BIBLIOGRAPHY

LOPEZ, CHARLIE G. APRIL 2011. Growth and Flowering of Rose Cv. *Grand Gala* as Affected by Different Kinds and Rates of Organic Fertilizer. Benguet State University, La Trinidad, Benguet.

Adviser: Araceli G. Ladilad, Phd.

ABSTRACT

The study was conducted at the Ornamental Horticulture Research Area at Benguet State University, La Trinidad, Benguet from June to October 2010 to determine the growth and flowering of rose as affected by different kinds and rates of organic fertilizers cv. Grand Gala.

Results showed that there were significant interaction effects between the kind of organic fertilizer and rate of application on the final height at flowering duration from pruning to flower-bud formation, flower bud development, and cutflower stem length. Rose plants applied with plantmate and green vermicompost at 10 tons/ha had the tallest plants, had the earliest durations from planting to flower bud formation; were the earliest plants to reach flower-bud formation from pruning date, had the shortest days from flower bud formation to calyx flex stage, and had the longest cutflower stems at harvest. There were no significant interaction effect between the kind of fertilizer and rate of application on the number of flowers produced and vase life of cutflowers.

Cost and return analysis also revealed that a favorable Return on Investments (R.O.I) was also obtained in plants treated with plantmate at 10 tons/ha having the highest R.O.I of 288.74%.

Rose cv. Grand Gala applied with plantmate at the rate of 10 tons/ha had the highest R.O.I of 288.74% compared to the plants applied with chicken manure, alnus compost, horse manure, and green vermicompost with the different rates of fertilizer applications due to the highest number of flowers produced per plant classified as extra long stemmed which had higher price in the market.

Based on the preceding results, it is recommended that 10 tons/ha of plantmate should be applied in rose plants Cv. Grand Gala for cut flower production to increase cut flower yield and produce extra long cut flower grade.

TABLE OF CONTENTS

Page

Bibliography. i

Abstract. i

Table of Contents iii

INTRODUCTION 1

REVIEW OF LITTERATURE 4

MATERIALS AND METHODS 7

DOCUMENTATION OF THE STUDY 9

RESULTS AND DISSCUSSION 11

- Final Height of the Plant at Flowering (cm) 11
- Final Number of Stems per Plant at Flowering 13
- Number of Days from Flower Bud Formation 14
- Days from Flower Bud Formation to Calyx Flex Stage 16
- Number of Flowers Produced per Plant 18
- Stem Length (cm) 18
- Vase Life (days) 21

Occurrence of Insect Pest and Diseases 21

Cost and Return Analysis 22

SUMMARY, CONCLUSION AND RECOMMENDATION 24

- Summary 24
- Conclusion 24
- Recommendation 25

LITTERATURE CITED 26

APPENDICES 27

INTRODUCTION

A rose is a perennial flower shrub or vine of the genus Rosa, within the family Rosaceae that contains over 100 species and comes in a variety of colours. The species from a group of erect shrubs, and climbing or trailing plants, with stems that are often armed with sharp prickles. Most are native to Asia, with smaller numbers of species native to Europe, North America, and northwest Africa. Natives, cultivars and hybrids are all widely grown for their beauty and fragrance.

The leaves are alternate and pinnately compound, with sharply toothed oval-shaped leaflets. The plant's fleshly edible fruit, which ripens in the late summer through autumn, is called a rose hip. Rose plants range in size from compact, miniature roses, to climbers that can reach 7 meters in height. Species from different parts of the world easily hybridize, which has given rise to the many types of garden roses.

The name rose comes from French, itself from Latin, rosa, which was borrowed from Oscan, from Greek rhodion (Aeolic wrodion), from Old Persian wurdi "flower" (cf. Avest. Warda, Sogdian ward, Parthian wâr).

Roses are erect, climbing, or trailing shrubs with stems that are usually copiously armed with prickles of various shapes and sizes that are called thorns. The plant's leaves are alternate and pinnately compound (i.e., feather-formed). The rather oval leaflets are sharply toothed. The rose plant's fleshly, sometimes edible, berrylike "fruit" (actually the floral cup) is known as a hip.

No other flower is so universally known and admired as that of the rose. Its blossoms range in colour from white through various tones of yellow and pink to dark crimson and maroon. Many varieties have been bred with beautiful blends of colour.

Rose flowers' size range from tiny miniatures 1.25 cm (0.5 inch) in diameter to flowers measuring more than 17.5 cm (7 inches) across. Roses have a delightful fragrance, which varies according to the variety and to climatic conditions.

Roses can become infected by a number of diseases, most of them caused by fungi. Powdery mildew appears as a grayish white moldlike growth on the surface of young leaves and stems. Black spot fungus appears as conspicuous black spots on the leaves causes them to fall off. Rust is also a common disease of roses.

Organic fertilizers are derived from organic waste. Organic fertilizers have an advantage over chemical ones because they are renewable. On the other hand, inorganic fertilizers are not renewable and soil fertility gradually declines as a result of their continued application.

Organic fertilizers supply some amount of nutrient requirements of the crop and promote favourable soil properties. Thus, the study will try to find the organic fertilizers that are favourable to the growth and yield of rose.

The study was conducted to:

1. determine the effects of the different kinds and rates of organic fertilizer on the growth, flowering, and yield of rose; and

2. determine the best organic fertilizer/s that will promote vegetative growth, flowering and improve yield in rose.

3. determine the economics of using Plantmate and other organic fertilizers in rose production.

REVIEW OF LITERATURE

Organic Fertilizers

Organic fertilizers are derived from organic waste such as plant residues and animal waste. Organic fertilizers have an advantage over chemical ones because they are renewable, inorganic fertilizers on the other hand are not renewable, and soil fertility gradually declines as a result of their continued application (Balco, 1986).

Marcelino (1995) found out that organic fertilizers supplies same amount of nutrient requirements of the crop and promote favourable soil properties such as granulation, efficient aeration, easy root penetration and more improved water holding capacity of the soil. He also pointed out that farm manure is available to crops because of its nitrogen content and influence on the soil.

Bucu (1991) stated that in general, the kinds of organic materials according to source are crop residues, green manure, swine manure, chicken manure, common compost, used mushroom compost, municipal refuse, residues after oil extraction, and residues from processing animal products.

The most common natural organic fertilizers in the Philippines are chicken manure, hog manure, and sunflower compost, chicken manure is extensively used in Benguet province than any other kind of manure (Bautista, 1983).

Importance of Organic Fertilizers

Alnus compost is abundant in the highlands that can be a perfect organic nitrogen source. It is easy to compost and it hastens decomposition (Pandosen, 1986 as cited by Marcelino (1995). At present, alnus compost has been discovered as a good source of

organic fertilizer; it is also friendly to the environment and also controls some plant disease. In addition, alnus compost is more economical to farmers than inorganic inputs because they can plant trees for the production of their own compost, thus helping in reforestation and restoration of the ozone layer. A study conducted by Dida (1998) reported that population and incidence of black scurf on potato tuber with increasing level of alnus compost applied.

