BIBLIOGRAPHY

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ABSTRACT

The response of alstroemeria to different kinds and rates of slow release fertilizer was evaluated under greenhouse condition to determine the growth, flowering, and yield of alstroemeria as affected by slow release fertilizer application, to determine the effect of different kinds and rates of slow release fertilizer on the growth and flowering of alstroemeria, and to determine the economics of using the different slow release fertilizer treatments in alstroemeria cutflower production. This study was conducted at Ornamental Horticulture Research Area, Department of Horticulture, College of Agriculture, Benguet State University, La Trinidad Benguet from September 2012 to January 2013.

Result showed that the two varieties of alstroemeria performed similarly in terms of the number of flowers produced per plant, number of days from planting to flower bud formation, number of days from planting to 100% anthesis, and number of days from planting to 50% anthesis. However the varieties performed differently in terms of the number of cutflower stems produced per plant. The Cv. Nadya performed better than shakira and had higher number of laterals per plant at flowering, had taller plants measured at flowering, and highest number of cutflower stems per plant.

Plants applied with 15g/m^2 Osmocote (14-14-14) promoted higher number of laterals per plant produced, taller plants with higher number of cutflower stems per plant at flowering than the other treatments that led to higher ROI.

RESULTS AND DISCUSSION

Final Height at Flowering (cm)

Effect of variety There were highly significant differences on the effect of the two alsroemeria varieties on the final height at flowering. Plants of Cv. nadya were taller at flowering with the mean of 75.55 cm while plants of Cv. Shaker were shorter with plants measured at 63.89 cm.

Effect of rate of fertilizer application. There were significant differences on the final height at flowering as affected by the different rates of slow release fertilizers applied. Among the treated plants however, those applied with 15g/m^2 of Osmocote (14-14-14) fertilizer were the tallest measuring 79.06 cm at flowering. This was followed by those applied with 10g/m^2 with the mean of 71.55 cm and those applied with 5g/m^2 with a mean of 65.39 cm. The untreated plants were the shortest which measured only 62.39 cm at flowering.

Interaction effect. The combined effects of the two varieties and the different rates of fertilizer application had significantly affected the final height at flowering. Results show that plants of Cv. Nadya treated with15g/m^2 were noted to be the tallest at flowering. Plants of Cv. Shakira were significantly shorter plants indicating that the fertilizers applied did not significantly enhance the growth of the alstroemeria variety.

Table 1. Final height at flowering

TREATMENT	MEAN(cm)
Variety	
Shakira	63.89[b]
Nadya	75.55[a]
Rate of Application (g/m^2)	
0	62.89[b]
5	65.39[b]
10	71.55[ab]
15	79.06[a]
CV (%)	10.99

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

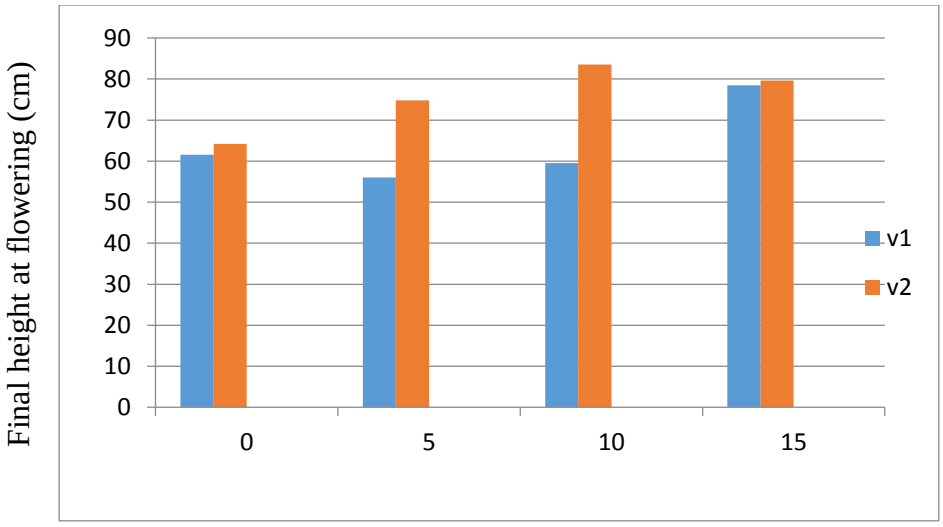

Figure 1. Interaction of variety and rate of application on the final height at flowering of alstroemeria

