IDRC-186e

INTERCROPPING

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

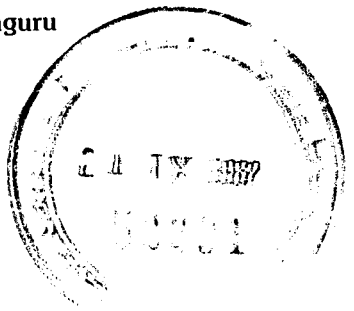
Editors: C.L. Keswani and B.J. Ndunguru

IDRC-186e

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



University of Dar es Salaam
Tanzania National Scientific Research Council
Intemational Development Research Centre

The International Development Research Centre is a public corporation created by the Parliament of Canada in 1970 to support research designed to adapt science and technology to the needs of developing countries. The Centre's activity is concentrated in five sectors: agriculture, food and nutrition sciences; health sciences; information sciences; social sciences; and communications. IDRC is financed solely by the Parliament of Canada; its policies, however, are set by an international Board of Governors. The Centre's headquarters are in Ottawa, Canada. Regional offices are located in Africa, Asia, Latin America, and the Middle East.

Postal Address: Box 8500, Ottawa, Canada K1G 3H9
Head Office: 60 Queen Street, Ottawa

Keswani, C.L.
Ndunguru, B.J.

University of Dar es Salaam, Dar es Salaam TZ
Tanzania National Scientific Research Council, Dar es Salaam TZ
International Development Research Centre, Ottawa CA

IDRC-186e

Intercropping : proceedings of the Second Symposium on Intercropping in Semi-Arid Areas, held at Morogoro, Tanzania, 4-7 August, 1980. Ottawa, Ont., IDRC, 1982. 168 p. : ill.

/Intercropping/, /semi-arid zone/ — /agricultural research/, /Africa/, /cultivation practices/, /plant breeding/, /plant protection/, /crop yield/, /research results/, /research methods/.

UDC: 631.584(213) ISBN: 0-88936-318-8

Microfiche edition available

Contents

Genotype Identification for Intercropping Systems — Summary

D. S. O. Osiru[1]

Department of Crop Science, University of Nairobi, Nairobi, Kenya

An important aspect of intercropping that often escapes the attention of agronomists and plant breeders is genotype identification for the system. The need for this seems obvious considering that in most developing countries the bulk of selected genotypes are grown under traditional situations, which involve intercropping. In Uganda, for example, as much as 75–90% of the beans grown are grown as mixed crops.

Past experience has shown that the selection of genotypes on the basis of monocrop performance seems to offer very little success. It has been pointed out that it may be possible to define genotype requirements for a given situation and that the extent to which this can be done depends a lot upon the crop being considered and the role it plays in a given intercropping situation. An important implication of this is that a breeding program should determine whether or not the best crop varieties selected for monocropping systems are also likely to be the best varieties when grown in association with other crops. Therefore, a series of experiments was conducted at the University of Nairobi to evaluate the performance of some of the promising varieties of beans under intercropping.

The experiments were carried out at the University of Nairobi field station (1°15′S, 36°44′E) at an altitude of 1815 m. One experiment was laid out during the end of the second rains in 1978 and the other during the first rains of 1979. Three bean varieties (cultivar Mwezi moja, Canadian Wonder, and the black variety) representing early, medium, and late maturity, respectively, were used. The beans were intercropped with maize variety Katumani Composite, which matured within 130 days under Kabete conditions.

The treatments consisted of monocropped maize, two-thirds maize/one-third beans, one-third maize/two-thirds beans, and beans in pure stand. The maize and bean monocrops were sown with 60- and 30-cm spacing, respectively, between rows. Within-row spacing was 30 cm throughout. This gave a theoretical population of 5.6 plant/m^2. The mixtures were achieved by sowing complete rows of either maize or beans in the required proportions. In both experiments, the component crops were sown at the same time at the beginning of the rains. The mixtures and pure stands were arranged in main plots of 6.6 m × 15 m. Each plot was then subdivided into three subplots of 6.6 m × 5 m for different bean varieties with four replications. Normal agronomic practices of weeding and fertilizing were followed.

Results from the investigation showed that the treatment consisting of two-thirds maize/one-third beans of the early-maturing variety had a negligible effect on maize yield. Medium- and late-maturing bean varieties had a slight, but insignificant, effect on maize yield, whereas in the one-third maize/two-thirds beans treatment, the maize yield was reduced by 55% and 58% of the monocrop yield.

Bean yields were affected in a similar manner by intercropping. It was of interest to note, however, that early-maturing beans maintained better yields in mixture than the medium- or late-maturing varieties. In the medium- and late-maturing beans, there were substantial yield reductions. Considering the yield advantages of mixing the two species, maize intercropped with early beans in the two-thirds maize/one-third beans treatment gave the highest increase in total yield when com-

[1]Present address: Department of Crop Science, Makerere University, P.O. Box 7062, Kampala, Uganda.

pared with the monocropped maize yield (LER 1.59). The corresponding land equivalent ratios (LERs) for medium- and late-maturing beans were 1.27 and 1.33 respectively. In the present study, early-maturing beans were 1.27 and 1.33 respectively. In the present study, early-maturing beans were erect and determinate. Throughout their growth period, therefore, they had a less competitive effect on maize. The medium- and late-maturing beans had a longer growth period, resulting in climbing and indeterminate tendencies. As expected, they exerted a considerable effect on maize.

Although the present results are not conclusive, they do point to some important characteristics that may be useful for identifying suitable genotypes for intercropping. In the maize-bean situation, it appears that the most desirable bean type would be one that matures early, can maximize resources early, and is fairly erect and determinate to ensure maximum competition with maize during the early part of the season.

Discussion

Van Leeuwen (comment): In Dr Osiru's paper, the yield of different varieties and also the maize yield are reported to show that the maize yield also depends upon the bean variety used in intercropping. In the papers of Drs May and Misangu and Makena and Dota, the production of the cereal component of the cropping system is not reported. This can only be justified in cases where there is no relationship between cereal yield and legume varieties but this should then be mentioned.

When the cereal yield in intercropping depends upon the variety of the legume, full details of the cereal yields should be given because the choice of a variety for intercropping will depend upon the performance of both components of the intercropping system.

I think a graph with sole cropping yield on one axis and intercropping yield on the other axis, for the legume varieties used, would be helpful in showing the results of the studies, especially if a higher number of varieties is involved.