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ABSTRACT

This study was conducted in green house condition at Balite, Long-long, La Trinidad Benguet from November 2007 to January 2008 to evaluate the growth and yield performance of Romaine 'Xanadu' applied with different rates of liquid compost fertilizer, determine the best rates of liquid compost fertilizer for Romaine and determine the level of profitability using the different rates of liquid compost fertilizer for romaine production that will give the highest profit.

Result of the study showed that all rates; 1 liter, 2 liter, 3 liter, 4 liter diluted in a 200 liters of water and drench applied seven days interval to romaine did not significantly differ from the rest of the treatments, control and farmers practice. Nevertheless the romaine applied with chicken dung as basal fertilizer and side dressing of complete fertilizer during hilling-up produced the highest Return on Investment (ROI) of 65.65% or Php 66 for every peso spent in the production., followed by 4 liter with 25.59% or 26 cents ROI. In descending order, the two highest return on investment were followed by those applied with 3 liter, 2 liter, 1 liter, control and the pure liquid compost fertilizer applied with their respective ROI 16.40%, 16.40%, 16.05, 13.81%, 2.09% and -28.72%.

Pure application has negative ROI due to the use of 192 liters of the liquid compost fertilizer.

The different rates of liquid compost fertilizer applied on romaine showed no burning effect. Although it was observed that when pure liquid compost fertilizer was accumulated in the leaves it can produced burning effect.

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INTRODUCTION

Benguet is the number one vegetable producing in the northern Philippines, for which it is the reason the province gained the title “The Capital Salad Bowl of the Philippines” and the economy of the province continues to be predominantly agricultural. At least fifty four percent of its labor population is dependent on agriculture and agricultural activities as a source of income and livelihood and some two-thirds of the provincial population live in rural areas that are directly and indirectly dependent on agro-farming.

Most of the inhabitants of the place are engaged in vegetable farming as a source of income for their daily consumption. It is considered that Benguet has a valley of a league and a half or more in circumference; it is surrounded with springs and forms a basin. The province is also known to be the major supplier of highland vegetables in Luzon. Some major vegetables that are currently being produced and cultivated, with immense fields are cabbage, chinese cabbage, garden pea, snap beans, white potato, carrots, lettuce and celery. The largest share of vegetable area is attributed mainly to the favorable environment conditions, in terms of soil types, climate and topography, and the industry of the people.

With the boom of the vegetable industry, a land use change in the province is very rapid with the expansion of cultivated areas and abandonment of depleted grounds due to uncontrollable soil erosion. The people used to open up and cultivate forest lands without any soil conservation measures thus rendering the land unproductive after several cropping. The soil depleted of its rich and natural humus or organic content is treated with fertilizers using gypsum binders. These fertilizers are not completely used up causing a cumulating effect.

As stated earlier lettuce is one of the vegetables being produced and one kind of lettuce which the farmers like's to plant is the Romaine variety, which is considered a high value crop. The characteristic of this kind of lettuce has long, upright, crisp leaves with a distinctive midrib almost to the tip. The tip of the leaf is blunt. Leaves are somewhat folded (cupped) and grouped into loose heads. The interior leaves are more delicate and blanched than those toward the outside. Tender crisp leaves are used fresh in tossed salads and many other salad dishes because it contains few calories and provides Iron Vitamin C and vitamin A.. Lettuce is one of the important vegetable crops in Benguet, because it requires a short span of days and gives the former high net income. Like all lettuce types, it is a cool season vegetable grown in cooler areas and precisely Benguet is one.

Throughout the past decades, fertilizers have been used extensively on vegetable crops. The leading fertilizer material was the inorganic or chemical one. Organic ones are seldom used. This situation resulted to acidic condition of our soil, decline of soil fertility and proliferation of soil borne diseases, thus decreasing the total yield of crops and severe cases, bankrupts the farmers.

The older method of increasing the organic content of the soil is the use of such fertilizers as manure and compost. The manuring of soil with animal wastes has been practiced for many thousands of years and serves as a source of various complex organic compounds that are important in the growth of plants.

