## BIBLIOGRAPHY

DULAY, ALLAN B. APRIL 2009. Effect of Tillage and Animal Manure on the Growth and Yield of Sweet Corn. Benguet State University, La Trinidad, Benguet.

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## ABSTRACT

Tillage enhanced the growth and yield of sweet corn. Sweet corn planted in tilled plots was the earliest to reach tasseling, silking and harvesting stages. Digging plots twice resulted in higher plants, longer and bigger corn ears, higher weight and number of marketable corn ear yield and higher return on cash expense (ROCE).

Animal manure application improved the growth, the weight and number of marketable ears, weight of total yield of sweet corn and ROCE. Sweet corn plants applied with either chicken or hog manure produced heavier and numerous marketable ears per plot than those planted in the untilled and unfertilized plots.

Tillage and animal manure application interacted significantly on weight and number of marketable and total weight of corn ear yield that resulted in higher ROCE. Highest ROCE was realized from sweet corn planted in plot dug twice and fertilized with chicken dung.

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# INTRODUCTION

Sweet corn has some specific environmental and cultural needs that must be meet for the plant to produce high-marketable yields. Corn is a warm-season crop that requires high temperatures for optimum germination and rapid growth. If the soil temperature is too low, the seed will not germinate. If at the same time, the soil is too wet, the seed may rot before the soil temperature is adequate for germination. In general, sweet corn does not tolerate cold weather and frost will injure sweet corn at any stage of growth. Other stressful climatic conditions, such as drought or flooding, can reduce yields and cause small, deformed ears (Davis, 2005).

The use of organic fertilizers can lessen the successive use of commercial fertilizers. Organic fertilizers are not very expensive and can ensure vigorous growth of plants. It influences nutrient absorption due to its role in granulation and improvement of physical and chemical properties of the soil (Mamuri, 2003).

Organic fertilizer application helps to control soil borne diseases, improve soil properties and help maintain stable soil moisture content. Because they contain a wide variety of microelements, they also help adjust and improve the nutrient balance in the soil. Improvement of soil tilth and texture, increase in soil fertility and reduce fertilizer cost are the most important benefits in organic fertilizers (Pakias, 2008). In addition, organic fertilizers are cheaper than the inorganic fertilizers and have a long lasting effect in restoring the fertility of the soil (Lacay, 2008).

One of the problems encountered by the farmers is the high cost of chemical fertilizers. This situation greatly increases the farmers investment in production. Organic fertilizer like animal manure appears to be very logical alternative in minimizing the use of chemical fertilizers.

Proper tillage is important to increase yields. It's purpose is to eliminate weeds, conserve moisture, prevent erosion or surface run-off and improve the physical condition of the soil. Pulverizing the soil aerates it and enhances the activity of microorganism and bacteria causing rapid oxidation and decaying of crop residues (Batangas, 2003).

The no-till method improves on traditional tillage systems in several ways. For example, the mulch helps prevent erosion and helps keep moisture in the soil. By eliminating plowing and harrowing, the method serves both time and tractor fuel (Anonymous, 2004).

Continuous tillage is a common practice of the farmers. This practice needs more labor and capital to produce crops. Soil cultivation and different plants grown in a particular type of soil should be studied to determine the correct tillage method to be applied in order to obtain maximum return.

There are several factors contributing to low productivity of corn. One is the utilization of inappropriate fertilizers such as the continuous and indiscriminate use of chemical fertilizers, which may alter soil properties making them not suitable for plant growth coupled with high cost of inputs. There is a need therefore to study the effect of animal manure on corn and to identify alternative fertilizer sources to partially if not totally replace the costly chemical fertilizers that are being used by the farmers.

The study was conducted to determine the effect of tillage, and animal manures application and their interaction effect on the growth and yield of sweet corn; and determine the profitability in producing corn using different tillage practices and animal manures.

The study was conducted at the Organic Farm of the Benguet State University in La Trinidad, Benguet from October 2007 to March 2008.

## REVIEW OF LITERATURE

Effect of tillage on corn plant

In 2003, Batangas mentioned that different tillage practices had no significant effect on the performance of corn plants in terms of the number of days to emergence, plant height, weight of the marketable and non-marketable corn ears.

Tosay (2008) reported that different tillage practices on the return on cash expenses of potato, digging once obtained the highest ROCE followed by re-digging once while zero tillage had the lowest ROCE.

Coraza (2004) mentioned that tillage practiced employed had no significant effect on the initial height of potato. However, a slight difference was observed. The undug plots produced taller plants. However, a week later, potato plants planted on plot dug twice had faster growth.

According to Phillips and Young (1973) as cited by Caanawan (2006), no tillage farming consist of the planting crops on land that was not previously prepared for planting. The seeds are simply grown in a narrow land just wide enough to provide a bed for seed. They added that the other accepted and recognized practices such as variety and a seed selection, proper use and the right kind of fertilizers, and control weeds, pest and diseases are very important components of no tillage farming.

Based on the results and findings of Lacay (2008), application of 5 tons/ha chicken dung produced the highest plant height and recorded the heaviest weight and number of marketable tubers of potato.

Effect of animal manure application in corn plant

Tamiray (1997) stated that in terms of chicken dung application, there was no significant effect on the parameters measured except on the diameter of ears. It showed that chicken dung increased the diameter of corn ears.

Pakias (2008) found that application of 10 tons/ha chicken manure increased the yield of lettuce. On the other hand, organic fertilizer application will improve some physical and chemical properties of the soil.

Based on the study of Galagal (2002) at Sablan on sweet potatoes, application of hog manure and chicken manure had significant effect on root yield on the different varieties of sweet potato.

In addition, result of study conducted by Javar (2005) showed that the most economical animal manure as fertilizer for green corn production, are carabao manure, cow manure, and goat manure. Their application resulted in long and big ear which are acceptable to the consumers.

Marcelino (1995), as cited by Edwin (2003), reported that organic fertilizer supplies some amount of the nutrient requirements of the crop and promotes favorable soil properties such as granulation, efficient aeration, easy root penetration and more improved water-holding capacity of the soil.

## MATERIALS AND METHOD

An area of 140 square meters was prepared and divided into three blocks, representing three replications. Each block was divided into nine plots measuring 1 m x 5 m. Planting of sweet corn was done in single row at a seeding rate of two seeds per hill at a distance of 30 cm between hills. Three weeks after emergence, the corn seedlings were thinned out leaving only one healthy plant per hill. The experiment was laid out following the 3 x 3 factor factorial arrangement in randomized complete block design (RCBD) with three replications.

The treatment combinations used are the following:

Factor A: Tillage (T)

$T_1$= no digging (Plots were cleaned without digging)

$T_2$= one digging (Plots were dug once after cleaning)

$T_3$ = two times digging (Plots were dug after cleaning and redug one week after)

Factor B: Animal Manure (AM)

$AM_1$= no manure

$AM_2$= chicken manure

$AM_3$= hog manure

The animal manures were incorporated to the soil 15 days before planting. Crop protection such as hand weeding and insect pests and disease control were employed to ensure normal growth and yield of the plants.

Soils samples were gathered from the experimental area before and after the study for soil analysis to determine the initial and final pH, organic matter, nitrogen, potassium, and phosphorus contents at Baguio Soils Laboratory in Pacdal, Baguio City and Regional Soils and Feeds Laboratory in San Fernando City, La Union.

Data gathered:

1. Days from sowing to emergence. The number of days from planting to emergence was recorded when 80% of the seed planted per plot emerged.

2. Days from sowing to silking/ tasseling. This was recorded when at least 50% of the plant per plot had extended tassel and silk.

3. Days from sowing to harvesting. This was the number of days from sowing until the corn ears were fully developed.

4. Plant height (cm). This was taken two weeks before harvesting by measuring the height of the ten sample plants per treatment. This was taken from the based of the plant to the tassel tip using meter stick.

5. Number and weight of marketable ears per plot. This was taken by counting and weighing the corn ears with fully developed kernels that are free from any damage or disease infection during the time of harvest.