Earlier findings of Mang-osan (1996) on English daisy showed that application of two (2) tons per ha chicken manure significantly produced taller plants, higher sucker count, promoted earlier flower development and produced more flower per plant. It also increased soil pH significantly.

Plantmate Organic Fertilizer

Plant mate organic fertilizer product is the result of an accelerated decomposition of biodegradable materials, both of plant and animal origin, through an advanced biofermentation process involving more than twenty (20) naturally-occurring beneficial microorganisms. To enhance its efficacy as a fertilizer chelated trace elements, enzymes, growth promotants and other compounds were added to fortify the mixture.

Its chemical properties are as follows:

-Total nitrogen	2.44%	-Total magnesium	0.19%
-Total phosphorus	3.74%	-Amino acids – adequate and balance	
-Total potassium	3.61%	-Micronutrients – adequate and balance	
-Total calcium	4.46%		

Green V. Organic Fertilizer

Vermicompost is an organic manure (bio-fertilizer) produced as the vermicast by earthworm feeding on biological waste materials or plant residues. This compost is an odourless, clean, organic material containing adequate quantities of N, P, K and several micronutrients essential for plant growth. Vermicompost is a preffered nutrient source for organic farming. It is eco-friendly, non-toxic, consumes low energy input for composting and is a recycled biological product. Green V is a 100% Vermicast Organic Fertilizer. This is not mixed with compost or chemical elements. This may be directly applied to the soil (basal application) or mixed with compost and resold as mixed organic fertilizer, fortified with vermicast (JAIN Irrigation Systems LTD, 2010).

The study was conducted at the Ornamental Horticulture Research Area at Benguet State University, La Trinidad, Benguet from June to October 2010.

MATERIALS AND METHODS

Materials

The materials used in the study were rose plants (2 year old), garden soil; chicken dung, plantmate, alnus leaves compost, and horse manure, plastic pots and labelling materials.

Method

The study was laid out in a Randomized Complete block design (RCBD) in factorial arrangement with six (6) replications per treatment. Factor A were the kinds of organic fertilizers and factor B were the rates of application.

Factor A– Kind of Organic Fertilizers

T_1- Chicken manure

T_2 - Alnus compost

T_3- Plantmate

T_4- Horse manure

T_5- Green V. (100% pure worm castings)

Factor B- Rate of Application (t/ha)

R_0- control

R_1- 2

R_2- 4

R_3-6

R_4- 8

R_5- 10

Data Gathered

1. Final height of the plant (cm) at flowering. This was taken by measuring the height of the plant at the base of the tip of the flower at 50% anthesis.

2. Final number of stems per plant at flowering. The number of stems per plant was counted for the duration of the study.

3. Number of days from planting to flower bud formation. (1 cm bud size) was obtained by counting the number of days from planting until flower bud formation will be observed.

4. Number of days from flower bud formation to calyx flex stage and at loose bud size (harvesting stage). This was obtained by counting the number of days from planting until flower bud formation to calyx flex stage and at loose bud size.

5. Number of flowers produced per plant. All the fully developed flowers during the duration of the experiment were recorded.

6. Cutflower stem length (cm). This was obtained by measuring the stem length of each cut flower and was classified according to grade classification of roses as follows:

Grade	Stem length (cm)
Short	18-24
Medium	25-32
Long	33-42
Extra long	43-60

7. Vaselife (days). Cut flowers were harvested at 50% anthesis where vase life was obtained under laboratory conditions. Tap water was be used as holding solution.

8. Cost and Return Analysis of the different treatments was taken using the formula: ROI = $\frac{\text{Gross Sale – Total Expenses}}{\text{Total Expenses}} \times 100$

9. Documentation of the study was done through pictures.

Figure 1. Overview of Rose plants at flowering

Figure 2. Overview of Rose plants applied with plantmate organic fertilizer

Figure 3. Overview of Rose applied with horse manure and green vermicompost at 10 tons/ha.

RESULTS AND DISCUSSION

Final Height of the Plant at Flowering

Effect of kind of fertilizer. Table 1 shows the final height of roses at flowering as affected by organic fertilizers. Results revealed that there were highly significant effects of organic fertilizers on the final height of roses at flowering. Specifically, it was revealed that roses applied with green vermicompost were the tallest at flowering followed by roses applied with plantmate organic fertilizer with an average height of 83.39 cm and 83.13 cm, respectively. However, roses applied with chicken manure and alnus leaves compost were the shortest with an average height of 80.01 cm and 79.19 cm at flowering.

Effect of rate of fertilizer application. Result show that roses applied with 10 t/ha of organic fertilizer were significantly taller with an average height of 83.24 cm as compared to the untreated plants. Among the treated plants however, those applied with 2, 4, 6, and 8 tons/ha had comparable plant height means of 81.85, 82.45, 82.59, and 82.55 cm. The untreated plants were the shortest at 75.65 cm which shows that plant nutrition significantly affected the final height of the rose plants.

Interaction effect. Statistical analysis revealed the highly significant effects on the interaction of the different kinds of organic fertilizers and the different rates of application on the final height of roses at flowering (figure 4). Specifically, roses that were applied with plantmate at 10 tons/ha as well as those applied with green vermicompost at 10 tons/ha were the tallest with an average height of 85.33 cm. On the other hand, roses applied with alnus leaves compost only in all rates of application were the shortest with an average height of 74.70 cm.

Table1. Final height at flowering

TREATMENT	MEAN (cm)
Kind of Organic Fertilizer	
Chicken manure	80.02[c]
Alnus compost	79.19[c]
Plantmate	83.13[a]
Horse manure	81.21[b]
Green vermicompost	83.39[a]
Rate of Application (tons/ha)	
0	75.65[d]
2	81.85[c]
4	82.45[b]
6	82.60[b]
8	82.55[b]
10	83.24[a]