In reality the starter solution practice is not a new thing. Market gardeners of a generation or two ago frequently used liquid manure, made by mixing chicken manure or cow manure with water and then diluting it to the proper strength, in setting out such crops as lettuce, cabbage and tomatoes (Encarta Encyclopedia © 1993-2003 Microsoft Corporation).

This study was conducted to valuate the effect of liquid compost fertilizer on the growth and yield performance of romaine; determine the best rates of liquid compost fertilizer for romaine and to determine the level of profitability using the different rates of liquid compost fertilizer.

This study was conducted from November 2007 to January 2008 at Balite, long-long, La Trinidad, Benguet.

REVIEW OF LITERATURE

Description of the Crop

Tied Jens (1964), stated that lettuce, a smooth annual plant of the Family Composite is extremely for its crisp tender leaves use as salads. Lettuce grown on well lime soil or sandy texture that permits adequate access to oxygen.

The leaves of iceberg lettuce, the crisp, juicy head lettuce that accounts for the bulk of commercially grown lettuce in the United States, curl around its core. Romaine lettuce contains more nutrients than iceberg, but is grown less often commercially because its long, tender leaves damage easily. Leaf lettuce, easiest to grow in the garden, does not form a head, but has free, loose leaves. Some varieties are red. These varieties differ in taste as well as in shape and texture (Encarta Encyclopedia © 1993-2003 Microsoft Corporation.)

Importance of the Crop

According to Ensminger et al. (1986), romaine lettuce is guaranteed to be packed with nutrients. The vitamins and minerals found in romaine lettuce are especially good for the alleviation or preservation of many healthy complaints due its extremely low calories content and high water volume. Romaine lettuce while over cooked in the nutrition world is actually a very nutritious food. Based on its nutrient density, the food ranking system qualified it as an excellent source of vitamin A, C, folute manganese and a good source of dietary fiber. The fiber adds another plus its colism of heart healthy effects.

In the colon, fibers bind to bile salts and remove them from the body. This force the body to make more bile which is helpful because it must breakdown cholesterol. Folic acid (vitamin B) is needed by the body to convert a damaging chemical called homocysteine into another, beneath substance. In addition, romaine lettuce is very good source of potassium, which is useful in lowering high blood pressure.

Soil and Climatic Adaptation

Temperature requirement, Groman (1997) wrote that most kinds of commercial lettuce grow well in 21 and 24 degree Celsius. In contrast, Wallace (1975) mentioned that the optimum high for lettuce is 10 to 15 Celsius which a day temperature of 15 to 20 Celsius. Seeds germinate in 6 to 10 days, can be directly planted.

According to McCollum (1942), lettuce can be grown in a wise variety of soil, including muck and sandy or silty loam prefers a moist but well-drained soil type, rich in organic matter, sandy loam or loam with pH ranging from 6.55 to 7.5.

Effects of Organic Fertilizer

In 1982, Cooke reported that organic fertilizer increased organic content. As a result, soil alkalinity is increased. In addition, simple supply of organic matter helps to keep the soil loose and prevents packing, facilitates digging, cultivation and enables roots of crop to penetrate the soil, readily increases water holding capacity, provides essential nutrients needed for plant growth.

For centuries, the use of farm manure has been synonymous with a successful and stable agriculture. It supplies organic matter and plant nutrients to the soil and generally; farm manure are conserving and protecting (Brady, 1974)

Capuno (1984) as cited by Villamor (2002) stated that using organic material like chicken manure alone or in concentration with inorganic fertilizer promoted a more vigorous growth and enhanced production of more leaves and taller solanaceous crop than those treated with inorganic fertilizer.

Application of compost improves the physiological, chemical and biological condition of the soil besides providing plant nutrients. The humus serves as the colloidal material with negative electric charge and coagulated with cation and form particles to form granules. Soil with more granules is less sticky, high buffering capacity, and has better permeability and greater holding capacity. It is capable of regulating plant growth and disease occurrence (Sangatnan and Sangatnan, 2000).

