BIBLIOGRAPHY

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ABSTRACT

The study was conducted to determine the growth and yield of three potato varieties using stem cuttings; compare the effect of organic fertilizers on the growth and yield of potato cuttings;determine the interaction effect between potato varieties and organic fertilizers on the growth and yield of potato; anddetermine the profitability of potato entries grown with the use of different organic fertilizers under organic production.

Results of the study showed that Multigreen enhanced the highest plant survival, highest initial and final plant height and widest canopy cover. It also produced the highest tuber yield thus, it appears to be the best commercial organic fertilizer for the growth and yield of potato.

Among the three potato varieties, Igorota was the most resistant to late blight incidence and had the highest total number of marketable tubers and highest yield.

Under organic production in La Trinidad, Igorota applied with Multigreen is the best combination to obtain high ROCE.

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INTRODUCTION

Potato (*Solanumtuberosum*) had become the world's most important tuber crop and it is the fourth most important staple crop after rice, wheat, and maize (Mosley, 2003).

The best quality and largest yield of potatoes are produced under cool climate and high altitude. In the Philippines, the moderately cool highlands of Benguet, Bukidnon, Davao del Sur, North Cotabato, Zamboanga City, Misamis Oriental and other highland areas are favorable for the production of potato in commercial scale (Kinoshita, 1972).

At present, potato production has not reached maximum production. One of the major constraints in potato production is poor quality of seed tubers which result in low yield (Pungsayan, 1985).

One of the alternative technologies for commercial potato production is the use of potato stem cuttings. Planting potato stem cuttings would greatly reduce the cost in producing, storing, and planting of tubers. Disease transmission in potato seed tubers will also be minimized (Gayao *et al.*, 1987).

Nowadays, many farmers operate or cultivate their farm through the use of synthetic chemicals and inorganic fertilizers not realizing the impact of these practices. Many researches show that the use of synthetic chemicals and fertilizers result in soil degradation, soil acidity, pollution of soil and water. Due to these impacts, agricultural researchers are encouraging farmers to bring back the productive capacity of the soil, soundness of the environment and safer food for human consumption through the use of organic fertilizers (Granste*et al.*, 1997).

The use of organic fertilizers assures the farmers of lower production costs and ensure vigorous growth of the plant. Organic fertilizer application also helps control soil born disease, improves soil properties and helps maintain stable soil nutrients (Balaoing, 2006).

The selection of varieties and suitable organic fertilizers would greatly help farmers to produce desirable yield and increase their profit.

The study was conducted to:

1. determine the growth and yield of three potato varieties using stem cuttings;

2. compare the effect of organic fertilizers on the growth and yield of potato cuttings;

3. determine the interaction effect between potato varieties and organic fertilizers on the growth and yield of potato; and

4. determine the profitability of potato varieties applied with organic fertilizers.

The study was conducted at the Balili, La Trinidad, Benguet from November 2011 to February 2012.

REVIEW OF LITERATURE

Effect of Organic Fertilizer on Plant

When the organic residues are in the process of becoming soil or humus, they supply some of essential nutrients to plant, to serve as the principal source of nitrates, organic phosphate, organic sulfates, borates, and chloride, increase the cation exchange capacity; and make phosphorous and macronutrients more readily available to plants over a wide pH range. Organic residues release essential nutrients faster by microbial decomposition when their ration of organic carbon to total nitrogen is now wider than above 20:1 (Follett, 1991).

Koshino (1990) found that nutrient elements from organic fertilizers are released slowly which is particularly important in avoiding salt injury, ensuring a continuous supply of materials for the growing season, and producing product of better quality.

According to Parnes (1986), organic matter is principally a source of nitrogen, phosphorous and sulfur. Soil organisms require and retain most of the calcium, magnesium and potassium in decaying residues which are then discarded by the soil organism during the first stages of decomposition. These nutrients become quickly available to plants.

The benefits derived from organic fertilizers are: improved soil structure; enhanced soil balance and nutrient availability; supply micronutrients essential for crop growth of microorganism that helps control growth of soil-borne diseases and nematodes; and makes plant healthier and gives higher crop yield.

Benguet State University Organic Compost

Espiritu (1998) reported that BSU-organic compost refers to agricultural and agro-industrial wastes composted with suitable fungal inocula (*Trichoderma* sp.) and enriched with free-living nitrogen fixing bacteria (*Azotobacteria* sp.). Farm wastes such as chicken, swine orcattle manure in combination with rice straw, coffee hulls as well as industrial wastes such as sugarcane bagasse and molasses can be used.

The BSU-organic fertilizers produced under the project are a mixture of mushroom compost, chicken dung and sunflower. It contains 32.23% organic matter indicative of high nitrogen content which is one of the most essential nutrients needed by the crop. The compost raw materials are treated with *trichoderma* and some strains of bacteria. Trichoderma is known to protect plant roots against disease caused by fungi (Laurean, 2009).

Advantages of Using Organic Fertilizers
or Compost

According to HARRDEC (2006) organic matter or compost or humus improves the soil condition of mineral soils and thus increase soil productivity. Composts store of nutrients used by the plants and help neutralize acidic soils, thus making them less susceptible to erosion.

The content of organic fertilizer includes nitrogen, phosphorous, potassium, magnesium and sulfur. Organic fertilizers aid the plant in absorbing more nutrients already present in the soil, the soil turns black because of rich humus content. Moisture is retained longer, preventing the crops from drying up when the soil is rich in organic matter. It minimizes pollution because the compost was recycled from rotten waste.

Organic fertilizers generally provide many advantages to organic farming, to soil properties and to crop yields. They improve soil structure, enhance soil balance and nutrient availability, and supply micronutrients essential for crop growth increase microorganism population that helps control growth of soil-borne diseases and nematodes, and makes plant healthier and gives higher crop yield. A direct relationship between organic matter and the population and distribution of beneficial soil biota is also noted. The most productive agricultural soil possess good structure, considerable cation exchange capacity and water retention, and high

population of beneficial microorganism, which are all dependent upon the presence of organic matter (OTA, 1982).

Organic fertilizer provides some essential elements for proper plant growth. It assures farmers of lower stable fertilizer cost and reliable local raw materials. The organic fertilizers could be at least 50% to 60% cheaper than chemical fertilizer and still effective in increasing the fertility of the soil (Pacsi, 2005).

Evaluation of Potato Varieties Using Organic Fertilizers

In a study by Pandosen (1980) results show that potato plants not applied with organic matter were stunted compared to the treated ones which were vigorous thus, organic matter plays a role similar to that of nitrogen with regard to the growth and yield of plants. The application of nitrogen produced vigorous plant and helped on the tuber formation. Apparently, an increase in the absorption of nitrogen by plants was followed by an increase in leaf area.

Campiwer (1999) found that different mixtures of organic fertilizers significantly affected the height and weight of the potato plants as well as the weight of extra large potato tubers. Application and formation of six (6) tons/ha chicken dung, six (6) tons/ha horse manure, six (6) tons/ha pig manure and six (6) tons/ha fresh sunflower enhanced taller and total yield of potato per plot. It also improved the physical and chemical properties of the soil and proved to be the best combination to enhance the growth and yield of potato.

The Use of Stem Cuttings

Uyen*et al*. (1985) reported that production of potato by stem cutting is being used in many countries in order to produce a virus-free tuber. According to Jones (1988) 30% and 20% of total planting materials respectively use in North American programs and Europe Programs are stem cuttings.

Furthermore Montierro*et al.* (1986) reported that the use of stem cuttings as planting materials is a very promising tool for low cost potato production. It is one of the alternative technologies in commercial potato production. Using them instead of tubers would greatly reduce the cost in producing, storing and transplanting. It also enables the rapid and timely increase of new cultivars and prevents possible occurrence of diseases in the clean, healthy planting materials. Zamora *et al.* (1986) reported that stem cutting yield more planting material at the shortest possible time than traditional seed piece method. Investment can be reduced by 60% using a cheaper alternative way of producing clean planting material like stem cutting (Gayao *et al.,* 1987).

Demonteverde (1992) reported that using rooted cuttings from a certain clone is an efficient, profitable and low cost method for potato production. According to Kiswa et

al. (1998) the use of rooted system cuttings as planting material, as an alternative to seed tubers can reduce the cost of seed by as much as 40% and this method eliminates disease caused by pathogens. It also breaks contact with non-systemic seed and soil-borne diseases, although labor is more intensive.

The practical use of rooted stem cuttings seems to be more related to removal of non-systemic disease and to allow high-quality seed to become available to growers before the seed becomes infected to a significant degree (Bryan, 1984).

MATERIALS AND METHODS

An area of approximately 270 square meters was prepared for planting (Figures 1-2). This was divided into three blocks, which corresponds to three replications. Each block was subdivided into 18 plots with a dimension of 1mx5m. The experiment was laid out in Split plot arranged in Randomized Complete Block Design (RCBD).

Upon crop establishment, all other practices including hilling-up, spraying, weeding and watering were equally employed in all the treatments (Figures3-5).

The treatments used were:

MAIN PLOT- ORGANIC FERTILIZER

F0= Control

F1= Abundant Harvest (10.38-8.34-9.45)

F2= NBEM-21 (2.8-3.95-3.66)

F3= Planergy Granules (6-6-6)

F4= Harvest King (8-8-8)

F5= Multigreen (20-8-15)

SUB PLOT- VARIETY

V1= Igorota

V2= Granola

V3= Raniag

Figure 1. Overview of the experimental area at Balili, La Trinidad, Benguet

Figure 2. Land preparation of the experimental area at Balili, La Trinidad, Benguet

Figure 3. Planting of potato stem cuttings at Balili, La Trinidad, Benguet

Figure 4. Hilling up at 20 days after transplanting

Figure 5. Harvesting of potato tubers applied with organic fertilizers

The data gathered were the following:

A.Meteorological data. The data on temperature, relative humidity, rainfall and sunshine duration were obtained fromPhilippine Atmospheric Geophysical and Astronomical Services Administration(PAGASA) station, Benguet State University, La Trinidad, Benguet.

