

BIBLIOGRAPHY

BADONGEN, ELME L. APRIL.2013.Growth and Flowering of Different Species of Calla Lily (*Zantedeschia sp.*) as Affected of Different Kinds of Slow Release Fertilizers. Benguet State University, La Trinidad, Benguet.

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ABSTRACT

This study was conducted at the Ornamental Horticulture Research Project Area of Benguet State University, La Trinidad, Benguet from September 2012 to March 2013 to evaluate the growth and flowering performance of different species of Calla Lily in different kinds of slow release fertilizer, determine the effect of different kinds of slow release fertilizers with regards to cutflower yield and quality; and to determine the economics of using the different kinds of slow release in different species of calla lily production.

Result showed, that application of 6g of Multicote per 15 cm black plastic bag was the best slow release fertilizer combination to the different calla lily species, the yellow calla species and the white calla specie.It promoted earlier flowering, vegetative growth that resulted to taller plants and long stem cutflowers. It is recommended as a slow-release fertilizer for different species of calla lily species for production.



RESULTS AND DISCUSSION

Initial Plant Height (cm)

Effect of calla lily species. Highly significant differences were obtained on the initial height of the two species of Calla lily plants measured at transplanting (Table 1.) Tallest plants were recorded from the *Zantheschiaaethiopica*(white) with a mean of 30cm.

On the other hand, the shortest plants observed from the *Zanthesdiaelliottiana* (yellow) with only 22cm, or approximately 8 cm shorter than the tallest plants of *Zantheschiaaethiopica*.

These results may be due to not uniformed sizes of the corms planted were in the different growing characteristics of the different species.

Effect of slow release fertilizers.Table 1 show that there were no significant differences on the initial height of calla plants 1 month transplanting. As affected by the different slow release fertilizers applied. Means ranges from 25 cm. to 25.67 cm.

Interaction effect. Table 1 show that there were no significant differences on the interaction effects of calla lily species and different slow release fertilizers applied. This may due to the slow release fertilizers are not yet significant to the growth of different species.



Initial Number of Leaves 1 Month after Transplanting

Effect of calla lily species. Table 2 shows that there were no significant differences on the initial number of leaves of calla plants observed at transplanting. This may due to the inherent growth characteristics of the plants.

Effect of slow release fertilizer. Table 2 shows that there were no significant differences on the initial number of leaves of calla lily as affected by the different slow release fertilizers applied. This may due to the fact that the effect of the slow release fertilizer absorbed by the plants was not yet significant at their growth stage.

Table 1. Initial plant height

TREATMENT	MEAN
<u>Calla Lily Species</u>	
<i>Zantheschia aethiopica</i>	24.444 ^b
<i>Zanthesdia elliottiana</i>	26.222 ^a
<u>Slow Release Fertilizer</u>	
Osmocote (14-14-14)	25.000 ^a
Osmocote (18-6-12)	25.667 ^a
Multicote (17-17-17)	25.333 ^a

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



Effect of slow release fertilizer. Table 2 shows that there were no significant differences on the initial number of leaves of calla lily as affected by the different slow release fertilizers applied. This may due to the fact that the effect of the slow release fertilizer absorbed by the plants was not yet significant at their growth stage.

Interaction effect. Likewise, Table 2 shows that there were no significant differences on the interaction effect. This may due to the inherent characteristics of the plants and the slow release fertilizers absorbed by the plants was not yet significant.

Table 2. Initial number of leaves 1 month at transplanting

TREATMENT	MEAN
<u>Calla lily species</u>	
<i>Zantheschia aethiopica</i>	2.444 ^a
<i>Zanthesdia elliottiana</i>	2.333 ^a
<u>Slow release fertilizer</u>	
Osmocote (14-14-14)	2.333 ^a
Osmocote (18-6-12)	2.333 ^a
Multicote (17-17-17)	2.500 ^a

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



Final Number of Leaves at Flowering

Effect of calla lily species. Highly significant differences were noted on the final number of leaves of the two species of calla lily plants at flowering (Table 3). Tallest plants were recorded from the *Zanthesdeschiaaethiopica*(white) species having a mean of 6.22 leaves counted at flowering.

