Improved Cassava-maize Intercropping for Sustainable Cassava Production In Nigeria

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BACKGROUND:

Intercropping is the growing of two or more crops on the same piece of land such that the period of overlap is long enough to include their vegetative stages (Gomez, 1984). It is a means of maximizing resources and increasing cropping system productivity (Olasantan, 1996). Intercropping has been therefore proposed to increase an agricultural intensification and meet increasing global food demand while addressing soil quality issues (Midmore, 1993). It is a common practice in tropical parts of the world with longer growing seasons, where small holder farmers allocate about 0.2 - 0.3 ha (30 - 45% of their farm area) to cassava base intercropping (Pypers et al., 2012). As much as 15 to 20% of the world's food supply comes from these systems that reduce risk in agriculture and increase food security (Harms, 2015). Cassava-maize intercrop is the most popular in Nigeria (Okigbo, 1978). Yet, the cassava yield in Nigeria is low in this system (Olasantan, 1997), with an average yield of less than 12 t/ha in farmers fields despite its potential yield of over 80 t/ha. Hence, there is a substantial potential for agronomic improvements of the cassava-maize intercropping system.

Hypotheses

1

Split application of N and K

enhances

Performance of cassava and maize

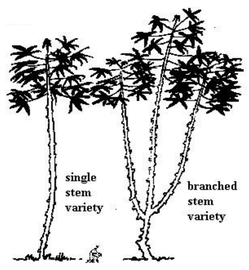
2

Increased cassava and maize densities

results in

improved micro-climate

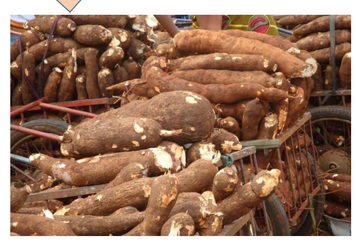
3



Genotypes and environments

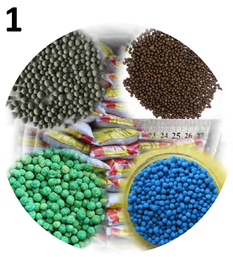
increase

root yield



Objectives:

1



To unravel the effect of split application of N and K mineral fertiliser on cassava performance.

2

To determine the effect of higher cassava and maize densities on light interception and crop micro climate.

3

To investigate the interactive effect of cassava genotype and environment on cassava and maize yield.

METHODOLOGY

- ❑ **Field trials (randomized complete block design replicated four times) with 9 treatments (Table 1) will be established in farmers fields in 2017 and repeated in 2018 in the guinea savannah and tropical rainforest agroecological zones of Nigeria (Fig. 1).**

Factors:

- ❑ **Mineral nutrient fertilizers rates: 0, 90:20:40, and 75:20:90 N:P:K,**
- ❑ **Cassava genotypes: erect and branching,**
- ❑ **Cassava densities: 10,000 and 12,500 plants/hectare,**
- ❑ **Maize densities: 20,000 and 40,000 plants/hectare.**
- ❑ **F1 and F2 represent split applications of N and K mineral nutrient fertilizers up to 6 weeks before and 10 weeks after maze maturity (Table 1).**

Task 1

To monitor the effect of N, P and K on the development of component crops in cassava-maize intercropping system.

observations

- **Height, nos. of leaves, leaf area, leaf abscission and senescing (*fortnightly from 1 MAP*)**
- **Dry and fresh weight determination (*1, 2, 3, 6 and 12 MAP*)**

Task 2

Elucidate the relationship between light interception and soil moisture/temperature in mono and intercrops systems.

observations

- **Canopy length, width and depth (*2, 3, 4, and 6 MAP*)**
- **Light interception, soil moisture and temperature (*2, 3, 4, and 6 MAP*)**

Task 2

Determine cassava genotypic and location interaction effects on cassava yield components, root production and cassava-maize intercropping productivity.

observations

- **Nos of grains per row, per cob, cob length, and grain yield (12 WAP)**
- **Root size, good and bad roots (rot), fresh root yield (*52 WAP*)**

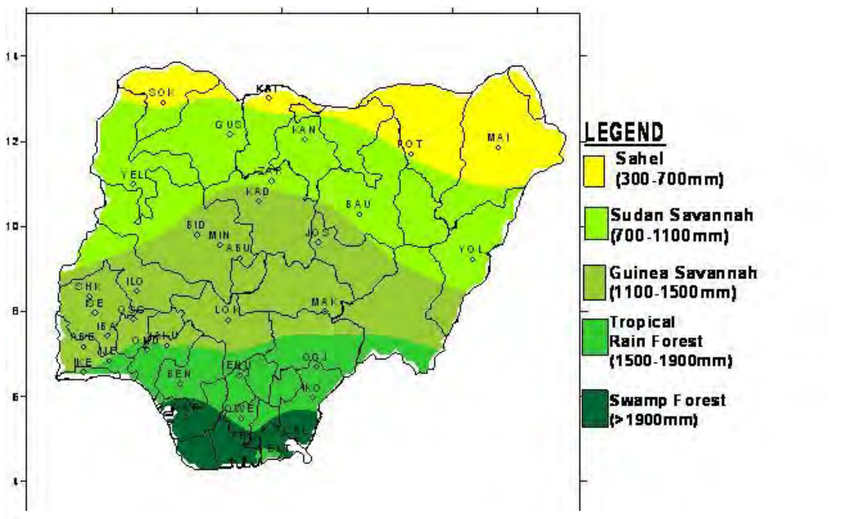


Fig. 1: Agroecologies of Nigeria

Factors/Treatments	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9
Cassava density (plants/ha)	10,000	12,500	12,500	12,500	12,500	12,500	12,500	12,500	None
Maize density (plants/ha)	20,000	40,000	40,000	40,000	40,000	40,000	None	None	40,000
Fert. Rate (kg/ha) (F_1 and F_2)	None	None	F_1	F_2	F_1	F_2	F_2	F_2	F_1
Cassava genotype (G_1 and G_2)	G_1	G_1	G_1	G_1	G_2	G_2	G_1	G_2	None

Table 1: Factors and treatments. F_1 = 90:20:40 N:P:K; F_2 = 75:20:90 N:P:K; G_1 = TME 419 (erect cassava genotype); G_2 = TMS 30572 (branching cassava genotype). Maize variety = SAMMAZ 35 (early maturity/yellow grain).

Expected outcome:

Location specific agronomic recommendations for increased and sustainable cassava and maize production in cassava-maize intercropping system in Nigeria.

References:

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4. *Gomez, A.R. and Gomez, K.A. (1984). Statistical procedures for agricultural research, 2nd ed., John Willey and Sons, New York.*

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