B.Initial and Final Soil Analysis. Soil samples were taken from the experimental area before and right after harvest. The nitrogen, phosphorus, potassium, soil pH, and organic matter content of the soil were analyzed at the Department of Agriculture, Soil Laboratory, Pacdal, Baguio City.

C. Vegetative Characters

1. Plant survival %. The number of plants that survived was counted 30 days after planting (DAP) and calculated using the formula:

$$\% \text{ Plant Survival} = \frac{\text{Number of plant survived}}{\text{Total Number of plants planted}} \times 100$$

2. Initial Plant Height. This was taken at 30 DAP using meterstick.

3. Final plant height. This was taken at 45 DAP using meterstick.

4. Canopy cover. This was gathered at 30 and 45 DAP using a wooden frame which measures 120cm x 6cm.

5. Plant Vigor. This was taken at 30 and 45 DAP based on the rating scale by CIP (Gonzales et al. (2004).

Scale	Description	Reaction
5	Plants are strong with robust stem and leaves, light color to dark green in color	Highly Vigorous

4	Plants are moderately strong with robust stem and leaves were light green in color	Moderately vigorous
3	Better than less vigorous	Vigorous
2	Plants are weak with few thin leaves and stems pale	Less Vigorous
1	Plants are weak with few stems and leaves very pale	Poor Vigorous

D. Reaction to Leaf miner and Late blight

1. Reaction to leaf miner. The reaction to leaf miner was recorded at 30 and 45 DAP using the following rating scale (CIP, 2001):

Scale	Description	Reaction
5	Leaf infested (1-20%)	Highly resistant
4	Infested (21-40%)	Moderate Resistant
3	Moderately infested (41-60%)	Susceptible
2	Severely infested (61-80%)	Moderately Susceptible
1	Most serious (81-100%)	Very Susceptible

2. Reaction to late blight. This was observed at 30 and 45 DAP using the CIP rating scale by Henfling (1982):

Scale	Blight	Description
1	0	No blight to be seen.
	0.1-1	Very few plants in large treatments with lesions. Not more than 2 lesions per 10m of row (30 plants).
2	1.1-3	Up to 10 lesions per plant.

3	3.1-10	Up to 30 small lesions per plant or up to 1 inch each 20 leaflets attacked.
4	10.1-24	Most plants are visibly attacked and leaflets infected. Very few multiple infections per leaflets.
5	25-49	Nearly every leaflet with lesions.Multiple infections per leaflets are common.Field looks green, but all plants are blight.
6	50-74	Every plants blighted and half the area destroyed by blight. Field look green-flecked and brown; blight is very obvious.
7	75-90	As previous, but ¾ of each plant blighted. Lower branches may be over whelming killed off, and the only green leaves, if any, are at the top of plant. Shape of plants may be more spindly due to extensive foliage loss. Field looks neither brown nor green.
8	91-97	Some leaves and most stems are green. Fields looks brown with some leaves patches.
9	97.1-99.9	Few green leaves, almost all with blight lesions, remain, many stem lesions. Plot looks brown.
10	100	All leaves and stem dead.

Description: 1 – Highly resistant; 2 – 3 Resistant; 4 – 5 Moderately resistant; 6 – 7 Moderately susceptible; 8 – 10 Susceptible

E. Yield and Yield Components

1. Number and weight of marketable tubers per plot (kg). All tubers that were of marketable size, not malformed, free from cuts, cracks and without more than 10% greening of the total surface was counted and weighed at harvest.

2. Number and weight of non-marketable tubers per plot (kg). This was obtained by counting and weighing all tubers that were malformed, damaged by pest and diseases and with more than 10% greening.

3. Total yield / plot (kg). This is the sum of the weight of marketable and non-marketable tubers.

4. Computed yield (tons/ha). This was computed using the formula:

$$\text{Yield (tons/ha)} = \frac{\text{Total yield per plot}}{5m^2/\ 1000m^2} \text{ x 100}$$

F.Return on cash expenses (ROCE). This was computed by dividing thenet profit over the total cost of production multiplied by 100.

$$\text{ROCE} = \frac{\text{Net profit}}{\text{Total cost of production}} \text{ x100}$$

Data Analysis

All quantitative data were analyzed using the Analysis of Variance (ANOVA) for the Split plot design with three replications. The significance of difference among the treatment means was tested using the Duncan's Multiple Range Test (DMRT) at 5% level of significance.

RESULTS AND DISCUSSION

Agro-Climatic Data

Table 1 shows the temperature, relative humidity, amount of rainfall and daily sunshine duration from November 2011 to February 2012. It was observed that the temperature ranged from 14^{o}C to 25^{o}C, relative humidity from 84-87%, rainfall amount from 2.20 to 6.40 mm and daily sunshine duration from 244 to 340 min.

Potato grows best in areas with temperature ranging from 17°C to 22°C and an average humidity of 86%. The temperature and relative humidity is important because it affects the growth and development of the plants, however the above average of temperature 25^{o}C and relative humidity 87% are not suitable to potato production.

Table 1.Agro-Climatic data during the conduct of the study (November 2011 February2012)

MONTH	TEMPERATURE (^{o}C)		RELATIVE HUMIDITY (%)	RAINFALL AMOUNT (mm)	DAILY SUNSHINE DURATION (min)
	Min	Max			
November	15	24	86	2.20	257
December	14	17	87	6.40	244
January	14	25	84	3.20	340
February	14	22	86	3.40	293
Mean	14	26	86	4.00	284

Source: PAG-ASA Station, BSU, La Trinidad, Benguet

Chemical Analysis of Soil

pH. The initial pH of the area was acidic (5.58) and according to Chapman and Carter (1986) potatoes are well suited even in acidic soil pH from 4.5 to 5.5.

Soil Organic Matter. Table 2 shows that there was an increase in the organic matter content of the soil. The increase is definitely attributableto the application of organic fertilizers.

Nitrogen. The nitrogen content of the area also increased. Again this is a direct effect of the organic fertilizers applied.

Table 2. Soil analysis before and after planting

	pH	ORGANIC MATTER (%)	NITRO-GEN (%)	PHOSPHO-ROUS (ppm)	POTAS-SIUM (ppm)
Before planting	5.58	2.0	0.12	120	230
After planting					
No fertilizer*	–	–	–	–	–
Abundant harvest	6.0	2.5	0.79	120	365
NBEM 21	5.56	2.5	0.4	135	306
Planergy Granules	5.96	2.5	0.45	128	324
Harvest king	6.0	3.0	0.7	135	375
Multi green	6.0	3.0	0.9	145	404

Data analyzed at the Soils Laboratory Department of Agriculture Pacdal, Baguio City
*No data collected

Phosphorous.The phosphorous content of all organic fertilizer applied were increased. This contributed to the growth and development of the potato plants during the early stage.

Potassium. The potassium content on the soil applied with Abundant Harvestafter soil analysis still remains which may have been caused by the nutrient uptake of the potato plant.

Plant Survival

Effect of Fertilizer. Significant differences were obtained on the percentage plant survival of potato applied with organic fertilizers. Potato applied with Multigreen significantly obtained the highest percentage of 72.22% while potato varieties applied without any fertilizers obtained 55.88%. The high percentageofplant survival of potato applied with Multigreen was apparently brought about by the NPK content of the fertilizer that enhanced the growth and development of the potato plant.

Effect of Potato Variety. The potato varieties significantly differed in terms of percentage plant survival. Igorota obtained the highest plant survival of 84.67% which was much greater than both Raniag and Granola.The high percentage of plant survival of Igorota could be due to its more desirable genetic characteristics.

Interaction Effect. There was no significant interaction effect between the fertilizers and varieties on the plant survival of potato, although Igorota applied with multigreen seem to have higher survival percentage.

Table 3. Plant survival of three potato varieties applied with organic fertilizers

TREATMENT	SURVIVAL(%)
Fertilizer (F)	
No fertilizer (Control)	55.89[d]
Abundant harvest (10:38-8.34-9.45)	64.67[bc]
NBEM21 (28-3.95-3.66)	61.33[cd]
Planergy granules (6-6-6)	62.56[bc]
Harvest king (8-8-8)	68.89[ab]
Multi green (20-8-15)	72.22[a]
Variety (V)	
Igorota	84.67[a]
Granola	58.44[b]
Raniag	49.67[c]
V x B	ns
CV_a(%)	5.93%
CV_b(%)	7.73%

Means with the same letter are not significantly different at 5% level of significance DMRT

Initial and Final Plant Height

Effect of Fertilizer.Table 4 shows the plant height of potato applied with organic fertilizers.At 30 DAT, all treatments had taller plants than the control. Amongthemselves however, no variations were noted. Fifteen days later, there was a slight change with plants applied with Abundant Harvest which are shorter than those applied with Multigreen.

Effect of Potato Variety. Table 4 shows that Igorota significantly produced the tallest plants followed by Raniag. Granola had the shortest plants on the initial and final height. The significant differences on the initial and final plant height of the different potato varieties could be due to their genetic characteristics.