6. Number and weight of the non-marketable ears per plot. These were the number and weight of corn ears that were damaged and malformed per plot.

7. Total number and weight of ears harvested per plot. These were taken by getting the total number and weight of marketable and non-marketable ears harvested per plot.

8. Length of corn ear (cm). This was done by measuring the length in cm. of ten corn samples per plot selected at random from the base to the tip of the ear using foot ruler.

9. Ear diameter (cm). The ear diameter in cm was taken from the widest part of ten sample ears per plot selected at random using vernier caliper.

10. Reaction to corn ear worm. The damage of corn ear worm per treatment was evaluated using the following rating scale (Remoquillo, 2003).

| Scale | Description | Remarks |
|---|---|---|
| 1 | less than 1% damage | Highly resistant |
| 2 | 1-5 % damage | Moderately resistant |
| 3 | 6-10 % damage | Resistant |
| 4 | 11-20 % damage | Susceptible |
| 5 | 21-30 % damage | Very susceptible |

11. Incidence of disease. Diseases like leaf blight and downy mildew were monitored and rated using the following scale used by (Remoquillo, 2003).

| Scale | % infection | Description |
|---|---|---|
| 1 | not infected or less than | Resistant |
| 2 | 10 % of the plant infected | Moderately resistant |
| 3 | 11-50 % of the plant infected | Susceptible |
| 4 | 51% or nearly all the plants are infected | Highly susceptible |

12. Return on total cash expenses (ROCE). This was computed by subtracting the total expenses from the gross sales divided by total production cost multiplied by 100 as follows.

$$\text{ROCE (\%)} = \frac{\text{Gross sales – Total expenses}}{\text{Total production cost}} \times 100$$

All the quantitative data measured in this study were statistically analyzed using 3 x 3 factor-factorial in randomized complete block design (RCBD). The significance of differences among treatment means was tested using Duncan's Multiple Range Test (DMRT) at 5 % level of significance.

## RESULTS AND DISCUSSION

### Soil Chemical Properties

The initial and final properties of the soil samples taken in the experimental area are shown in Table 1.

Initially, the soil was moderately acidic and after harvest the pH of the soil applied with different animal manures increased but was still moderately acidic. There was an increase in organic matter due to the application of manures.

The nitrogen content of the area was reduced after the experiment. This could be due to the high nitrogen uptake of the corn because corn needs high amount of nitrogen for its growth and development.

In terms of phosphorus content, soils that were not applied with animal manure had slightly reduced phosphorus content while the soil applied with animal manures had higher P content than the initial content.

Soils fertilized with different animal manures had increased potassium content after the experiment.

Table 1. Soil pH, organic matter, nitrogen, phosphorus and potassium content of the soil before and after planting

| TREATMENT | pH | (%) OM | (%) N | (%) P | (ppm) K |
|---|---|---|---|---|---|
| Before planting | 5.86 | 2.5 | 1.00 | >100 | 418 |
| After planting | | | | | |
| No manure | 6.0 | 3.5 | 0.84 | 98 | 511 |
| Chicken manure | 6.0 | 3.0 | 0.96 | 126 | 517 |
| Hog manure | 6.0 | 3.5 | 0.65 | 108 | 559 |

Days to Emergence

Effect of tillage. Tillage practices did not show significant effect on the number of days from planting to emergence, corn seeds emerged within 6 days after sowing regardless of tillage practices and animal manure application.

Effect of animal manure. There were also no significant differences in the emergence of sweet corn seeds applied with different animal manures.

Interaction effect. There was no interaction effect between tillage and animal manures on the number of days to emergence. All the seeds emerged in six days after sowing.

Days from Sowing to Tasseling

Effect of tillage. Sweet corn plants in plot tilled once and twice produced tassel earlier, that was eight days ahead than those sown in uncultivated plots (Table 2).

Effect of animal manure. Plants applied with chicken and hog manures produced tassel one and two days earlier than the unfertilized plants. This observation conformed with the result observed by Dumapis (2006), that corn plants applied with chicken dung were the earliest to produced tassel and silk.

Interaction effect. Animal manures used and the tillage practices done had no significant interaction effect on the number of days to tasseling (Table 2).

Days from Sowing to Silking

Effect of tillage. Sweet corn planted in plot tilled once or twice produced silk nine to ten days earlier than those planted with zero tillage (Table 2).

Effect of animal manure. Plants applied with animal manures produced silk one to two days earlier than those of the unfertilized plants.

Interaction effect. There was no significant interaction of tillage and animal manures used on the days from sowing to silking.

Days to Harvesting

Effect of tillage. Sweet corn plants sown in plot tilled once and twice were harvested four days earlier than those plants sown in plots without tillage.

Effect of animal manure. Sweet corn plants applied with animal manures were harvested one day ahead than the unfertilized plants.

Interaction effect. No significant interaction effect of tillage and animal manure application was observed on the days to harvesting of sweet corn (Table 2).

Table 2. Days from sowing to emergence, tasseling, silking, and harvesting of sweet corn planted in plots applied with different tillage practices and animal manures

| | NUMBER OF DAYS FROM SOWING TO: | | |
|---|---|---|---|
| TREATMENT | TASSELING | SILKING | HARVESTING |
| Tillage (T) | | | |
| No tillage | $94^{a}$ | $102^{a}$ | $124^{a}$ |
| Plot dug once | $86^{b}$ | $92^{b}$ | $120^{b}$ |
| Plot dug twice | $86^{b}$ | $91^{b}$ | $120^{b}$ |
| Animal Manure (AM) | | | |
| No manure | $90^{a}$ | $96^{a}$ | $122^{a}$ |
| Chicken manure | $88^{b}$ | $94^{b}$ | $121^{b}$ |
| Hog manure | $89^{ab}$ | $95^{b}$ | $121^{b}$ |
| T x AM | ns | ns | ns |
| CV (%) | 8.87 | 1.50 | 1.08 |

Means with the same letter/s are not significantly different at 5% level by DMRT.

Plant Height

Effect of tillage. Taller plants were produced in plot dug twice than plants grown in tilled once and untilled plots (Table 3). This result indicates that tillage increased the plant height of sweet corn.

Effect of animal manure. The height of sweet corn applied with animal manures was higher than the unfertilized plots. This is apparently due to lack of sufficient major elements like N-P-K in unfertilized plots which are needed for better growth and development of sweet corn plant.

Interaction effect. The tillage practiced and the different animal manures used did not show interaction significantly on the plant height of corn.

Table 3. Plant height of sweet corn planted in plots with different tillage practices and animal manures

| TREATMENT | PLANT HEIGHT (cm) |
|---|---|
| Tillage (T) | |
| No tillage | 97.25[c] |
| Plot dug once | 122.94[b] |
| Plot dug twice | 133.56[a] |
| Animal manure (AM) | |
| No manure | 105.73[b] |
| Chicken manure | 124.72[a] |
| Hog manure | 123.30[a] |
| T x AM | ns |
| CV (%) | 8.60 |

Means with the same letter/s are not significantly different at 5% level by DMRT.

Corn Ear Length

Effect of tillage. Sweet corn sown in plot dug twice produced the longest corn ear among the tillage practices employed. Plants grown in plot dug once gave longer ears than those produced in the untilled plots. It was observed that the corn plants in plot with zero tillage had short ear length (Table 4).

Effect of animal manure. The length of corn ears harvested in plots applied with chicken and hog manures was longer than those corn ear harvested from unfertilized plots (Table 4). The plants applied with chicken and hog manures had a greater nutrient content consumed that the plants without fertilizer which resulted in shorter ear.

Interaction effect. No significant interaction effect between the tillage practiced and the different animal manures used was noted on corn ear length.

