

AGENCY FOR INTERNATIONAL DEVELOPMENT  
WASHINGTON, D. C. 20523  
BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

Batch 77

1. SUBJECT CLASSIFICATION	A. PRIMARY Serials	Y-AF00-0000-0000
	B. SECONDARY Food production and nutrition—Plant production	

2. TITLE AND SUBTITLE  
Corn and bean interactions in mixed culture; progress report, July-Sept. 1977

3. AUTHOR(S)  
(100) Clark, Ann; Shibles, Richard; Laing, Douglas; (101) CIAT

4. DOCUMENT DATE 1977	5. NUMBER OF PAGES 101 Sp.	6. ARC NUMBER ARC
--------------------------	-------------------------------	----------------------

7. REFERENCE ORGANIZATION NAME AND ADDRESS  
CIAT

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publisher, Availability)  
(Research summary)

9. ABSTRACT

10. CONTROL NUMBER PN-AAF-224	11. PRICE OF DOCUMENT
12. DESCRIPTORS Beans Maize	13. PROJECT NUMBER
	14. CONTRACT NUMBER AID/ta-G-1435 GTS
	15. TYPE OF DOCUMENT

4P  
AID/ta-G-1435 GTS

CIAT

PN-AAF-224

**CORN AND BEAN INTERACTIONS IN MIXED CULTURE**

**QUARTERLY PROGRESS REPORT**

to

**AGENCY FOR INTERNATIONAL DEVELOPMENT**

**AID Grant No. AID/ta-G-1435 GTS**

**PIO/T No. 317757**

**Prepared by:**

**Ann Clark**

**Richard Shibles**

**Douglas Laing**

**September, 1977**

The research discussed in this report is part of an ongoing investigation into bean physiology and varietal improvement at the Centro Internacional de Agricultura Tropical (CIAT). We are studying the performance of beans grown in association with corn, to analyze the physiological basis for the bean yield depression consistently observed in this system. Information derived from this study will be used to design a bean ideotype specifically for associated culture with maize.

We have chosen to evaluate the corn:bean interaction by comparing the growth, development and yield of bean varieties grown in both monoculture and associated systems. The first phase of this program, outlined in the 'Report on Discussions with Laing and Francis at CIAT, March 14, 1977', is currently underway and is discussed in this report.

#### OBJECTIVES:

1. To become familiar with the range of genotypic variability available for subsequent comparison.
2. To evaluate the magnitude of the genotype by cropping system interaction.
3. To identify, largely by yield performance, a strong and a weak competitor within each type, for subsequent study.

#### METHODS:

This study is currently underway on the research station of CIAT, located near Palmira, Colombia, S.A. A description of environmental parameters at this site may be found in the CIAT 1976 Annual Report (p. XVIII).

Seed of forty bean varieties, ten in each of four growth habits, was planted on July 18. First irrigation was on July 22 and plants were thinned to required populations two weeks later (day 14). Four replications of each variety were planted both in monoculture and in association with maize, using a split split-plot design. Cultural systems were the whole plots with habits and varieties within habits as the first and second splits, respectively.

#### PLANT POPULATIONS

	<u>Associated</u>		<u>Monoculture</u>
Type I	240,000	pl ha <sup>-1</sup>	240,000
Type II	240,000		240,000
Type III	120,000		120,000
Type IV	120,000		120,000
Maize (H-207)	40,000		0

These populations were achieved using raised beds, 1 m apart on centers, each containing two rows of beans spaced accordingly. In associated culture, a single row of maize was planted down the center

of each bed concurrent with the bean planting. In monoculture, Type IV (climbing) beans were artificially supported to a height of 2 m, using a system of bamboo, wire and twine. Plots consisted of three beds (six rows of beans), 6 m long, with data collection restricted to plants in the middle 4 m of the innermost 4 rows.

Fertilizer (200 kg ha<sup>-1</sup> of 10-30-10) was incorporated prior to planting and supplemented by foliar application of zinc, boron and urea on days 15, 18, 22, 28, 36, and 41. Irrigation was applied post planting (day 1) and at 12, 34, 43, and 53 days. Chemical control of insects and diseases was rigorous, in accordance with the usual practices at CIAT during the dry season. Dimecron, Benlate, Lannate Koccide, Sevin, Thiodin, and Plantvax were applied from a backpack sprayer unit at intervals, as needed.

#### DATA COLLECTION:

Growth and development of beans are being assessed using both physical and temporal indices. Empirical vigor and disease ratings are made at intervals. Plant and canopy heights and plant width are being measured throughout the growth cycle. Dry weight partitioning, plant leaf area and plant structure are being evaluated by periodic whole plant harvests. Yield and yield components will be assessed at the final harvest. Dates of emergence, the flowering interval and physiological maturity are being taken.

These data will be used to compare varietal behavior in both systems, and specifically, to select those varieties considered most appropriate for intensive study in subsequent seasons.

#### RESULTS:

The data collected to date have not been analyzed but some observations can be noted. Common mosaic virus, a seed-borne and insect transmitted disease, has infected some of the varieties in this trial. All of the Type I varieties, and several varieties in each of the other types are affected and cannot be considered for subsequent evaluation. In addition, the as-yet-undiagnosed Problem X (see the CIAT 1976 Annual Report, p.A-14) has effected all of the remaining varieties. Symptoms of Problem X appeared late in plant growth (day 40), and do not appear to be affecting subsequent growth, as infected plants remain outwardly vigorous. It may be noted that all 40 varieties included in this trial were chosen for their comparative resistance to Problem X. The significance of Problem X in this trial remains to be evaluated.

#### PROJECTED ACTIVITIES FOR THE NEXT SEASON:

The first phase of research will be terminated in late October to mid-November, after which the data will be analyzed and the second phase begun. Using the varieties chosen from the first season, competitive interactions between corn and bean will be evaluated at the root and shoot levels. The approach to be used has been diagrammed and explained in the 'Report on Discussions with Laing and Francis at CIAT, March 14, 1977'

A possible revision of the proposed methodology would restrict subsequent study to Types II, III and IV, because Type I varieties chosen for this investigation have been shown to be susceptible to common mosaic virus. This disease could constitute a serious problem on the CIAT research station, and as such, makes the study of susceptible varieties unfeasible.