Fresh Chicken Manure

According to Hermano (2003) non processed chicken are such that they are a) odorous b) salty (EC of 14) hot due to heat emitted during decomposition process into the soil d) introduced pest and the food nutrient are not yet immediately available for plants. The nutrient contents as per report are: N= 1.3-3.6 %, 1.4-7.2 % P and 1.4-1.5 % K. A more detailed composition of 7-9% moisture dried chicken manure according to its chemical contents are: crude protein 24-31 %, true protein 10-23%, non-protein 2.0%, calcium (Ca) 7.8-8.2, phosphorus (P) 2-2.7%, potassium (K) 1.9-2.4 %, amono acids 0.64-0.9 %. The amino acid contents were lysine, Hystidine, Arginine, Aspartic Acid, Theonine, Serine, Glutamic Acid, Glysine, Alanine, valine and Methionine. The 1.8 % to 2% ammonia made the manure odorous while the high protein contents manure.

As stated by Gil Garandang (2006) any kind of animal manure can likewise be used. It is however ideal to use chicken manure because of its more potent ingredients as far as macro nutrients like nitrogen, phosphorous, potassium and calcium, not to mention its good source of micro nutrients.

Sunflower

According to Pandosen (1986), wild sunflower has been known to be a good source of organic nitrogen. Fresh sunflower contains 3.76% nitrogen and wild sunflower based compost contains 3.22% nitrogen.

Another research conducted by Palaleo (1978), found that sunflower compost have the following compositions; 0.38% nitrogen, 96.6ppm phosphorus, 6567.5ppm potassium, 7.69% organic matter content, 3206 calcium content, 70.16 CEC mic. per 100 gram compost and have pH of 6.8.

According to Adchak (1993), application of 60 kg N/ha in combination with 15 tons chopped fresh wild sunflower improved the growth and yield of cabbage plants. Likewise, it improved the physical and chemical properties of the soil.

Crude Sugar (Mollasses)

In the United States, where compost tea is getting popular in organic agriculture, compost is made into tea, sugar or molasses are added, fermented to increase microbial population. If you ferment the same materials by adding sugar or molasses, it is easily broken down (biologically) by microorganisms and thus making nutrient more available. Microorganisms get their energy from sugar in fermenting the materials (Carandang, 2006).

Liquid Composting or Compost Tea

In reality the starter solution practice is not a new thing. Market gardeners of a generation or two ago frequently used liquid manure, made by mixing chicken manure or cow manure with water and then diluting it to the proper strength, in setting out such crops as lettuce, cabbage and tomatoes (Encarta Encyclopedia © 1993-2003 Microsoft Corporation).

Citation by Duffy, Sarreal, Ravva and Stanker (2004), Compost water extracts (compost teas) are gaining popularity among organic growers, largely because of their disease suppressive activity when applied to foliage or soil. Production methods often include addition of supplemental constituents, particularly molasses, to stimulate plant-beneficial microbial populations.

MATERIALS AND METHODS

Materials

The materials used are romaine seedling, liquid compost fertilizer, pesticide, garden tools and equipment, identifying tags and pegs, measuring instrument and record notes.

Methods

The experiment was laid out fallowing the Randomized Complete Block Design (RCBD) and the treatments will be replicated three times. The treatments was as follows.

Code	Rates of liquid Compost fertilizer in 200 liters of water
T1	1 liter
T2	2 liter
T3	3 liter
T4	4 liter
T5	Pure liquid compost fertilizer
T6	Farmer's Practice
T7	No application of liquid compost fertilizer (control)

Seedling production. Seeds of the romaine "xanadu" was sown on seedling boxes then pricked it after 6 to 7 days in 128 holes tray. Proper care was done in order to produce healthy seedlings. The seedling was transplanted 20 t0 25 days after pricking.

Liquid composting. 20 kgs of fresh chicken manure, 30 kgs chop sunflowers young stems and shoot and 5 kgs of crude sugar (sinacub, molasses or peinang) was prepared and fermented 15 to 20 days in a 200 liter drum. Water was added for the stock solution.