Table 4. Ear length and diameter of sweet corn planted in plots with different tillage practices and animal manures

| TREATMENT | LENGTH (cm) | DIAMETER (cm) |
|---|---|---|
| Tillage (T) | | |
| No manure | 10.58[c] | 3.41[c] |
| Plot dug once | 18.56[b] | 4.51[b] |
| Plot dug twice | 19.93[a] | 5.04[a] |
| Animal manure (AM) | | |
| No manure | 15.17[b] | 3.86[b] |
| Chicken manure | 17.19[a] | 4.66[a] |
| Hog manure | 16.71[a] | 4.45[a] |
| T x AM | ns | ns |
| CV (%) | 7.35 | 8.32 |

Means with the same letter/s are not significantly different at 5% level by DMRT.

Corn Ear Diameter

Effect of tillage. Biggest corn ear diameter was measured in plants grown in plot dug twice. Plants sown in plot tilled once produced bigger corn ear diameter than those harvested from plants grown in plot with zero tillage (Table 4).

Effect of animal manure. Application of chicken and hog manures in corn plots registered bigger corn ear diameter than the ear diameter produced by the plants in unfertilized plots.

Interaction effect. It was observed that there was no significant interaction effect of tillage and animal manure on the ear diameter of corn (Table 4).

Reaction to Corn Ear Worm

The reaction of sweet corn to corn ear worm was not affected by tillage practices employed in this study. All sweet corn plants were moderately resistant to corn ear worm. The plants applied with different animal manures similarly exhibited moderately resistant reaction to corn ear worm.

Leaf Blight and Downy Mildew Incidence

All plants grown in plot with different tillage practices had 10% infection leaf blight and downy mildew. Indicating that they were resistant to the diseases. Also, the plants applied with different animal manures exhibited moderate resistance to leaf blight and downy mildew.

Weight of Marketable Ears

Effect of tillage. Sweet corn planted in plots dug twice produced heavier marketable corn ear, followed by the marketable corn yield from plants planted in plot dug once. However, no marketable corn ear was harvested in plots without tillage (Table 5). This confirms with the study of Tosay (2008) that potato planted in undug plots resulted in very low yield. It is advantageous to dig once than no digging at all.

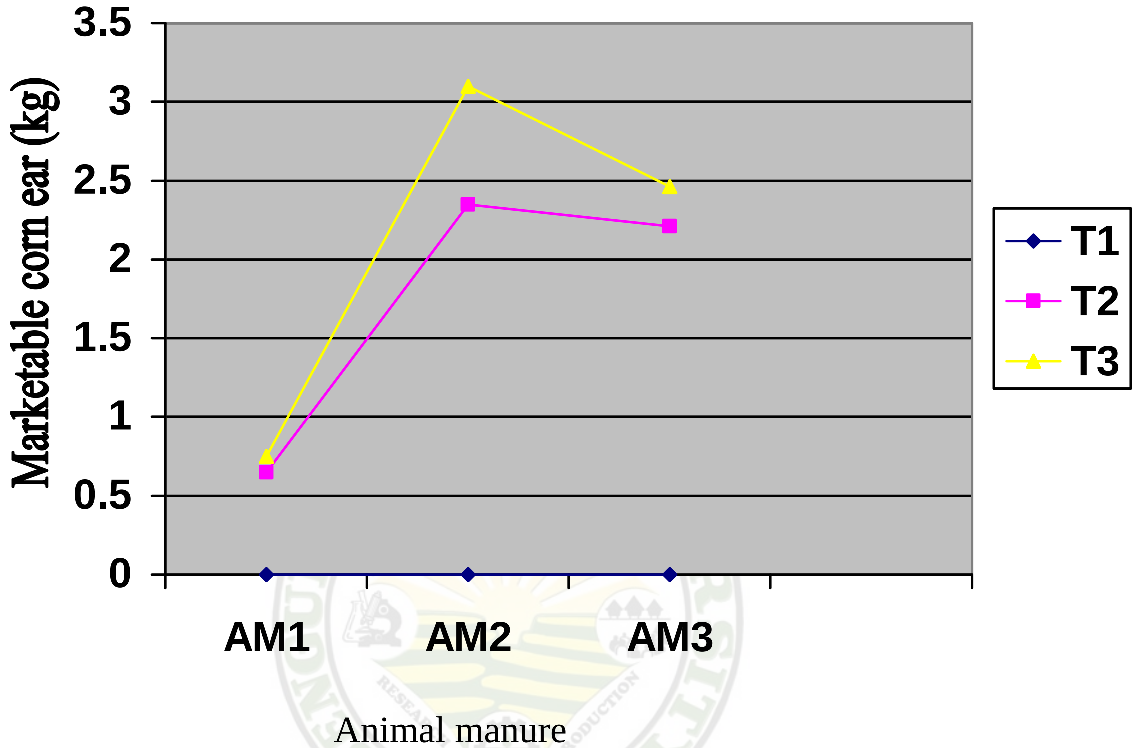
Effect of animal manure. Sweet corn plants fertilized with chicken and hog manures produced heavier marketable ear than the plants grown in untilled plot. This confirms with the study of Dumapis (2006) that corn with no fertilizer resulted in very low yield.

Table 5. Weight of marketable, non-marketable and total ear yield per plot of sweet corn planted in plots with and without tillage and fertilized with different animal manures

| TREATMENT | EAR YIELD PER PLOT ( kg/5m$^2$) | | |
|---|---|---|---|
| | MARKETABLE | NON MARKETABLE | TOTAL |
| Tillage (T) | | | |
| No tillage | 0.00$^c$ | 0.16$^b$ | 0.16$^b$ |
| Plot dug once | 1.73$^b$ | 0.69$^a$ | 2.42$^a$ |
| Plot dug twice | 2.10$^a$ | 0.91$^a$ | 3.00$^a$ |
| Animal manure (AM) | | | |
| No manure | 0.47$^b$ | 0.29$^b$ | 0.76$^b$ |
| Chicken manure | 1.80$^a$ | 0.78$^a$ | 2.58$^a$ |
| Hog manure | 1.56$^a$ | 0.69$^a$ | 2.25$^a$ |
| T x AM | ** | ns | ** |
| CV (%) | 19.58 | 44.61 | 19.93 |

Means with the same letter/s are not significantly different at 5% level by DMRT.

Interaction effect. Sweet corn plants in plot dug twice produced highest weight when applied with chicken manure. It was followed by plot dug once applied with hog manure. Zero tillage with no manure produced the lowest weight (Fig. 1).




Legend: Tillage (T)
$T_1$- no tillage
$T_2$- plot dug once
$T_3$- plot dug twice

Animal Manure (AM)
$AM_1$- no manure
$AM_2$- chicken manure
$AM_3$- hog manure

Figure 1. Interaction effect of tillage practice and animal manure application on the weight of marketable corn ear

Weight of Non-marketable Ears

Effect of tillage. Heavier non-marketable corn ear produced in plot tilled once and twice than in plants grown in untilled plants (Table 5).

Effect of animal manure. Sweet corn plants applied with chicken manure and hog manure produced heavier non-marketable corn ear than the plants grown in unfertilized plants.

