

Intercropping Sweet Corn with Different Legumes

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Abstract

The study was conducted at a farmer's field in Danuman West, Sta. Maria, Ilocos Sur to determine the yield performance of sweet corn as affected by the intercropping of different legumes and to determine the highest net returns of legumes as intercrops of corn.

The legumes used as intercrops were: mungbean, rice bean, copea (Black cowpea), and peanut (Spanish Red). Thus the treatments were: T₁-sweet corn intercropped with mungbean, T₂-sweet corn intercropped with rice bean, T₃-sweet corn intercropped with cowpea, and T₄-sweet corn intercropped with peanut. These including a control (CG - unintercropped corn plants) were laid out following a Complete Randomized Design (CRD) with three (3) replications.

Results showed no effect of legume intercrops on corn plant height and yield performance. Although the highest actual corn yield was recorded in the unintercropped corn plants with 7.3 kg/plot, the yield performance of the farmland can be increased by intercropping different legumes with sweet corn. T₄ (sweet corn intercropped with peanut) had a corn yield of 6.9 kg/plot and 28.0 kg/plot of peanuts.

Intercropping gives a possibility of increasing the economic yield of the corlands with little modifications on the corn farming techniques and practices at the farmer's level.

Introduction

Rationale

Corn plant farmers in the locality are strict practitioners of the monoculture system of growing crops. Thus, they derive their farm income mainly from corn.

The use of intercrops in corn farming in a way maximizes the economic use of corn farms. This means an increase in farm income derived from the

economic yield of intercrops; thus, increasing farm income through additional crop yields from the same piece of land.

Objectives

- I. To determine and compare the average growth performance of sweet corn intercropped with different legumes for the duration of three months.
2. To determine the yield per hectare of sweet corn affected by the intercropping of different legumes.
3. To determine the highest net returns of legumes as increments of corn.

Review of Literature

According to Bugtaw (1998), corn farmers reported a notable increase in their harvests with the use of 2 or more intercrops.

Tabanao (1995) found out that 2.5 cu m irrigation water gave the highest yield for both monocrops and intercropped upland corn. He also stressed that fertilizer application depends on the availability or level of moisture in the soil if the plants are to take efficient use of nutrients.

Bayaca (1989) cited that technologies on corn production can improve yield with the adoption of cropping patterns such as corn + peanut, corn + mungbean and corn + cotton. In support of the technology adaptation studies of the Regional Integrated Agricultural Research System, the project funded the conduct of 19 and 55 exploratory trials for the first and second cycles, respectively.

Methodology

Corn seeds were planted at a distance of 50 cm between rows and 50 cm between hills.

Mungbean, rice bean, cowpea, and peanut were planted simultaneously one (1) row of intercrops at a distance of 25 cm per ridge of corn. Legume seeds were hand drilled at 25 cm between hills and at the rate of three (3) seeds per hill at a depth of five (5) centimeters.

The treatments used were: T₁ -- sweet corn intercropped with mungbean, T₂ -- sweet corn intercropped with rice bean, T₃ -- sweet corn intercropped with

cowpea, and T, - sweet corn intercropped with peanut. These including a control (T, - unintercropped corn plants) were laid out following a Complete Randomized Design (CRD) with three (3) replications.

Height of the com plant was measured three times after planting, once each month. In determining the height, measurement started from the base up to the longest leaf with the use of a pull push rule.

After determining all the yield components of the corn plants, the millable stalks of all plants were cut, cleaned and weighed separately to obtain the actual cum yield per 9.0 m². Corn yield in kilograms per plot was computed based on the actual com yield per 9.0 m².

The yield of the sample plants was combined with the yield of the plants within the sample area. Pod yield obtained from each of the intercrops per plot was computed per 9.0 m².

Discussion of Results

The result of this experimental study is shown in the following tables:

Table 1. First monthly average height of sweet corn in centimeters.

| Treatments | Replication | | | \bar{x} |
|----------------|-------------|-------------|-------------|--------------|
| | 1 | 2 | 3 | |
| T | 55 | 56 | 59 | 56.67 |
| T ₁ | 51 | 52 | 55 | 52.67 |
| T ₂ | 53 | 51 | 53 | 52.33 |
| T ₃ | 52 | 52 | 55 | 53.00 |
| T ₄ | 53 | 52 | 56 | 53.67 |
| Mean | 52.8 | 52.6 | 55.6 | 53.67 |

Legend: T, sweet com (mono crop)
 T₁, sweet com and mungbean
 T₂, sweet com and rice bean
 T₃, sweet com and cowpea
 T₄, sweet com and peanut

The table above shows that T has the highest average height with a mean of 56.67 cm. This is due to the fact that there was no intervention in the growth of the sweet com. This is followed by T₄, with an average height of 53.67 cm.