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

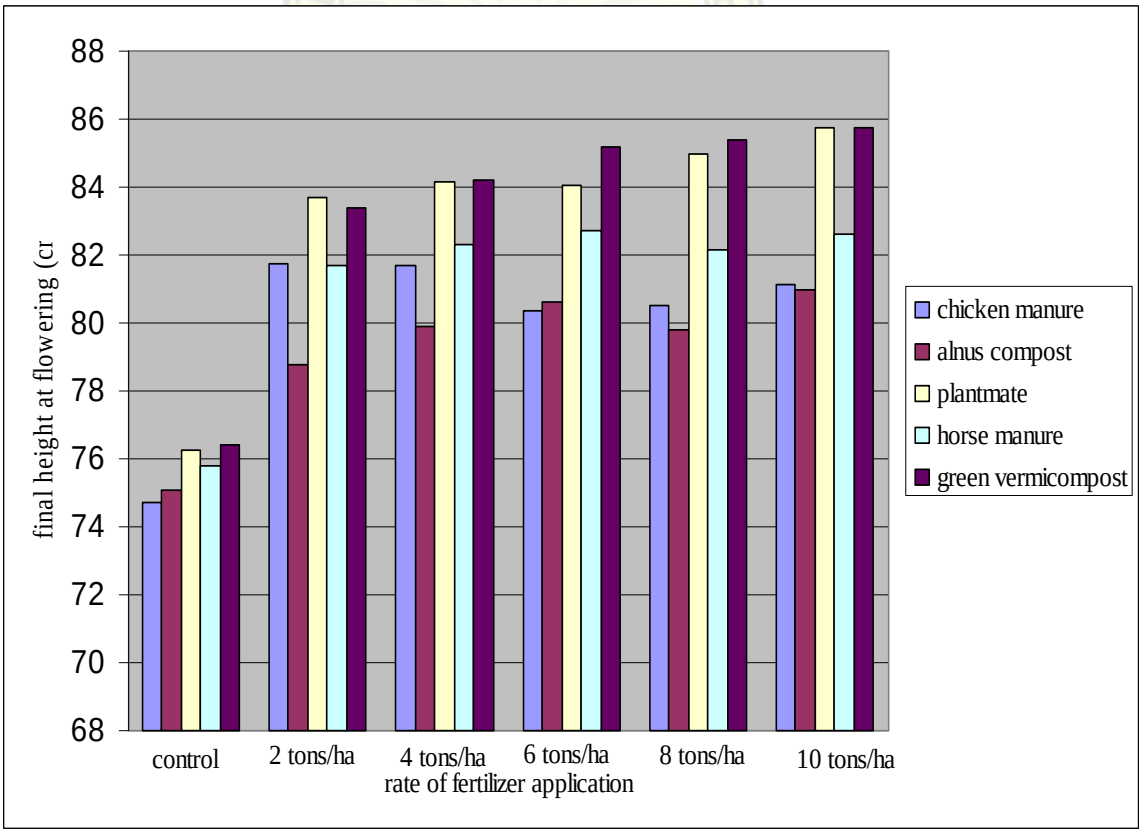

Figure 4.Final height at flowering (cm)

Final Number of Stems at Flowering

Effect of kind of organic fertilizer. The effect of the different kinds of organic fertilizers applied on the number of stems of rose plants at flowering were significant as shown in Table 2. Plants applied with plantmate and green vermicompost had the highest number of stems at flowering, both having a mean of 7.28 stems; while plants applied with alnus leaves compost have the least number of stems counted at flowering with a mean of 6.67 stems per plant.

Effect of rate of fertilizer application. Again, table 2 shows significant differences on the number of stems produced per plant at flowering as affected by the rate of organic fertilizers applied. Plants treated with organic fertilizers at the rate of 6 tons/ha had the highest number of stems wit a mean of 7.53, while untreated plants had the lowest number of stems with a mean of 6.40.

Table 2. Final number of stems at flowering

TREATMENT	MEAN
Kind of Organic Fertilizer	
Chicken manure	7.33[b]
Alnus compost	6.67[c]
Plant mate	7.28[a]
Horse manure	7.33[b]
Green vermicompost	7.28[a]
Rate of Application (t/ha)	
0	6.40[d]
2	7.07[c]
4	7.47[b]
6	7.53[a]
8	7.20[c]
10	7.40[b]

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

Interaction effect. The combined effects of the different kinds and rates of organic fertilizers applied in rose plants used did not significantly affected the number of stems produced per plant at flowering.

Number of Days from Planting to Flower Bud Formation

Effect of kind of organic fertilizer. Significant differences were obtained on the effect of the different kinds of organic fertilizers applied on the number of days from planting to flower bud formation. As shown in Table 3 plants applied with chicken manure, alnus leaves compost, and horse manure had significantly delayed flower bud formation with means of 48.44, 48.61, and 48.5 days; respectively, while plants applied with plantmate and green vermicompost had significantly earlier durations to flower bud formation from pruning date with means of 46.90 and 46.17 days respectively.

Effect of rate of fertilizer application. Table 3 shows significant differences on the effect of the different rates of fertilizers applied in roses on the number of days to flower bud formation from pruning date. Plants applied with 10 tons/ha had the earliest duration to flower bud formation with a mean of 46.87 days, while the untreated plants (contol) took the longest durations to flower bud formation with a mean of 49.88 days from pruning date.

Interaction effect. Statistical analysis revealed highly significant effects on the interaction between the different kinds of organic fertilizers and the different rates of application on the number of days to flower bud formation (figure 5). Plants applied with plantmate and green vermicompost at 10 tons/ha were the earliest to reach flower bud formation with a mean of 45.33 days, while the untreated plants (control) had the longest duration to flower bud formation with a mean of 50.67 days from pruning date.

Table 3. Days from planting to flower-bud formation

TREATMENT	MEAN
Kind of Organic Fertilizer	
Chicken manure	48.44[a]
Alnus compost	48.61[a]
Plant mate	46.89[b]
Horse manure	48.500[a]
Green vermicompost	46.167[a]
Rate of application t/ha	
0	49.87[a]
2	47.53[b]
4	47.40[c]
6	47.13[c]
8	47.53[b]
10	46.87[d]