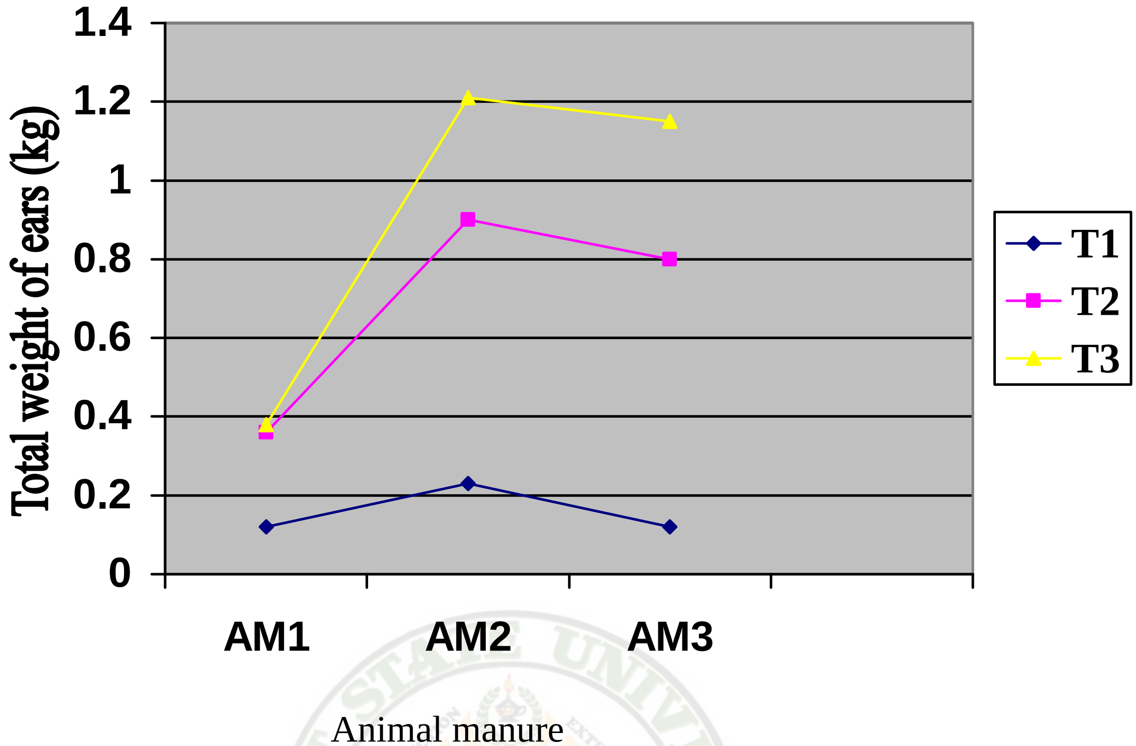
Interaction effect. The tillage practiced and the different animal manures used did not interact significantly on the weight of non-marketable corn ears per plot.

Total Corn Ear Yield per Plot

Effect of tillage. Table 5 also shows the total corn ear per plot in kg/5m$^2$. It was observed that plants grown in plot dug twice produced higher total corn ear than the plants in plot without tillage.

Effect of animal manure. Plants fertilized with chicken and hog manure produced heavier total weight of corn ear per 5m$^2$ plot than those plants in unfertilized plots (Table 5). The plants that were grown with no manure had the lightest total weight of corn ears.

Interaction effect. Highly significant interaction effect existed between tillage practiced and animal manure in the total weight of ears harvested (Fig. 2). Plants applied with chicken manure in plot dug twice had the highest total weight of corn ear among the treatment combinations evaluated. It was followed by the plants fertilized with hog manure in plots tilled two times. Furthermore, the plants grown in plots with zero tillage and animal manure application resulted in lowest total corn ear yield.




Legend: Tillage (T)
$T_1$- no tillage
$T_2$- plot dug once
$T_3$- plot dug twice

Animal Manure (AM)
$AM_1$- no manure
$AM_2$- chicken manure
$AM_3$- hog manure

Figure 2. Interaction effect of tillage practice and animal manure application on the total weight of ears

Number of Marketable Ears

Effect of tillage. Sweet corn plants in plot dug twice produced higher number of marketable corn ear which was comparable with the number of ears harvested in plot dug once (Table 6). No marketable corn ear was harvested from plants grown in no tillage plots. No yield because ears are undersize with underdeveloped kernels, and some were infested by corn ear worm.

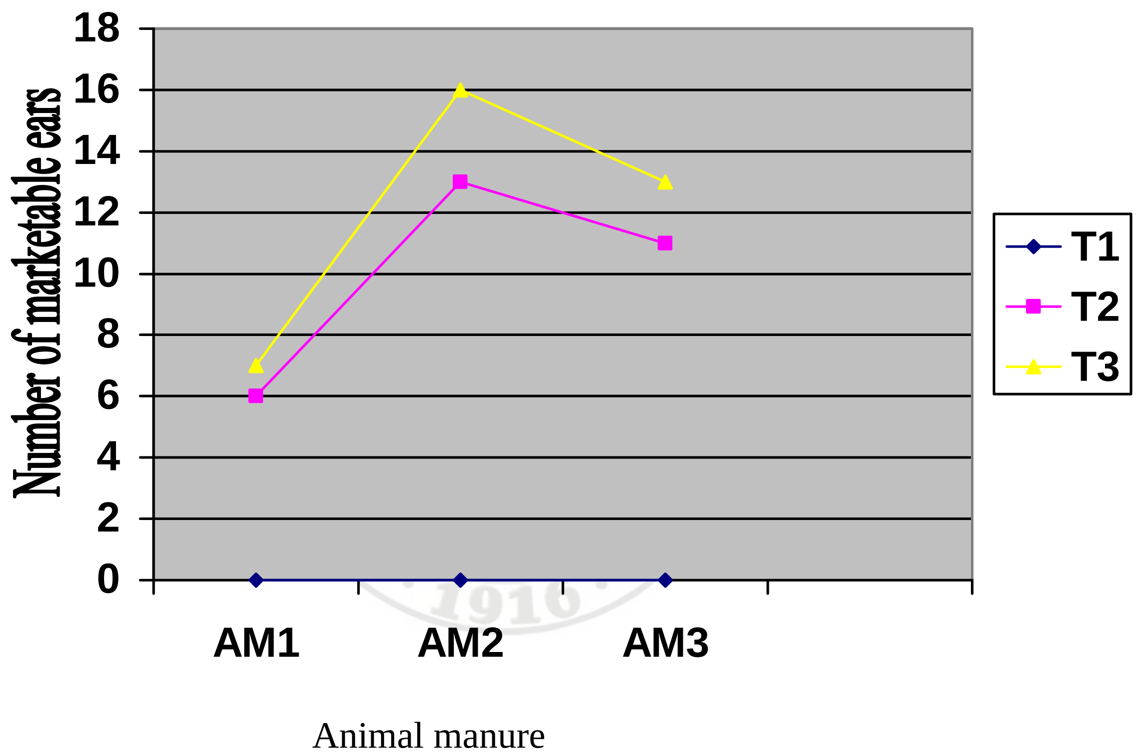
Effect of animal manure. Table 6 also shows that plants fertilized with chicken and hog manure gave higher number of marketable corn ear per 5m$^2$ plot. It was observed that plants that were not applied with animal manure produced lower number of marketable corn ear.

Table 6. Number of marketable, non-marketable, and total ears per 5m$^2$ plot of sweet corn plants in plot dug once or twice fertilized with different animal manures

| TREATMENT | NUMBER OF CORN EAR PER 5m$^2$/PLOT | | |
|---|---|---|---|
| | MARKETABLE | NON-MARKETABLE | TOTAL |
| Tillage (T) | | | |
| No tillage | 0[c] | 7[a] | 7[c] |
| Plot dug once | 10[b] | 4[b] | 14[b] |
| Plot dug twice | 12[a] | 5[b] | 17[a] |
| Animal manure (AM) | | | |
| No manure | 4[b] | 5[a] | 9[a] |
| Chicken manure | 10[a] | 6[a] | 16[a] |
| Hog manure | 8[a] | 6[a] | 14[a] |
| T x AM | ** | ns | ns |
| CV(%) | 23.61 | 25.43 | 17.66 |

Means with the same letter/s are not significantly different at 5% level by DMRT.

Interaction effect. Highly significant interaction effect between tillage practiced and different animal manures used was noted on the number of marketable ears in this study (Table 6 and Fig. 3). Plants grown in plot dug twice produced higher number of marketable corn ear when applied with chicken manure. It was followed by plants in plot dug once fertilized with hog manure. Plants in untilled and unfertilized produced the lowest number of marketable corn ear.




Legend: Tillage (T)
- $T_1$- no tillage
- $T_2$- plot dug once
- $T_3$- plot dug twice

Animal Manure (AM)
- $AM_1$- no manure
- $AM_2$- chicken manure
- $AM_3$- hog manure

Figure 3. Interaction effect of tillage practice and animal manure application on the number of marketable ears

Number of Non-marketable Ears

Effect of tillage. It was observed that plants in no tillage produced higher number of non-marketable ears per $5m^2$ plot (Table 6). It was caused by incomplete and not fully developed kernels and damaged by corn ear worms at harvest. It was also observed that plot dug once had the lowest non-marketable ears per $5m^2$ plot.