Table 1a. ANOVA on the first monthly average height of sweet coru.

| Source of Variations | Sum of squares | Df | MSS | F-ratio | Interpretation |
|----------------------|----------------|-----------|-------|----------------|-----------------|
| Between groups | 36.66 | 4 | 9.165 | 2.64 | Not significant |
| Within groups | 34.67 | 10 | 3.467 | | |
| Total | 71.33 | 14 | | tv=3.48 | |

When the difference in the average height of sweet corn is considered, there is no significant difference in the average height of sweet corn (mono crop). This means that with or without legumes which are intercropped the height of the sweet com remains the same.

Table 2. Second monthly average height of sweet corn in centimeters.

| Treatments | Replication | | | \bar{x} |
|----------------|-------------|-------------|-----------|-------------|
| | 1 | 2 | 3 | |
| T ₁ | 59 | 59 | 64 | 60.67 |
| T ₂ | 56 | 56 | 60 | 57.33 |
| T ₃ | 55 | 54 | 58 | 55.67 |
| T ₄ | 58 | 56 | 60 | 58.00 |
| T ₅ | 58 | 56 | 58 | 57.33 |
| Mean | 57.2 | 56.2 | 60 | 57.8 |

Table 2 presents the average height of sweet com in centimeters. T₁ has the greatest height with a mean of 60.67 cm, a difference of four centimeters from the first month. This is followed by sweet corn intercropped with cowpea with a mean of 58 cm. The difference in the height of sweet corn from the first month to the second month is five centimeters. As shown in the first month, sweet corn intercropped with rice bean is the shortest, with a mean of 55.67 cm while sweet com intercropped with peanut and mungbean shows the same average height with a mean of 57.33 cm.

Table 2a. ANOVA on the second monthly average height of sweet corn

| Source of Variations | Sum of squares | df | MSS | F-ratio | Interpretation |
|----------------------|----------------|-----------|------|----------------|-----------------|
| Between groups | 39.73 | 4 | 9.93 | 2.13 | Not significant |
| Within groups | 46.67 | 10 | 4.67 | | |
| Total | 86.4 | 14 | | tv=3.48 | |

Table 2a presents the ANOVA result on the second monthly average height of sweet corn. The average height of sweet corn intercropped with different legumes is not significantly different from each other.

The final height of sweet corn is presented in Table 3.

Table 3. Final height of sweet corn in centimeters.

| Treatments | Replication | | | Mean |
|----------------|-------------|------|------|-------|
| | 1 | 2 | 3 | |
| T | 70 | 71 | 77 | 72.67 |
| T ₁ | 68 | 67 | 72 | 69 |
| J | 62 | 63 | 78 | 67.67 |
| T ₂ | 69 | 66 | 77 | 70.67 |
| T ₃ | 66 | 70 | 74 | 70 |
| Mean | 67 | 67.4 | 75.6 | 70.00 |

The results show consistency with the monocrop. (T) having the highest mean height which is 72.67 cm. This is followed by sweet corn intercropped with cowpea with a mean of 70.67 cm. Sweet corn intercropped with rice bean (T₃) still has the lowest mean height.

Table 3a. ANOVA on the final height of sweet corn.

| Source of Variations | Sum of squares | df | MSS | F-ratio | Interpretation |
|----------------------|----------------|----|-------|---------|-----------------|
| Between groups | 55.33 | 4 | 13.84 | 0.58 | Not significant |
| Within groups | 240.00 | 10 | 24 | | |
| Total | 295.33 | 14 | | tv=3.48 | |

Table 3a presents the comparison among the final height of sweet corn. The result shows no significant difference. This implies that the final height of sweet corn intercropped with different legumes is not very significantly different.

The yield performance of sweet corn as affected by the intercropping of different legumes is presented in Table 4.

In the first replication, the total yield of corn in the five treatments is 10 kg, second replication is 10.9 kg and in the third replication, 12.2 kg.