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

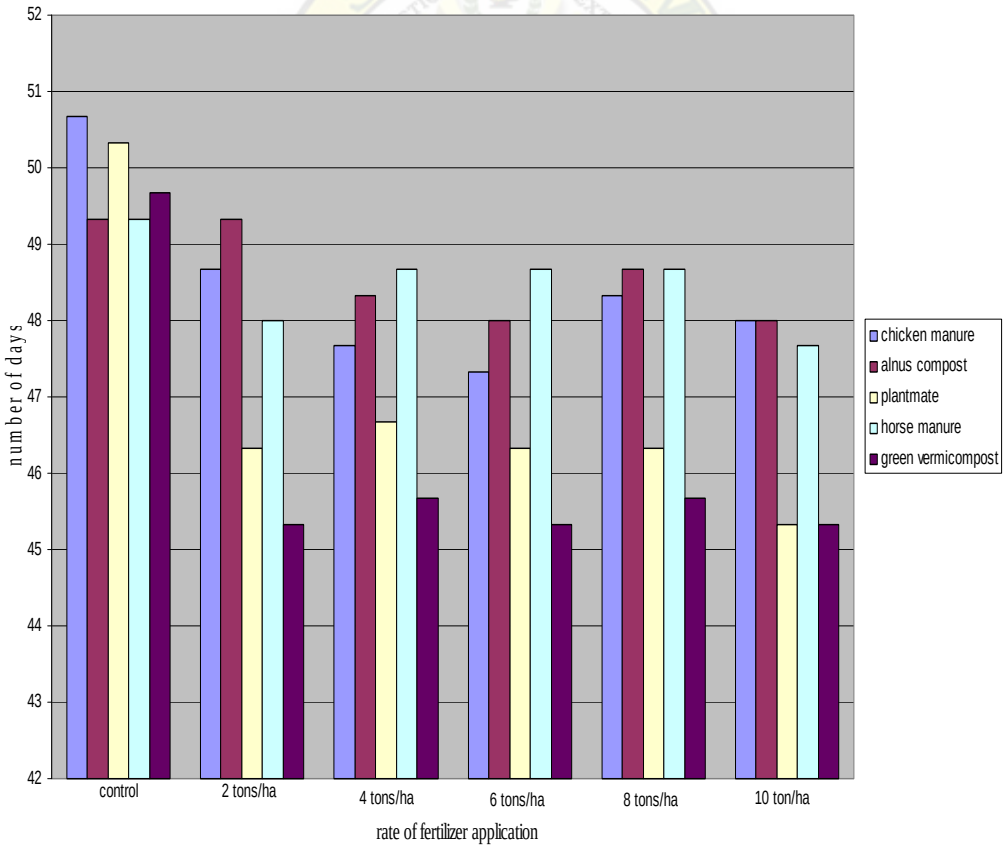

Figure 5. Number of days from planting to flower bud formation

Days from Flower Bud Formation to Calyx Flex Stage

Effect of kind of organic fertilizer. Table 4 shows the numbers of days from flower bud formation to calyx flex stage as affected by organic fertilizers. Results revealed that there were significant effects of the kind of organic fertilizers applied on rose plants on the number of days from flower bud formation to calyx flex stage. It was observed that roses applied with green vermicompost and plantmate had the earliest durations from flower bud formation to calyx flex stage with means of 19.57 and 19.89 days; respectively; while roses applied with chicken manure had the longest durations from flower bud formation to calyx flex stage with a mean of 21.28 days.

Effect of rate of fertilizer application. Table 4 shows significant effects of the different rates of fertilizer application to the number of days from flower bud formation to calyx flex stage. Plants applied with the rate of 10 tons/ha had the fastest flower development with a mean of 19.8 days to calyx flex stage from 0.5 cm bud size. Plants applied with the rate of 2 tons/ha, 4 tons/ha, 6 tons/ha, and 8 tons/ha have showed comparable results with means of 20.79, 20.33, 20.27, and 20.33 days to calyx flex stage; respectively. Untreated plants (control) showed a significant delay in flower development a mean of 21.20 days which was the longest duration from flower bud formation to calyx flex stage.

Interaction effect. Table 4 shows significant interaction effects between the kinds of organic fertilizers and different rates of fertilizer application (Figure 6). Roses applied with plantmate and green vermicompost at 10 tons/ha had the fastest development of flowers from flower bud formation to calyx flex stage with a mean of 18.33 days; while

the unfertilized roses had the longest duration of flower development with a mean of 22.33 days from 1cm bud size.

Table 4. Days from flower bud formation to calyx flex stage

TREATMENT	MEAN
Kind of Organic Fertilizer	
Chicken manure	21.28[a]
Alnus compost	20.78[b]
Plant mate	19.89[c]
Horse manure	20.50[b]
Green vermicompost	19.56[d]
Rate of Application (t/ha)	
0	21.20[a]
2	20.78[b]
4	20.33[b]
6	20.27[b]
8	20.33[b]
10	19.80[c]

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

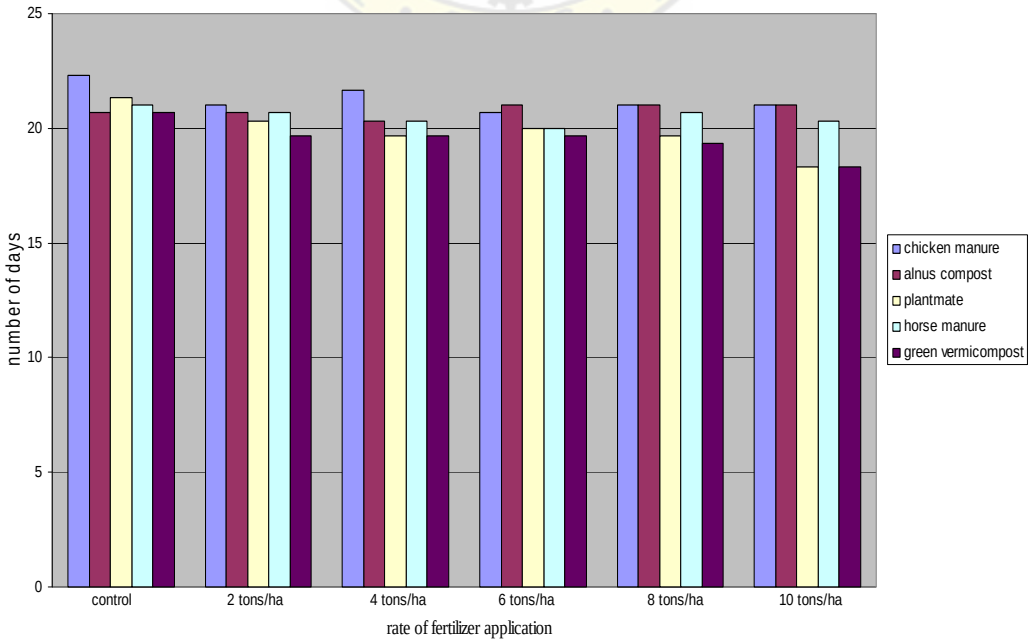

Figure 6. Days from flower bud formation to calyx flex stage

Number of Flowers Produced Per Plant

Effect of kind of organic fertilizer. Significant effects were observed on the number of flowers produced per plant as affected by the different kinds of organic fertilizers. Table 5 shows that plants applied with plantmate had the highest number of flowers with an average of 3.83 flowers per plant for the duration of the study; while plants applied with alnus leaves compost had the least number of flowers with an average of 2.79 flowers produced per plant.

Effect of rate of fertilizer application. Results showed that there were significant effects of the different rates of fertilizers applied to the number of flowers produced per plant. Table 5 shows that plants applied with 10 tons/ha had the highest number of flowers with a mean of 3.6 flowers produced per plant, while untreated plants controlled had the least number of flowers with a mean of 3.0 flowers produced per plant.

Interaction effect. Interaction effects between the different kinds of organic fertilizers and different rates of application on the number of flowers produced per plant were not significant.

Cut Flower Stem Length(cm)

Effect of kind of organic fertilizer. Table 6 shows significant effects of the different kinds of organic fertilizers on the cut flower stem length. Plants applied with green vermicompost had the longest cutflower stems with an average of 50.41 cm and a grade classification of extralong cut flower stem length along with plants applied with plantmate also having a grade classification of extra long cut flowers with a mean of 43.56 cm. Plants applied with alnus leaves compost had the shortest cut flower stem with an average length of 25.69 cm and a grade classification of medium cut flowers.

Table 5. Number of flowers produced per plant

TREATMENT	MEAN
Kind of Organic Fertilizer	
Chicken manure	3.28[c]
Alnus compost	2.78[d]
Plant mate	3.83[a]
Horse manure	3.33[c]
Green vermicompost	3.56[b]
Rate of Application (t/ha)	
0	3.0[d]
2	3.33[c]
4	3.40[b]
6	3.40[b]
8	3.40[b]
10	3.60[a]

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

Table 6. Cut flowers stem length

TREATMENT	MEAN (cm)	GRADE CLASSIFICATION
Kind of Organic Fertilizer		
Chicken manure	29.45[d]	Medium
Alnus compost	25.69[d]	Medium
Plant mate	43.56[b]	Extra long
Horse manure	34.92[c]	Long
Green vermicompost	50.41[a]	Extra long
Rate of Application (t/ha)		
0	25.75[d]	Medium
2	35.05[c]	Long
4	37.59[c]	Long
6	39.69[b]	Long
8	40.97[b]	Long
10	41.80[a]	Long

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

Effect of rate of fertilizer application. Results revealed significant differences on the cut flower stem length as affected by the different rates of fertilizer applied. Plants

applied with the rate of 10 tons/ha had the longest cut flower stems with a mean of 41.8 cm. Untreated (control) plants had the shortest cut flowers with a mean of only 25.75 cm; which only shows that plant nutrition significantly affected the stem length of rose cutflowers. Only the untreated plants had the grade classification of medium for its cutflowers; while all the other plants applied with the other fertilizer rates had a grade classification of long stemmed cut flower.