Number of Laterals Produced Per Plant at Flowering

Effect of variety. Highly significant differences were noted on the final number of laterals per plant at flowering of the two alstroemeria varieties (Table 2).Cv. Nadya produced the higher final number of laterals per plant at flowering with a mean of 17.69, while Cv.Shakira had fewer laterals with a mean of 13.69 per plant at flowering.

Effect of rate of fertilizer application. Table 2 shows significant differences were found on the number of laterals as affected by rate of fertilizer application. Plants treated with 15g/m^2 of Osmocote (14-14-14) produced more laterals per plant at flowering with a mean of 20.11 followed by those applied into 5g/m^2 which had a mean of 16.05 and those applied with 10g/m^2 with a mean of 14.83 laterals. The untreated plants produced the lowest number of laterals per plant at flowering with only 11.76 laterals.

Interaction effect. There were no significant interaction effects between the two alstroemeria varieties and the different rates of slow release fertilizer application on the final number of laterals per plant at flowering in alstroemeria.

Number of Flowers Produced Per Plant

Effect of variety. There were no significant differences observed on the number of flowers produced per plant as affected by the alstroemeria variety. Flower development in both varieties Nadya and Shakira had only slight differences which ranged from 5.05 to 5.08 flowers per plant.

Table 2. Final number of laterals per plant at flowering

TREATMENT	MEAN
Variety	
Shakira	13.69[b]
Nadya	17.69[a]
Rate of Application (g/m^2)	
0	11.76[b]
5	16.05[ab]
10	14.83[b]
15	20.11[a]
CV (%)	22.92

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

Effect of rate of fertilizer application. Highly significant differences were however obtained on the number of flowers produced per plant at flowering as affected by the different rates of slow release fertilizer application. Results show that there were more flowers produced in plants applied with the higher rate 15g/m^2 a mean of 6.00 flowers per plant. This was followed by the untreated plants which measured with a mean of 4.89 flowers. Those applied with 10g/m^2 had the lower flower counting of 4.83, while plants applied with 5g/m^2 had the least number of flowers with only 4.55 flowers per plant.

Interaction effect. There were no significant interaction effects of the two varieties and the different rates of fertilizer application on the number of flowers produced per plant at flowering (Table3).

Table 3. Number of flowers produced per plant

TREATMENT	MEAN
Variety	
Shakira	5.05
Nadya	5.08
Rate of Application (g/m^2)	
0	4.89[b]
5	4.55[b]
10	4.83[b]
15	6.00[a]
CV (%)	10.25

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

Number of Days from Transplanting to Flower Bud Formation (0.5 cm)

Effect of variety. There were no significant differences observed on the number of days from planting to flower bud formation as affected by the alstroemeria variety. Flower bud formation in both varities Nadya and Shakira had only slight differences. Flowering ranged from 102.33 to 112.19 days from transplanting (Table 4).

Effect of rate of fertilizer application. Likewise, there were no significant differences observed on the number of days from planting to flower bud formation as affected by different rates of fertilizer application.

Interaction effect. The combined effects of the varieties and rates of fertilizer application on the number of days from planting to flower bud formation in alstroemeria were not significant.

Table 4 .Number of days from planting to flower bud formation

TREATMENT	MEAN
Variety	(Days)
Shakira	102.33
Nadya	112.19
Rate of Application (g/m^2)	
0	103.22
5	108.55
10	111.22
15	106.05
CV (%)	13.68

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

Number of Days from Planting to Full Bloom Stage (100% anthesis)

Effect of variety. There were no significant differences observed on the number of days from planting to 100% anthesis as affected by the alstroemeria variety. Flower development in both varieties Nadya and Shakira had only slight differences which ranged from123.44 to127.58 days (Table 5).

