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Yield Characteristics and Growth of Cassava-Soybean Intercrop

N.S. Oguzor
Department of Agricultural Education, Federal College of Education (Technical),
Omoku, Rivers State, Nigeria

Abstract: An experiment was conducted to investigate yield characteristics and growth of cassava-soybean intercrop. The experimental design used was randomized complete block comprising of 3 blocks and 3 replicates of sole soybean, sole cassava and cassava-soybean intercrop. Results of the experiment revealed that intercrop showed significant and positive effect on yield of soybean and cassava.

Key words: Yield characteristics, growth, cassava-soybean intercrop

INTRODUCTION

Intercropping is a cropping system in which short term annuals are planted through long term annuals or biennials at the early stage of development (Oguzor and Nwankwo, 1997). This system of cropping is to a great extent practiced in various ways based on the extent of spatial arrangement of the crops on the field and they include row intercropping, patch intercropping and mixed intercropping.

Soybean and cassava are very important combination components in the cropping system. Research has shown that in small holdings, cassava is frequently grown intercropped with maize, fruit trees and legumes (vegetables). Financial gains can be more by certain intercropping cultivation systems than when monocultured (sole cassava). When intercropped with legumes it has shown a substantial increase in yield.

Soybean (*Glycine max*), an erect annual of the legume family which could grow up to a height of 2 to 6 ft, bearing inconspicuous white or purple flower and prudent brownish hairy pods is becoming popular in the diet of people in the tropical regions. Its growing importance is attributed to research findings that has exposed the crop potential of being capable of being processed into various edible forms. Also, it has an added importance in soil management because of its ability to fix atmospheric nitrogen into plant usable form in the soil.

Cassava also called *manioc* belong to the Euphobiaceae family, origin of two geographical regions. One in North Eastern Brazil and the othet in Western and southern mexico. It came to Africa through the Portuguese traders by the last half of the 16th century and by the 20th century, cassava has become widely grown in Africa. There is no gain saying the fact that Africa has more cassava than the rest of the World.

When crops are intercropped, the soil surface is covered by several layers of leaves for longer periods of time thereby reducing the impact of rain droplets, wind speed on the surface of the soil and as such run off and erosion by wind and water is reduced (Igbozurike, 1971). However, this practice is based on the presumption that non legumes can utilize nitrogenous compounds fixed or transferred by legume (Willey, 1979). There is increasing awareness of considerable biological advantages fromn growing crops together rather than separately (monocrop). Through experiments advantage as high as 73% have been achieved by intercropping legumes (Krantz, 1978). Also, Zuofa and Tariah (1991) reported similar findings. The advantage of using legumes such as soybean as intercrop with tubers such as cassava is important due to the role legumes play in the cropping systems. This all important role is in the fixation of nitrogen through their symbiotic relationship with *Rhizobium* sp. Also, nitrogen is passed into the soil from the top through litter fall which will immensely benefit the associating arable crop.

Soybean planted with the first rains from late April to early May and intercropped with cotton, resulted in very low yield (Arwouth Na Lampang, 1980). Data from ongoing relay planting experiment on cassava and soybean indicates that it is not only operational nor convenient but also non-remunerative to plant cassava and soybean simultaneously (Arwouth Na Lampang, 1980). Systematic designs are particularly valuable in determining the range of separation distance and which the yield o soybean remains unaffected.

The advantages of intercropping cannot be overstressed as it aids in the spreading of production risk against complete crop failure. Intercropping may provide a physical barrier to the spread of pest and disease through crop stands. But experimental

evidence is conflicting reporting decrease (Keswani and Merta, 1980; Mokubiti, 1956) and increases in crop damage and infestation (Van Rheaneo *et al*., 1980).

According to Willey (1979) due to lack of competition between the 2 components of cassava as mixed crop with soybean for nitrogen which is often a limiting soil resource there is yield increase in cassava. Ileaorgu and Odurukwe reported that intercropping is aimed at achieving a high and stable crop yield and as well as taking care of long range soil productivity. Further research shows that when one component of the intercrop combination fails the other component of the combination is able to utilize the resources that would have been available to the field crop and so yield stability is therefore one of the advantages of intercropping (Onwueme and Sinha, 1991). The effect of intercropping is expected to show whether or not to encourage the combination of cassava and soybean, which are 2 very important crops especially to the small scale farmers who form the bulk of food producers in Nigeria. This study investigates the yield characteristics and growth of cassava-soybean intercrop with a view to determining if intercropping would affect the height, number of leaves and yield of soybean and cassava.

