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Effect of Intercropping Panicum Maximum with Maize (Zea Mays)

Nweke I.A.
Department of soil science Anambra State University, Nigeria

Abstract: *The study investigated the effect of intercropping panicum maximum with maize. The field experiment was carried out at the Faculty of Agriculture Teaching and Research Farm, Anambra State University, Igbariam Campus. The experiment was laid out in a randomized complete block design (RCBD) with five (5) replications. Growth and yield parameters such as height, number of leaves, stem girth and grain weight per plot were measured. The results obtained indicated that the intercropped performed better than the sole crop in all the parameters assessed, though there were no significant differences (P=0.05) in number of leaves in 5 weeks after planting (WAP) , 6 WAP, plant height 6 WAP and stem girth in 8 WAP. The plant height and number of leaves increased as the week after planting (WAP) increased. The plant height result in 5WAP and 7WAP as well as grain yield showed statistical significant (P=0.05) differences among mixed and sole crops, percentage increase in plant height of mixed crops over sole crops in 5WAP and 7WAP were 21.46% and 17.58% respectively, while the percentage increase in the grain yield of intercrop over sole crop was 28.26%. The results obtained from this study indicated that the intercrop of panicum naximum/maize could be ideal as it will increase the quantity, availability and feeding value of biomass, erosion control and better performance of the animals fed on the intercropped plants.*

Keywords: *Intercropping, panicum maximum, Maize.*

I. Introduction

Maize (Zea mays L.) is one of the most completely domesticated dual purpose field crops, used in human diet and animal diets. Maize has the potential to supply large amounts of energy rich forage for animal diets, and its fodder can safely be fed at all stages for animal growth without danger of oxalic acid, prussic acid as with the case of sorghum (Dahmardeh et al., 2009). Thus forage maize has become a major constituent of ruminant animals in recent years where its inclusion in dairy cow diets improves forage intake, increase animal performance and reduces production costs (Anil et al., 2000, Cusicangul and lauwer, 1999).

In conventional agriculture or commercial agricultural production famers intercrop the maize with guinea grass (panicum maximum) to have a benefit of using both the production for maize and guinea grasses, so that after harvesting of maize, farmers can be harvesting the guinea grass for feed of animals or livestock. The two crops panicum maximum and maize can also be harvested together for silage or hay after the maize cobs has been harvested. Most animals in the world feed on panicum maximum as the grass has good quality either as forage, silage or hay provided it cured properly.

Guinea grass is a perennial grass with robust stem. It has ciliate hairs on the stem, the leaves are long and tapers, the spikelet are solitary, the root is comparatively short and fibrous in nature. The grass remains one of the best cultivated grasses in the tropics due to its tall, vigorously growing perennial with rather coarse herbage and has naturalized in most tropical agriculture were it is used extensively for forage purposes hence its importance in the expansion of animal production throughout the tropics. The efficiency of guinea grass has played a major role in grassland improvement and livestock production. Many researchers have explored the use of intercropping for forage production. Toniolo et al., (1987) reported higher crude protein content in maize-soybean intercrop than that of mono cropped maize, while Javanmard et al., (2009) indicated intercropped maize with different legumes, increased dry matter and crude protein yield of forage by all intercropped compositions compared with the maize monoculture. Dahmardeh et al., (2009) opined that maize/cowpea intercrop resulted in more digestible dry matter than maize sole cropping. Intercropping provides an efficient utilization of environmental resources, reduces risk to cost of production, provides greater financial stability for farmers, decreased pest damages, suppress weeds growth more than mono cultures and improve forage yield and quality (Ofor and Stem, 1987).

In Nigeria, intercrop has remained the traditional farming practice, it is a wide spread food crop production system in the humid and sub-humid tropics of West Africa. Hence the objective of this study was to assess the effect of intercropping panicum maximum and maize with a view of improving grazing efficiency and silage or hay production for the benefit of livestock farmers with small land holding.

II. Materials And Methods

The study was conducted in the Teaching and Research Farm of Faculty of Agriculture, Anambra State University, Igbariam Campus. The area lies between latitude 06^0 14^1N and 06^045^1E. The rainfall pattern is bimodal between April and October, with a mean annual rainfall of 1268.4mm. While the dry season is between November and March, The relative humidity of the study area is moderately high all year round with highest (85%) during the wet season and lowest (64%) during the dry season. The soils are of the sandy loam textural class classified as ultisol (FDALR, 1985) and contain very low level of the major plant nutrients, organic matter and carbon content was low (Nweke and Nsoanya, 2013; Nweke et al, 2013). The soil is acidic and available P is below the level outlined by Landon (1991). The experiment was laid out as a randomized complete block design (RCBD), with 10 plots each measuring 3mx4m plots were separated by 0.5m apart and each replicate was 1m alley. The study area was ploughed of the natural vegetation and harrowed. The land area mapped out for the experiment was then leveled with spade. NPK 15:15:15 was applied by broadcasting before sowing the seeds, and the second application of NPK 15:15:15 mixed with urea was done three weeks after planting using ring method to boost vegetative growth. The maize seeds was planted 2 per hole at a spacing of 75cm x 25cm and at a depth of 2cm, propagules of the panicum maximum (guinea grass) was transplanted 2 weeks after sowing. The sowing and transplanting was done early in the morning before sunset.

