

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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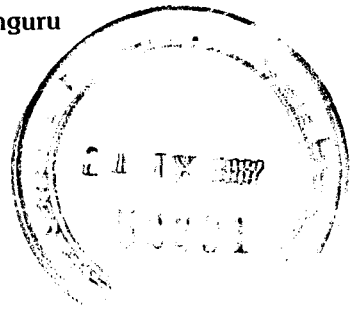
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in this study because the temporal difference between the two component crops is one of the most important factors determining whether additive or replacement populations are needed to obtain high intercrop yield advantages.

May (answer): There were two or three harvests of green-gram depending on the treatment. Most

of the legumes were harvested by the time the cereal was in full flower.

Monyo (question): The names of the varieties used for the study are not included in your paper. Could you make the information available?

May (answer): IPA 5910 for green-gram and Serere 17 for bulrush millet.

Influence of Intercropping Methods on Foliar NPK Contents and Yields of Maize and Cowpeas — Summary

H.O. Mongi,¹ M.S. Chowdhury, and C.S. Nyeupe²

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Most soils of Tanzania contain sufficient potassium but insufficient available nitrogen and phosphorus to meet crop demands. There is little information that quantifies the relative merits of intercropping and monocropping with respect to the application of fertilizers and their effect on component crops. This study was conducted to investigate the effect of different methods of intercropping and phosphorus application on the nutrient uptake and yields of maize and cowpeas.

Experiments were conducted at Mafiga Farm of the University of Dar es Salaam at Morogoro. The treatments included three levels of P applied at rates of 0, 30, and 60 kg/ha. The intercropping methods included maize *Ilonga* composite intercropped with cowpea cultivar SVS 66 in alternate rows, in the same hole, and in alternate rows with cowpea being planted 3 weeks after maize (relay intercropping). A monocrop of maize was also included. When intercropped in alternate rows or in relay, maize and cowpea received equal halves of a particular P dose in their respective rows. In monocropped maize or in same-hole intercropping, a full dose of P was applied in the rows. In all cases, P was applied as triple superphosphate approximately 2 cm below the seeds at

sowing time. A basal dressing of N, at a rate of 30 kg/ha as sulphate of ammonia, was included in all treatments.

Maize was planted with a spacing of 75 cm × 30 cm; cowpeas were sown with the same spacing when intercropped in the same hole. In alternate row or relay intercropping, cowpea was sown with a spacing of 15 cm within the rows and between the rows of maize.

Leaf samples of maize consisted of ear leaves at the silking stage, whereas leaf samples of cowpea consisted of fully open terminal leaves at the pod formation stage. In both cases, 20 random plants were used for analysis. Total N of the leaf samples was determined by the microkjeldahl method. Leaf P and K contents were estimated by phosphovanadomolybdic complex and flame photometry methods respectively.

Twenty randomly selected plants from each plot were harvested along with the cobs or pods to determine dry matter yields. Maize cobs were harvested in mid-July, whereas mature pods of cowpea were collected periodically from mid-June to mid-July from each plot and bulked together. Grain yields were expressed as quintals per hectare on a 13% moisture basis.

The results showed that intercropping methods did not affect the grain and dry matter yields of maize but dry matter and grain yields, as well as N and P contents, of cowpea were significantly decreased by relay cropping. Intercropping in the same hole significantly increased the N content of maize and ear leaves, whereas the foliar P and K

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contents of maize were not affected by any of the intercropping methods. Phosphorus application had no significant effect on the nutrient uptake, dry matter yield, or grain yield of the component crops.

Discussion

Mills (question): Applied phosphorus appeared not to improve cowpea yield, particularly when interplanted in the same hole. Is it related to increased dry matter yield of maize by P?

Chowdhury (answer): Yes, cowpea cannot benefit because of the adverse effect of the shade created by maize. However, no pure cowpea stand was there to measure the direct effect of phosphorus.

Reddy (question): Considering your future plans, do you think that it would be useful to partition below ground the two component crops in intercropping using polyethylene partitions and compare the results with nonpartitioned intercrops to see the transfer of fixed nitrogen from legume to cereal?

Chowdhury (answer): It is a good idea.

Modifying the Competitive Relationship in Maize-Bean Mixtures in Kenya — Summary

O. E. Hasselbach and A. M. M. Ndegwa

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In order to avoid labour-peak constraints during the cropping season, it was thought desirable that in maize/bean mixtures the two crops should be planted at different times. Different plant arrangements of one or both crops may modify competition and may, therefore, interact with time-of-planting effects.

Therefore, experiments were conducted to study the nature of the competition that maize exerts on beans both above and below ground. In addition, two experiments were carried out using five relative times of planting and two contrasting bean cultivars to study the effect of time of planting on the yield of the two crops in mixtures. All bean treatments were planted in pure stand and mixed stand with maize. Maize and beans planted in alternate rows and when mixed were spaced at 75 cm × 30 cm and 75 cm × 10 cm respectively. Planting times for beans were 4 weeks before maize; 2 weeks before maize; 1 week before maize; at the same time as maize; and 1 week after maize (in the first season, 2 weeks after maize). In all of the experiments, two bean cultivars (Mwezi moja (GLP 1004) and Canadian Wonder) and

one maize cultivar (H 511) were used.

It was observed that up to 43% reduction in bean yield could be attributed to interplanted maize over a wide range of mixed cropping trials. In the time of planting trial, planting beans 1 month before maize resulted not only in the highest total yield returns per unit area but also, usually, the highest bean yields. The lengthened growth period of this crop combination, however, restricts its use to high rainfall areas.

In some preliminary trials where wider maize interrow spacings than the recommended 75 cm were used, the best total yield returns per unit land area were obtained with spacings of 125 cm. To compensate for the reduced maize yields in this case, multiple-hill planting of maize (retaining the same density) or the use of a prolific maize variety could be considered.

It has been pointed out that time of planting and plant arrangement have been investigated singly, and that there is a need to investigate the combined effects of these factors on the growth and yield of beans and maize.