Table 4.Plant height of three potato varieties at 30 and 45 DAT as affected by organic fertilizers

TREATMENT	PLANT HEIGHT	
	INITIAL	FINAL
Fertilizer (F)		
No fertilizer (Control)	10.56[b]	20.00[c]
Abundant harvest (10:38-8.34-9.45)	12.78[ab]	21.89[bc]
NBEM21 (28-3.95-3.66)	11.44[ab]	22.33[abc]
Planergy granules (6-6-6)	12.00[ab]	22.00[abc]
Harvest king (8-8-8)	14.56[a]	24.44[ab]
Multi green (20-8-15)	14.78[a]	24.67[a]
Variety (V)		
Igorota	19.39[a]	32.50[a]
Granola	8.11[c]	16.11[b]
Raniag	10.56[b]	19.06[b]
V x B	ns	ns
CV_a(%)	12.06%	8.67%
CV_b(%)	10.78%	9.09%

Means with the same letter are not significantly different at 5% level of significance DMRT

Interaction Effect. There was no significant interaction effect between the fertilizers and varieties on the height of potato plants.

Canopy Cover

Effect of Fertilizer. No significant differences were observed among the plants treated with organic fertilizer. Although, plants applied with Multigreen seem to have the widest canopy cover while plants with no fertilizer obtained the narrowest canopy cover.

Effect of Variety.Igorota significantly produced the widest canopy cover among theof potato varieties (8.4) followed by Raniag (5.1) while Granola showed the narrowest canopy cover of 3.22 at 30 DAT.

Table 5. Canopy cover of three potato varieties at 30 and 45 DAT applied with organic fertilizers

TREATMENT	CANOPY COVER	
	30 DAT	45 DAT
Fertilizer (F)		
No fertilizer (Control)	18.67	26.22
Abundant harvest (10:38-8.34-9.45)	22.22	28.89
NBEM21 (28-3.95-3.66)	18.89	28.00
Planergy granules (6-6-6)	19.44	25.33
Harvest king (8-8-8)	26.22	31.11
Multi green (20-8-15)	25.78	32.89
Variety (V)		
Igorota	32.39[a]	40.89[a]
Granola	12.78[c]	23.11[b]
Raniag	20.44[b]	22.22[b]
V x B	ns	ns
CV_a(%)	26.48%	16.57%
CV_b(%)	18.28%	16.67%

Means with the same letter are not significantly different at 5% level of significance DMRT

At 45 DAT, canopy cover of all the potato varieties consistently increased but Igorota had much greater canopy cover compared to the other two varieties. This is an indication that Igorota has better adaptability to local conditions and consequently, better growth and yield potential over the other varieties.

Interaction Effect. There was no significant interaction effect between the fertilizer and varietties on the canopy cover of potato plants.

Plant Vigor

Effect of Fertilizer. At 30 DAT, highly significant differences were recorded on plant vigor of potato applied with organic fertilizer. However, at 45 DAT differences in plant vigor were no longer observable. This suggested that most of the nutrients

contained by the organic fertilizer have been used quite early in the growth of potato plants.

Effect of Variety. Highly significant differences were recorded on vigor of different potato varieties. Igorota was observed to be moderately vigorous at 30 DAT but already vigorous at 45 DAT. In both stage, Granola and Raniag were less vigorous.

Interaction Effect. There was no significant interaction effect between the fertilizer and varieties on the plant vigor of potato plants.

Table 6. Plant vigor of three potato varieties at 30 and 45 DAT applied with organic fertilizers

	PLANT VIGOR*	
TREATMENT	30 DAT	45 DAT
Fertilizer (F)		
No fertilizer (Control)	2.89[b]	2.33
Abundant harvest (10:38-8.34-9.45)	3.67[a]	2.56
NBEM21 (28-3.95-3.66)	3.33[b]	2.44
Planergy granules (6-6-6)	3.33[b]	2.56
Harvest king (8-8-8)	4.11[a]	2.89
Multi green (20-8-15)	3.89[a]	3.00
Variety (V)		
Igorota	4.33[a]	3.89[a]
Granola	3.22[b]	2.78[b]
Raniag	3.06[b]	2.22[b]
V x B	ns	ns
CV_a(%)	13.23%	18.66%
CV_b(%)	16.32%	18.66%

Means with the same letter are not significantly different at 5% level of significance DMRT

*Scale: 5 – Highly vigorous, 4 - Moderately vigorous, 3 – Vigorous, 2 - Less vigorous, 1 – Poor vigorous

Leaf Miner

Effect of Fertilizer. At 30 DAT, results show that all potato plants applied with organic fertilizer were highly resistant.At 45 DAT, most plants were susceptible to leaf miner. The increase of leaf miner incidence might be due to continuous rainfall during the conduct of the study.

Effect of Variety. Results revealed that all potato varieties were highly resistant to leaf miner at 30 DAT. At 45 DAT, Igorota was moderately resistant but both Granola and Raniag were susceptible. The resistance of Igorota might be due to genetic characteristics.

Table 7. Reaction to leaf miner of three potato varietiesat 30 and 45 DAT appliedwith organic fertilizers

	REACTION TOLEAF MINER	
TREATMENT	30 DAT	45 DAT
Fertilizer (F)		
No fertilizer (Control)	Highly resistant	Susceptible
Abundant harvest (10:38-8.34-9.45)	Highly resistant	Susceptible
NBEM21 (28-3.95-3.66)	Highly resistant	Susceptible
Planergy granules (6-6-6)	Highly resistant	Susceptible
Harvest king (8-8-8)	Highly resistant	Moderately resistant
Multi green (20-8-15)	Highly resistant	Moderately resistant
Variety (V)		
Igorota	Highly resistant	Moderately resistant
Granola	Highly resistant	Susceptible
Raniag	Highly resistant	Susceptible
V x B		ns
CV_a(%)		7.98
CV_b(%)		15.26

Means with the same letter are not significantly different at 5% level of significance DMRT

Interaction Effect. There was no significant interaction effect between the fertilizer and variety on the leaf miner incidence of potato plants.

Late Blight

Effect of Fertilizer. There was no significant difference observed among the potato plants applied with organic fertilizers (table 8). Most of the treatments had consistent trend observed in late blight occurrence. The increase in late blight infection from 30-45 DAP may be attributed toscattered rainfall and foggy condition which affects the relative humidity during the conduct of the study.According to Perez (2008), high

Table 8. Reaction to late blight incidence of three potato varieties at 30 and 45 DAT applied with organic fertilizers

	REACTION TO LATE BLIGHT	
TREATMENT	30 DAT	45 DAT
Fertilizer (F)		
No fertilizer (Control)	Resistant	Moderately susceptible
Abundant harvest (10:38-8.34-9.45)	Highly resistant	Moderately resistant
NBEM21 (28-3.95-3.66)	Resistant	Moderately resistant
Planergy granules (6-6-6)	Highly resistant	Moderately resistant
Harvest king (8-8-8)	Highly resistant	Moderately resistant
Multi green (20-8-15)	Highly resistant	Moderately resistant
Variety (V)		
Igorota	Highly resistant	Resistant
Granola	Highly resistant	Moderately susceptible
Raniag	Resistant	Moderately susceptible
V x B	ns	ns
CV_a(%)	7.50%	10.18%
CV_b(%)	15.01%	11.61%

Means with the same letter are not significantly different at 5% level of significance DMRT

relativehumidity affects the lateblight incidence because the presence of moisture favors the occurrence of late blight.

Effect of Variety. Significant differences were observed among potato varieties. Raniag and Granola was the most affected by late blight at 45 DAT (Figure 6). Igorota had exhibited the least late blight infection, suggesting that it posseses genetic characteristics better than two varieties.

Interaction Effect. No significant interaction was observed between organic fertilizers and potato varieties.

Figure 6. Late blight incidence at 45 days after transplanting

Number of Marketable and Non-marketable Tubers per Plot

Effect of fertilizer.Table 9 shows the number of marketable and non-marketable tubers of potato applied with organic fertilizers. Potato applied with Multigreen had the highest marketable tubers. Least number of marketable tubers and high number of non-marketable tubers are obtained in plants not applied with organic fertilizers.

Effect of variety. Significant differences were observed among the potato entries in terms of number of marketable tubers. Igorota produced the highest number of both

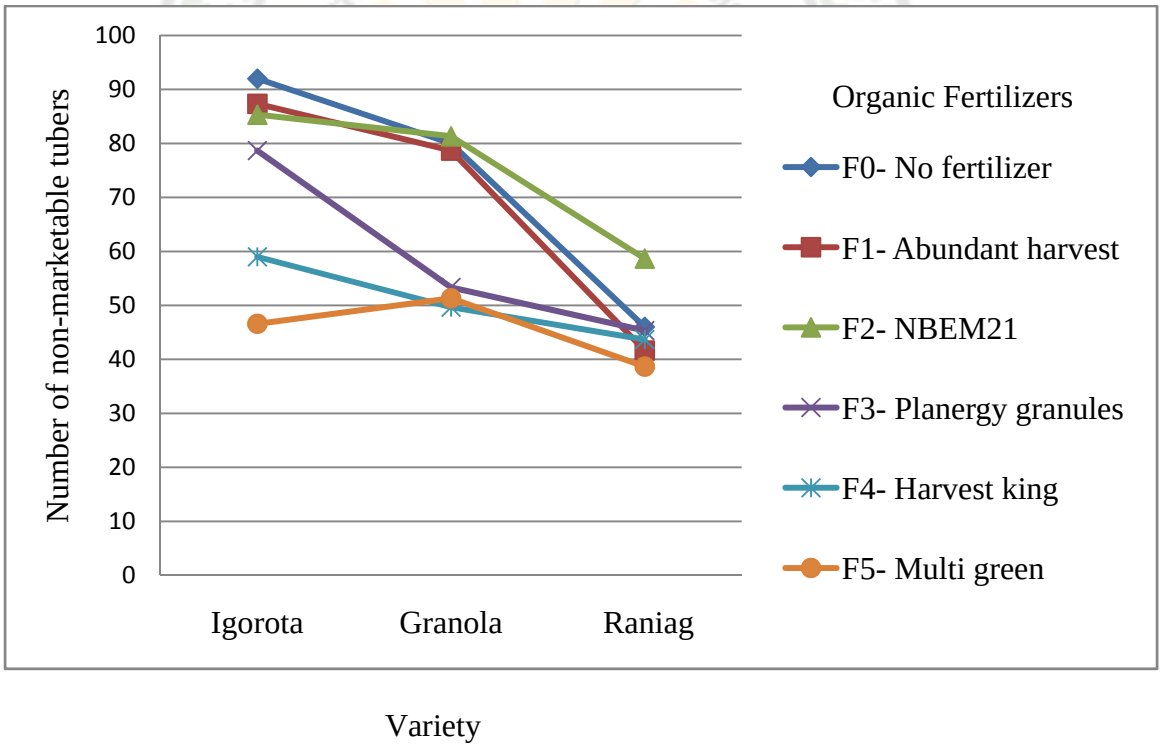
Table 9.Number of marketable andnon-marketable tubers of three potato varieties applied with organic fertilizers