Land preparation. The area was prepared using 21 plots measuring 1m x 5m. The plot was divided into 3 replicate and each replication had 7 plots to represent the 7 treatments. Each plot was applied with one can of processed chicken manure and mixed thoroughly with the soil, except for the farmers practice. The spacing of planting had a distance of 20cm x 25cm before transplanting the seedlings.

Transplanting. 20 to 25 days after pricking, the seedling was transplanted to their assigned plot in 4 rows with a rectangular arrangement at 20 to 25 cm during land preparation. These means that there were 20 seedlings per row or 80 seedlings per plot.

Application of liquid compost fertilizer. Their were four drums (200li) in the experimental area and each liquid compost rates was assigned to a drum. The different rates of liquid compost was placed in each drum and filled with water. The mixture in the drum which is the different rates of liquid compost was used to irrigate the plants and the fertilizer according to the treatments. The application of liquid compost fertilizer was the drench method, every 7 days for 45 days. The liquids compost fertilizer was introduced 5 days after transplanting the seedlings. The recommended rate of 120-100-100kg $N-P_2-O_5-K_2O$ per hectare was applied 2 to 3 weeks after transplanting fallowed by hilling-up.

Hilling-up. This was immediately done after applying the side dressed fertilizer. This was done to cover and to prevent rapid loss of the nitrogen element through volatilization. Also it was effective in controlling the weeds.

Care and maintenance. Irrigation was done every three days from transplanting to a day before harvest. Pest control was done manually but in the case of fungus, fungicide was applied.

Harvesting. Harvesting the plants was done 49 days after transplanting or when the leaves of plants was erect and are copping.

Data to be gathered. The data gathered was computed, tabulated and subjected to separation test using the Duncan's Multiple Range Test (DMRT) was the following.

1. Number of days from transplanting to harvest. This was the number of days from transplanting the seedlings to the day the plant were harvested.

2. Plant height at harvest (cm). 10 sample plants were randomly selected by measuring the leaves from the base of the plant to tip of the leaves at harvest time.

3. Weight of non- marketable yield (kg/plot). This was done by measuring the weight of non-marketable plant with defects such as malformed plants, diseased rotten and plant unfit for the market.

4. Weight of marketable yield (kg/plot). This was the weight of all plants that was sold in the market without defects.

5. Total yield (kg/plot). This was the total weight of marketable and non-marketable plants that was recorded.

6. Weight of individual plant (g). This was taken using the formula:

$$\text{Plant weight (g)} = \frac{\text{Total plant weight/plot}}{\text{Number of harvested plants/plot}}$$

7. Computed yield per hectare (tons). The yield per plot was converted to tons per hectare by multiplying the yield per plot by 2000 then divided by 1000. Two thousand is the number of plot per hectare based on the plot size 1m X 5m used in the study while 1000 is the weight of one ton.

8. Cost and return analysis. All expenses incurred in the study was recorded and the return on investment (ROI) was computed using the formula:

$$ROI\ (\%) = \frac{\text{Gross sales} - \text{total expenses}}{\text{Total expenses}} \times 100$$

9. Phytotoxicity. The plants in each plot was observed if there will be burning effect, discoloration and other abnormalities as an effect of the liquid compost fertilizer applied.

10. Documentations. This was done by means of photographs.

RESULTS AND DISCUSSION

Number of Days from Transplanting Harvest

Table 1 show that there were no significant differences in the number of days from transplanting to harvest among the plants applied with liquid compost fertilizer at different rates, farmers practice and no application of liquid compost fertilizer (control). These means that the duration from transplanting to harvest was not influenced by the different rates used in the study.

