

633.15

Am 7

1991

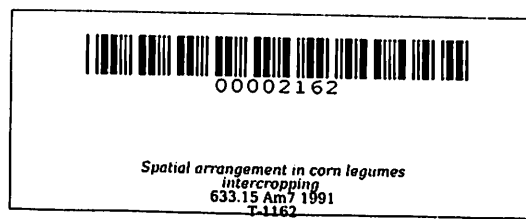
**SPATIAL ARRANGEMENT IN CORN
LEGUMES INTERCROPPING**

SOLOMON M. AYOSSA

March, 1991

~~4~~
SPATIAL ARRANGEMENT IN CORN
LEGUMES INTERCROPPING

SOLOMON M. AMOSSA



Submitted to the Faculty of Graduate Studies
Don Severino Agricultural College
In Partial Fulfillment of the
Requirements for the
Degree of

Master of Science
(Agronomy)

March 1991

ABSTRACT

Solomon Amosa. Don Severino Agricultural College, Indang, Cavite, July 1990. Spatial Arrangement in Corn Legumes Intercropping. Major Adviser: Dr. Eusebio V. Alava.

The study was conducted to determine the effect of the different intercropping treatments and the pattern on the growth and yield of corn plant using single and double row system and to evaluate the economy of production of the different intercropping systems.

$\frac{1}{2} P \frac{1}{2} P$ IBP variety 1 corn, UPL Pn-4 variety of peanut, UPLBS3' variety of bush sitao, and UPLSY-4 variety of soybean were used in the study.

Split plot in Randomized Complete Block Design was used in the experiment with seven treatments.

Results showed that corn bush sitao intercropping combination in a single row system produced highest corn yield and yield components over the rest of the intercropping treatments. However corn and bush sitao monoculture surpassed, the intercropping treatments in yield in this experiment. Corn-bush sitao intercropping combination in a double row system produced lesser yield when compared to the single row system. This was due to the difference in population density. However yield per plant of corn and bush sitao was greater in a double row system than those in the single system. This was also attributed to the difference in

population density.

Generally, considering the net profit obtained from each intercropping treatment in the study, corn bush sitao intercropping combination in the single row system gave the highest net return. The lowest net profit was obtained from corn soybean intercropping combination.

T A B L E O F C O N T E N T S

	PAGE
INTRODUCTION	1
Objectives of the study	2
Time and Place of the Study	2
REVIEW OF RELATED LITERATURE	3
Local Literature and Studies	3
Foreign Literature and Studies	7
Justification	9
MATERIALS AND METHODS	11
Varieties of Crops Used	11
Experimental Design	12
Intercropping Treatments	14
Cultural Management	22
Land Preparation	22
Innocation and Application of fertilizer	22
Preparation of Planting Materials	23
Planting	23
Thinning	23
Weeding and Cultivation	24
Control of Pest and Diseases	24
Harvest and Gathering of Post-harvest Data	24
Other Data Gathered	26
Procedure in Leaf Area Determination	26

	PAGE
RESULTS AND DISCUSSION	28
General Observation	28
Growth Pattern of Main Crop and Intercrop	28
Pest and Disease Incidence	31
Weather Condition	31
Physiological Character	32
Yield Parameter	39
Corn	
Shelled Yield of Corn Plant per plot	40
Fresh Weight of Corn Plant with Corn Ears (gm)	43
Weight of Husked Corn Ears per Plant (gm)	44
Length of Corn Ears (cm)	46
Diameter of Corn Ears at Maturity Stage /Plant (cm)	48
Number of Marketable Corn Ears per Plot	50
Number of Non-marketable Corn Ears per Plot	52
Peanut	
Shelled Yield of Peanut Plant per Plot	54
Fresh Weight of Peanut Plant w/ Pods/Plant (gm)	55
Dry Weight for Shelled Yield of Peanut per Plant (gm)	56
Number of Peanut Pods per Plant	58
Number of Marketable Pods of Peanut per Plant	59

	PAGE
Number of Non-marketable Pods of Peanut per Plant	60
Bush Sitao	
Yield of Bush Sitao per Plot (kg)	61
Fresh Weight of Bush Sitao Plant with Pods/Plant in (gm)	65
Weight of Bush Sitao Pods per Plants (gm)	66
Number of Bush Sitao Pods per Plant	68
Number of Marketable Pods per Plant of Bush Sitao	69
Number of Non-marketable Bush Sitao Pods per Plant	71
Soybean	
Shelled Yield of Soybean per Plot	73
Fresh Weight of Soybean w/ Pods/Plant (gm)	74
Dry Weight of Soybean w/ Pods/Plant (gm)	75
Number of Soybean Pods per Plant	77
Number of Marketable Pods of Soybean per Plant	78
Number of Non-marketable Pods of Soybean per Plant	80
Land Productivity Index	81
Cost and Return Analysis of Production	84
SUMMARY AND CONCLUSION	90
RECOMMENDATION	95
LITERATURE CITED	103
APPENDIX	107