Field Observation

Field observation was commenced on both mixed and sole crop at 5 weeks after planting (WAP) and continued at weekly interval until 8 weeks after planting. The plant height of each plant was measured from the plant base to the flag leave. Ten plants were sampled for this purpose from each plot at 5, 6 and 7 WAP for both mixed and sole crop. The number of leaves counted and the average was taken for 5 WAP, 6 WAP and 7 WAP for both mixed and sole crop. The stem girth was measured 8 WAP with a rope which was then transferred and read off on a meter rule. Ten plants were randomly selected from each plot and used. At maturity the grain from the tagged plants/plot were harvested and dried to 14% moisture content. The grain harvested from the tagged plant was weighed to get the grain yield per plot in gkg^{-1}

Data analysis

Data collected from the study was subjected to t-test analysis, while Least significant difference (LSD) was used to compare the treatment means.

III. Results And Discussion

The result of plant height, number of leaves, stem girth and grain weight are given in Table 1. The panicum maximum/maize intercrop had the highest values in these parameters when compared to the values obtained for sole maize, which indicated that the intercropping system influenced the assessed parameters. Though the influence of intercropping system on the number of leaves in 5WAP, 6WAP, stem girth in 8WAP as well as plant height in 6WAP were not statistically significant. The results showed that plant height and number of leaves increased in both mixed and sole crops as the weeks after planting (WAP) increased. The plant height result in 5WAP and 7WAP showed statistical significant difference (P=0.05) between the mixed and sole crops. The percentage increase in plant height in the mixed crops relative to the sole crops in 5WAP and 7WAP were 21.46% and 17.58% respectively. However, on the individual treatment basis, the increase in plant height from 5WAP to 7WAP was observed to be 58.85% in mixed crops while in sole crops it was 60.78%. The grain yield result showed higher value in the intercrop than sole and it was statistically significant (P=0.05), the percentage increase in grain yield per plot over sole on the average is 28.26%.

Table 1. Effect of panicum maximum/maize intercrop on the height (cm) of plant, number of leaves, stem girth (cm) and grain weight/plot (gkg^{-1})

Treatment	5WAP		6WAP		7WAP		8WAP Stem girth cm	Grain weight/plot (gkg^{-1})
	Height(cm)	Number of leaves /plant	Height (cm)	Number of leaves/ plant	Height (cm)	Number of leaves/ plant		
PM	81.44	8.18	114.26	10.4	197.9	12.96	7.12	4.07
SM	63.96	6.68	114.88	9.9	163.1	10.92	7.06	2.92
$LSD_{0.05}$	3.06	NS	NS	NS	3.22	1.29	NS	0.67

WAP = weeks after planting, LSD = Least significant difference, PM = Panicum maximum/maize intercrop, SM= Sole maize, NS = Non-significant.

Many researchers have employed the use of intercropping for forage production and these have strong implications for our crop and animal farmers. Based on the findings of this study, the intercropped of both panicum maximum and maize was found to yield better than the maize on sole cropping in all the parameters assessed, though some parameters assessed were not statistically significant. The non significant result may be due to the competition for resources such as nutrients in the rhizosphere and light (Caballero et al., 1995, Assefa and Ledin, 2001) or it may be due to morphological similarity in maize and panicum maximum in the sense that there rooting system, lateral root spread and rooting density may likely be similar and this will affect their competition for nutrients and light. However, changes in crop management practices such as plant spacing or plant population (Lindquist and Mortensen, 1998) and planting date can result in maize plant better compete with panicum maximum and this may likely be the result of the significant effect observed in grain yield and plant height. The intercrop of maize and panicum maximum could be ideal as it will increase both quantity and feeding value of biomass; erosion control and better performance of animals feed on these intercropped plants.

IV. Conclusion

The performance of maize intercropped with panicum maximum and maize in sole cropping were examined. The result of the study showed that intercropping system influenced the growth and yield parameters as the values obtained in the intercrop plants were higher, though not statistically significant in some parameters, but the grain yield was statistically significant and that is ideal. The farmers are therefore, advised to intercrop maize and panicum maximum as this mixture is important where land is scarce and cost of production relatively high. It will produce financial stability for farmers, more efficient utilization of environmental resources, suppress weed growth and erosion, improve soil quality and forage yield and quality.

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