, assailable P = 4.83ppm, assailable K = 0.24meq/100g of soil on an acid base PH (water) = 5. As for pig manure, the results indicate that it is rich in assailable N = 0.04meq/100g of soil; Assailable P. = 57.47ppm, assailable K2O 3.73meq/100g with a PH (water) = 5.74. The form of organic manure under study is pig manure. This manure comes from pigs fed on rice cake, corn on straw bedding accumulated in the pigsty (Building) built for this purpose, has been the subject of composting.

2.1.3 Plant material
The plant material used was the obatampa variety of maize. It is a hybrid from Ghana with a short vegetative cycle of 90 days, very rich in protein, amino acids (lysine and tryptophan) easily assimilated with a potential yield of up to 7 to 10t/ha in the station (SNPRV -1998).

2.2 Methods
The test was carried out in the Daaninin II district of the N’Zérékoré urban commune from October 03, 2018 to July 31, 2019. We used the full block experimental set-up. The variants formed are Do = control without treatment, D1 = 10t/ha of pig manure, D3 = 15t of pig manure, D4 = 20t/ha of pig manure were carried out at the SENASOL-Conakry station (SNPRV -1998).

2.3.1 Phenological observations
The results of the phenological observations appear in Table 3. As indicated by this table, the emergence and the stage of three leaves were uniform at the level of the control plots Do and those which received the dose D1, D2 and D3. From
3.2.6. Yield (t / ha)

The comparison of the averages of the yields from the LSD test at the 0.5% threshold shown in (Figure 6). The addition of pig manure positively influenced the yield (t / ha) of obatampa maize. From this graph it appears that the dose D3 gave the highest yield (5.80 t / ha) compared to the dose D2 = 3.43 t / ha and D1 = 3.31 t / ha which, they show no statistically significant difference. The lowest yield was observed at the dose D0 = 1.94 t / ha. Like the height, the yields were proportional to the increase in the rate of pig manure. The D3 dose gave the highest yield (5.80 t / ha) followed by the D2 doses = 3.43 t / ha and D1 = 3.31 t / ha. A highly significant difference (P <0.05) was recorded between the different treatments (D1, D2 and D3) and the D0 control (1.94t / ha) which gave the lowest yield (t / ha).

IV. DISCUSSION

The valorization of pig manure by the production of the first corn of its kind in Guinea, is an added value in improving crop yields in the forest zone. The management of pork waste and the use of obatampa corn whose nutritional values are superior to other varieties of corn due to its richness in amino acids lysine and tryptophan, vitamins A, E, C, minerals and trace elements in food of children [5, 6, 7, and 19]. It is in this context that this study, the influence of pig manure on the yield of maize variety obatampa, has proved indispensable in this forest area of Guinea. Among others, authors [37, 38, 16, 15, and 22] have confirmed that Far from being waste, pig manure is a valuable source of nutrients that is to say of fertilizers, for plants, which also improves soil quality. From the point of view of the duration of the different phenophages, emergence is the start of maize growth; for the four variants formed, the start and end of emergence and the stage of three leaves were identical. However, at the panicle formation level, we observe an early start and end for the variants D1, D2, and D3 compared to the control variant D0 this is certainly explained by the contact effect of organic manure - seed which raised the dormancy of grains by softening their seed coats and thus facilitating their absorption of water. As for the end of heading and maturation, the differences of 2 to 3 days observed between the variants having received the doses of pig manure are identical except D3 and D2 which are identical at the end of maturation. This difference is due to the effect of organic manure by its improving action of the texture which acted on the porosity of the soil by conserving water compared to the control variants D0 [25] which states that organic manure improves the properties. soil physics. Climatic conditions play a major role in the development, growth and productivity of maize [9], the average temperature recorded (30.22 ° C) during the test period is within the limits indicated by [28, 29, 30, 35], who argue that temperatures between 25 ° C - 35 ° C fit well with maize development; as for the annual rainfall the data obtained 1625mm of rain during the test year is higher than that defined by [11, 33] which says that the rainfall is about 800 mm / year for the late varieties (120d) and of 600 mm / year for the early varieties (90 days), it is also decent to that.
which certifies that the culture must be done in an area with sufficient rainfall (at least 1000 mm of water per year), and is within the limits defined by [40] 1600 mm to 2000 mm of rain per year. The height of the maize plants is a biological parameter which depends on the nature of the soil, the climate and the cultivation methods, the results obtained ranging between (2.43 m -2.80 m) are comparable to those of [11, 28, 36] which state that the height of the maize plants varies from 2m to 5 m, our results are also comparable to those [9, 33] which indicate that the height of the obatampa maize is 1.75m. The differences observed in this parameter are due to the difference in the doses of pig manure applied and the cultivation methods adopted. The average diameter of the ears at harvest, our results on this parameter 4.19 - 4.68 cm, corroborate the results of [35, 38] which state that the diameter of the ears of corn is between 1 and 6 cm. Overall, the average number of kernels per ear, a biological parameter and one of the yield components is a function of the length and size of the ears; the results recorded (260.43 - 426.82) are close to the results of [37] who found respectively 500 to 1000 grains per ear. The parameter average length of ears at harvest was discussed, an important parameter in the evaluation of yield: the differences in results obtained on each of our 14 cm -17cm variants, are due to the difference in increasing doses of pig manure, and are comparable to those of [11], who found values between (14 - 20 cm ), and are furthermore in the interval defined by [37] 15 - 16 cm for the variety obatampa. The average weight of 1000 grains (gr) obtained is between 230.13 ± 45.16 and 298.60 ± 58.60 approaches those [11, 37] the weight of 1000 seeds depends on the composition of the kernels, the size of the kernels, and the treatments applied. The grain yield of corn is linked to the variety, certain morphological parameters and the treatments applied. The results obtained 1.94 t / ha -5.80 are below [37] between 6 and 7 t / ha in the station. They are also superior to those [31] which attest that the yield of obatampa maize is between 3 - 5 t / ha. 

V. CONCLUSION

The results of research on the influence of pig manure on the yield of maize variety obatampa led to the following conclusions: The weather conditions that prevailed during the test period were generally favorable for the cultivation of the maize obatampa variety. The growing cycle, which fluctuated between 95–90 days for the D0, D1, D2, D3 treatments, was inversely proportional to the different doses of pig manure. The average values of the height of the plants at harvest (cm), the average weight of 1000 grains (g) at harvest and the yield (t / ha were in turn proportional to the increase in the doses of pig manure. The highest yield was obtained with the dose D3 = 5.80 t / ha Pig manure has had a positive influence on the development and production of the obatampa variety of maize, under the edaphic-climatic conditions of N’Zérékoré.

VI. REFERENCE

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VII. ANNEX

Photo.1. Maïs en végétation (21/05/2019)
Photo.2. Fleur femelle du maïs (24/06/2019)

Photo.3. Fleur mâle du maïs (03/07/2019)