Interaction effect. Significant interaction effects were likewise observed, between the different kinds and rates of fertilizer application on the cut flower stem length at harvest (Figure 7). Plants applied with green vermicompost at the rate of 10 tons/ha had the longest cut flower stems with a mean of 60.4 cm; while plants with alnus leaves compost and the untreated plants has the shortest cut flower stem length with a mean of 23.9 cm respectively.

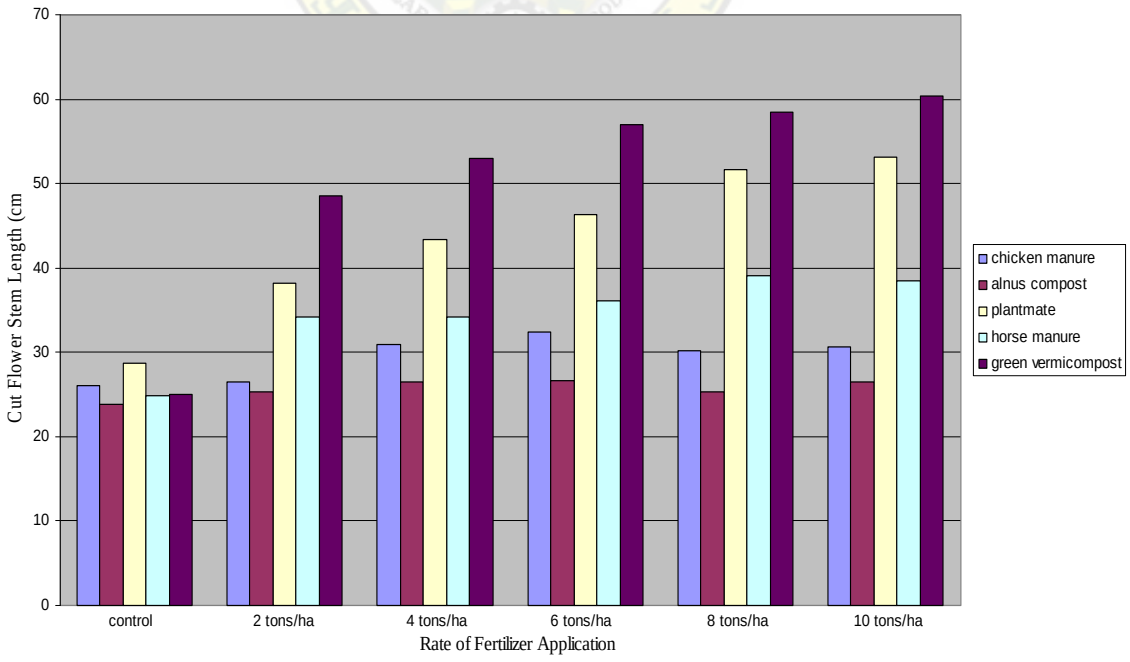

Figure 7. Cut flowers stem length at harvest (cm)

Vaselife.

Effect of different kinds of organic fertilizer. Table 7 shows the vaselife of rose cutflowers as affected by different kinds of organic fertilizers. Results revealed highly significant effect of organic fertilizers on the vaselife of rose cutflowers. Cutflowers from plants applied with green vermicompost had the longest vaselife with an average of 11.89 days; while cutflowers applied with chicken manure had the shortest vaselife with an average of 10.94 days from harvesting at calyxflex stage.

Effect of different rates of fertilizer application. Significant differences were observed on the vaselife of rose cutflowers applied with different rates of organic fertilizers. Table 7 shows that cutflowers harvested from plants applied with 2 tons/ha, 6 tons/ha, and 10 tons /ha had the longest vaselife and had the same mean of 11.53 days; while cutflowers harvested from untreated plants had the shortest vaselife with an average of 10.80 days from holding in tap water only.

Interaction effect. Table 7 shows that there were no significant differences on the vase life of rose cutflowers as affected by the combined effects of the different kinds of organic fertilizers and different rates of application.

Occurrence of Insect Pests and Disease.

Insect pests and diseases during the study were identified. The insect pests noted during the conduct of the study were cutworms, aphids and snout beetles and were controlled by proper weeding and with irrigation with strong water pressure and manually picking the insects while the disease observed was powdery mildew which was controlled by spraying Benlate fungicide.

Table 7. Vaselife (days)

TREATMENT	MEAN
Kind of Organic Fertilizer	
Chicken manure	10.94[d]
Alnus compost	11.6[c]
Plant mate	11.72[b]
Horse manure	11.11[c]
Green vermicompost	11.89[a]
Rate of Application (t/ha)	
0	10.80[c]
2	11.53[a]
4	11.33[b]
6	11.53[a]
8	11.33[b]
10	11.53[a]

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

Cost and Return Analysis

The economics of using organic fertilizers at different rates in rose plants cv. Grand Gala is shown in Table 8. Results show that the highest gross income, net income and return of investments (R.O.I) was obtained from rose plants applied with plantmate organic fertilizer at 10 tons/ha with an R.O.I of 288.74%. The lowest R.O.I was obtained in the plants treated with alnus leaves compost.

Table 8. Cost and Return Analysis

TREATMENT	MARKETABLE YIELD (dozens)	GROSS SALES (Php)	EXPENSES (Php)	NET PROFIT (Php)	R.O.I (%)	RANK
Chicken manure						
2tons/ha	4.16	249.60	162.40	87.2	53.69	17
4 tons/ha	3.75	225	162.80	62.2	38	21
6 tons/ha	4.16	249.60	163.20	86.4	52.94	18
8 tons/ha	4.16	249.60	163.60	86	52.56	19
10 tons/ha	4.16	249.60	164	85.6	52.19	20
Alnus compost						
2 tons/ha	3.34	200.4	162.40	38	23.40	22
4 tons/ha	3.34	200.4	162.80	37.6	23.10	23
at 6 tons/ha	3.34	200.4	163.20	37.2	22.79	24
at 8 tons/ha	3.34	200.4	163.60	36.8	22.49	25
at 10 tons/ha	4.59	275.4	164	111.4	67.93	16
Plantmate						
2tons/ha	4.59	459	165.40	293.6	177.51	10
4 tons/ha	5	600	165.80	434.2	261.88	2
6 tons/ha	5	600	166.20	433.8	261.01	3
8 tons/ha	5	600	166.60	433.4	260.14	4
10 tons/ha	5.41	649.2	167	482.2	288.74	1
Horse manure						
2 tons/ha	4.59	459	162.40	296.6	182.64	11
4 tons/ha	4.16	416	162.80	253.2	155.53	12
6 tons/ha	4.16	416	163.20	252.8	154.90	13
8 tons/ha	4.16	416	163.60	252.4	154.28	14
10 tons/ha	4.16	416	164	252	153.66	15
Green vermicompost						
2 tons/ha	4.16	499.2	167.40	331.8	198.21	9
4 tons/ha	5	600	167.80	432.2	257.57	5
6 tons/ha	4.59	550.8	168.20	382.6	227.47	7
8 tons/ha	4.49	550.8	168.60	382.2	226.69	8
10 tons/ha	5	600	169	431	255.03	6

