

INTERCROPPING

Proceedings of the
Second Symposium on
Intercropping in Semi-Arid Areas,
held at Morogoro, Tanzania,
4-7 August 1980

Editors: C.L. Keswani
and B.J. Ndunguru

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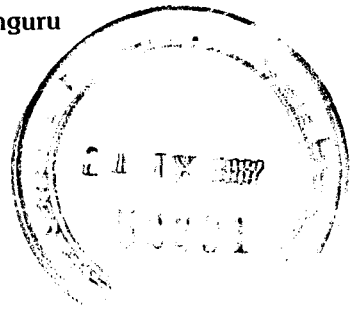
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row crop. Nitrogen was not applied to any of the other legumes grown in the augmented treatments. All plots received a blanket application of P_2O_5 and K_2O at a rate of 56 kg/ha of each. Maize was spaced at 100 cm $\times$ 50 cm, whereas intercrop spacings for soybean and mung bean were 50 cm $\times$ 5 cm and cowpea and groundnut were 50 cm $\times$ 10 cm. Soybean seeds were inoculated with commercial inoculant "Nitragin S" at 5 g/60 kg of seeds.

It was observed that in both intercropping and monocropping, maize showed a positive response to N at both locations. Yield, however, varied widely. Variations in yield were attributed to different agroclimatic conditions. In the intercropping systems, the yield of maize tended to decrease. This was attributed to the inability of maize to compete with soybean for nutrients and other resources. Except in a few cases, intercropping depressed the yield of soybean.

In general, the total yield of intercropped systems increased. The amount of the increase depended considerably on the N level used. Thus at 25 kg N/ha, total yield increased under intercropping in all six locations. This indicated that intercropping makes better overall use of resources than when the same crops are grown separately.

In augmented experiments involving a maize-cowpea combination, the yield of maize varied from location to location. In general, cowpea yields were depressed by intercropping. In the case of maize-mung bean trials, intercropped maize increased its yield compared with its monocrop counterpart in three of four trials. In maize-French bean intercropping, maize yield was higher in the intercropping system and the yield of the legume decreased due to intercropping. In the maize-groundnut system, maize yield was higher

compared with monocropped maize, whereas the intercropped groundnut yield was lower.

In general, applied nitrogen tended to increase the crude protein content of both maize and sorghum. Although intercropping tended to depress the protein content in some cases, the crude protein harvest of combined maize-soybean was significantly higher than that of the monocropped system.

Based on land equivalent ratio values, it was also observed that in all experiments, regardless of N level, the intercrop system provided higher economic returns than the corresponding monocrop system.

Discussion

Edje (question): In your experiment, the results show net returns indicating, among other things, that labour cost has been deducted from the gross value. What was the plot size in the trial? I ask this because it is fairly difficult to obtain meaningful results for labour input on small plot sizes.

Gunasena (answer): The plot size was small. Labour for weeding and fertilizer application for 1 day was around Rs15 (U.S.\$ 1.0).

Haque (question): How many rows of legumes were grown between maize rows?

Gunasena (answer): In most cases, two rows of legumes were grown between maize rows. Sometimes, however, one row of legumes was grown.

Jana (question): Was your experiment carried out under rain-fed and irrigated conditions?

Gunasena (answer): It is possible in this part of Sri Lanka to grow crops without irrigation. The lowest rainfall level is about 350 mm. However, the distribution is not good.

Effect of Minimum Tillage, Mulches, and Fertilizers on Intercropped Cowpeas with Maize — Summary

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Water has always been a limiting factor for crop production in most of the semi-arid areas of the

world, including the Morogoro region. Rainfall in these areas is unpredictable and is characterized

by variation over the years, with distinct periods of high and low levels of precipitation leading to insufficient soil moisture levels during certain periods to support plant growth. Soil erosion is another factor limiting crop production in semi-arid areas, especially where natural vegetation has been removed, causing reduced soil fertility. In order to restore soil fertility in these areas, shifting cultivation has been practiced. Due to increased population pressure, introduction of new cash crops, and new farming systems, however, this customary practice has given way to hoe cultivation in the form of clean weeding. In addition, when continuous farming replaces traditional cultivation in semi-arid regions, degradation of soil structure; accelerated soil erosion; increased fluctuation in soil temperature; and decreased organic matter, nutrients, and moisture holding capacity result.

The objectives of the present study, therefore, were to examine the effect of cultivation techniques, mulch treatments, and fertilizers on grain yield of maize and cowpeas in an intercropping system. Experiments were conducted at the faculty farm at Morogoro. The treatments in these studies included three cultivation practices (continuous conventional cultivation; cultivation in the first year only in 1975, i.e., when the experiment was first started; and zero tillage, i.e., only scraping of the area before planting) and five mulch treatments (10-cm thick grassy mulch; 20-cm thick grassy mulch applied in two splits; 10-cm woody mulch; 20-cm woody mulch applied in two splits; and no mulch). Four fertilizer regimes were used: nitrogen alone at 60 kg N/ha; phosphorus alone at 17.5 kg P/ha; N plus P at 60 kg N/ha plus 17.5 kg P/ha; and no fertilizer.

A $3 \times 4 \times 5$ factorial trial in a randomized block design with two replications was laid out. In the experiments, maize variety MAS (medium altitude selection) and cowpea variety SVS 3 were used. A number of growth parameters including yield components and grain yield at a moisture content

of 13% were measured during the 1978 cropping season.

The results indicated that continuous cultivation gave the highest grain yield of both component crops, whereas the no-mulch treatment recorded the lowest grain yield. Other mulch treatments, including 20-cm grassy mulch, 10-cm woody mulch, and 20-cm woody mulch, were intermediate in performance. Nitrogen and phosphorus together gave the highest grain yield of maize and cowpea, whereas the treatment using no fertilizer gave the lowest yield. N and P alone were intermediate. The statistical analysis of grain yield of maize-cowpea was significant at the 0.05 probability level only for the cultivation practices; for both mulch and fertilizer treatments, it was significant at the 0.01 probability level.

Discussion

Haque (question): What type of wood was used for mulch?

Jana (answer): Tender twigs of different plants were used as woody mulch.

Edje (question): Your plots in the slides looked very clean. Did you remove the weeds?

Jana (answer): The weeds and mulch were cleared every time. Herbicides were also applied to control weeds.

Mills (question): Were the effects of cultivars, mulch, and fertilizer additive or were interactions present?

Jana (answer): All effects were additive.

Wilson (question): How do you explain the results that show a negative response to zero tillage and a fertilizer response to mulching when the mulched plots were also under no tillage.

Jana (answer): Attempts were made to combine the three: fertilizer, mulch, and no tillage. In the farmers' fields there is no mulch because they burn the crop residues.

Increased Resource Exploitation Through Intercropping with Cassava — Summary

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In almost all indigenously evolved tropical cropping systems in which cassava (*Manihot esculanta*

Crantz) contributes substantially to the total output, mixed cropping or intercropping pre-