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EFFECT OF PROXIMITY BETWEEN INTERCROPPED MAIZE AND BEANS ON GROWTH AND YIELD OF MAIZE UNDER VARYING NITROGEN LEVELS

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Maize (*Zea mays* L.) is the most important cereal crop in Kenya (Chui, 1987); 70 to 90% of the total maize production comes from small-scale farms ranging in size from 0.2 to 0.8 ha (Ackello and Odhiambo, 1986). However, yields from small-scale farms are usually low, averaging 1.9 tonnes/ha, due largely to low soil fertility and poor crop husbandry (Onyango, 1987). The problem of low soil fertility could be alleviated by the use of commercial N fertilisers, but these are prohibitively expensive for most small-scale farmers. Use of legumes such as common beans (*Phaseolus vulgaris* L.) in intercropping systems could provide an alternative to commercial N fertilisers.

Tropical legumes are capable of secreting N during growth (Agboola and Fayemi, 1972) or releasing it during decomposition of decaying roots and nodules (Poth *et al.*, 1986). Fertiliser N needs of a cereal intercropped with a legume were reported to be lower than those for a sole crop due to transfer of some fixed N by the legume to the associated cereal during the growing season (Willey, 1979). Consequently, the beneficial effect of the legume on the cereal is likely to depend on their spatial arrangement which determines edaphic and canopy interactions of the intercrop components. Hence, a relevant question is how intimate the legume and the cereal components of an intercrop should be.

Where small-scale farmers practise intercropped row planting of maize and beans in Kenya, the crops are planted in alternate rows, alternate hills in the same row, or in the same hill depending on local tradition and the farmer's preference. These various intercropping patterns have not been evaluated in detail in Kenya. In particular, there is a need to investigate the nitrogen gains that arise from the various planting patterns as reflected in the yield of the associated cereal.

Chui and Nadar (1984) reported that intercropping maize with common beans in alternate rows without applying N reduced maize yield by 33% below that of a maize monocrop under the same soil and management conditions. Intercropping maize with beans in the same hill and in alternate hills in the same row increased maize yield by 27 and 7% respectively, under similar N conditions. Intercropping maize with soybean (*Glycine max* L. Merr.) or cowpeas (*Vigna unguiculata* L. Walp) in the same hill resulted in consistently larger maize grain yields than intercropping in alternate hills in the same row (May and Misangu, 1982). The beneficial effects to cereals, of increased proximity between legumes and associated cereals have also been reported by Mongi *et al.* (1982) and Nyambo *et al.* (1982). However, most of these studies have not included fertiliser treatments, so no conclusion could be drawn on the N contribution of the legumes. The objective of this study was therefore to investigate the effect of proximity between maize and beans in an intercrop system on growth and yield of maize, and how N fertiliser influences this interspecific interaction.

MATERIALS AND METHODS

The study was conducted at the University of Nairobi's Kabete Field Station, located