TREATMENT	NUMBER (PER 5 m²)	
	MARKETABLE	NON-MARKETABLE
Fertilizer (F)		
No fertilizer (Control)	26.89[b]	72.67[ab]
Abundant harvest (10:38-8.34-9.45)	37.56[ab]	69.11[ab]
NBEM21 (28-3.95-3.66)	30.00[b]	75.11[a]
Planergy granules (6-6-6)	37.67[ab]	59.11[abc]
Harvest king (8-8-8)	38.67[ab]	50.78[abc]
Multi green (20-8-15)	51.22[a]	45.56[c]
Variety (V)		
Igorota	53.56[a]	74.83[a]
Granola	29.00[b]	65.72[a]
Raniag	28.44[b]	45.61[b]
V x B	ns	*
CV_a(%)	30.68%	20.71%
CV_b(%)	25.14%	13.99%

Means with the same letter are not significantly different at 5% level of significance DMRT

marketable and non-marketable tubers. The lowest number of marketable and non-marketable tubers were obtained from Raniag and Granola which was affected by late blight. The varieties that produced the highest number of marketable tubers also had the widest canopy and were resistant to late blight infection.

Interaction effect. No significant interaction was observed between the fertilizers and varieties in terms of number of marketable tubers produced. However, significant interaction was observed on the number of non-marketable tubers between organic fertilizersand potato varieties. Figure 7shows that Raniag applied with Multigreen has the lowest non-marketable tubers followed by Igorot applied with Multigreen and Granola applied with Multigreen.



Figrure 7.Interaction effect of potato varieties and organic fertilizers on the number of non- marketable tuber

Weight of Marketable and Non-marketable Tubers

Effect of Fertilizer. Table 10 shows the weight of marketable and non-marketable tubers per plot. Significant differences were obtained in the marketable and non-marketable tubers of potato. Plants applied with Multigreen significantly produced the heaviest marketable potato tubers. Plants with no fertilizer produced the heaviest non-marketable potato tubers.

Table 10.Weight of marketable and non-marketable tubers of three potatovarieties applied with organic fertilizers

TREATMENT	WEIGHT (kg/5m²)	
	MARKETABLE	NON-MARKETABLE
Fertilizer (F)		
No fertilizer (Control)	0.98 [b]	0.99[c]
Abundant harvest (10:38-8.34-9.45)	1.48[ab]	1.49[abc]
NBEM21 (28-3.95-3.66)	1.3[ab]	1.30[bc]
Planergy granules (6-6-6)	1.31[ab]	1.31[bc]
Harvest king (8-8-8)	4.43[ab]	1.60[ab]
Multi green (20-8-15)	1.52 [a]	1.86[a]
Variety (V)		
Igorota	2.67 [a]	2.73[a]
Granola	0.98 [b]	0.98[b]
Raniag	0.56 [b]	0.56[b]
V x B	ns	*
CV_a(%)	14.22%	20.71%
CV_b(%)	17.04%	19.29%

Means with the same letter are not significantly different at 5% level of significance DMRT

Effect of Variety. There were significant differences observed among varieties in terms of weight of marketable and non-marketable tubers of potato. Igorota had the heaviest weight of marketable and non-marketable tubers followed by Raniag and the lowest was obtained from Granola.

The high yield of Igorota variety might be attributed to its genetic characteristics, including resistance to late blight (Table 10).Earlier results show that potato variety with high plant survival and widest canopy cover had the highest weight of tubers.

Interaction Effect. No significant interaction was observed between the fertilizer and varieties in terms of weight of marketable tubers produced per plot. However, highly significant interaction was observed on the weight of non-marketable tubers between the organic fertilizers and varieties. Granola and Raniag had the lowest weight of non-marketable tubers (Figure 8).

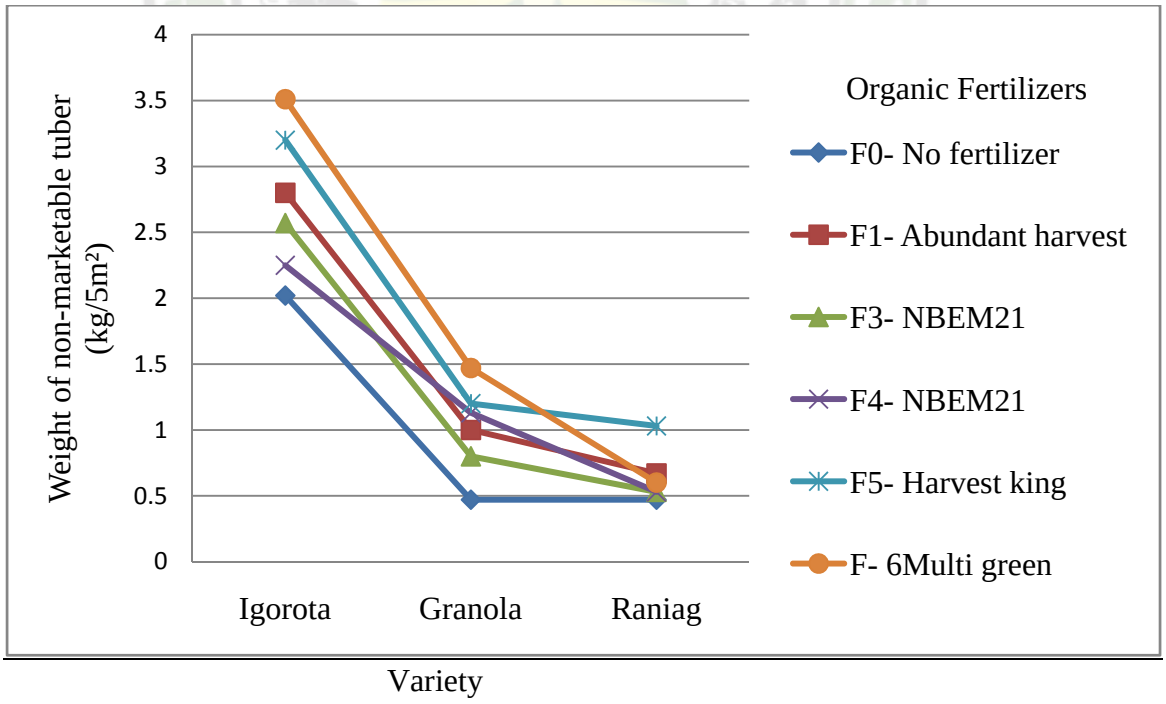


Figure 8. Interaction effect of potato varieties and organic fertilizers on the weight of non-marketable tuber

Total Yield per Plot

Effect of Fertilizer. There weresignificant differences on the total yield of potato varietiesas affected bydifferent fertilizers. Potatoplantsapplied withMultigreen significantly produced the highest total yield.The result might be due to the high plant survival obtained as affected by these fertilizers.

Effect of Variety. Significant differences were also observed on the total yield of potato. Igorota significantly produced the highest total yield of potato tubers. During the conduct of the study, intermittent rains occurred, especially during the younger vegetativegrowth stage which ultimately affected potato yield.

Table 11. Total plot yield of three potato varieties applied with organicfertilizers

TREATMENT	TOTAL YIELD (Kg/5m²)
Fertilizer (F)	
No fertilizer (Control)	1.68[b]
Abundant harvest (10:38-8.34-9.45)	1.96[b]
NBEM21 (28-3.95-3.66)	1.83[b]
Planergy granules (6-6-6)	1.90[b]
Harvest king (8-8-8)	2.00[b]
Multi green (20-8-15)	2.24[a]
Variety (V)	
Igorota	3.57[a]
Granola	1.38[b]
Raniag	0.85[b]
V x B	ns
CV_a(%)	14.80%
CV_b(%)	17.35%

Means with the same letter are not significantly different at 5% level of significance DMRT

Interaction Effect. The interaction between organic fertilizer and entries did not significantly affect the yield of potato.

Computed Yield per Hectare

Effect of Fertilizer. It was observed that the potato plants applied with Multigreen obtained the highest computed yield. This result may be attributed to the high percentage of plant survival and the NPK content of the organic fertilizer which could be favorable to potato plant growth.