On the other hand, the least leaf count per plant were observed from the *Zanthesdiaelliottiana* (yellow) species with a mean of 4.67 leaves or approximately 1.56 leaves count lease than the leaf count of *Zanthesdeschiaaethiopica*(white) species.

Effect of slow release Fertilizer.Table3 shows that there were no significant differences on the final number of leaves of calla plants counted at harvesting. This may be due to the inherent characteristics of the plant. Leaf count ranges from 2.33 to 2.5.

Table 3. Final number of leaves at flowering (cm)

TREATMENT	MEAN
<u>Calla lily species</u>	
<i>Zanthesdeschia aethiopica</i>	6.222 ^a
<i>Zanthesdia elliottiana</i>	4.667 ^b
<u>Slow release fertilizer</u>	
Osmocote (14-14-14)	4.833 ^c
Osmocote (18-6-12)	5.167 ^b
Multicote (17-17-17)	6.333 ^a

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



Interaction effect. Likewise, table 3 shows that there were no significant differences on the interaction effect. This may be due to the inherent characteristics of the plant.

Final Height at Flowering

Effect of calla lily species. Highly significant differences were obtained on the final height of calla lily species at flowering (Table3). Tallest plants were recorded from the *Zantedeschiaaethiopica* (white) species with the mean of 53.03 cm. On the other hand, the shortest plant where observed from the *Zanthesdiaelliottiana* (yellow) species with a mean of 45.58 cm or approximately 7.46 cm shorter than the tallest plants of *Zantedeschiaaethiopica* (white) species .

Effect of slow release fertilizer. Highly significant differences were shown on the final height of callas as affected by the different kinds of slow release fertilizer. Application of Multicote produced the tallest plants with a mean of 49.10 cm. Osmocote (14-14-14) produces the shortest with a mean of 47.78 cm. These results may due to the different rates of the NPKin the fertilizer applied.

Interaction effect. Table 4 shows no significant differences on the interaction effect on different species and different slow release fertilizers applied. This may be due to the inherent characteristics of the plants that can be all combined to the different slow release fertilizer.

Number of Days from Transplanting to Flower Bud Formation (1cm bud size)

Effect of calla lily species. Highly significant differences were seen on the number of days from planting to flower bud formation as affected by the different species of Calla lily. *Zantedeschiaaethiopica* (white) flowered after a mean of 135.56 days and



Zanthesdiaelliottiana (yellow) flowered after a mean of 94.00 days. These findings explained that yellow calla was earlier to form its flower buds than the white calla based on their results.

This may be due to the different characteristics of the different species on their reproductive stage.

Effect of slow release fertilizer. Table 5 shows that there were no significant differences on the number of days from transplanting to flower bud formation as affected by the application of the different slow release fertilizers. This may be due to the flowering characteristics of the varieties.

Table 4. Final height at flowering (cm)

TREATMENT	MEAN
<u>Calla lily species</u>	
<i>Zanthesdeschia aethiopica</i>	53.033 ^a
<i>Zanthesdia elliottiana</i>	45.578 ^b
<u>Slow release fertilizer</u>	
Osmocote (14-14-14)	47.783 ^c
Osmocote (18-6-12)	49.100 ^b
Multicote (17-17-17)	51.033 ^a

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



Interaction effect. Table 5 shows no significant differences on the interaction effect on different species and different slow release fertilizers applied. This may be due to the inherent characteristics of the plant.

Days from Flower Bud Formation to 50% Anthesis

Effect of calla lily species. Highly significant differences were noted on the days from flower bud formation to 50% anthesis on the two species of calla lily plants. Table 6 reveals that *Zanthesdiaelliottiana* (yellow) species flower bud formation to 50% anthesis, significantly earlier with a mean of 5.00 days from tight bud stage. This followed by the cutflower of *Zanthesdeschiaaethiopica* (white) species with a mean of 11.89 days.

Effect of slow release fertilizer. Table 6 shows that there were no significant differences on the number of days from flower bud formation to 50% anthesis in the calla species grown. This may be due to the different characteristics of the two species of calla lily plants.