Effect of animal manure. Animal manure application did not show any significant effect in number of non-marketable corn ear per plot.

Interaction effect. Statistically no significant interaction effect was observed between the tillage practiced and the different animal manure used on non-marketable.

Total Number of Ears

Effect of tillage. Sweet corn planted in plot dug twice (17) produced higher total number of corn ear per 5 $m^2$ plot followed by plot dug once which produced 14 ears (Table 6). It was also observed that plants grown in untilled plots produced the lowest total number of ears per plot.

Effect of animal manure. Table 6 also shows the total number of ears was not significantly affected by the application of different animal manures. Numerically, plants applied with chicken manure recorded higher number of ears followed by those plants applied with hog manure. Plants with no manure had the lowest number of ears.

Interaction effect. Statistically no significant interaction effect was observed between the tillage practiced and the different animal manures used on total number of corn ear per 5 $m^2$ plot (Table 6).

Return on Cash Expenses

Effect of tillage. The effect of different tillage practices on the return on cash expenses in growing sweet corn is shown on Table 7. Plants grown in plot dug twice obtained the highest ROCE of 52.51% followed by plot dug once with the ROCE of 31.37% while no tillage had the lowest ROCE of -100%.

Effect of animal manure. The return on cash expenses in growing sweet corn applied with chicken manure had the highest ROCE of 70.94%, followed by those plants applied with hog manure at 46.52% ROCE and without manure that had 17.29% ROCE.

Interaction effect. Table 9 shows the result of cost and return analysis of the different tillage practiced applied with different animal manure. It shows that plot dug twice applied with chicken manure registered the highest ROCE of 85.83%. The lowest ROCE was obtained from no tillage applied with different animal manures.

Table 7. ROCE in producing sweet corn in plots with and without tillage

| TILLAGE | NUMBER OF MARKETABLE (ears/plot) | GROSS SALES (PhP) | TOTAL EXPENSES (PhP) | NET INCOME (PhP) | ROCE (%) |
|---|---|---|---|---|---|
| No tillage | 0 | 0.00 | 34.34 | -34.34 | -100 |
| Plot dug once | 10 | 50 | 38.06 | 11.94 | 31.37 |
| Plot dug twice | 12 | 60 | 39.34 | 20.66 | 52.51 |

- Total expenses include: land preparation, seeds, cost of animal manure, care and management including weeding and watering.
- Sold at PhP 5.00/ear in the month of April 2008.

Table 8. ROCE in producing sweet corn in plots fertilized with animal manures

| ANIMAL MANURE | NUMBER OF MARKETABLE (ears/plot) | GROSS SALES (PhP) | TOTAL EXPENSES (PhP) | NET INCOME (PhP) | ROCE (%) |
|---|---|---|---|---|---|
| No manure | 6 | 35 | 29.84 | 5.16 | 17.29 |
| Chicken manure | 14 | 70 | 40.95 | 29.05 | 70.94 |
| Hog manure | 12 | 60 | 40.95 | 19.05 | 46.52 |

• Total expenses include: land preparation, seeds, cost of animal manure, care and management including weeding and watering.

• Sold at PhP 5.00/ear in the month of April 2008.

Table 9. ROCE in producing sweet corn in plots with and without tillage fertilized with animal manures

| TREATMENT | NUMBER OF MARKETABLE (ears/plot) | GROSS SALES (PhP) | TOTAL EXPENSES (PhP) | NET INCOME (PhP) | ROCE (%) |
|---|---|---|---|---|---|
| $T_1AM_1$ | 0 | 0 | 26.94 | -26.94 | -100 |
| $AM_2$ | 0 | 0 | 38.05 | -38.05 | -100 |
| $AM_3$ | 0 | 0 | 38.05 | -38.05 | -100 |
| $T_2AM_1$ | 6 | 30 | 30.66 | -.66 | -2.15 |
| $AM_2$ | 13 | 65 | 41.77 | 23.23 | 55.61 |
| $AM_3$ | 11 | 55 | 41.77 | 13.23 | 31.67 |
| $T_3AM_1$ | 7 | 35 | 31.94 | 3.06 | 9.58 |
| $AM_2$ | 16 | 80 | 43.05 | 36.95 | 85.83 |
| $AM_3$ | 13 | 65 | 43.05 | 21.95 | 50.95 |

• Total expenses include: land preparation, seeds, cost of animal manure, care and management including weeding and watering.

• Sold at PhP 5.00/ear in the month of April 2008.

Legend:

$T_1$- no tillage   $AM_1$- no manure
$T_2$- plot dug once   $AM_2$- chicken manure
$T_3$- plot dug twice   $AM_3$- hog manure

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### Summary

The study was conducted at BSU Experimental Station, Balili, La Trinidad, Benguet: to determine the effect of tillage and animal manures application and their interaction effect on the growth and yield of corn; and determine the profitability in producing corn using different tillage practices and animal manures.

Based on the result of the study, sweet corn seeds emerged within six days after planting regardless of tillage practices employed. Plants in plot dug once and twice were the earliest to produce tassel and silk and earliest to harvest than those plants grown in plots without tillage. Taller plants were produced in plot dug twice than plants grown in tilled once and untilled plots. Sweet corn plants in plot dug twice had the longest ears and biggest ear diameter than those harvested from plants grown in plot tilled once and without tillage. All plants grown in plot with different tillage practices were all resistant to corn ear worm and to leaf blight and downy mildew. The weight and number of marketable ears per $5m^2$ plot grown in plot dug twice produced heavier and higher marketable corn ear followed by the marketable corn yield from plants planted in plot dug once and in plots without tillage. The weight and number of non-marketable corn ear in plot tilled once and twice were heavier and higher than those plants grown in untilled plots. Sweet corn planted in dug plots produced heavier and higher total number of corn ear per 5m2 plot than the plants in untilled plot. Plants grown in plot dug twice obtained the highest ROCE of 52.51%, followed by plants grown in plot dug once with the ROCE of 31.37% while growing sweet corn in untilled plot had the lowest ROCE of -100%.

No significant differences among the different animal manures were observed on the days from emergence. Significant differences were observed among the different animal manures applied in terms of days from emergence to silking, tasseling and harvesting. Animal manure application enhanced maturity of sweet corn. The height of sweet corn applied with animal manures was higher than the unfertilized plots. Application of chicken and hog manures in corn plots registered longer and bigger corn ear than those corn ear harvested from unfertilized plots. The plants exhibited resistant reaction to corn ear worm, leaf blight and downy mildew regardless of animal manures applied. Plants fertilized with chicken and hog manure produced heavier marketable, non-marketable and total weight of corn ear per $5m^2$ plot than the corn ear yield of plants grown in unfertilized plots. Number of non marketable and total number of ear per plot did not differ significantly among the plants applied with different animal manure. The ROCE in growing sweet corn applied with chicken manure was the highest at 70.94%, followed by those plants applied with hog manure at 46.52% ROCE and without manure that had 17.29% ROCE.

No significant interaction effect of tillage and animal manure in all the parameters measured were observed, except on the weight of marketable, total weight of ears and number of marketable ears. Sweet corn plants in plot dug twice produced the significantly heaviest weight of marketable ear. Plants in untilled plots produced the lowest number of marketable ears when there was no manure applied.

## Conclusion

Results obtained in this study, revealed that tillage enhanced the growth and yield of sweet corn. Digging plots two times resulted in higher plant height, longer and bigger corn ears, higher weight and number of marketable corn ear yield and higher ROCE.

Animal manure application improved the growth, the weight and number of marketable yield and total weight of sweet corn and ROCE.

Tillage and animal manure application did not significantly interact in maturity and growth of sweet corn. However, they interacted significantly on weight and number of marketable and total weight of corn ear yield that resulted in higher ROCE.