Effect of Variety. Highly significant differences were observed on the yield of

Table 12.Computed yield of three potato varieties applied with organic fertilizers

TREATMENT	COMPUTED YIELD (tons/ha)
Fertilizer (F)	
No fertilizer (Control)	3.38[b]
Abundant harvest (10:38-8.34-9.45	3.91[a]
NBEM21 (28-3.95-3.66)	3.66[a]
Planergy granules (6-6-6)	3.80[a]
Harvest king (8-8-8)	4.00[a]
Multi green (20-8-15)	4.48[a]
Variety (V)	
Igorota	7.15[a]
Granola	2.76[b]
Raniag	1.71[b]
V x B	ns
CV_a(%)	14.86%
CV_b(%)	17.34%

Means with the same letter are not significantly different at 5% level of significance DMRT

the different potato varieties. Igorota obtained the highest computed yield per hectare. High yield from this variety might have been brought about by its wide canopy cover, resistance to late blight, high percentage of plant survival and plant vigor.The low yield of Raniag and Granola maybe explained by their susceptibility to late blight.

Interaction effect. There was no significant interaction between the fertilizers and the entries on the computed yield of potato.

Return on Cash Expenses

Effect of Organic Fertilizers. The return on cash expense of potato applied with organic fertilizer is presented in Table 13. It was observed that potatoes applied with Multigreen registeredthe highest ROCE of 138.78% while plants\ applied with NBEM 21 had the lowestwhich was 61.43% due to low number of tubers that were produced.

Effect of Variety. Profitability of the three potato entries is shown in Table 13. Igorota obtained high return on cash expense with 184.71% followed by Granola with 48.86% and Raniag with 42.14%. The highest number of tubers fromIgorota variety may have contributed to high ROCE. The result is definitely due to the better adaptability, better resistance to late blight and higher yield of Igorota.

Table 13. Return on cash expenses (ROCE) of three potatovarieties applied with organic fertilizers

TREATMENT	COST OF PRODUC-TION (Php)	TOTAL NUMBER OF TUBERS (per 15m²)	GROSS INCOME (Php)	NET INCOME (Php)	ROCE (%)
Fertilizer (F)					
No fertilizer (Control)	519.75	242	968	447.75	86.15
Abundant harvest	729	338	1352	623	85.46
NBEM-21	669	270	1080	411	61.43
Planergy granules	699	334	1336	637	91.14
Harvest king	779	384	1592	757	97.18
Multi green	789	471	1884	1095	138.78
Variety (V)					
Igorota	232.375	168.167	672.67	434.63	184.71
Granola	232.375	88.67	354.67	120.46	48.86
Raniag	232.375	85.33	341.33	107.04	42.14

*Tubers were sold at Php4.00 per tuber.
*Total cost of production includes cost of organic fertilizers, planting materials and labor

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The study was conducted at Balili, La Trinidad, Benguet from November 2011 to February 2010. The objectives are to determine the growth and yield of three potato varieties using stem cuttings; compare the effect of organic fertilizers on the growth and yield of potato stem cuttings; determine the interaction effect between potato varieties and organic fertilizers on the growth and yield of potato; and determine the profitability of potato varieties applied with organic fertilizers.

Findings revealed that potato applied with organic fertilizers did not differ significantly on plant survival, highest initial and final plant height, canopy cover, plant vigor, leaf miner and late blight incidence.On yield parameters, significant differences were noted on the number and weight of non-marketable tubers of potato applied with organic fertilizers.

The different potato varieties significantly differed on plant characteristics such as plant survival, height, leaf miner and late blightresistance, canopy cover,number and weight of marketable tubers, total and computed yield. Igorota was the best performer in terms of resistance to late blight, highest yield and obtained the highest ROCE.

The interaction of potato varieties applied with organic fertilizers was significant in the number and weight of marketable tubers.Igorota applied with Multigreen was the best combination in terms of high yield and high ROCE under organic potato production.

Conclusion

Among the entries, Igorotawas the best potato variety in terms of plant survival, height, leaf miner and late blightresistance, canopy cover,number and weight of marketable tubers, total and computed yield.Multigreenappears to be the best commercial organic fertilizer for the growth and yield of potato.

Igorota applied with Multigreenwas the best combination in terms of yield and ROCE for tuber production.

Recommendation

Based on the results of the study, entry Igorota could be recommended for organic production under La Trinidad, Benguet condition due to its high yield and resistance to late blight incidence.

Due to higher ROCE, Multigreen is recommended as an organic fertilizer for potato production using stem cuttings.

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APPENDICES

Appendix Table 1. Plant survival (%) of three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	78	75	83	236	78.67
V_2	47	41	44	132	44.00
V_3	50	41	44	135	45.00
Sub-total	175	167	171	503	55.89
F_1					
V_1	81	83	89	253	84.33
V_2	56	58	63	177	59.00
V_3	47	58	47	152	50.67
Sub-total	184	199	139	582	64.67
F_2					
V_1	75	80	86	241	80.33
V_2	61	50	56	167	55.67
V_3	50	47	47	144	48.00
Sub-total	186	177	138	552	61.33
F_3					
V_1	81	83	86	250	83.33
V_2	63	56	50	169	56.33
V_3	44	50	50	144	48.00
Sub-total	128	189	186	563	62.56
F_4					
V_1	86	89	94	269	89.67
V_2	72	61	63	144	65.33
V_3	52	56	47	155	51.67
Sub-total	210	206	204	620	68.89
F_5					
V_1	97	89	89	275	91.67
V_2	72	72	67	211	70.33
V_3	52	56	56	164	54.67
Sub-total	221	187	212	650	72.22
Total	1164	1145	1161	3418	1156.67

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	78.67	84.33	80.33	83.33	89.67	91.67	508.00	84.67
GRANOLA	44.00	59.00	55.67	56.33	65.33	70.33	350.66	58.44
RANIAG	45.00	50.67	48.00	48.00	51.67	54.67	298.01	49.67
TOTAL	167.67	194.00	184.00	187.66	206.67	216.67	1156.67	
MEAN	55.89	64.67	61.33	62.55	68.89	72.22		64.26

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	11.593	5.796			
Factor A	5	1498.815	299.763	20.63**	3.33	5.64
Error	10	145.296	14.530			
Factor B	2	11937.926	5968.963	266.38**	4.10	7.56
AB	10	294.963	29.496	1.31ns	2.26	3.17
Error	24	537.778	22.407			
TOTAL	53	14426.370				

** = Highly significant Coefficient of variation = 5.93%

ns = Not significant Coefficient of variation = 7.37%

Appendix Table 2. Initial plant height (cm)of three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	14	17	16	47	15.67
V_2	5	7	7	19	6.33
V_3	7	11	11	29	9.67
Sub-total	26	35	34	95	10.56
F_1					
V_1	20	19	20	59	19.67
V_2	9	9	7	25	8.33
V_3	10	11	10	31	10.33
Sub-total	39	39	37	115	12.78
F_2					
V_1	14	19	19	52	17.33
V_2	7	6	8	21	7.00
V_3	9	10	11	30	10.00
Sub-total	30	35	28	103	11.44
F_3					
V_1	17	20	19	56	18.67
V_2	6	7	10	23	7.67
V_3	9	10	12	29	9.67
Sub-total	32	37	41	108	12.00
F_4					
V_1	23	24	20	67	22.33
V_2	7	12	10	29	9.67
V_3	12	13	10	35	11.67
Sub-total	42	49	40	131	14.56
F_5					
V_1	23	20	25	68	22.67
V_2	8	11	10	29	9.67
V_3	12	10	14	36	12.00
Sub-total	43	31	49	133	14.78
Total	212	236	239	685	228.35

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	15.67	19.67	17.33	18.67	22.33	22.67	116.34	19.39
GRANOLA	6.33	8.33	7	7.67	9.67	9.67	48.67	8.11
RANIAG	9.67	10.33	10	9.67	11.67	12	63.34	10.56
TOTAL	31.67	38.33	34.33	36.01	43.67	44.34	228.35	
MEAN	10.56	12.78	11.44	12.00	14.56	14.78		12.69

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	28.259	14.130			
Factor A	5	129.870	25.974	5.54*	3.33	5.64
Error	10	46.852	4.685			
Factor B	2	1267.148	633.574	338.74**	4.10	7.56
AB	10	28.630	1.863	1.53	2.26	3.17
Error	24	44.889	1.870			
TOTAL	53					

* = Significant — Coefficient of variation = 17.06%

** = Highly significant — Coefficient of variation = 10.78%

ns = Not significant

Appendix Table 3. Finalplant height (cm)of three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	28	31	28	87	29.00
V_2	14	15	14	43	14.33
V_3	14	18	18	50	16.67
Sub-total	56	64	60	180	20.00
F_1					
V_1	29	34	30	93	31.00
V_2	17	13	13	43	14.33
V_3	18	22	21	61	20.33
Sub-total	64	69	64	197	21.89
F_2					
V_1	34	34	31	99	33.00
V_2	17	16	14	47	15.67
V_3	17	19	19	55	18.33
Sub-total	68	69	64	201	22.33
F_3					
V_1	30	37	29	96	32.00
V_2	19	15	14	48	16.00
V_3	19	19	16	54	18.00
Sub-total	68	71	59	198	22.00
F_4					
V_1	34	34	35	103	34.33
V_2	19	17	17	53	17.67
V_3	20	24	20	64	21.33
Sub-total	73	75	72	220	24.44
F_5					
V_1	36	38	33	107	35.67
V_2	22	17	17	56	18.67
V_3	22	20	17	59	19.67
Sub-total	80	75	67	222	24.67
Total	409	423	386	1218	406

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	29	31	33	32	34.33	35.67	195.00	32.50
GRANOLA	14.33	14.33	15.67	16	17.67	18.67	96.67	16.11
RANIAG	16.67	20.33	18.33	18	21.33	19.67	114.33	19.06
TOTAL	60.00	65.66	67.00	66.00	73.33	74.01	406.00	
MEAN	20.00	21.89	22.33	22.00	24.44	24.67		22.56