MATERIALS AND METHODS

The experiment was sited at the Teaching and Research farm of the Department of Agricultural Education, Federal College of Education (Technical), Omoku, Rivers State, Nigeria. Omoku is characterized by relatively high rainfall in the raining season and moderately high temperature of about 24°C in the dry season.

The site of the experiment was cleared manually, stumped with cutlass, spade, pegs, ranging poles, line and measuring tape. The experimental area measuring 30×15 m was mapped out into three replicates containing 3 blocks of 3 rows of plant stands. The experiment was laid out in a randomized complete block design with the following treatments: Sole cassava; sole soybean; intercropped soybean and cassava.

High yielding local soybean variety and TMS 4 (2) 145 cassava variety were used for the experiment. The crops were planted at a spacing of 1×1 m for cassava and 50×30 cm for soybean. Soybean was planted at 3 seeds per hole and later thinned to 2 plants per stands.

Observation and measurement: Height of both crops was taken from 5 randomly tagged plants per experimental unit (block) with a meter rule at 20, 40 and 60 Days After Planting (DAP). The data obtained were computed and mean height of plants for each treatment determined and recorded. Number of leaves for both plants was obtained by counting the leaves on each tagged plants per experimental unit. At maturity, both crops were harvested manually and yield parameters taken include: Total soybean yield per experimental unit; total cassava per experimental unit. Data collected were analysed by the use of mean and analysis of variance.

RESULTS AND DISCUSSION

Results as shown in Table 1 reveal decreases in height of cassava from sole at a mean height of 28.40 cm to a mean height of 27.4 cm, though the difference was not significant at 0.05 level. On the other hand, when soybean was planted sole, mean height recorded was 19.6 cm but when intercropped the height decreased to 17.83 cm. The decrease was not significant at 0.05 level. The implication of this finding is that intercropping did not significantly affect the height of the crops.

Table 2 shows the mean scores of the effect of intercropping on number of leaves of soybean and cassava when planted sole and intercropped. From the table it is observed that the mean number of leaves recorded when cassava was planted sole was 21.67 which increased significantly to 24.67 ($p<0.05$). However, when sole soybean was planted the mean number of leaves recorded was 12.00 which decreased significantly to 7.00 when intercropped ($p<0.05$). The finding suggests that intercropping significantly affects number of leaves of cassava and soybean.

From Table 3, it is observed that when cassava was planted a mean yield weight of 9.1 kg^{-1} was recorded., while when cassava was intercropped a significant mean yield weight of 10.35 kg^{-1} recorded ($p<0.05$). Also, when soybean was planted sole, a mean yield weight of 191g was recorded.

Table 1: Effect of intercropping on height

Treatment	Mean
Sole cassava	28.40±8.09a
Sole soybean	19.67±6.63a
Intercropped cassava	27.40±10.12a
Intercropped soybean	17.83±5.92a

Means in the same column followed by the same letter (s) are not significantly different

Table 2: Effect of intercropping on number of leaves

Treatment	Mean
Sole cassava	21.67±4.04ab
Sole soybean	12.00±9.64ab
Intercropped cassava	24.67±10.41b
Intercropped soybean	7.00±2.65a

Means in the same column followed by the same letter (s) are not significantly different

Table 3: Effect of intercropping on yield (roots and pods)

Treatment	Mean
Sole cassava	9.1±12.87a
Intercropped soybean	10.35±14.64a
Intercropped cassava	143.85±73.33b
Sole soybean	191.00±29.69b

Means in the same column followed by the same letter (s) are not significantly different

The result reveals an increase in cassava yield when intercropped. The implication of this finding is that higher yields of cassava could be obtained with intercropping of compatible crop. This finding is in line with the assertions of Zuofa and Tariah (1991), Krantz (1978), Willey (1977) and Leihnes (1993) that intercropping results in greater yield results per hectare than sole cropping. The high yield of intercropped cassava could probably be due to the beneficial effect of the nitrogen fixing capability of the legume (soybean). This impression was also observed by Willey (1977).

The yield of soybean was not favoured by intercropping as sole soybean performed better than intercropped soybean. This could probably be due to the fact that atmospheric nitrogen fixed by the soybean which shaded the soybean. This shading by cassava on the soybean resulted in the reduction of photosynthesis which invariably affected the yield of soybean in the intercropped plots.

CONCLUSION AND RECOMMENDATION

Yield of cassava was found to increase positively in the intercropped treatment than the sole treatment while sole treatment for soybean increased positively in yield than the intercropped treatments. It is therefore recommended that for economic reasons, planting cassava on sole basis should not be encouraged, rather it should be intercropped with legume such as soybean for optimum yield. On the otherhand, intercropping is not a better practice for soybean, instead sole cropping is a recommended practice.

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