## Recommendation

Based on the results of this study, farmers could dig the plot once or twice for successful sweet corn production. However, digging the plot two times is the best for sweet corn to get heaviest marketable yield and highest return on total cash expenses.

Farmers may apply any of the animal manures as fertilizer to sweet corn but chicken manure is better than using hog manure to produce highest number and heaviest marketable ear per plot and to get highest ROCE.

In addition, farmers could till plots once or two times and apply chicken manure to realize higher ROCE.

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## APPENDICES

Appendix Table 1. Days from planting to emergence of sweet corn

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 7 | 6 | 6 | 19 | 6 |
| $T_1AM_2$ | 6 | 6 | 7 | 19 | 6 |
| $T_1AM_3$ | 7 | 6 | 6 | 19 | 6 |
| $T_2AM_1$ | 6 | 6 | 6 | 18 | 6 |
| $T_2AM_2$ | 6 | 7 | 6 | 19 | 6 |
| $T_2AM_3$ | 6 | 6 | 6 | 18 | 6 |
| $T_3AM_1$ | 5 | 6 | 6 | 17 | 6 |
| $T_3AM_2$ | 6 | 6 | 5 | 17 | 6 |
| $T_3AM_3$ | 5 | 6 | 6 | 17 | 6 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 0.0740 | 0.0370 | 0.13 | 0.8799 |
| Treatment | 10 | 2.3703 | 0.2370 | 0.83 | 0.6111 |
| Factor A | 2 | 2.0740 | 1.0370 | $3.61^{ns}$ | 0.0507 |
| Factor B | 2 | 0.0740 | 0.0370 | $0.13^{ns}$ | 0.8799 |
| T x AM | 4 | 0.1481 | 0. 0370 | $0.13^{n}$ | 0.9696 |
| Error | 16 | 4.5925 | 0.2870 | | |
| Total | 36 | 6.9629 | | | |

C.V= 8.87%

ns- not significant

Appendix Table 2. Days from sowing to tasseling of sweet corn

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 95 | 96 | 96 | 287 | 96 |
| $T_1AM_2$ | 93 | 94 | 93 | 280 | 93 |
| $T_1AM_3$ | 94 | 95 | 94 | 283 | 94 |
| $T_2AM_1$ | 88 | 89 | 84 | 261 | 87 |
| $T_2AM_2$ | 84 | 86 | 85 | 255 | 85 |
| $T_2AM_3$ | 86 | 87 | 84 | 257 | 86 |
| $T_3AM_1$ | 86 | 87 | 86 | 259 | 86 |
| $T_3AM_2$ | 84 | 85 | 86 | 255 | 85 |
| $T_3AM_3$ | 88 | 84 | 85 | 257 | 86 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 5.5555 | 2.7777 | 1.56 | 0.2400 |
| Treatment | 10 | 473.5555 | 47.3555 | 26.64 | 0.0001 |
| Factor A | 2 | 450.8888 | 225.4444 | 126.81** | 0.0001 |
| Factor B | 2 | 16.2222 | 8.1111 | 4.56* | 0.0270 |
| T x AM | 4 | 0.8888 | 0.222 | $0.13^{ns}$ | 0.9713 |
| Error | 16 | 28.4444 | 1.7777 | | |
| Total | 36 | 502.0000 | | | |

C.V= 1.50%

ns- not significant
*- significant
**- highly significant

Appendix Table 3. Days from sowing to silking of sweet corn

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 103 | 103 | 100 | 306 | 102 |
| $T_1AM_2$ | 101 | 100 | 99 | 300 | 100 |
| $T_1AM_3$ | 101 | 103 | 100 | 304 | 101 |
| $T_2AM_1$ | 93 | 93 | 94 | 280 | 93 |
| $T_2AM_2$ | 92 | 92 | 90 | 274 | 91 |
| $T_2AM_3$ | 90 | 93 | 92 | 275 | 92 |
| $T_3AM_1$ | 92 | 93 | 92 | 277 | 92 |
| $T_3AM_2$ | 91 | 90 | 90 | 271 | 90 |
| $T_3AM_3$ | 92 | 91 | 90 | 273 | 91 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 7.1851 | 3.5925 | 3.42 | 0.0581 |
| Treatment | 10 | 565.2592 | 56.5259 | 53.79 | 0.0001 |
| Factor A | 2 | 538.7407 | 269.3703 | 265.32** | 0.0001 |
| Factor B | 2 | 18.2962 | 9.1481 | 8.70** | 0.0028 |
| T x AM | 4 | 1.0370 | 0.2592 | $0.25^{ns}$ | 0.9075 |
| Error | 16 | 16.8148 | 1.0509 | | |
| Total | 36 | 582.0740 | | | |

C.V= 1.08%

ns- not significant
**- highly significant

Appendix Table 4. Days from sowing to harvesting of sweet corn

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 124 | 125 | 124 | 373 | 124 |
| $T_1AM_2$ | 123 | 123 | 124 | 370 | 123 |
| $T_1AM_3$ | 124 | 124 | 124 | 372 | 124 |
| $T_2AM_1$ | 120 | 120 | 121 | 361 | 120 |
| $T_2AM_2$ | 119 | 120 | 120 | 359 | 120 |
| $T_2AM_3$ | 120 | 121 | 119 | 360 | 120 |
| $T_3AM_1$ | 120 | 121 | 120 | 361 | 120 |
| $T_3AM_2$ | 119 | 120 | 120 | 359 | 120 |
| $T_3AM_3$ | 120 | 119 | 120 | 359 | 120 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 0.9629 | 0.4814 | 1.35 | 0.2871 |
| Treatment | 10 | 97.4814 | 9.7481 | 27.35 | 0.0001 |
| Factor A | 2 | 93.4077 | 46.7037 | 131.01** | 0.0001 |
| Factor B | 2 | 2.7407 | 1.3703 | 3.84* | 0.0433 |
| T x AM | 4 | 0.3703 | 0.0925 | $0.26^{ns}$ | 0.8994 |
| Error | 16 | 16.8148 | 1.0509 | | |
| Total | 36 | 103.1851 | | | |

C.V=0.49%

ns- not significant
*- significant
**- highly significant

Appendix Table 5. Plant height (cm) of sweet corn planted in tilled and untilled plots fertilized with different animal manures

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 84.12 | 80.76 | 84.17 | 249.05 | 83.01 |
| $T_1AM_2$ | 98.42 | 104.88 | 101.89 | 305.19 | 101.73 |
| $T_1AM_3$ | 117.04 | 104.58 | 99.45 | 321.07 | 107.02 |
| $T_2AM_1$ | 100.59 | 134.84 | 102.04 | 337.47 | 112.49 |
| $T_2AM_2$ | 135.82 | 114.14 | 142.25 | 392.21 | 130.73 |
| $T_2AM_3$ | 127.92 | 129.19 | 119.67 | 376.78 | 125.59 |
| $T_3AM_1$ | 132.10 | 118.82 | 114.13 | 365.05 | 121.68 |
| $T_3AM_2$ | 139.77 | 143.02 | 142.35 | 425.15 | 141.71 |
| $T_3AM_3$ | 131.13 | 145.39 | 135.35 | 411.87 | 137.29 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 70.7258 | 35.3629 | 0.34 | 0.7142 |
| Treatment | 10 | 8492.3567 | 849.2356 | 8.25 | 0.0001 |
| Factor A | 2 | 6271.6757 | 3135.8378 | 30.48** | 0.0001 |
| Factor B | 2 | 2015.0561 | 1007.5280 | 9.79** | 0.0017 |
| T x AM | 4 | 134.8990 | 33.7247 | $0.33^{ns}$ | 0.8552 |
| Error | 16 | 1646.0609 | 102.8788 | | |
| Total | 36 | 10138.4176 | | | |

C.V=8.60%

ns- not significant
**- highly significant

Appendix Table 6. Ear length (cm) of sweet corn planted in tilled and untilled plots fertilized with different animal manure