Table 1. Number of days from transplanting harvest

TREATMENTS	NUMBER OF DAYS
1 li liquid compost fertilizer diluted in 200 li of water	48.333[a]
2 li liquid compost fertilizer diluted in 200 li of water	48.333[a]
3 li liquid compost fertilizer diluted in 200 li of water	48.333[a]
4 li liquid compost fertilizer diluted in 200 li of water	48.333[a]
Pure liquid compost fertilizer	48.333[a]
Farmer’s Practice	48.333[a]
No application of liquid compost fertilizer (control)	48.000[a]

Means with a common letter are not significantly different at 5% level by DMRT

Plant Height at Harvest (cm)

As presented in table 2, there were no significant differences on the plant applied with the different rates of liquid compost fertilizer. However, the farmers practice of applying chicken dung as basal fertilizer at side dressing of 14-14-14 plus 46-0-0 during hilling-up promoted taller romaine plants at harvest.

Table 2. Plant height at harvest (cm)

TREATMENTS	PLANT HEIGHT (cm)
1 li liquid compost fertilizer diluted in 200 li of water	25.78 [a]
2 li liquid compost fertilizer diluted in 200 li of water	25.38 [a]
3 li liquid compost fertilizer diluted in 200 li of water	25.02 [a]
4 li liquid compost fertilizer diluted in 200 li of water	25.70 [a]
Pure liquid compost fertilizer	25.58 [a]
Farmer's Practice	26.12 [a]
No application of liquid compost fertilizer (control)	25.53 [a]

Means with a common letter are not significantly different at 5% level by DMRT

<u>Weight of Non-marketable Yield</u>

There were no significant differences indicated in the non-marketable yield of romaine applied with the different rates of liquid compost fertilizer, control and farmers practice as shown in table 3. This means that the different treatments did not influence the weight of non-marketable romaine produced at harvest.

Table 3. Weight of non-marketable yield

TREATMENTS	MARKETABLE YIELD (Kg)
1 li liquid compost fertilizer diluted in 200 li of water	0.93 [a]
2 li liquid compost fertilizer diluted in 200 li of water	1.38 [a]
3 li liquid compost fertilizer diluted in 200 li of water	0.95 [a]
4 li liquid compost fertilizer diluted in 200 li of water	1.25 [a]
Pure liquid compost fertilizer	1.30 [a]
Farmer's Practice	1.77 [a]
No application of liquid compost fertilizer (control)	1.65 [a]

Means with a common letter are not significantly different at 5% level by DMRT

Weight of Marketable Yield

Table 4 shows that the application of chicken dung as basal fertilizer at side dressing of 14-14-14 plus 16-0-0 during hilling-up produced the heaviest mean of marketable yield but did not significantly differ from the rest of the treatment means. The result maybe explained by the other data gathered where there were no significant differences on the weight of individual plant, plant height at harvest, non-marketable yield and total yield.

Table 4. Weight of marketable yield

TREATMENTS	MARKETABLE YIELD (Kg)
1 li liquid compost fertilizer diluted in 200 li of water	8.07 [a]
2 li liquid compost fertilizer diluted in 200 li of water	8.40 [a]
3 li liquid compost fertilizer diluted in 200 li of water	8.60 [a]
4 li liquid compost fertilizer diluted in 200 li of water	9.47[a]
Pure liquid compost fertilizer	8.37[a]
Farmer's Practice	10.05[a]
No application of liquid compost fertilizer (control)	7.08[a]

Means with a common letter are not significantly different at 5% level by DMRT

Total yield

The total yield from the different treatments did not indicate significant differences among the treatment means (Table 5). As mentioned earlier, the results in weight of individual plant, plant height at harvest, non-marketable yield and total yield where there were no significant differences in all the treatment means.

Table 5. Total yield

TREATMENTS	TOTAL YIELD (Kg)
1 li liquid compost fertilizer diluted in 200 li of water	9.00 [a]
2 li liquid compost fertilizer diluted in 200 li of water	9.78[a]
3 li liquid compost fertilizer diluted in 200 li of water	9.55[a]
4 li liquid compost fertilizer diluted in 200 li of water	10.72[a]
Pure liquid compost fertilizer	9.67[a]
Farmer's Practice	11.48[a]
No application of liquid compost fertilizer (control)	8.73[a]

Means with a common letter are not significantly different at 5% level by DMRT

Weight of Individual Plants

Although the statistical analysis indicated no significant differences among the treatments in terms of the weight of individual plants, the farmers practice had the heaviest weight per plant closely: followed by the 4 liter of liquid compost fertilizer in 200 liter of water (Table 6). Statistically, it might not be significant but economically the slightly heavier plant may give significant advantage in a hectare basis.