LIST OF FIGURES

FIGURE NO.	PAGE
1. Experimental Field Layout	13
2. Spatial Arrangement in Corn Legumes Intercropping	15
3. Average Growth of Corn, Peanut, Bush Sitao, and Soybean	29
4. LAI at Flowering Stage and Corn Yield as Affected by Plant Population	35
5. Yield of Corn at Different Plant Population	41
6. Yield of Bush Sitao at Different Plant Density	64
7. Corn Peanut Intercropping in a Single Row System One Month After the Time of Planting	96
8. Corn Bush Sitao Intercropping in a Double Row System Seven Weeks After the Time of Planting	97
9. Corn Soybean Intercropping in a Single Row System One Month After the Time of Planting	98
10. Peanut Monoculture Five Weeks After the Time of Planting	99
11. Soybean Monoculture Five Weeks After the Time of Planting	100
12. General View of the Experimental Field	101

LIST OF TABLES

TABLE NO.	PAGE
1. Spacing and Number of Plants per Hectare of Corn, Peanut, Bush Sitao, and Soybean under Different Intercropping Treatments	21
2. Means for Leaf Area Index of Corn Plant at Full Tassling Stage	34
3. Means for Leaf Area Index of Peanut Plant at Full Blooming Stage	37
4. Means for Leaf Area Index of Bush Sitao Plant at Full Blooming Stage	38
5. Mean for Leaf Area Index of Soybean Plant at Full Blooming Stage	39
6. Means for Shelled Yield of Corn Plant per Plot (kg)	42
7. Means for Fresh Weight of Corn Plant with Ears /Plant/gm.	44
8. Means for Husked Corn Ears Weight per Plant (gm).	46
9. Means for Length of Corn Ears (cm)	48
10. Means for Diameter of Corn Ears(cm)	50
11. Means for Number of Marketable Corn Ears per Plot (%).	52
12. Means for Non-marketable Corn Ears per Plot (%)	53
13. Means for Shelled Yield of Peanut Plant per Plot (kg)	55
14. Means for Fresh Weight of Peanut Plant with Pods/Plant (gm)	56

TABLE NO.	PAGE
15. Means for Dry Shelled Yield Weight of Peanut/Plant (gm)	58
16. Means for Number of Peanut Pods per Plant	59
17. Means for Number of Marketable Pods of Peanut per Plant	60
18. Means for Number of Non-marketable Pods of Peanut per Plant	61
19. Means for Yield of Bush Sitao Plant per Plot (kg)	63
20. Means for Fresh Weight of Bush Sitao Plant with Pods/Plant (gm)	66
21. Means for the Weight of Bush Sitao Pods per Plant (gm)	67
22. Means for Bush Sitao Pods per Plant	69
23. Mean for Number of Marketable Pods of Bush Sitao/Plant	70
24. MeanS for Non-marketable Bush Sitao Pods per Plant	72
25. Means for Shelled Yield of Soybean Plant per Plot (kg)	74
26. Means for Fresh Weight of Soybean Plant with Pods/Plant/gm	75
27. Means for Dry Weight of Soybean Shelled Yield per Plant (gm)	77
28. Means for Number of Soybean Pods per Plant	78
29. Means for Number of Marketable Pods of Soybean per Plant	80

TABLE NO.	PAGE
30. Means for Number of Non-marketable Pods of Soybean per Plant	81
31. Land Equivalent Ratio and Yield Efficiency of Various Intercropping Treatments	82
32. Cost and Return Analysis of Production of Corn, Peanut, Bush Sitao, and Soybean Under Different Intercropping Treatments	86
33. Computed Cost of Production	87
34. Computation of Cost of Production	88

LIST OF APPENDIX TABLES

APPENDIX TABLE NO.	PAGE
1. Leaf Area Index for Corn Plant at Full Tassling Stage	108
1a. Analysis of Variance for Corn Plant at Tasseling stage	108
2. Leaf Area Index For Peanut Plant at Full Blooming Stage	109
2a. Analysis of Variance for Peanut Plant at Full Blooming Stage	109
3. Leaf Area Index for Bush Sitao Plant at Full Blooming Stage	110
3a. Analysis of Variance for Bush Sitao at Full Blooming Stage	110
4. Leaf Area Index for Soybean Plant at Full Blooming Stage	111
4a. Analysis of Variance for Soybean Plant at Full Blooming Stage	111
5. Shelled Yield of Corn Plant per Plot(kg)	112
5a. Analysis of Variance for Shelled Yield of Corn Plant per Plot (Kg.)	112
6. Fresh Weight of Corn Plant with Corn Ears Plant (gm).	113
6a. Analysis of Variance for Fresh Weight of Corn Plant with Corn Ears (kg.)	113
7. The Weight of Husked Corn Ears per Plant (gm)	114
7a. Analysis of Variance for the Weight of Husked corn Ears per Plant	114

APPENDIX
TABLE NO.

