INFLUENCE OF PLANT POPULATIONS ON INSECT PESTS OF COMMON BEANS
INTERCROPPED WITH MAIZE

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Low built up of insect pests, considered as a reason for yield advantage
in intercropping, perhaps results from the increase in complexity of plant
mixtures, which provide a less favourable habitat for some of the insect
pests than when crops are grown in pure stand. However, little is known
about the influence of intercropping on insect pests of common beans. Further,
the effect of plant populations on insect pests under intercropping systems
is not well known. The present paper reports on the effect of plant popula-
tions on some insect pests of common beans intercropped with maize.

Bean Variety 'Selian wonder' and maize variety 'Illonga composite' were
selected for the present study. A split plot design was used with intercrop
combinations and pure stands as main treatments and plant populations as
subtreatments. The main treatment plots were 6m long and 15m wide and sub-
treatment plots were 6m long and 3.75m wide. The treatments were replicated
four times.

A replacement series technique was employed for getting intercrop
combinations by 'replacing' a certain proportion of one species by another
using plant equivalence for the component crops. Both possible combinations
of one-third/two-thirds of the component crops were formed in addition to
pure stand treatments as follows : Pure bean (BBB), two-thirds beans/one-
third maize (BBM), one-third beans/two-thirds maize (BMM) and pure maize
(MMM). Four plant populations, P1 (66,666 plants/ha), P2 (133,333 plants/ha),
P3 (266,666 plants/ha), and P4 (533,333 plants/ha) were used. The row width
of 75cm and 37.5cm for maize and beans, respectively were used; the within
row spacing was 60, 30, 15 and 7.5cm for maize and 40, 20, 10 and 5cm
for beans. The intercrop combinations were obtained by planting complete
pair of rows of beans or complete row of maize in required proportions.

Insect infestation was estimated by both insect counts and by estimating
the damage caused by insect pests in pure stand and intercrop beans. The
aphid (Aphis fabae Scopoli) damage was estimated on a 0-5 visual scale.
The incidence of leafhopper (Empoasca sp.) was determined by counting total
number of leafhoppers on 20 plants per plot. The incidence of flower thrrips
(Megalurothrips sjostesti Trybom) was estimated by counting thrrips in 10
flower collected at random from each plot four times at four day intervals
beginning at 35 days after planting (DAP). The population of pod-sucking
bugs (Clavigralla shadabi Dolling, C. tomentosicollis, Anoplocnemis curvipes
F., Riptortus dentipes F. and Nezara viridula) was estimated by counting
all the pod-sucking bugs on five plants selected at random per plot at weekly
intervals beginning 45 DAP.

Intercropping had no significant effect on the damage caused by aphids
(A. fabae) to beans, although intercropped beans had slightly more aphid
damage than pure stand beans (Table 1). Further, the aphid damage was less

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in higher than lower plant populations. The incidence of leafhopper (Empoasca sp.) was not significantly different among the various crop combinations, although beans intercropped with maize had lower leafhopper infestation (Table 1). However, with increasing plant populations, there was a significant (P < 0.05) decrease in leafhopper infestation. Restriction of movement (barrier effect) of leafhopper in beans intercropped with maize could have possibly reduced the pest population.

The incidence of flower thrips (M. sjostedti) was significantly (P < 0.05) less in intercropped than pure stand beans (Table 1). The thrips population decreased with increasing proportion of maize in the intercropped combinations. The infestation of flower thrips was significantly (P < 0.05) lower in higher (P3 and P4) than lower plant populations (P1 and P2). The lower thrips populations in intercropped plots indicate that maize may present some barrier for dispersal of thrips in intercropped beans.

Clavigralla spp. and A. curvipes were dominant pod-sucking bugs recorded feeding on bean pods. Fewer R. dentipes and N. viridula were recorded. Pod-sucking bugs did not differ significantly in number in pure stand and intercropped beans (Table 1). Their population increased from P1 to P3 and from P1 to P2 in 1981 and 1983 trials, respectively, followed by a gradual decreased up to P4.

Acknowledgment: The study was supported by a grant from US - AID XII Bean/Cowpea CRSP between WSU and SUA, Morogoro, Tanzania.

Table 1. Incidence and damage by insect pests to common beans grown in pure stand and intercropped with maize at different plant populations

<table>
<thead>
<tr>
<th>Treatment</th>
<th>x No. of leafhopper/20 plants</th>
<th>Aphid Damage</th>
<th>Thrips/flower</th>
<th>x No. of pod-sucking bugs/5 plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BBB</td>
<td>4.75a</td>
<td>0.94a</td>
<td>2.10a</td>
<td>3.13a</td>
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<tr>
<td>RRM</td>
<td>4.69a</td>
<td>1.00a</td>
<td>1.83ab</td>
<td>2.05b</td>
</tr>
<tr>
<td>RMM</td>
<td>3.75a</td>
<td>1.06a</td>
<td>1.76b</td>
<td>1.39b</td>
</tr>
<tr>
<td>Mean</td>
<td>4.40</td>
<td>1.00</td>
<td>1.73</td>
<td>2.19</td>
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<tr>
<td>Sub treatment</td>
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<tr>
<td>P1</td>
<td>5.25a</td>
<td>1.25ab</td>
<td>2.17a</td>
<td>2.79a</td>
</tr>
<tr>
<td>P2</td>
<td>4.58ab</td>
<td>1.58a</td>
<td>1.83b</td>
<td>2.23b</td>
</tr>
<tr>
<td>P3</td>
<td>3.75b</td>
<td>0.83bc</td>
<td>1.55c</td>
<td>1.91c</td>
</tr>
<tr>
<td>P4</td>
<td>4.00b</td>
<td>0.33d</td>
<td>1.38c</td>
<td>1.85c</td>
</tr>
<tr>
<td>Mean</td>
<td>4.39</td>
<td>1.00</td>
<td>1.73</td>
<td>2.10</td>
</tr>
</tbody>
</table>

In a column, means followed by the same letters are not significantly different (P < 0.05; Duncan's multiple range test)

*Aphid damage based on visual scale of 0-5.