Computed Yield per Hectare

The computed yield per hectare (tons) emphasis that there were no significant differences among the seven treatments. However the farmers practice of applying chicken dung as basal fertilizer at side dressing of 14-14-14 plus 46-0-0 during hilling-up promoted higher yield per hectare at harvest (Table 7).

Table 6. Weight of individual plants

TREATMENTS	WEIGHT (Kg)
1 li liquid compost fertilizer diluted in 200 li of water	117 [a]
2 li liquid compost fertilizer diluted in 200 li of water	126[a]
3 li liquid compost fertilizer diluted in 200 li of water	118[a]
4 li liquid compost fertilizer diluted in 200 li of water	138[a]
Pure liquid compost fertilizer	125[a]
Farmer's Practice	149[a]
No application of liquid compost fertilizer (control)	114[a]

Means with a common letter are not significantly different at 5% level by DMRT

Table 7. Computed yield per hectare

TREATMENTS	YIELD PER HECTARE (tons)
1 li liquid compost fertilizer diluted in 200 li of water	117 [a]
2 li liquid compost fertilizer diluted in 200 li of water	126[a]
3 li liquid compost fertilizer diluted in 200 li of water	118[a]
4 li liquid compost fertilizer diluted in 200 li of water	138[a]
Pure liquid compost fertilizer	125[a]
Farmer's Practice	149[a]
No application of liquid compost fertilizer (control)	114[a]

Means with a common letter are not significantly different at 5% level by DMRT

Table 7. Cost and return analysis from a 15 square meter area

ITEM	APPLICATION OF FERTILIZER RATES						
	1 li	2 li	3 li	4 li	pure	Farmers Practice	Control
Yield (Kg)	24.2	25.2	25.8	28.4	25.1	30.15	21.25
Sales (Php)	363	378	387	426	376.5	452.25	318.75
Farm inputs							
Seeds	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Chicken manure	-	-	-	-	-	70	-
PCM	127.5	127.5	127.5	127.5	127.5	-	127.5
Quire dust	12.66	12.66	12.66	12.66	12.66	12.66	12.66
14-14-14	-	-	-	-	-	24.11	-
46-0-0	-	-	-	-	-	1.42	-
Liquid compost fertilizer	6.75	13.5	20.25	27	216	-	-
Dithane	20	20	20	20	20	20	20
Labor							
Sowing seeds	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Pricking	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Land preparation	38.57	38.57	38.57	38.57	38.57	38.57	38.57
Hilling-up	-	-	-	-	-	16.875	-
Transplanting	12.86	12.86	12.86	12.86	12.86	12.86	12.86
Irrigation	45	45	45	45	45	45	45
Applying fertilizer	24.10	24.10	24.10	24.10	24.10	-	-
Spraying	5.36	5.36	5.36	5.36	5.36	5.36	5.36
Expenses (Php)	318.96	325.71	332.46	339.21	528.21	273.02	312.21
Net/loss (Php)	44.04	52.29	54.54	86.79	-151.71	179.23	6.54
ROI %	13.81	16.05	16.40	25.59	-28.72	65.65	2.09

Note: selling price per kilo of marketable romaine was Php 15.00/Kg

Cost and Return Analysis

The different rates of fertilizer application on romaine produced different total yield and different level of inputs, which resulted to the differences in the net income and return on investment a (Table 8). The farmers practice obtained the highest return on investment of 65.65% or 56 cents for every peso invested in the production. It was followed by the application of 4 liter of liquid compost fertilizer per 200liter of water with 25.59% or 25 cents ROI. In descending order, the two highest return on investment were followed by those applied with 3 liter, 2 liter, 1 liter, control and the pure liquid compost fertilizer applied with their respective ROI 16.40, 16.05, 13.81, 2.09 and -28.72. Pure application has negative ROI due to the used of 192 liters of the liquid compost fertilizer.