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	38.778	19.389			
Factor A	5	138.222	27.644	7.21**	3.33	5.64
Error	10	38.333	3.833			
Factor B	2	2748.111	1374.056	326.86**	4.10	7.56
AB	10	37.000	3.700	0.88ns	2.26	3.17
Error	24	100.889	4.204			
TOTAL	53	3101.333				

** = Highly significant — Coefficient of variation = 8.67%

ns = Not significant — Coefficient of variation = 9.09%

Appendix Table 4. Canopy cover 30 DAPof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	24	28	28	80	26.67
V_2	8	12	12	32	10.67
V_3	16	20	20	56	18.67
Sub-total	48	60	60	168	18.67
F_1					
V_1	36	32	36	104	34.67
V_2	12	16	12	40	13.30
V_3	20	20	16	56	18.67
Sub-total	68	68	64	200	22.22
F_2					
V_1	24	32	32	88	29.33
V_2	12	6	12	30	10.00
V_3	16	16	20	52	17.33
Sub-total	52	54	44	170	18.89
F_3					
V_1	7	36	32	75	25.00
V_2	8	12	16	36	12.00
V_3	16	24	24	64	21.33
Sub-total	31	72	72	175	19.44
F_4					
V_1	36	44	36	11	38.67
V_2	12	20	16	48	16.00
V_3	24	28	20	72	24.00
Sub-total	72	92	72	236	26.22
F_5					
V_1	36	36	48	120	40.00
V_2	16	16	12	44	14.00
V_3	20	24	24	68	22.00
Sub-total	72	76	84	232	25.78
Total	343	422	416	1076	392.31

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	26.67	34.67	29.33	25	38.67	40	194.34	32.39
GRANOLA	10.67	13.3	10	12	16	14	75.97	12.66
RANIAG	18.67	18.67	17.33	21.33	24	22	122.00	20.33
TOTAL	56.01	66.64	56.66	58.33	78.67	76.00	392.31	
MEAN	18.67	22.21	18.89	19.44	26.22	25.33		21.80

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	214.926	107.463			
Factor A	5	534.315	106.863	3.18^{ns}	3.33	5.64
Error	10	335.519	33.552			
Factor B	2	3516.259	1758.130	110.01^{**}	4.10	7.56
AB	10	247.519	24.752	1.54^{ns}	2.26	3.17
Error	24	383.556	15.981			
TOTAL	53	5232.093				

^{ns} = Not significant — Coefficient of variation = 26.48%

** = Highly significant — Coefficient of variation = 18.28%

Appendix Table 5. Canopy cover 45 DAPof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	36	32	36	104	34.67
V_2	16	24	24	64	21.33
V_3	20	28	20	68	22.67
Sub-total	72	84	80	236	26.22
F_1					
V_1	44	44	44	132	44.00
V_2	24	28	20	72	24.00
V_3	20	20	16	56	18.67
Sub-total	88	92	80	260	28.89
F_2					
V_1	32	48	40	120	40.00
V_2	28	16	24	68	22.67
V_3	16	20	28	64	21.33
Sub-total	76	84	92	252	58.00
F_3					
V_1	32	40	40	112	37.33
V_2	12	16	24	52	17.33
V_3	20	20	24	64	21.33
Sub-total	64	76	88	228	25.33
F_4					
V_1	40	44	44	128	42.67
V_2	28	32	20	80	26.67
V_3	28	48	16	72	24.00
	96	104	80	280	31.11
F_5					
V_1	44	44	54	140	46.67
V_2	24	32	24	80	26.67
V_3	28	28	20	76	25.33
Sub-total	96	104	96	29	32.89
Total	492	564	518	1552	517.34

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	34.67	44	40	37.33	42.67	46.67	245.34	40.89
GRANOLA	21.33	24	22.67	17.33	26.67	26.67	138.67	23.11
RANIAG	22.67	18.67	21.33	21.33	24	25.33	133.33	22.22
TOTAL	78.67	86.67	84.00	75.99	93.34	98.67	517.34	
MEAN	26.22	28.89	28.00	25.33	31.11	32.89		28.74

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	24.33	12.167			
Factor A	2	1258.78	629.389	2832.25**	6.94	18.00
Error	4	0.889	0.222			
Factor B	5	127.500	25.500	8.80**	2.53	3.70
AB	10	28.556	2.856	0.98ns	2.26	2.98
Error	30	86.778	2.893			
TOTAL	53	1526.833				

** = Highly significant
ns = Not significant

Coefficient of variation = 16.57%
Coefficient of variation = 16.67%

Appendix Table 6. Plant vigor 30 DAPof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	4	4	3	11	3.67
V_2	2	3	3	8	2.67
V_3	2	2	3	7	2.33
Sub-total	8	7	9	26	2.89
F_1					
V_1	5	4	4	13	4.33
V_2	3	4	3	10	3.33
V_3	3	3	4	10	3.33
Sub-total	11	11	11	33	3.67
F_2					
V_1	4	4	5	13	4.33
V_2	3	3	3	9	3.00
V_3	3	2	3	8	2.67
Sub-total	11	9	11	30	3.33
F_3					
V_1	4	3	5	12	4.33
V_2	3	3	3	9	3.00
V_3	3	3	3	9	2.67
Sub-total	10	9	11	30	3.33
F_4					
V_1	5	5	5	15	5.00
V_2	3	4	4	11	3.67
V_3	3	4	4	11	3.67
Sub-total	11	13	13	37	4.11
F_5					
V_1	5	5	4	14	4.67
V_2	4	3	4	11	3.67
V_3	3	4	3	10	3.33
Sub-total	12	12	11	35	3.89
Total	62	63	66	191	63.67

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	3.67	4.33	4.33	4.33	5	4.67	26.33	4.39
GRANOLA	2.67	3.33	3	3	3.67	3.67	19.34	3.22
RANIAG	2.33	3.33	2.67	2.67	3.67	3.33	18.00	3.00
TOTAL	8.67	10.99	10.00	10.00	12.34	11.67	63.67	
MEAN	2.89	3.66	3.33	3.33	4.11	3.89		3.54

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	0.481	0.241			
Factor A	5	8.759	1.752	8.02**	3.33	5.64
Error	10	2.185	0.219			
Factor B	2	17.370	8.685	26.05**	4.10	7.56
AB	10	0.630	0.063	0.19ns	2.26	3.17
Error	24	8.000	0.333			
TOTAL	53	37.426				

** = Highly significant
ns = Not significant

Coefficient of variation = 13.23%
Coefficient of variation = 16.32%

Appendix Table 7. Plant vigor 45 DAPof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	3	3	3	9	3.00
V_2	2	2	2	6	2.00
V_3	2	2	2	6	2.00
Sub-total	7	7	7	21	2.33
F_1					
V_1	4	3	3	10	3.33
V_2	2	2	3	7	2.33
V_3	2	2	2	6	2.00
Sub-total	7	7	8	23	2.56
F_2					
V_1	3	3	3	9	3.00
V_2	2	2	3	7	2.33
V_3	2	2	2	6	2.00
Sub-total	7	7	8	22	2.44
F_3					
V_1	3	3	4	10	3.33
V_2	2	2	2	6	2.00
V_3	2	3	2	7	2.33
Sub-total	7	8	8	23	2.55
F_4					
V_1	3	4	4	11	3.67
V_2	2	3	3	8	2.67
V_3	2	2	3	7	2.33
Sub-total	11	9	10	26	2.89
F_5					
V_1	4	5	3	12	4.00
V_2	3	2	2	7	2.33
V_3	2	3	3	8	2.67
Sub-total	9	10	8	27	3.00
Total	45	48	49	142	47.32

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	3	3.33	3	3.33	3.67	4	20.33	3.39
GRANOLA	2	2.33	2.33	2	2.67	2.33	13.66	2.28
RANIAG	2	2	2	2.33	2.33	2.67	13.33	2.22
TOTAL	7.00	7.66	7.33	7.66	8.67	9.00	47.32	
MEAN	2.33	2.55	2.44	2.55	2.89	3.00		2.63

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	0.481	0.241			
Factor A	5	3.037	0.607	2.52^{ns}	3.33	5.64
Error	10	2.407	0.241			
Factor B	2	15.593	7.796	32.38^{**}	4.10	7.56
AB	10	1.296	0.130	0.53^{ns}	2.26	3.17
Error	24	5.778	0.241			
TOTAL	53	28.593				

^{ns} = Not significant Coefficient of variation = 18.68%

**= Highly significant Coefficient of variation = 18.66%

Appendix Table 8. Leaf miner 45 DAPof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	3	3	4	10	3.33
V_2	3	3	2	8	2.67
V_3	2	3	3	8	2.67
Sub-total	8	9	9	26	2.89
F_1					
V_1	4	3	4	11	3.67
V_2	4	3	3	10	3.33
V_3	3	3	3	9	3.00
Sub-total	11	9	10	30	3.33
F_2					
V_1	4	3	3	10	3.33
V_2	2	3	3	8	2.67
V_3	3	3	3	9	3.00
Sub-total	9	9	9	27	3.00
F_3					
V_1	3	4	4	11	3.67
V_2	3	3	3	9	3.00
V_3	3	3	3	9	3.00
Sub-total	9	10	10	29	3.22
F_4					
V_1	4	5	4	13	4.33
V_2	5	4	4	13	4.33
V_3	4	3	3	11	3.33
	13	12	11	36	4.00
F_5					
V_1	5	4	4	13	4.33
V_2	4	4	4	12	4.00
V_3	4	3	4	11	3.67
Sub-total	13	11	12	36	4.00
Total	63	60	61	185	61.33