Retail prices: Short = Php 40.00/dozen, Medium = Php 60.00/dozen, Long = Php 100/dozen, Extra long = Php 120/dozen

SUMMARY CONCLUSION AND RECOMMENDATION

Summary

The study was conducted at the Ornamental Horticulture Area at Benguet State University, La Trinidad Benguet from January 2010 to October 2010 to determine the effect of the different kinds of organic fertilizers applied with the different rates of application on the growth and flowering of rose cv. Grand Gala.

Results showed that there were significant interaction effects between the kind of organic fertilizer and rate of application on the final height at flowering duration from pruning to flower-bud formation, flower bud development, and cutflower stem length. Rose plants applied with plantmate and green vermicompost at 10 tons/ha had the tallest plants, had the earliest durations from planting to flower bud formation; were the earliest plants to reach flower-bud formation from pruning date, had the shortest days from flower bud formation to calyx flex stage, and had the longest cutflower stems at harvest. There were no significant interaction effect between the kind of fertilizer and rate of application on the number of flowers produced and vase life of cutflowers.

Cost and return analysis also revealed that a favorable Return on Investments (R.O.I) was also obtained in plants treated with plantmate at 10 tons/ha having the highest R.O.I of 288.74%.

Conclusion

Rose cv. Grand Gala applied with plantmate at the rate of 10 tons/ha had the highest R.O.I of 288.74% compared to the plants applied with chicken manure, alnus compost, horse manure, and green vermicompost with the different rates of fertilizer

applications due to the highest number of flowers produced per plant classified as extra long stemmed which had higher price in the market.

Recommendation

Based on the preceding results, it is recommended that 10 tons/ha of plantmate should be applied in rose plants Cv. Grand Gala for cut flower production to increase cut flower yield and produce extra long cut flower grade. It is also further recommended that these different kinds of organic fertilizers and different rates of fertilizer application should be verified using other rose varieties under La Trinidad, Benguet condition.

LITERATURE CITED

BALCO, G. R. 1986. Non-metallic minerals: Fertilizer research. Philippine Council for Agriculture and Resources Research and Development. National Council for Agriculture and Resource Development. National Science and Technology Authority. Los Baños, Laguna. P. 76.

BAUTISTA, O. K. 1983. Introduction to Tropical Horticulture. University of the Philippines, Los Banos, Laguna. P 100.

BRITANICA. 2010. Description of Rose. Retrieved January 7, 2010 from www.britanica.com/EBchecked/topic/509710/Rose.

BUCU, G. S. 1991. Kinds and Sources of Organic Materials. Golden Root Newsletter 3 (2): 1, 2, 9.

DIDA, N. C. 1998. Management of black surf of potato using alnus compost as soil conditioner. BS Thesis. Benguet State University, La Trinidad, Benguet. P. 6.

JAIN IRRIGATION SYSTEMS LTD. 2010. Organic Farming. Retrieved January 7, 2010 from http:jisl.co.in/Agricultural%20services/vermicompost.htm.

MANG-OSAN, J. B. 1996. Effects of organic and inorganic fertilizer on growth and flowering of English daisy. BS Thesis. Benguet State University, La Trinidad, Benguet. P. 5.

MARCELINO, B. C. 1995. Effect of different organic matters on the growth yield of NCT 8 Japonica rice Benguet. P. 5.

TRADE KEY. 2010. Plantmate Organic Fertilizer. Retrieved January 7, 2010 from http://www.tradekey.com/product_view/id/94931.htm.

WIKIPEDIA. 2010. Horticultural Description of Rose. Retrieved January 7, 2010 from en.wikipedia.org/wiki/Rose.

BALCO, G. R. 1986. Non-metallic minerals: Fertilizer research. Philippine Council for Agriculture and Resources Research and Development. National Council for Agriculture and Resource Development. National Science and Technology Authority. Los Baños, Laguna. P. 76.

BAUTISTA, O. K. 1983. Introduction to Tropical Horticulture. University of the Philippines, Los Banos, Laguna. P 100.

BRITANICA. 2010. Description of Rose. Retrieved January 7, 2010 from www.britanica.com/EBchecked/topic/509710/Rose.

BUCU, G. S. 1991. Kinds and Sources of Organic Materials. Golden Root Newsletter 3 (2): 1, 2, 9.

DIDA, N. C. 1998. Management of black surf of potato using alnus compost as soil conditioner. BS Thesis. Benguet State University, La Trinidad, Benguet. P. 6.

JAIN IRRIGATION SYSTEMS LTD. 2010. Organic Farming. Retrieved January 7, 2010 from http:jisl.co.in/Agricultural%20services/vermicompost.htm.

MANG-OSAN, J. B. 1996. Effects of organic and inorganic fertilizer on growth and flowering of English daisy. BS Thesis. Benguet State University, La Trinidad, Benguet. P. 5.

MARCELINO, B. C. 1995. Effect of different organic matters on the growth yield of NCT 8 Japonica rice Benguet. P. 5.

TRADE KEY. 2010. Plantmate Organic Fertilizer. Retrieved January 7, 2010 from http://www.tradekey.com/product_view/id/94931.htm.

WIKIPEDIA. 2010. Horticultural Description of Rose. Retrieved January 7, 2010 from en.wikipedia.org/wiki/Rose.