The yield performance of legumes is also presented. In the first replication, the total yield of legumes in the five treatments is 21.9 kg, 22.3 kg in the second replication and 25.7 kg in the third.

The total yield performance of sweet corn is 33.1 kg sold at P45.45 per kilo, with a total income of P331.78. On the other hand, the total yield performance of legumes is 69.9 kg. The selling price of mungbean, ricebean and cowpea is P36.36 per kilo while peanut is sold at P68.18 per kilo. The total gross income of legumes is P3,432.53. The total gross income of both sweet corn and legumes is P4936.92.

Table 4a. ANOVA on the yield performance of sweet corn as affected by the intercropping of different legumes in kilograms.

| Source of Variations | Sum of squares | df | MSS | F-ratio | Interpretation |
|----------------------|----------------|----|--------|---------|-----------------|
| Between groups | 3.982 | 2 | 1.991 | 0.17 | Not significant |
| Within groups | 141.748 | 12 | 11.812 | | |
| Total | 145.73 | 14 | | tv=3.88 | |

Table 4a presents the ANOVA result which showed no significant difference. This means that since intercropping does not adversely affect the yield performance of sweet corn, intercropping legumes do not add to the total yield of the farm land.

Table 5 presents the cost and return analysis of sweet corn intercropped with different legumes. The table clearly shows the cost of production, the total gross income and the net return per treatment.

The total cost of production in the five treatments is P2,785.00 while the total gross income is P4,936.92 with a net return of P2,338.14.

Table 5. Cost and return analysis of sweet corn intercropped with different legumes.

| Treatments | Cost of Production in Pesos | | | | | | | Total Cost of Prod'n In Pesos | Total Gross Income in Pesos | Net Return in Pesos |
|------------|-----------------------------|---------|-------|------------|-----------|-----------|--------------|-------------------------------|-----------------------------|---------------------|
| | Seed | Legumes | Labor | Fertilizer | Chemicals | Gas & Oil | Sol Teet ina | | | |
| T0 | 20 | | 120 | 74 | 100 | 144 | 60 | 518 | 331.78 | -186.22 |
| 1, | 20 | 40 | 120 | 74 | 100 | 144 | 60 | 558 | 860.83 | 302.83 |
| 1 | 20 | 40 | 120 | 74 | 100 | 144 | 60 | 558 | 619.84 | 61.94 |
| 1, | 20 | 40 | 120 | 74 | 100 | 144 | 60 | 558 | 901.73 | 343.73 |
| 2 | 20 | 75 | 120 | 74 | 100 | 144 | 60 | 593 | 2222.64 | 1629.64 |
| Total | 100 | 195 | 600 | 370 | 500 | 720 | 300 | 2785 | 4936.92 | 2338.14 |

The table further shows that the highest net return is that of the sweet corn intercropped with peanut with a net return of P1,629.64, followed by sweet corn intercropped with cowpea with a net return of P343.73, sweet corn intercropped with mungbean with a net return of P302.83 and the last, sweet corn intercropped with rice bean with a net return of P61.94,

There is recorded yield derived from sweet corn (monocrop) but due to the expenses incurred in the treatments, there is no net return, instead a deficit of P186.22.

Conclusions

Based on the results of the experimental study on the growth and yield performance of sweet corn as affected by the intercropping of different kinds of legumes, the following conclusions are drawn:

1. The highest average height was that of sweet corn (monocrop) but when intercropped with different legumes, it was sweet corn intercropped with peanut that had the highest average height during the first month but during the second and third month, it was sweet corn intercropped with cowpea that gave the highest final height.
2. The highest yield performance of sweet corn was that of the monocrop but when intercropped with different legumes, it was sweet corn intercropped with peanut that gave the highest total yield while sweet corn intercropped with rice bean gave the lowest total yield.
3. The Spanish red peanut yielded the highest net return as intercrop of corn, while the least net returns of legumes was yielded by the rice bean.
4. The income derived from intercropping sweet corn with different legumes especially Spanish Red peanut was far greater than the income derived from sweet corn alone.

Recommendations

Based on the conclusions drawn in this study the following recommendations are forwarded:

- I. Since there were no significant differences in the height of sweet corn intercropped with different legumes, intercropping therefore did not intervene with their growth. It is advisable to intercrop corn with different legumes.
2. Since the highest yield performance was sweet corn intercropped with Spanish Red peanut, it is recommended that farmers choose peanut as intercrop.

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