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STABILITY OF BEAN MIXTURES IN ASSOCIATION WITH MAIZE

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INTRODUCTION

Beans are one of the most important sources of dietary protein in Malawi. Production is generally by the smallholder farmer where the crop is grown mostly in association with maize. The bean types grown in Malawi are mixture, "land races", which were probably introduced into Malawi by the Portuguese through Mozambique and East Africa over three hundred years ago.

In 1969, a major bean improvement programme was initiated in Malawi and an extensive collection of 4,000 bean lines was made throughout Malawi. The collection showed tremendous genetic diversity of beans grown in Malawi, and it showed that it had great potential as a basis for bean improvement work.

Between 1982 to 1984, members of the Bean/Cowpea Collaborative Research Support Program (CRSP) in Malawi (Bunda College) and the U.S.A. (Michigan State University) studying the genetic, agronomic and socio-cultural analysis of diversity among bean land races in Malawi, made another extensive collection of beans in Malawi. Data showed that out of the 308 samples collected mostly from farmer's fields, the average number of bean types grown by farmers in Malawi was about 12 (Table 1). One farmer had 73 different types.

During the 1983/84 crop season, a field trial was conducted at five different sites to compare the seed yield of bean lines and their mixtures when grown in association with maize.

MATERIALS AND METHODS

Field trials were conducted at five sites. These were Bunda College (1118m), Dedza (1650m), Dowa (1200m), Misuku Hills (1400m) and Thyolo (840m). There were thirty entries. These consisted of sixteen pure lines, nine synthetic mixtures, one natural mixture (contained over 60 types), one F_2 line, and two controls. Four bean sides were planted on the same stand with three maize plants. Cultural practices for the experiment was as recommended for maize.

RESULTS AND DISCUSSION

Mean seed yields (Kg/ha) for Bunda College, Dedza, Dowa, Misuku Hills and Thyolo were 497, 757, 458, 310 and 306, respectively. The low bean yields were attributed to the competitive ability of maize conferred on it by its larger frame, vigour and height. No one treatment yielded consistently highest across sites. The natural mixture ranked fifth across locations.

Yield advantage of mixtures was calculated using relative yields. This was the ratio of the yield of the synthetic mixture over the mean yield of the pure line. The sum of the ratios normally produce land equivalent ratios.

A relative yield (RY) of one means that the pure line was as good as the mixtures, an RY less than one means that the pure lines yielded more than the mixtures while an RY greater than one means that there was a yield advantage of the mixture over the pure line. The RY ranged from 0.79 (Thyolo) to 1.30 (Dowa) with a location RY mean of 1.07, indicating that mixtures yielded 7% higher than pure lines.

The trial will be repeated during the 1984/85 crop season in seven locations. A parallel trial with thirty entries not grown in association with maize is also being conducted at the same sites.

Table 1: Germplasm collection in Malawi 1982-1984

Date of collection	Region	No samples collected	No types per farmer
March - April, 1982	Northern	113	15
March - April, 1983	Central	54	14
March - April, 1984	Southern	98	7
July - August, 1984	Northern	43	11
Total/Mean	-	308	11.8

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EFFECTS OF RELATIVE DISTANCE OF BEAN STANDS FROM MAIZE STANDS ON YIELD

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INTRODUCTION

Mixed cropping, the practice of growing two or more crops on the same unit of land during the same cropping season is the commonest cropping system among smallholder farmers in Malawi (Edje et al., 1976 and Edje, 1979). It is a strategy for increasing crop yield, crop diversity and the stability of crop production (Gomez and Gomez, 1983). Also through mixed cropping farmers are assured of the spread and availability of a variety of food over a longer period of time as the crops mature over a period of time than in monoculture. Although mixed cropping is popular, little attention was paid to it until in the early 1970s when researchers started "going outside the research stations and talking to the farmers who have been experimenting with mixed cropping for centuries".

Because mixed cropping is popular with the smallholder farmer, substantial wealth of information has been accumulated in recent years to support the practice. In Malawi, the research emphasis has been an genotype interaction, plant density effects, response to mineral nutrition, relative dates of interplanting, crop protection etc. However, it has been observed on farmers' fields that maize and beans are sometimes planted at the same stand or the beans may be planted 15-45cm away from the maize stand, irrespective of whether the beans are dwarf or climbing. In this planting pattern, the maize crop is often fertilized but not the beans.