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	3.33	3.67	3.33	3.67	4.33	4.33	22.66	3.78
GRANOLA	2.67	3.33	2.67	3	4.33	4	20.00	3.33
RANIAG	2.67	3	3	3	3.33	3.67	18.67	3.11
TOTAL	8.67	10.00	9.00	9.67	11.99	12.00	61.33	
MEAN	2.89	3.33	3.00	3.22	4.00	4.00		3.41

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	0.259	0.130			
Factor A	5	10.593	2.119	9.69**	3.33	5.64
Error	10	2.185	0.219			
Factor B	2	4.148	2.074	8.00**	4.10	7.56
AB	10	1.630	0.163	0.62ns	2.26	3.17
Error	24	6.222	0.259			
TOTAL	53	25.037				

** = Highly significant
ns = Not significant

Coefficient of variation = 13.73%
Coefficient of variation = 14.94%

Appendix Table 9. Late blight 30 DAPof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	1	1	1	3	1.00
V_2	1	2	2	5	1.67
V_3	2	2	2	6	2.00
Sub-total	4	5	5	14	1.56
F_1					
V_1	1	1	1	3	1.00
V_2	1	2	1	4	1.33
V_3	1	1	1	3	1.00
Sub-total	3	4	3	10	1.11
F_2					
V_1	1	1	1	3	1.00
V_2	2	2	1	5	1.67
V_3	1	3	2	6	2.00
Sub-total	3	6	4	14	1.56
F_3					
V_1	1	1	1	3	1.00
V_2	1	1	1	3	1.00
V_3	1	1	2	4	1.33
Sub-total	3	6	4	10	1.11
F_4					
V_1	1	1	1	3	1.00
V_2	1	1	1	3	1.00
V_3	1	2	2	5	1.67
	3	4	4	11	1.22
F_5					
V_1	1	1	1	3	1.00
V_2	1	2	1	4	1.33
V_3	2	1	1	4	1.33
Sub-total	4	4	3	11	1.22
Total	21	26	23	70	23.33

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	1	1	1	1	1	3	8.00	1.33
GRANOLA	1.67	1.33	1.67	1	1	4	10.67	1.78
RANIAG	2	1	2	1.33	1.67	4	12.00	2.00
TOTAL	4.67	3.33	4.67	3.33	3.67	11.00	30.67	
MEAN	1.56	1.11	1.56	1.11	1.22	3.67		1.70

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	0.704	0.352			
Factor A	5	1.926	0.385	2.97^{ns}	3.33	5.64
Error	10	1.296	0.130			
Factor B	2	2.815	1.407	7.23^{*}	4.10	7.56
AB	10	1.852	0.185	0.95^{ns}	2.26	3.17
Error	24	4.667	0.194			
TOTAL	53	13.259				

^{ns} = Not significant Coefficient of variation = 7.50%

*= Significant Coefficient of variation = 15.01%

Appendix Table 10. Late blight 45 DAPof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	3	2	3	8	2.67
V_2	6	7	7	20	6.67
V_3	7	8	7	22	7.33
Sub-total	16	17	17	50	5.56
F_1					
V_1	3	2	3	8	2.67
V_2	6	6	7	19	6.33
V_3	6	7	7	20	6.67
Sub-total	15	15	17	47	5.22
F_2					
V_1	4	3	2	9	3.00
V_2	6	7	7	20	6.67
V_3	7	6	7	20	6.67
Sub-total	17	16	16	49	5.44
F_3					
V_1	2	3	3	8	2.67
V_2	7	6	6	19	6.33
V_3	7	7	7	21	7.00
Sub-total	16	16	16	48	3.33
F_4					
V_1	3	3	2	8	2.67
V_2	6	6	6	18	6.00
V_3	6	7	7	20	6.67
	15	16	15	46	5.11
F_5					
V_1	2	3	2	7	2.33
V_2	5	6	5	16	5.33
V_3	7	7	6	20	6.67
Sub-total	14	16	13	43	4.78
Total	93	96	94	283	94.35

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	2.67	2.67	3	2.67	2.67	2.33	16.01	2.67
GRANOLA	6.67	6.33	6.67	6.33	6	5.33	37.33	6.22
RANIAG	7.33	6.67	6.67	7	6.67	6.67	41.01	6.84
TOTAL	16.67	15.67	16.34	16.00	15.34	14.33	94.35	
MEAN	5.56	5.22	5.45	5.33	5.11	4.78		5.24

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	0.259	0.130			
Factor A	5	3.426	0.685	2.40^{ns}	3.33	5.64
Error	10	2.852	0.285	246.05^{**}		
Factor B	2	182.259	91.130	0.59^{ns}	4.10	7.56
AB	10	2.185	0.219		2.26	3.17
Error	24	8.889	0.370			
TOTAL	53	199.870				

^{ns} = Not significant Coefficient of variation = 10.18%

**= Highly significant Coefficient of variation = 11.61%

Appendix Table 11. Number of marketable tubers per plotof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	38	42	36	116	38.67
V_2	16	20	14	50	16.67
V_3	24	20	32	76	25.33
Sub-total	78	82	82	242	26.89
F_1					
V_1	48	59	59	166	55.33
V_2	28	36	24	88	29.33
V_3	28	36	20	84	28.00
Sub-total	104	131	103	338	37.56
F_2					
V_1	54	46	42	142	47.33
V_2	24	20	20	64	21.33
V_3	28	20	16	64	21.33
Sub-total	106	86	78	270	30.00
F_3					
V_1	58	50	55	163	54.33
V_2	32	40	20	92	30.67
V_3	20	32	32	84	28.00
Sub-total	110	122	107	339	33.67
F_4					
V_1	78	70	58	156	52.00
V_2	40	24	32	96	32.00
V_3	40	32	24	96	32.00
	158	126	114	348	38.67
F_5					
V_1	76	64	81	221	73.67
V_2	48	56	38	132	44.00
V_3	36	28	44	108	36.00
Sub-total	160	148	163	461	51.22
Total	716	695	647	1998	665.99

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	38.67	55.33	47.33	54.33	52	73.67	321.33	53.56
GRANOLA	16.67	29.33	21.33	30.67	32	44	174.00	29.00
RANIAG	25.33	28	21.33	28	32	36	170.66	28.44
TOTAL	80.67	112.66	89.99	113.00	116.00	153.67	665.99	
MEAN	26.89	37.55	30.00	37.67	38.67	51.22		37.00

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	210.111	105.056			
Factor A	5	3213.333	642.667	4.98*	3.33	5.64
Error	10	1289.222	128.922			
Factor B	2	7403.111	3701.556	42.79**	4.10	7.56
AB	10	534.222	53.422	0.61ns	2.26	3.17
Error	24	2076.000	86.500			
TOTAL	53	14726.000				

* = Significant — Coefficient of variation = 30.68%

** = Highly significant — Coefficient of variation = 25.14%

ns = Not significant

Appendix Table 12. Number of non-marketable tubers per plotof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	102	85	89	276	92.00
V_2	92	76	72	240	80.00
V_3	48	54	36	138	46.00
Sub-total	242	215	197	654	72.67
F_1					
V_1	94	92	76	262	87.33
V_2	98	58	80	236	78.67
V_3	40	34	50	124	41.33
Sub-total	232	184	206	622	69.11
F_2					
V_1	78	90	88	256	85.33
V_2	68	86	90	244	81.33
V_3	46	62	68	176	58.67
Sub-total	192	238	249	676	75.11
F_3					
V_1	85	72	79	236	78.67
V_2	54	48	58	160	53.33
V_3	56	38	42	136	45.33
Sub-total	195	158	179	532	59.11
F_4					
V_1	63	55	59	177	59.00
V_2	50	62	37	149	49.67
V_3	38	49	44	131	43.67
	151	166	140	457	50.78
F_5					
V_1	54	39	47	140	46.67
V_2	38	64	52	154	51.33
V_3	36	44	36	116	38.67
Sub-total	128	147	135	410	45.56
Total	1140	1108	1103	3351	1117

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	92	87.33	85.33	85.33	59	46.67	455.66	75.94
GRANOLA	80	78.67	81.33	81.33	49.67	51.33	422.33	70.39
RANIAG	46	41.33	58.67	58.67	43.67	38.67	287.01	47.84
TOTAL	218.00	207.33	225.33	225.33	152.34	136.67	1165.00	
MEAN	72.67	69.11	75.11	75.11	50.78	45.56		64.72

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	44.778	22.389			
Factor A	5	6668.389	1333.678	8.06**	3.33	5.64
Error	10	1653.000	165.300			
Factor B	2	8048.444	4024.222	53.37**	4.10	7.56
AB	10	2614.667	261.267	3.47*	2.26	3.17
Error	24	1809.556	75.398			
TOTAL	53	20838.833				

