MAIZE/BEAN INTERCROPPING ON THE ZIMBABWEAN HIGHVELD

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INTRODUCTION

Intercropping is a common cropping system in Africa, Asia and Latin America, where more than 80% of smallholder farmers practice it (Edje, 1990). The predominant intercrop is a cereal/legume mixture. It is popular because of its nutritional complimentarity (Edje, 1990).

Spatial arrangements of component crops is one of the most important management factors that determine whether an intercrop will be advantageous or not (Natarajan, 1990). Maize is the major food crop in Zimbabwe and the major cash crop for most smallholder farmers. Any maize/legume intercropping practice must therefore not lower maize yield but should produce a bonus protein yield from the legume.

The objectives of the study were (i) to evaluate the performance of maize/bean intercrops on the Zimbabwean highveld, (ii) to determine the performance of speckled Natal Sugar and speckled Carioca beans, normally grown as sole crops under intercropping conditions and (iii) to test the effects of various spatial arrangements on the maize/bean intercrop performance.

MATERIALS AND METHOD

Maize hybrid R215 was intercropped with two type II bean varieties, Carioca (a Pinto) and Natal Sugar (a Cranberry) at the University of Zimbabwe on a sandy clay loam that could be irrigated and at Domboshava Training Institute on a sandy soil under rainfed conditions.

The experimental design was a RCBD with bean variety, and spatial arrangements as treatments and with three replications. Maize was planted in 90 cm rows at intra-row spacings of 30 cm (one plant/station) or 60 cm (two plants/station). Beans were planted either in the same row as the maize or in alternative rows to maize rows. A maize monoculture was used as the control.

At harvest, unshelled and shelled weight of maize and beans was determined. Maize/bean intercropping performance relative to the sole crops was determined by the partial land equivalent ratio (LER) method. Monetary values were determined for the intercrops using Zimbabwean Grain Marketing Board prices of ($900.00 per tonne for maize and $2400 per tonne for beans).

RESULTS AND DISCUSSION

Intercropping maize (90x30 cm) with rows of either Natal Sugar or Carioca between maize rows did not affect maize yield (Table 1). Planting beans in the same row as maize lowered maize yield when maize was grown with Natal Sugar, but not when grown with Carioca. Maize yields at 90x30 cm and 90x60 cm spacing were not significantly different. Intercropping did not affect maize shelling percent in any of the spatial arrangements. Bean yields tended to be higher when beans and maize were planted in the same row than when beans and maize were planted in alternate rows. Natal Sugar attained a higher shelling percentage ($P < 0.01$) than Carioca under both maize/bean spatial arrangements.

Monetarily, the intercrops made up to 58.3% and 46.6% more money ($p \leq 0.05$) at the 90x60 cm and 90x30 cm spacing, respectively, than their respective maize monoculture. There was no significant monetary difference between growing the maize/bean in alternate rows or in the same row.

Intercropping with Natal Sugar achieved higher monetary values than intercropping with Carioca.

At Domboshava, the 1991/92 season was characterized by drought conditions resulting in a near failure of the maize and low yield of beans (data not shown). There were no treatment differences in maize and bean yields. Maize yield reductions due to intercropping with beans were high, ranging from 24.3% to 80.7%. Drought had a more devastating effect on maize yield than on bean yield. Carioca proved to be better suited for drought conditions than Natal Sugar.

Table 1:   Yield, yield components of maize and beans and relative yields changes at different spatial arrangement in intercropping at University site

Treatment	Maize		Beans	
	Yield kg/ha	Shelling %	Yield kg/ha	Shelling %
Maize (90x30cm) one plant hill	8433	87.3	-	-
Maize (90x30cm) Carioca rows between maize rows	8499	88.4	666	78.3
Maize (90x30cm) Natal Sugar rows between maize rows	8269	87.5	748	80.7
Maize (90x60cm) Two plants hill	7265	87.4	-	-
Maize (90x60cm) Carioca in the same row as maize	6828	86.6	778	78.2
Maize (90x60cm) Natal Sugar in the same row as maize	5660	86.0	1070	81.1
Mean	7492	87.2	816	79.6
LSD5%	1431.7	1.7	638.2	1.5
Significance	**	N·S	N·S	**
CV	10.5	1.1	39.2	0.9

**   Means significant at 1% Indicate significance at p≤0.01
*   Means significant at 5% Indicate significance at p≤0.05

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