Effect of rate of fertilizer application. Likewise, there were no significant differences observed on the number of days from planting to 100% anthesis as affected by the different rates of slow release fertilizers applied (Table 5).

Interaction effect. There was no significant interaction effects between the different rates of slow release fertilizer application and the two alstroemeria varieties on the number of days from planting to 100% anthesis.

Table 5. Number of days from planting to 100% anthesis

TREATMENT	MEAN
Variety	(Days)
Shakira	125.47
Nadya	130.08
Rate of Application g/m^2	
0	127.00
5	129.39
10	125.39
15	129.33
CV (%)	9.11

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

Number of Days from Transplanting to 50% anthesis

Effect of variety. Statistically, There were no significant differences observed on the number of days from transplanting to 50% anthesis as affected by the two alstroemeria varieties used in the study (Table 6).

Effect of rate of fertilizer application. Likewise, There were no significant differences obtained among the different rates of fertilizer application on the number of days from planting to 50% anthesis (Table 6).

Interaction effect. There was no significant interaction effects observed between the two alstroemeria varieties and the different rates of slow release fertilizer application on the number of days from planting to 50% anthesis.

Table 6. Number of days from planting to 50% anthesis

TREATMENT	MEAN
Variety	(Days)
Shakira	123.44
Nadya	127.58
Rate of Application (g/m^2)	
0	125.33
5	126.83
10	122.50
15	127.39
CV (%)	9.33

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

Effect of variety. Significant differences were obtained on the number of cutflower stems produced per plant. Plants of Cv. Nadya had the highest number of cutflower stems per plant producing a mean of 2.05 while plants of Cv. Shakira produced only a mean of 1.66 cutflowers per plant for the cropping period.

Effect of rate of fertilizer application. Results show that there were highly significant differences on the effects of the rates of slow release fertilizer application on the number of cutflowers produced per plant. It was also noted that plants applied with fertilizers produce higher number of cutflower stems compared to the plants that were not applied with fertilizers.

Table 7. Number of cutflowers produced per plant

TREATMENT	MEAN
Variety	
Shakira	1.66[b]
Nadya	2.05[a]
Rate of Application (g/m^2)	
0	1.28[b]
5	2.00[a]
10	2.00[a]
15	2.16[a]
CV (%)	20.09

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

Interaction effect. There were no significant interactions effects between the two alstroemeria varieties and the different rates of slow release fertilizer application applied in alstroemeria on the number of cutflowers produced per plant.

Table 8 shows the soil analysis before and after the study. The pH increased slightly from 6.94 to 7.2 before and after the study, respectively, on the other hand, organic matter remain the same, phosphorous increased from125 to 185 ppm,and potassium also increased from 628 to748 ppm.

Table 8. Soil Analysis

	pH	OM(%)	P, ppm	K, ppm
Initial	6.94	2.0	125	628
Final	7.52	2.0	185	748

Cost and Return Analysis

Table 9 shows that the Return on Investment (ROI) of alstroemeria plants applied with different rates of slow release fertilizer were observed. The plants applied with 15g/m^2 of slow release fertilizer had more cutflowers produced which led a highest return on investment (ROI) of 56.66% which ranked number 1 while the other rates of slow release fertilizers artributed to low percent of (ROI).

Table 9. Cost and return analysis

TREATMENT	YIELD (doz)	GROSS SALES (PhP)	EXPENSES (PhP)	NET INCOME (PhP)	ROI (%)	RANK
Cv. Shakira						
0	6	150	143.33	6.67	4.65	8
5 g/m^2	7	175	151.33	23.17	15.26	5
10 g/m^2	7	175	160.33	14.67	9.15	7
15 g/m^2	8	200	168.33	31.17	18.46	4
Cv. Nadya						
0	6	150	135.00	15	11.11	6
5 g/m^2	8	200	143.50	56.50	39.37	3
10 g/m^2	9	225	152.00	73	48.03	2
15g/m^2	10	250	160.50	89.50	55.76	1

Note: Selling Price was PhP 25.00/doz

- Expenses include the land preparation, plant cost, cost of slow release fertilizer, care and management includes weeding and watering.