** = Highly significant — Coefficient of variation = 20.71%

ns = Not significant — Coefficient of variation = 13.98%

Appendix Table 13. Weight of marketable tubers per plotof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	2.40	2.20	1.50	6.1	2.03
V_2	0.40	0.60	0.40	1.4	0.46
V_3	0.60	0.40	0.40	1.4	0.46
Sub-total	3.40	3.20	2.30	8.9	0.98
F_1					
V_1	2.70	2.70	3.00	8.4	2.8
V_2	1.00	1.20	0.80	3	1
V_3	0.80	0.80	0.40	2	0.67
Sub-total	4.50	4.70	4.20	13.4	1.48
F_2					
V_1	2.80	2.40	2.50	7.7	2.57
V_2	1.00	0.80	0.60	2.4	0.8
V_3	0.60	0.60	0.40	1.6	0.53
Sub-total	4.40	3.80	3.50	11.7	1.3
F_3					
V_1	2.50	2.25	2.00	6.75	2.25
V_2	1.20	1.60	0.60	3.4	1.13
V_3	0.40	0.60	0.60	1.6	0.53
Sub-total	4.10	4.45	3.20	11.75	1.31
F_4					
V_1	3.40	3.20	3.00	9.6	3.2
V_2	1.40	0.80	0.80	3	1
V_3	0.70	0.60	0.40	1.7	0.57
	4.50	4.60	4.20	13.3	4.43
F_5					
V_1	3.25	3.00	4.28	10.53	3.51
V_2	1.60	1.60	1.20	4.4	1.47
V_3	0.60	0.40	0.80	1.8	0.6
Sub-total	4.45	4.00	5.28	13.73	1.52
Total	27.35	25.75	23.68	76.78	25.58

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	2.03	2.8	2.57	2.25	3.2	3.51	16.36	2.73
GRANOLA	0.46	1	0.8	1.13	1	1.47	5.86	0.98
RANIAG	0.46	0.67	0.53	0.53	0.57	0.6	3.36	0.56
TOTAL	2.95	4.47	3.90	3.91	4.77	5.58	25.58	
MEAN	0.98	1.49	1.30	1.30	1.59	1.86		1.42

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	44.778	22.389			
Factor A	5	15112.611	3022.522	38.81**	3.33	5.64
Error	10	778.778	77.878			
Factor B	2	398.111	199.056	1.78ns	4.10	7.56
AB	10	1820.778	182.078	1.62ns	2.26	3.17
Error	24	2683.778	111.824			
TOTAL	53	20838.833				

** = Highly significant
ns = Not significant

Coefficient of variation = 14.22%
Coefficient of variation = 17.04%

Appendix Table 14. Weight of non-marketable tubers per plotof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	1.20	1.00	1.50	6.10	2.03
V_2	0.70	0.50	0.50	1.40	0.47
V_3	0.20	0.30	0.30	1.40	0.47
Sub-total	2.10	1.80	2.30	8.90	0.99
F_1					
V_1	0.80	0.50	0.50	8.40	2.80
V_2	0.50	0.40	0.70	3.00	1.00
V_3	0.30	0.20	0.30	2.00	0.67
Sub-total	1.60	1.10	1.50	13.40	1.49
F_2					
V_1	0.75	0.80	0.90	7.70	2.57
V_2	0.40	0.30	0.70	2.40	0.80
V_3	0.20	0.30	0.30	1.60	0.53
Sub-total	1.35	1.40	1.90	11.70	1.30
F_3					
V_1	0.90	1.00	0.75	6.75	2.25
V_2	0.30	0.40	0.30	3.40	1.13
V_3	0.40	0.30	0.30	1.60	0.53
Sub-total	1.60	1.70	1.35	11.75	1.31
F_4					
V_1	0.50	0.65	0.50	9.60	3.20
V_2	0.20	0.40	0.30	3.10	1.20
V_3	0.30	0.30	0.30	1.70	1.03
	1.00	1.35	1.10	14.40	1.60
F_5					
V_1	0.50	0.50	0.75	10.53	3.51
V_2	0.30	0.20	0.20	4.40	1.47
V_3	0.30	0.20	0.20	1.80	0.60
Sub-total	1.10	1.20	1.15	16.73	1.86
Total	8.75	8.25	9.3	76.88	26.26

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	2.03	2.8	2.57	2.25	3.2	3.51	16.36	2.73
GRANOLA	0.47	1	0.8	1.13	1.2	1.47	6.07	1.01
RANIAG	0.47	0.67	0.53	0.53	1.03	0.6	3.83	0.64
TOTAL	2.97	4.47	3.90	3.91	5.43	5.58	26.26	
MEAN	0.99	1.49	1.30	1.30	1.81	1.86		1.46

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	0.355	0.178			
Factor A	5	3.987	0.797	9.12**	3.33	5.64
Error	10	0.874	0.087			
Factor B	2	47.443	23.721	314.62**	4.10	7.56
AB	10	2.490	0.249	3.30*	2.26	3.17
Error	24	1.810	0.075			
TOTAL	53	56.959				

** = Highly significant — Coefficient of variation = 20.71%

* = Significant — Coefficient of variation = 19.29%

Appendix Table 15. Total yield per plotof three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	3.60	3.20	3.00	9.80	3.27
V_2	1.10	1.10	0.90	3.10	1.03
V_3	0.80	0.70	0.70	2.20	0.73
Sub-total	5.50	4.00	4.60	15.10	1.68
F_1					
V_1	3.50	3.20	3.50	10.20	3.40
V_2	1.50	1.60	1.50	4.60	1.53
V_3	1.10	1.00	0.70	2.80	0.93
Sub-total	6.10	5.80	5.70	17.60	1.96
F_2					
V_1	3.55	3.20	3.40	10.15	3.38
V_2	1.40	1.10	1.30	3.80	1.27
V_3	0.80	0.90	0.80	2.50	0.83
Sub-total	5.75	5.20	5.50	16.45	1.83
F_3					
V_1	3.40	3.25	3.75	10.40	3.47
V_2	1.50	2.00	0.60	4.10	1.37
V_3	0.80	0.90	0.90	2.60	0.87
Sub-total	5.70	6.25	4.25	17.10	1.90
F_4					
V_1	4.30	3.70	3.50	11.50	3.83
V_2	1.60	1.20	1.10	3.90	1.30
V_3	1.00	0.90	0.70	2.60	0.87
	6.90	5.80	5.30	18.00	2.00
F_5					
V_1	3.75	3.50	5.03	12.28	4.09
V_2	1.90	2.00	1.40	5.30	1.76
V_3	0.90	0.70	1.00	2.60	0.87
Sub-total	6.55	6.20	7.43	20.00	2.24
Total	36.5	34.15	33.78	104.43	34.8

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	3.27	3.4	3.38	3.47	3.83	4.09	21.44	3.57
GRANOLA	1.03	1.53	1.27	1.37	1.3	1.76	8.26	1.38
RANIAG	0.73	0.93	0.83	0.87	0.87	0.87	5.10	0.85
TOTAL	5.03	5.86	5.48	5.71	6.00	6.72	34.80	
MEAN	1.68	1.95	1.83	1.90	2.00	2.24		1.93

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	0.242	0.121			
Factor A	5	0.601	0.320	3.89*	3.33	5.64
Error	10	0.823	0.082			
Factor B	2	75.129	37.565	333.60**	4.10	7.56
AB	10	0.930	0.093	0.82ns	2.26	3.17
Error	24	2.702	0.113			
TOTAL	53	81.427				

* = Significant
** = Highly significant
ns = Not significant

Coefficient of variation = 14.80%
Coefficient of variation = 17.35%

Appendix Table 16. Computed yield (ton/ha)of three potato varieties applied with organic fertilizers

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
F_0					
V_1	7.20	6.40	6.00	19.60	6.53
V_2	2.20	2.20	1.80	6.20	2.07
V_3	1.60	1.40	1.40	4.58	1.27
Sub-total	11.00	10.00	9.20	30.38	3.38
F_1					
V_1	7.00	6.40	7.00	20.40	6.80
V_2	3.00	3.20	3.00	9.20	3.07
V_3	2.20	2.00	1.40	5.60	1.87
Sub-total	12.20	11.60	11.40	35.38	3.91
F_2					
V_1	7.10	6.40	6.80	20.30	6.76
V_2	2.80	2.20	2.60	7.60	2.53
V_3	1.60	1.80	1.60	5.00	1.67
Sub-total	11.50	10.40	11.00	32.90	3.66
F_3					
V_1	6.80	6.50	7.50	20.80	6.93
V_2	3.00	4.00	1.20	8.20	2.73
V_3	1.60	1.80	1.80	5.20	1.73
Sub-total	11.40	12.30	10.50	34.20	3.80
F_4					
V_1	8.60	7.40	7.00	23.00	7.67
V_2	3.20	2.40	2.20	7.80	2.60
V_3	2.00	1.80	1.40	5.20	1.73
Sub-total	13.80	11.60	10.60	36.00	4.00
F_5					
V_1	7.50	7.00	10.06	24.56	8.19
V_2	3.80	4.00	2.80	10.60	3.53
V_3	1.80	1.40	2.00	5.20	1.73
Sub-total	13.10	12.40	14.86	40.36	4.48

TWO-WAY TABLE

TREATMENT	ORGANIC FERTILIZER						TOTAL	MEAN
	F0	F1	F2	F3	F4	F5		
P03	6.53	6.8	6.76	6.93	7.67	8.19	42.88	7.15
GRANOLA	2.07	3.07	2.53	2.73	2.6	3.53	16.53	2.76
RANIAG	1.27	1.87	1.67	1.73	1.73	1.73	10.00	1.67
TOTAL	9.87	11.74	10.96	11.39	12.00	13.45	69.41	
MEAN	3.29	3.91	3.65	3.80	4.00	4.48		3.86

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE	F VALUE	TABULAR F	
					.05	.01
Replication	2	0.924	0.471			
Factor A	5	6.223	1.245	3.75^{*}	3.33	5.64
Error	10	3.315	0.331	332.72^{**}		
Factor B	2	299.725	149.863	0.84^{ns}	4.10	7.56
AB	10	3.828	0.383		2.26	3.17
Error	24	10.810	0.450			
TOTAL	53					

* = Significant Coefficient of variation = 14.86%

** = Highlysignificant Coefficient of variation = 17.34%