PAGE

8. Length of Corn Ears per Plant (cm)	115
8a. Analysis of Variance for Length of Corn Ears per Plant	115
9. Diameter of Corn Ears (cm.)	116
9a. Analysis of Variance for Diameter of Corn Ears (cm.)	116
10. Number of Marketable Corn Ears per Plot (%)	117
10a. Analysis of Variance for Number of Marketable Corn Ears per Plot (%)	117
11. Number of Non-marketable Corn Ears per Plot(%)	118
11a. Analysis of Variance for Non-marketable Corn Ears per Plot (%)	118
12. Shelled Yield of Peanut Plant per Plot (kg)	119
12a. Analysis of Variance for Shelled Yield of Peanut Plant per Plot	119
13. Fresh Weight of Peanut Plant with Pods/Plant (gm.)	120
13a. Analysis of Variance for Fresh Weight of Peanut Plant with Pods/Plant (gm.)	120
14. Dry Weight for Shelled Yield of Peanut/Plant (gm)	121
14a. Analysis of Variance Dry Weight of Shelled Yield of Peanut/Plant (gm.)	121
15. Number of Peanut Pods per Plant	122
15a. Analysis of Variance for Number of Peanut Pods per Plant	122
16. Number of Marketable Pods of Peanut per Plant	123
16a. Analysis of Variance for Number of Marketable Pods of Peanut per Plant	123

APPENDIX
TABLE NO.

PAGE

17. Number of Non-marketable Pods of Peanut/Plant	124
17a. Analysis of Variance for Number of Non-marketable Pods of Peanut/Plant	124
18. Yield of Bush Sitao Plant per Plot (kg).	125
18a. Analysis of Variance for Yield of Bush Sitao Plant per Plot (kg.)	125
19. Fresh Weight of Bush Sitao Plant with Pods per Plant (gm)	126
19a. Analysis of Variance for Fresh Weight of Bush Sitao Plant with Pods per Plant	126
20. Weight of Bush Sitao Pod per Plant (gm)	127
20a. Analysis of Variance for Weight of Bush Sitao Pod per Plant	127
21. Number of Bush Sitao Pods per Plant	128
21a. Analysis of Variance for Number of Bush Sitao Pods per Plant	128
22. Number of Marketable Pods of Bush Sitao/Plant	129
22a. Analysis of Variance for Number of Marketable Pods of Bush Sitao/Plant	129
23. Number of Non-marketable Bush Sitao Pods/Plant	130
23a. Analysis of Variance for Number of Non-marketable Bush Sitao Pods/Plant	130
24. Shelled Yield of Soybean per Plot (kg.)	131
24a. Analysis of Variance for Shelled Yield of Soybean per Plot (kg.)	131
25. Fresh Weight of Soybean Plant with Pods/Plant (gm.)	132
25a. Analysis of Variance for Fresh Weight of Soybean Plant with Pods/Plant (gm.)	132

APPENDIX
TABLE NO.

PAGE

26. Dry Weight of Soybean Shelled Yield per Plant gm.)	133
26a. Analysis of Variance for dry Weight of Soybean Shelled Yield per Plant (gm.)	133
27. Number of Soybean Pods/Plant	134
27a. Analysis of Variance for Number of Soybean Pods/Plant	134
28. Number of Marketable Pods of Soybean per Plant	135
28a. Analysis of Variance for Number of Marketable Pods of Soybean per Plant	135
29. Number of Non-marketable Pods of Soybean per Plant	136
29a. Analysis of Variance for Number of Non- marketable Pods of Soybean per Plant	136

INTRODUCTION

One of the several factors that hamper the endeavor is the low productivity of agricultural land because of improper land utilization and unavailability of new improved technologies in farming. Since intercropping system of farming is one of the improved techniques of maximizing the production, there should be a need of introducing such system to the farmers to increase the yield per unit area.

The area of the land under cultivation raises only slowly and the survival of the growing world population will depend on further increase in the yield of these crops. Limited use of these system in the developed world for commercial production is due to its high labor requirement (Crookston, 1976) and the mechanized technology designed for large scale production.

With intercropping, the crop combination is important and regarded as a basic consideration for total productivity (IRRI, 1972). The most common combination, however, is that of a cereal and legumes which frequently gives a significant total yield advantage (Reddy Willey, 1981). In a crop mixture, it is necessary for maximum benefit that the environment's demands of the component crops are not the same (Crookston, 1976). A good crop combination in an intercropping system often results from complimentary in terms of overall use of growth reasources compared with the situation