Phytotoxicity

The different rates of liquid compost fertilizer applied on romaine showed no burning effect. Although it was observed that during pure liquid compost fertilizer was accumulated in the leaves it can produced burning effect.

Fig. 1. Overview of the experiment area, liquid compost fertilizer and pegs

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

This study was conducted in green house condition at Balite, Long-long, La Trinidad Benguet from November 2007 to January 2008 to evaluate the growth and yield performance of Romaine 'Xanadu' applied with different rates of liquid compost fertilizer, determine the best rates of liquid compost fertilizer for Romaine and determine the level of profitability using the different rates of liquid compost fertilizer for romaine production that will give the highest profit.

Result of the study showed that all rates; 1 liter, 2 liter, 3 liter, 4 liter diluted in a 200 liters of water and drench applied seven days interval to romaine did not significantly differ from the rest of the treatments, control and farmers practice. Nevertheless the romaine applied with chicken dung as basal fertilizer and side dressing of complete fertilizer during hilling-up produced the highest Return on Investment (ROI) of 65.65% or Php 66 for every peso spent in the production., followed by 4 liter with 25.59% or 26 cents Return on investment. In descending order, the two highest return on investment were followed by those applied with 3 liter, 2 liter, 1 liter, control and the pure liquid compost fertilizer applied with their respective ROI 16.40%, 16.40%, 16.05, 13.81%, 2.09% and -28.72%. Pure application has negative return on investment due to the use of 192 liters of the liquid compost fertilizer.

The different rates of liquid compost fertilizer applied on romaine showed no burning effect. Although it was observed that when pure liquid compost fertilizer was accumulated in the leaves it can produced burning effect.

Conclusion

Based from the experiment and above data, the application of liquid compost fertilizer on romaine which compose of 20 kgs chicken manure, 30 kgs shop sunflower leaves, 5 kgs crude sugar and fermented in a 200 liters of water did not influence the growth and yield. Therefore it was concluded that liquid compost fertilizer with this concentration is not essential in growing romaine lettuce.

Recommendation

It is therefore recommended, that liquid compost fertilizer with this concentration is not necessary in growing romaine, however it is further recommended that the amount of chicken dung and shop sunflower leaves will be increase to have essential effect on the growth in yield of romaine lettuce.

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APPENDICES

Appendix Table 1. Number of days from transplanting to harvest

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
T_1	49	48	48	145	48.333
T_2	49	48	48	145	48.333
T_3	49	48	48	145	48.333
T_4	49	48	48	145	48.333
T_5	49	48	48	145	48.333
T_6	49	48	48	145	48.333
T_7	48	48	48	144	48.000

ANALYSIS OF VARIANCE

Source of Variation	Degrees of freedom	Sum of squires	Mean squire	Computed F	TABULAR F	
					0.05	0.01
Replication	2	3.429	1.714			
Treatment	6	0.286	0.048	1.00ns	3.00	4.82
Error	12	0.571	0.048			
Total	20	4.286				

ns = not significant

Coefficient of Variation = 0.45%

Appendix Table 2. Plant height at harvest (cm)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
T_1	25.75	26.9	24.7	77.35	25.78
T_2	25.15	25.45	25.55	76.15	25.38
T_3	25.8	24.6	24.65	75.05	25.02
T_4	25.45	25.6	26.05	77.1	25.7
T_5	24.39	26.05	26.3	76.74	25.58
T_6	25.85	27.25	25.25	78.35	26.12
T_7	24.85	25.7	26.05	76.6	25.53

ANALYSIS OF VARIANCE

Source of Variation	Degrees of freedom	Sum of squires	Mean squire	Computed F	TABULAR F	
					0.05	0.01
Replication	2	72.614	36.307			
Treatment	6	255.226	42.538	1.03ns	3.00	4.82
Error	12	494.944	41.245			
Total	20	822.785				

ns = not significant   Coefficient of Variation = 23.76%

Appendix Table 3. Weight of marketable yield (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
T_1	.5	1.2	1.1	2.8	0.93
T_2	1.25	1.5	1.4	4.15	1.38
T_3	.5	1.1	1.25	2.85	0.95
T_4	.5	1.75	1.50	3.75	1.25
T_5	.6	1.6	1.7	3.9	1.3
T_6	1.6	1.2	2.5	5.3	1.77
T_7	2.25	1.2	1.5	4.95	1.65

