INTERCROPPING
in semi-arid areas

Report of a symposium held at the
Faculty of Agriculture, Forestry
and Veterinary Science,
University of Dar es Salaam,
Morogoro, Tanzania,
10-12 May 1976

Editors:
J. H. Monyo, A. D. R. Ker,
and Marilyn Campbell

IDRC-076e
Monyo, J. H.
Ker, A. D. R.
Campbell, M.


/IDRC pub CRDI/. Report of a symposium on intercropping in semi-arid zone/s in the tropical zone/, with an examination of agricultural research activities — examines the effects of intercropping on crop plant production/; includes research result/s, list of participants, bibliography/c notes.


Microfiche Edition $1
Intercropping in Semi-Arid Areas

Report of a symposium held at the Faculty of Agriculture, Forestry and Veterinary Science, University of Dar es Salaam, Morogoro, Tanzania, 10–12 May 1976

Editors: J. H. Monyo, A. D. R. Ker, and Marilyn Campbell

The views expressed in this publication are those of the individual author(s) and do not necessarily represent the views of IDRC.
Farmer's field near Ibadan, Nigeria, showing intercrop of cowpea under maize
Contents

Foreword A. D. R. Ker .......................................................... 5

Addresses to the Participants

Welcoming address A. M. Hokororo ...................................... 8
Opening address Hon Mr J. S. Malecela ................................. 9

Summaries of Papers Presented

An appraisal of some intercropping methods in terms of grain yield, response to applied phosphorus, and monetary return from maize and cowpeas Y. A. Sudi, H. O. Mongi, A. P. Uriyo, and B. R. Singh ......................................................... 12

Rhizosphere populations in intercropped maize and soybean T. H. M. Kibani, C. L. Keswani, and M. S. Chowdhury ......................... 13

Intercropping for increased and more stable agricultural production in the semi-arid tropics B. A. Krantz, S. M. Virmani, Sardar Singh, and M. R. Rao ................................................................. 15

Cropping systems research: the scope and strategy for research in crop combinations based on experience of previous and current studies B. N. Okigbo ......................................................... 16

Mixed cropping research at the Institute for Agricultural Research, Samaru, Nigeria E. F. I. Baker and Y. Yusuf ................................................................. 17

Crop production practices in intercropping systems R. C. Finlay ................................................................. 18

Effects of crop combinations and planting configurations on the growth and yield of soybeans, millet, and sorghum in intercropping R. K. Jana and V. M. Sekao ................................................................. 19

Intercropping with sorghum at Alemaya, Ethiopia Brhane Gebrekidan ................................................................. 21

Studies on mixtures of maize and beans with particular emphasis on the time of planting beans D. S. O. Osiru and R. W. Willey ................................................................. 23

Intercropping of cassava with vegetables G. F. Wilson and M. O. Adeniran ................................................................. 24

Some aspects of the productivity and resource use of mixtures of sunflower and fodder radish R. W. Willey and D. A. Lakhani ................................................................. 25

Preliminary results of intercropping trials in Zaire with maize and certain legumes Thomas G. Hart and Mangha Kewe ................................................................. 27

(con’t.)
Contents (concluded)

Effects of maize height difference on the growth and yield of intercropped soybeans  D. R. Thompson, J. H. Monyo, and R. C. Finlay ................................................. 29

Intercropping as a means of producing off-season tomatoes during the hot summer months in the Sudan  A. T. Abdel Hafeez .................................................. 30

Development of cowpea ideotypes for farming systems in Western Nigeria  Olatunde A. Ojomo ................................................................. 30

Cereal–legume breeding for intercropping  R. C. Finlay ........................................... 31

Cowpea as an intercrop under cereals  H. C. Wien and D. Nangju ................................ 32

Selection criteria in intercrop breeding  R. C. Finlay .................................................. 33

Experiments with maize–bean and maize–potato mixed crops in an area with two short rainy seasons in the highlands of Kenya  N. M. Fisher ......................................................... 37

Pest control in mixed cropping systems  H. Y. Kayumbo ............................................. 39

Measuring plant density effects on insect pests in intercropped maize–cowpeas  B. M. Gerard ............................................................... 41

Effects of spraying on yield of cowpeas grown in monoculture and under maize, sorghum, or millet  H. Y. Kayumbo, R. C. Finlay, and S. A. Doto ........................................... 44

Possible relationship between intercropping and plant disease problems in Uganda  J. Mukiibi .......................................................... 45

Attempted control of virus incidence in cowpeas by the use of barrier crops  S. A. Shoyinka ................................................................. 46

Induced resistance to bean rust and its possible epidemiological significance in mixed cropping  D. J. Allen ............................................................... 46

A limited objective approach to the design of agronomic experiments with mixed crops  N. M. Fisher ................................................................. 47

Systematic spacing designs as an aid to the study of intercropping  P. A. Huxley and Z. Maingu ................................................................. 50

Future directions of intercropping and farming systems research in Africa  A. D. R. Ker ................................................................. 51

Developing mixed cropping systems relevant to the farmers' environment  D. W. Norman ................................................................. 52

Assessment of innovations in intercropping systems  C. D. S. Bartlett, E. A. Manday, and G. I. Mlay ................................................................. 58

Summary and Conclusions  D. W. Norman ................................................................. 59

H. Doggett ................................................................. 62

References ................................................................. 63

List of Participants ................................................................. 67
Cereal–Legume Breeding for Intercropping

R. C. Finlay

Faculty of Agriculture, Forestry and Veterinary Science, University of Dar es Salaam, Morogoro, Tanzania

At Morogoro in the cereal–legume variety testing and improvement program, the genetic material has been tested in three ways.

A range of our best cowpea and soybean varieties was tested in monoculture and in mixture with three standard cereals: a dwarf sorghum, a tall bulrush millet, and the local full season maize variety. We examined the genotype–mixture interaction along with other important factors such as insecticide spraying in cowpeas and the use of inoculum in soybeans.

A wide range of maize material was then tested with our standard soybean variety. In 1976, in addition to maize, we are testing 50 sorghum varieties and the Morogoro bulrush millet composite (in an \( S_1 = 10 \times 10 \) lattice yield trial). Cowpea, green gram, and sesame breeding lines are also being tested this season in yield trials under monoculture and intercrop conditions. Growth and development parameters and yield components are being examined for differences.

The third method used is diallel analysis, in which superior cultivars of different species are tested in mixtures for compatibility. Differences have been observed within and among species. If less competitive species, such as low-growing legume varieties in a mixture, are put under severe competition stress by taller cereals, their tendency is toward a low mean yield. Varietal differences for such legumes are more easily measured under milder forms of competition where error means tend to be larger. The importance has been noted of plant stand, height, leaf number and size, and the proportion of the high-yielding component in our mixtures. We are developing appropriate selection criteria from these studies for use in the breeding program. This program is an integrated part of production in the cropping system, which, in turn, must be tailored to local farming systems.

\(^{1}\)Present address: Plant Science Department, University of Manitoba, Winnipeg, Man.