APPENDICES

Appendix Table 1. Final height at flowering (cm)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	III	III		
Chicken manure					
Control	76.3	74.7	73.1	224.1	74.70
2 tons/ha	81.2	82.3	81.7	245.2	81.73
4 tons/ha	81.3	82.4	81.3	245.00	81.67
6 tons/ha	79.7	80.1	81.3	241.1	80.37
8 tons/ha	80.2	81.00	80.3	241.5	80.50
10 tons/ha	81.2	80.2	82.00	243.4	81.13
Alnus compost					
Control	76.13	75.7	73.2	225.20	75.07
2 tons/ha	79.3	78.7	78.3	236.3	78.77
4 tons/ha	79.4	81.3	79	239.7	79.90
6 tons/ha	80	80.7	79.3	241.9	80.63
8 tons/ha	80.1	79.3	80	239.4	79.80
10 tons/ha	81.3	81.7	80	243	81.00
Plantmate					
Control	74.3	78.8	75.6	228.7	76.23
2 tons/ha	83.7	83.4	83.9	251	83.67
4 tons/ha	84.2	83.6	84.7	252.5	84.17
6 tons/ha	84.3	83	84.8	252.1	84.03
8 tons/ha	84.1	85.2	85.6	254.9	84.97
10 tons/ha	85.3	85.8	86.1	257.2	85.73
Horse manure					
Control	77.4	73.3	76.7	227.4	75.80
2 tons/ha	82.3	82.7	80.1	245.1	81.70
4 tons/ha	82.2	82.4	82.3	246.9	82.30
6 tons/ha	82.3	82.7	83.2	248.2	82.73
8 tons/ha	80.3	82.7	83.4	246.4	82.13
10 tons/ha	82.3	82.8	82.7	247.8	82.60

Appendix Table 1. Continued…

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
Green vermicompost					
Control	75.3	77.3	76.7	229.3	76.43
2 tons/ha	83.7	83.4	83.1	250.2	83.40
4 tons/ha	83.8	84.2	84.6	252.6	84.20
6 tons/ha	84.8	85.2	85.6	255.6	85.20
8 tons/ha	85.3	85.9	84.9	256.1	85.37
10 tons/ha	85.2	85.8	86.2	257.2	85.73

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARE	MEAN OF SQUARE	COMPUTED F	PROB
Factor A	4	247.919	61.980	62.3957	0.0000
Factor B	5	608.114	121.623	122.4391	0.0000
AB	20	41.016	2.051	2.0646	0.0162
Error	60	59.600	0.993		
TOTAL	89	956.649			

Coefficient of variation: 1.22%

Appendix Table 2. Final number of stems at flowering

TREATMENT	REPLICATION			TOTAL	MEAN
	I	III	III		
Chicken manure					
Control	6	6	7	19	6.33
2 tons/ha	7	8	7	22	7.33
4 tons/ha	7	8	8	23	7.67
6 tons/ha	8	8	7	23	7.67
8 tons/ha	8	7	7	22	7.33
10 tons/ha	8	7	8	23	7.67
Alnus compost					
Control	6	7	7	20	6.67
2 tons/ha	6	6	7	19	6.33
4 tons/ha	7	7	8	22	7.33

6 tons/ha	6	7	7	20	6.67
8 tons/ha	6	6	7	19	6.33
10 tons/ha	7	7	6	20	6.67
Plantmate					
Control	6	6	6	18	6.00
2 tons/ha	7	8	7	22	7.33
4 tons/ha	7	8	8	23	7.67
6 tons/ha	7	9	8	24	8.00
8 tons/ha	7	7	7	21	7.00
10 tons/ha	8	7	8	23	7.67
Horse manure					
Control	7	7	6	20	6.67
2 tons/ha	7	7	8	22	7.33
4 tons/ha	8	7	7	22	7.33
6 tons/ha	7	8	8	23	7.67
8 tons/ha	7	7	8	22	7.33
10 tons/ha	7	8	8	23	7.67
Green vermicompost					
Control	6	7	6	19	6.33
2 tons/ha	7	7	7	21	7.00
4 tons/ha	8	7	7	22	7.33
6 tons/ha	8	8	7	23	7.67
8 tons/ha	8	8	8	24	8.00
10 tons/ha	8	7	7	22	7.33

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARE	MEAN OF SQUARE	COMPUTED F	PROB
Factor A	4	5.933	1.483	4.7679	0.0021
Factor B	5	13.156	2.631	8.4571	0.0000
AB	20	7.400	0.370	1.1893	0.2949
Error	60	18.667	0.311		
TOTAL	89	45.156			

Coefficient of variation: 7.77%

Appendix Table 3. Number of days from planting to flower bud formation

TREATMENT	REPLICATION			TOTAL	MEAN
	I	III	III		
Chicken manure					
Control	51	50	51	152	50.67
2 tons/ha	48	49	49	146	48.67
4 tons/ha	48	47	48	143	47.67
6 tons/ha	47	48	47	142	47.33
8 tons/ha	50	47	48	145	48.33
10 tons/ha	49	47	48	144	48.00
Alnus compost					
Control	50	48	50	148	49.33
2 tons/ha	49	49	50	148	49.33
4 tons/ha	49	48	48	145	48.33
6 tons/ha	48	49	47	144	48.00
8 tons/ha	49	49	48	146	48.67
10 tons/ha	48	49	47	144	48.00
Plantmate					
Control	51	50	50	151	50.33
2 tons/ha	47	46	46	139	46.33
4 tons/ha	47	47	46	140	46.67
6 tons/ha	46	46	47	139	46.33
8 tons/ha	47	46	46	139	46.33
10 tons/ha	45	45	46	136	45.33
Horse manure					
Control	49	50	49	148	49.33
2 tons/ha	47	49	48	144	48.00
4 tons/ha	50	49	47	146	48.67
6 tons/ha	49	48	48	146	48.67
8 tons/ha	49	48	49	146	48.67
10 tons/ha	47	48	48	143	47.67
Green vermicompost					
Control	49	50	50	149	49.67
2 tons/ha	44	46	46	136	45.33
4 tons/ha	45	46	46	137	45.67
6 tons/ha	45	45	45	136	45.33
8 tons/ha	46	45	46	137	45.67
10 tons/ha	45	45	46	136	47.33

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARE	MEAN OF SQUARE	COMPUTED F	PROB
Factor A	4	90.556	22.639	36.3839	0.0000
Factor B	5	87.789	17.558	28.2179	0.0000
AB	20	34.378	1.719	2.7625	0.0013
Error	60	37.33	0.622		
TOTAL	89	250.056			

Coefficient of variation: 1.65%

Appendix Table 4. Number of days from flower bud formation to calyx flex stage

TREATMENT	REPLICATION			TOTAL	MEAN
	I	III	III		
Chicken manure					
Control	22	23	22	67	22.33
2 tons/ha	20	22	21	63	21.00
4 tons/ha	21	22	22	65	21.67
6 tons/ha	21	20	21	62	20.67
8 tons/ha	22	20	21	63	21.00
10 tons/ha	21	22	20	63	21.00
Alnus compost					
Control	21	20	21	62	20.67
2 tons/ha	20	21	21	62	20.67
4 tons/ha	21	20	20	61	20.33
6 tons/ha	21	21	21	63	21.00
8 tons/ha	22	21	20	63	21.00
10 tons/ha	21	21	21	63	21.00
Plantmate					
Control	21	22	21	64	21.33
2 tons/ha	20	20	21	62	20.67
4 tons/ha	20	19	20	59	19.67
6 tons/ha	20	20	20	60	20.00
8 tons/ha	19	20	18	59	19.67
10 tons/ha	18	19	18	55	18.53
Horse manure					
Control	21	22	20	63	21.00
2 tons/ha	21	20	21	62	20.67

4 tons/ha	20	20	21	61	20.33
6 tons/ha	21	20	19	60	20.00
8 tons/ha	21	20	21	62	20.67
10 tons/ha	20	20	21	61	20.33
Green vermicompost					
Control	21	21	20	62	20.67
2 tons/ha	20	20	19	59	19.67
4 tons/ha	20	19	20	59	19.67
6 tons/ha	20	20	19	59	19.67
8 tons/ha	20	19	19	58	19.33
10 tons/ha	19	18	18	55	18.33