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 10.16 | 10.24 | 10.12 | 30.52 | 10.17 |
| $T_1AM_2$ | 11.30 | 10.92 | 10.15 | 32.37 | 10.79 |
| $T_1AM_3$ | 10.65 | 10.40 | 11.26 | 32.31 | 10.77 |
| $T_2AM_1$ | 17.68 | 16.90 | 17.50 | 52.08 | 17.36 |
| $T_2AM_2$ | 20.15 | 16.53 | 21.56 | 58.24 | 19.41 |
| $T_2AM_3$ | 19.94 | 18.80 | 17.95 | 56.69 | 18.89 |
| $T_3AM_1$ | 18.10 | 19.0 | 16.81 | 53.91 | 17.79 |
| $T_3AM_2$ | 20.25 | 21.83 | 21.99 | 64.07 | 21.35 |
| $T_3AM_3$ | 19.63 | 19.80 | 21.97 | 61.40 | 20.46 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 1.4017 | 0.7008 | 0.48 | 0.6248 |
| Treatment | 10 | 486.5877 | 48.6587 | 33.63 | 0.0001 |
| Factor A | 2 | 459.1098 | 229.5549 | 158.63** | 0.0001 |
| Factor B | 2 | 20.0518 | 10.0259 | 6.93** | 0.0468 |
| T x AM | 4 | 6.0242 | 1.5060 | $1.04^{ns}$ | 0.4169 |
| Error | 16 | 23.1535 | 1.4470 | | |
| Total | 36 | 509.7412 | | | |

C.V=7.35%

ns- not significant
**- highly significant

Appendix Table 7. Ear diameter (cm) of sweet corn planted in tilled and untilled plots fertilized with different animal manure

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 3.21 | 3.15 | 3.18 | 9.54 | 3.18 |
| $T_1AM_2$ | 3.53 | 3.96 | 3.77 | 11.26 | 3.75 |
| $T_1AM_3$ | 3.19 | 3.40 | 3.30 | 9.89 | 3.29 |
| $T_2AM_1$ | 4.41 | 3.86 | 3.74 | 12.01 | 4.00 |
| $T_2AM_2$ | 5.16 | 4.05 | 5.13 | 14.34 | 4.78 |
| $T_2AM_3$ | 5.39 | 4.58 | 4.28 | 14.25 | 4.75 |
| $T_3AM_1$ | 4.46 | 4.52 | 4.17 | 13.15 | 4.38 |
| $T_3AM_2$ | 5.12 | 5.53 | 5.67 | 16.32 | 5.44 |
| $T_3AM_3$ | 5.16 | 5.17 | 5.58 | 15.91 | 5.30 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 0.1112 | 0.0556 | 0.43 | 0.6576 |
| Treatment | 10 | 16.2814 | 1.6281 | 12.60 | 0.0001 |
| Factor A | 2 | 12.4760 | 6.2380 | 48.26** | 0.0001 |
| Factor B | 2 | 3.1202 | 1.5601 | 12.07** | 0.0006 |
| T x AM | 4 | 0.5738 | 0.1434 | $1.11^{ns}$ | 0.3860 |
| Error | 16 | 2.0682 | 0.1292 | | |
| Total | 36 | 18.3496 | | | |

C.V=8.32%

ns- not significant
**- highly significant

Appendix Table 8. Reaction to corn ear worm

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 1 | 1 | 1 | 3 | 1 |
| $T_1AM_2$ | 1 | 1 | 1 | 1 | 1 |
| $T_1AM_3$ | 1 | 1 | 1 | 3 | 1 |
| $T_2AM_1$ | 1 | 1 | 1 | 3 | 1 |
| $T_2AM_2$ | 1 | 3 | 2 | 6 | 2 |
| $T_2AM_3$ | 3 | 1 | 2 | 6 | 2 |
| $T_3AM_1$ | 1 | 1 | 1 | 3 | 1 |
| $T_3AM_2$ | 2 | 1 | 3 | 6 | 2 |
| $T_3AM_3$ | 3 | 2 | 1 | 6 | 2 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 0.2222 | 0.1111 | 0.23 | 0.7982 |
| Treatment | 10 | 6.8888 | 0.6888 | 1.42 | 0.2577 |
| Factor A | 2 | 2.6666 | 1.3333 | $2.74^{ns}$ | 0.0946 |
| Factor B | 2 | 2.6666 | 1.3333 | $2.74^{ns}$ | 0.0946 |
| T x AM | 4 | 1.3333 | 0.3333 | $0.69^{n}$ | 0.6122 |
| Error | 16 | 7.7777 | 0.4861 | | |
| Total | 36 | 14.6666 | | | |

C.V= 48.26%

ns- not significant

Appendix Table 9. Incidence to leaf blight and downy mildew

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 3 | 2 | 3 | 8 | 3 |
| $T_1AM_2$ | 3 | 3 | 1 | 7 | 2 |
| $T_1AM_2$ | 2 | 2 | 3 | 7 | 2 |
| $T_2AM_1$ | 2 | 2 | 2 | 6 | 2 |
| $T_2AM_2$ | 2 | 2 | 1 | 5 | 2 |
| $T_2AM_3$ | 2 | 2 | 2 | 6 | 2 |
| $T_3AM_1$ | 2 | 2 | 3 | 7 | 2 |
| $T_3AM_2$ | 2 | 2 | 1 | 5 | 2 |
| $T_3AM_3$ | 3 | 2 | 1 | 6 | 2 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 0.8888 | 0.4444 | 1.00 | 0.3897 |
| Treatment | 10 | 3.5555 | 0.3555 | 0.80 | 0.6315 |
| Factor A | 2 | 1.5555 | 0.7777 | $1.75^{ns}$ | 0.2054 |
| Factor B | 2 | 0.8888 | 0.4444 | $1.00^{ns}$ | 0.3897 |
| T x AM | 4 | 0.2222 | 0.0555 | $0.12^{n}$ | 0.9713 |
| Error | 16 | 7.1111 | 0.4444 | | |
| Total | 36 | 10.6666 | | | |

C.V= 31.57%

ns- not significant

Appendix Table 10. Weight of marketable ears per $5m^2$ plot of sweet corn planted in tilled and untilled plots fertilized with different animal manures

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 0 | 0 | 0 | 0 | 0 |
| $T_1AM_2$ | 0 | 0 | 0 | 0 | 0 |
| $T_1AM_3$ | 0 | 0 | 0 | 0 | 0 |
| $T_2AM_1$ | 0.85 | 0.50 | 0.60 | 1.95 | 0.65 |
| $T_2AM_2$ | 2.45 | 2.25 | 2.23 | 7.05 | 2.35 |
| $T_2AM_3$ | 2.35 | 2.05 | 2.25 | 6.65 | 2.21 |
| $T_3AM_1$ | 1.00 | 0.85 | 0.40 | 2.25 | 0.75 |
| $T_3AM_2$ | 2.55 | 3.10 | 3.65 | 9.30 | 3.10 |
| $T_3AM_3$ | 2.65 | 2.50 | 2.25 | 7.40 | 2.46 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 0.2214 | 0.0110 | 0.1 | 0.8394 |
| Treatment | 10 | 36.7773 | 3.6777 | 58.80 | 0.0001 |
| Factor A | 2 | 22.6659 | 11.3329 | 181.18** | 0.0001 |
| Factor B | 2 | 9.1294 | 4.5647 | 72.98** | 0.0001 |
| T x AM | 4 | 4.9598 | 1.2399 | 19.82** | 0.0001 |
| Error | 16 | 1.0007 | 0.0625 | | |
| Total | 36 | 37.7781 | | | |

C.V= 19.58%

**- highly significant

Appendix Table 11. Weight of non-marketable ears per $5m^2$ plot of sweet corn planted in tilled and untilled plots fertilized with different animal manures