Occurrence of Insect Pests and Diseases During the Cropping Period

Table 10 shows the occurrence of insect pest and diseases observed during the conduct of the study. Insect pest that infest the plants during the vegetative growth flowering stages were green aphids and spotted beetles while the diseases noted were wilting and yellowing of the plants and stunted growth.

Table 10. Occurrence of insect pests during the cropping period

INSECT PEST	RATING INDEX	DESCRIPTION
Green Aphids	2	Slight infestation
Spotted Beetle	2	Slight infestation

Rating Index	Description
1	No infestation
2	Slight 1-10% plants infected
3	Moderate 11-25% plants infected

Table 11. Occurrence of diseases

DISEASES	RATING INDEX	DESCRIPTION
Fusarium wilt (yellowing/ browning of leaves)	2	Slight infestation
Verticillium wilt	2	Slight infestation
Root Rot (Stunted growth)	2	Slight infestation

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Rating Index	Description
1	No infestation
2	Slight 1-10% plants infected
3	Moderate 11-25% plants infected

Meteorological data

The air temperature during the study period ranged from13.1 to23.7^{o}c while relative humidity ranged from 83 to 98%. Temperature and relative humidity during the conduct of the study were observed to be not suitable for alstroemeria production.

A very little rainfall of 21 mm was recorded from September 2012 to January 2013. The sunshine duration in the month of September to January was low at 253.3 to 360 minutes per day that has significantly delayed the flowering of alstroemeria plants.

Table 11. Meteorological data

MONTH	TEMPERATURE(^{O}C) MIN	MAX	RH (%)	RAINFALL AMT. (MM)	BRIGHT SUNSHINE (MIN)
September	17.5	22.4	87.1	9.2	253.3
October	15.1	22.2	83	21	347.7
November	13.1	19.9	80	1.33	329
December	13.2	20.6	84	0.1	377.7
January	18.8	23.7	98	0.5	360

Figure 1. Overview of the experimental plants at flowering

SUMMARY, CONCLUSION, AND RECOMMENDATION

Summary

This study was conducted at the Ornamental Horticulture Research Project Area of the Benguet State University La Trinidad Benguet from September 2012 to January 2013 to evaluate the growth flowering yield of alstroemeria as affected by slow release fertilizer application, to determine the effect of different kinds and rates of slow release fertilizer on the growth and flowering of alstroemeria, and to determine the economics of using slow release fertilizer treatments in alstroemeria cutflower production.

Results show that there were no significant interaction effects between the varieties and rates of fertilizer application on the number of days from planting to 100% anthesis, number of days from planting to 50% anthesis, number of flowers produced per plant, number of days from planting to flower bud formation, final number of laterals per plant at flowering and number of cutflower stems per plant in alstroemeria. However, Cv. Nadya had higher differences were counted number of laterals per plant at flowering, had the longest cutflower stems at flowering and significantly produced more number of cut flower stems per plant. On the other hand, on the effect of the different rates of fertilizer application. Application of $15g/m^2$ promoted the production of significantly higher number of flowers and the number of cutflower stems per plant. It has likewise; Significantly affected the number of laterals per plant at flowering and the final height at flowering.

Conclusion

Based from the results obtained, it is therefore concluded, that the use of osmocote (14-14-14) in alstroemeria cutflowers production applied at the rate of 15g/m^2 led to the production of desirable growth and quality of alstroemeria plant.

Recommendation

Based from the above findings, it is recommended that slow release fertilizer at the rate of 15g/m^2 osmocote should be applied to improve the vegetative growth and development and increase cutflower stem of the two varieties grown.

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