ANALYSIS OF VARIANCE

Source of Variation	Degrees of freedom	Sum of squires	Mean squire	Computed F	TABULAR F	
					0.05	0.01
Replication	2	1.026	0.513			
Treatment	6	1.812	0.302	1.35ns	3.00	4.82
Error	12	2.694	0.225			
Total	20	5.532				

ns = not significant

Coefficient of Variation = 35.92%

Appendix Table 4. Weight of marketable yield (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
T_1	8	10	6.2	24.2	8.07
T_2	9	11.1	5.1	25.2	8.4
T_3	10.5	7.8	7.5	25.8	8.6
T_4	9.4	10.25	8.75	28.4	9.47
T_5	8.8	8	8.3	25.1	8.37
T_6	9.2	12	8.95	30.15	10.05
T_7	7.25	7.6	6.4	21.25	7.08

ANALYSIS OF VARIANCE

Source of Variation	Degrees of freedom	Sum of squires	Mean squire	Computed F	TABULAR F	
					0.05	0.01
Replication	2	18.232	9.116			
Treatment	6	16.586	2.764	1.58ns	3.00	4.82
Error	12	20.950	1.746			
Total	20	55.950				

ns = not significant

Coefficient of Variation = 15.41%

Appendix Table 5. Total yield (kg)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
T_1	8.5	11.2	7.3	27	9
T_2	10.25	12.6	6.5	29.35	9.78
T_3	11	8.9	8.75	28.65	9.55
T_4	9.9	12	10.25	32.15	10.72
T_5	9.4	9.6	10	29	9.67
T_6	10.8	13.2	10.45	34.45	11.48
T_7	9.5	8.8	7.9	26.2	8.73

ANALYSIS OF VARIANCE

Source of Variation	Degrees of freedom	Sum of squires	Mean squire	Computed F	TABULAR F	
					0.05	0.01
Replication	2	16.432	8.216			
Treatment	6	16.549	2.758	1.5ns	3.00	4.82
Error	12	22.132	1.844			
Total	20	55.112				

ns = not significant

Coefficient of Variation = 13.79%

Appendix Table 6. Weight of individual plants (g)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
T_1	113	144	95	352	117
T_2	131	161	87	379	126
T_3	144	122	112	352	118
T_4	125	156	133	414	138
T_5	121	123	132	376	125
T_6	138	171	139	448	149
T_7	128	111	104	343	114

ANALYSIS OF VARIANCE

Source of Variation	Degrees of freedom	Sum of squires	Mean squire	Computed F	TABULAR F	
					0.05	0.01
Replication	2	2473.524	1236.762			
Treatment	6	2608.476	434.746	1.43ns	3.00	4.82
Error	12	3657.810	304.817			
Total	20	8739.810				

ns = not significant

Coefficient of Variation = 13.63%

Appendix Table 7. Computed yield per hectare (tons)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
T_1	17	22.4	14.6	54	18
T_2	20.5	25.2	13	58.7	19.57
T_3	22	17.7	17.5	57.2	19.07
T_4	19.8	24	20.5	64.3	21.43
T_5	18.8	19.2	20	58	19.33
T_6	21.6	24.6	20.9	67.1	22.37
T_7	19	17.6	15.8	52.4	17.47

ANALYSIS OF VARIANCE

Source of Variation	Degrees of freedom	Sum of squires	Mean squire	Computed F	TABULAR F	
					0.05	0.01
Replication	2	58.072	29.036			
Treatment	6	55.450	9.242	1.29ns	3.00	4.82
Error	12	86.248	7.187			
Total	20	8739.810				

ns = not significant

Coefficient of Variation = 13.67%