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 0.12 | 0.10 | 0.14 | 0.36 | 0.12 |
| $T_1AM_2$ | 0.23 | 0.26 | 0.20 | 0.69 | 0.23 |
| $T_1AM_3$ | 0.11 | 0.15 | 0.10 | 0.36 | 0.12 |
| $T_2AM_1$ | 0.50 | 0.50 | 0.10 | 1.10 | 0.36 |
| $T_2AM_2$ | 1.15 | 0.90 | 0.65 | 2.70 | 0.90 |
| $T_2AM_3$ | 1.10 | 0.50 | 0.80 | 2.40 | 0.80 |
| $T_3AM_1$ | 0.50 | 0.35 | 0.30 | 1.15 | 0.38 |
| $T_3AM_2$ | 1.20 | 1.15 | 1.30 | 3.65 | 1.21 |
| $T_3AM_3$ | 1.10 | 0.55 | 1.80 | 3.45 | 1.15 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREES OF FREEDOM | SUM OF SQUARES | MEANS OF SQUARES | COMPUTED F | Pr>F |
|---|---|---|---|---|---|
| Replication | 2 | 0.1352 | 0.0676 | 0.98 | 0.3951 |
| Treatment | 10 | 4.6665 | 0.4666 | 6.80 | 0.0004 |
| Factor A | 2 | 2.7382 | 1.3691 | 19.94** | 0.0001 |
| Factor B | 2 | 1.2323 | 0.6161 | 8.97** | 0.0024 |
| T x AM | 4 | 0.5607 | 0.1401 | $2.04^{ns}$ | 0.1368 |
| Error | 16 | 1.0987 | 0.0686 | | |
| Total | 36 | 5.7653 | | | |

C.V= 44.61%

ns- not significant
**- highly significant

Appendix Table 12. Total weight of ears per 5m$^2$ plot of sweet corn planted in tilled and untilled plots fertilized with different animal manures

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 0.12 | 0.10 | 0.14 | 0.36 | 0.12 |
| $T_1AM_2$ | 0.23 | 0.26 | 0.20 | 0.69 | 0.23 |
| $T_1AM_3$ | 0.11 | 0.15 | 0.10 | 0.36 | 0.12 |
| $T_2AM_1$ | 1.35 | 1.00 | 0.70 | 3.05 | 1.01 |
| $T_2AM_2$ | 3.60 | 3.15 | 2.88 | 9.63 | 3.21 |
| $T_2AM_3$ | 3.45 | 2.55 | 3.05 | 9.05 | 3.01 |
| $T_3AM_1$ | 1.50 | 1.20 | 0.70 | 3.40 | 1.13 |
| $T_3AM_2$ | 3.75 | 4.25 | 4.95 | 12.95 | 4.31 |
| $T_3AM_3$ | 3.75 | 3.05 | 4.05 | 10.85 | 3.16 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 0.2568 | 0.1284 | 0.93 | 0.4150 |
| Treatment | 10 | 66.9547 | 6.6954 | 48.47 | 0.0001 |
| Factor A | 2 | 41.0350 | 20.5175 | 148.54** | 0.0001 |
| Factor B | 2 | 17.0701 | 8.5350 | 61.79** | 0.0001 |
| T x AM | 4 | 8.5926 | 2.1481 | 15.55** | 0.0001 |
| Error | 16 | 2.2101 | 0.1381 | | |
| Total | 36 | 69.1648 | | | |

C.V= 19.93%

**- highly significant

Appendix Table 13. Number of marketable ears per $5m^2$ plot of sweet corn plants in tilled and untilled plots fertilized with different animal manures

| TREAMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1AM_1$ | 0 | 0 | 0 | 0 | 0 |
| $T_1AM_2$ | 0 | 0 | 0 | 0 | 0 |
| $T_1AM_3$ | 0 | 0 | 0 | 0 | 0 |
| $T_2AM_1$ | 6 | 5 | 6 | 17 | 6 |
| $T_2AM_2$ | 16 | 11 | 12 | 39 | 13 |
| $T_2AM_3$ | 10 | 10 | 13 | 33 | 11 |
| $T_3AM_1$ | 10 | 8 | 4 | 22 | 7 |
| $T_3AM_2$ | 14 | 15 | 18 | 47 | 16 |
| $T_3AM_3$ | 15 | 13 | 12 | 40 | 13 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 4.6666 | 2.3333 | 0.78 | 0.4760 |
| Treatment | 10 | 950.0000 | 95.0000 | 31.67 | 0.0001 |
| Factor A | 2 | 748.2222 | 374.1111 | 124.70** | 0.0001 |
| Factor B | 2 | 130.8888 | 65.4444 | 21.81** | 0.0001 |
| T x AM | 4 | 66.2222 | 16.5555 | 5.52** | 0.0055 |
| Error | 16 | 48.0000 | 3.0000 | | |
| Total | 36 | 998.0000 | | | |

C.V= 23.61%

ns- not significant
**- highly significant

Appendix Table 14. Number of non-marketable ears per $5m^2$ plot of sweet corn plants in tilled and untilled plots fertilized with different animal manures

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 7 | 5 | 7 | 19 | 6 |
| $T_1AM_2$ | 10 | 7 | 9 | 26 | 9 |
| $T_1AM_2$ | 9 | 6 | 7 | 22 | 7 |
| $T_2AM_1$ | 5 | 3 | 4 | 12 | 4 |
| $T_2AM_2$ | 4 | 3 | 5 | 12 | 4 |
| $T_2AM_3$ | 4 | 5 | 4 | 13 | 4 |
| $T_3AM_1$ | 6 | 5 | 2 | 13 | 4 |
| $T_3AM_2$ | 6 | 6 | 5 | 17 | 6 |
| $T_3AM_3$ | 6 | 3 | 9 | 18 | 6 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 11.1851 | 5.5925 | 2.73 | 0.0957 |
| Treatment | 10 | 75.4814 | 7.5481 | 3.68 | 0.0101 |
| Factor A | 2 | 51.1851 | 25.5925 | 12.48** | 0.0005 |
| Factor B | 2 | 7.6296 | 3.8148 | $1.86^{ns}$ | 0.1878 |
| T x AM | 4 | 5.4814 | 1.3703 | $0.67^{ns}$ | 0.6234 |
| Error | 16 | 32.8148 | 2.0509 | | |
| Total | 36 | 108.2962 | | | |

C.V= 25.43%

ns- not significant
**- highly significant

Appendix Table 15. Total number of ears per $5m^2$ plot of sweet corn plants in tilled and untilled plots fertilized with different animal manures

| TREAMENT | REPLICATION I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_1AM_1$ | 7 | 5 | 7 | 19 | 6 |
| $T_1AM_2$ | 10 | 7 | 9 | 26 | 9 |
| $T_1AM_3$ | 9 | 6 | 7 | 22 | 7 |
| $T_2AM_1$ | 11 | 8 | 10 | 29 | 10 |
| $T_2AM_2$ | 20 | 14 | 17 | 51 | 17 |
| $T_2AM_3$ | 14 | 15 | 17 | 46 | 15 |
| $T_3AM_1$ | 16 | 13 | 6 | 35 | 12 |
| $T_3AM_2$ | 20 | 21 | 23 | 64 | 21 |
| $T_3AM_3$ | 21 | 16 | 21 | 58 | 19 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARE | MEAN OF SQUARE | COMPUTED F | Pr > F |
|---|---|---|---|---|---|
| Replication | 2 | 29.4074 | 14.7037 | 2.80 | 0.0904 |
| Treatment | 10 | 747.0370 | 74.7037 | 12.24 | 0.0001 |
| Factor A | 2 | 464.5185 | 232.2592 | 44.28** | 0.0001 |
| Factor B | 2 | 201.4074 | 100.7037 | $19.20^{ns}$ | 0.0001 |
| A x B | 4 | 51.7037 | 12.9259 | $2.46^{ns}$ | 0.0870 |
| Error | 16 | 83.9259 | 5.2453 | | |
| Total | 36 | 830.9629 | | | |

C.V= 17.66%

ns- not significant
**- highly significant