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARE	MEAN OF SQUARE	COMPUTED F	PROB
Factor A	4	34.156	8.539	19.7051	0.0000
Factor B	5	14.467	3.093	7.1385	0.0000
AB	20	15.978	0.799	1.8436	0.0358
Error	60	26.000	0.43		
TOTAL	89	91.600			

Coefficient of variation: 3.23%

Appendix Table 5. Number of flowers produced per plant

TREATMENT	REPLICATION			TOTAL	MEAN
	I	III	III		
Chicken manure					
Control	3	3	4	10	3.33
2 tons/ha	3	3	4	10	3.33
4 tons/ha	3	3	3	9	3.00
6 tons/ha	4	3	3	10	3.33
8 tons/ha	4	3	3	10	3.33
10 tons/ha	3	4	3	10	3.33
Alnus compost					
Control	3	3	3	9	3.00
2 tons/ha	2	3	3	8	2.67
4 tons/ha	3	2	3	8	2.67
6 tons/ha	3	2	3	8	2.67

8 tons/ha	3	2	3	8	2.67
10 tons/ha	3	3	3	9	3.00
Plantmate					
Control	3	3	3	9	3.00
2 tons/ha	4	3	4	11	3.67
4 tons/ha	4	4	4	12	4.00
6 tons/ha	4	4	4	12	4.00
8 tons/ha	4	4	4	12	4.00
10 tons/ha	4	4	5	13	4.33
Horse manure					
Control	3	3	3	9	3.00
2 tons/ha	4	3	4	11	3.67
4 tons/ha	3	3	4	10	3.33
6 tons/ha	4	3	3	10	3.33
8 tons/ha	4	3	3	10	3.33
10 tons/ha	3	4	3	10	3.33
Green vermicompost					
Control	3	3	2	8	2.67
2 tons/ha	4	3	3	10	3.33
4 tons/ha	4	4	4	12	4.00
6 tons/ha	4	3	4	11	3.67
8 tons/ha	4	3	4	11	3.67
10 tons/ha	4	4	4	12	4.00

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARE	MEAN OF SQUARE	COMPUTED F	PROB
Factor A	4	10.956	2.739	12.3250	0.0000
Factor B	5	2.889	0.578	2.6000	0.0341
AB	20	5.444	0.272	1.2250	1.2670
Error	60	13.333	0.222		
TOTAL	89	32.622			

Coefficient of variation: 14.05%

Appendix Table 6. Cut flower stem length (cm)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	III	III		
Chicken manure					
Control	24.3	28.2	25.7	78.2	26.07
2 tons/ha	29.2	22.3	28	79.5	26.50
4 tons/ha	29.7	32.8	30.1	92.6	30.87
6 tons/ha	31.3	33.2	32.8	97.3	32.43
8 tons/ha	30.3	31.2	29.2	90.7	30.23
10 tons/ha	30.3	30.2	31.3	91.8	30.60
Alnus compost					
Control	23.4	22.6	25.7	71.7	23.90
2 tons/ha	22.4	25.6	28	76	25.33
4 tons/ha	28.2	27.1	24.2	79.5	26.50
6 tons/ha	28.3	29.2	22.4	79.9	26.63
8 tons/ha	25.6	27	23.4	76	25.33
10 tons/ha	28.2	26.4	24.7	79.3	26.43
Plantmate					
Control	29.3	28.7	28.3	86.3	28.77
2 tons/ha	36.4	38.7	39.5	114.6	38.20
4 tons/ha	43.1	42.3	44.7	130.1	43.37
6 tons/ha	44.5	45.6	43.7	138.8	46.27
8 tons/ha	51.3	52.4	51.67	155.37	51.79
10 tons/ha	52.6	53	53.7	159.3	53.19
Horse manure					
Control	28.3	22.6	23.9	78.4	24.93
2 tons/ha	36.3	35.7	37.8	109.8	36.60
4 tons/ha	36	29.4	37.3	102.7	34.23
6 tons/ha	38.2	32.7	37.6	108.5	36.17
8 tons/ha	36.7	39.4	41.3	117.400	38.47
10 tons/ha	37.7	39.4	38.3	115.4	38.47
Green vermicompost					
Control	22.9	27.2	25.1	75.2	25.07
2 tons/ha	48.6	49.3	47.9	145.8	48.60
4 tons/ha	51	52.3	55.6	158.9	52.97
6 tons/ha	55.3	57.2	58.3	170.8	56.93
8 tons/ha	58.3	59.4	57	175.4	58.47
10 tons/ha	58.4	60.1	62.7	181.2	60.40

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARE	MEAN OF SQUARE	COMPUTED F	PROB
Factor A	4	7412.921	1853.230	416.8934	0.0000
Factor B	5	2648.445	529.689	119.1562	0.0000
AB	20	1685.022	84.251	18.9527	0.0000
Error	60	266.720	4.445		
TOTAL	89	12013.107			

Coefficient of variation: 5.73%

Appendix Table 7. Vase life (days)

TREATMENT	REPLICATION			TOTAL	MEAN
	I	III	III		
Chicken manure					
Control	11	10	11	32	10.67
2 tons/ha	11	11	12	34	11.33
4 tons/ha	10	11	11	32	10.67
6 tons/ha	12	10	11	33	11.00
8 tons/ha	10	10	12	32	10.67
10 tons/ha	30.3	30.2	31.3	34	11.33
Alnus compost					
Control	10	11	11	32	10.67
2 tons/ha	11	11	12	34	11.33
4 tons/ha	10	11	11	32	10.67
6 tons/ha	11	12	12	35	11.67
8 tons/ha	11	11	11	33	11.00
10 tons/ha	12	10	11	33	11.00
Plantmate					
Control	11	12	11	34	11.33
2 tons/ha	11	12	13	36	12.00
4 tons/ha	11	12	12	35	11.67
6 tons/ha	12	12	12	36	12.00
8 tons/ha	12	11	12	35	11.67
10 tons/ha	12	11	12	35	11.67

Horse manure					
Control	11	11	11	33	11.00
2 tons/ha	11	10	11	32	10.67
4 tons/ha	11	12	11	34	11.33
6 tons/ha	10	12	12	34	11.33
8 tons/ha	10	11	12	33	11.00
10 tons/ha	12	11	11	34	11.33
Green vermicompost					
Control	10	11	10	31	10.33
2 tons/ha	13	12	12	37	12.33
4 tons/ha	11	13	13	37	12.33
6 tons/ha	12	12	11	35	11.67
8 tons/ha	13	13	11	37	12.33
10 tons/ha	12	12	13	37	12.33

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARE	MEAN OF SQUARE	COMPUTED F	PROB
Factor A	4	13.267	3.317	6.3511	0.0002
Factor B	5	6.056	1.211	2.3191	0.0542
AB	20	9.667	0.483	0.9255	0.0000
Error	60	31.333	0.522		
TOTAL	89	60.322			

Coefficient of variation: 6.37%