Interaction effect. Table 6 shows no significant differences on the interaction effect on different species and different slow release fertilizers applied. This may be due to the inherent characteristics of the plant.

Stem Length at Harvest

Effect of calla species. Highly significant differences were noted on the stem length of cutflowers at harvest of the two species of calla lily measured upon harvest.



Table 5. Number of days from transplanting to flower bud formation

TREATMENT	MEAN
<u>Calla lily species</u>	
<i>Zantheschia aethiopica</i>	135.556 ^a
<i>Zanthesdia elliottiana</i>	94.000 ^b
<u>Slow release fertilizer</u>	
Osmocote (14-14-14)	106.833 ^a
Osmocote (18-6-12)	123.333 ^a
Multicote (17-17-17)	114.167 ^a

Longest stem length was recorded from the white calla lily with the mean of 47.17cm; while the shortest cutflower stem were measured from the *Zanthesdiaelliottiana* (yellow) with a mean of 36.01 cm. Means with a common letter are not significantly different at 5% level by DMRT

36.01 cm, or approximately 11.16 cm shorter than the longest cutflower stems measured in *Zanthesdeschiaaethiopica* (white).

Effect of slow release fertilizer. Highly significant differences were obtained on the different kinds of slow release fertilizers on the stem length at harvest shown in Table 7. Plants applied of multicoteMulticote (17-17-17) produced cutflowers with the longest stems of 46.50cm. Those applied of Osmocote (18-6-12) has longest cutflower stems having a mean of 42.250 cm while those applied to osmocote (14-14-14) had a mean of 36.02. However those applied with multicote (17-17-17) and Osmocote (18-6-12) had the



cutflower stems (Table 7) are the best because this may be due to the NPK content of the two fertilizers.

Interaction effect. Table 7 shows no significant differences on the interaction effect on different species and different slow release fertilizers applied. This may be due to the inherent characteristics of the plant.

Flower Bud Length at Harvest

Effect of calla lily species. Highly significant differences were noted on the flower bud length at harvest of the two species of calla lily measured upon harvesting (Table 8). Longest flower buds were recorded from the *Zantheschiaaethiopica* (white) species with the mean of 12.28 cm. while smallest flower buds obtained from the *Zanthesdiaelliottiana* (yellow) species with a mean of 8.189 cm, or approximately 4.089 cm shorter than the tallest plant between the two calla species.

Effect of slow release fertilizer. The effect of different slow release fertilizers applied on the flower bud length were highly significant (Table8).Plants applied with Multicote (17-17-17)has the highest mean of 10.95 cm. Plants applied with Osmocote (18-6-12) has longer flower buds with a mean of 9.88 cm compared to those applied with Osmocote (14-14-14) with a mean of 9.87 cm

Interaction effect. Highly significant differences on the interaction effect on different species and different slow release fertilizers applied. This may be due to the significantly effect to the different species to the effect on the slow release fertilizer applied.



Table 6. Days from flower bud formation to 50% anthesis

TREATMENT	MEAN
<u>Calla lily species</u>	
<i>Zantheschia aethiopica</i>	11.889 ^a
<i>Zanthesdia elliottiana</i>	5.000 ^b
<u>Slow release fertilizer</u>	
Osmocote (14-14-14)	8.000 ^a
Osmocote (18-6-12)	8.333 ^a
Multicote (17-17-17)	9.000 ^a

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

Vaselife

Effect of calla lily species. Highly significant on the vaselife of the two species of calla lily (table9). Longest vaselife were recorded from the white calla lily with the mean of 9.222 cm. On the other hand, the shortest vaselife were recorded from the yellow calla lily with the mean of 5.667 cm or approximately 3.555 cm. This may due to the flowering characteristics of the two varieties.



Table 7. Stem length at harvest

TREATMENT	MEAN
<u>Calla lily species</u>	
<i>Zantheschia aethiopica</i>	47.167 ^a
<i>Zanthesdia elliottiana</i>	36.01 ^b
<u>Slow release fertilizer</u>	
Osmocote (14-14-14)	36.071 ^b
Osmocote (18-6-12)	42.250 ^a
Multicote (17-17-17)	46.500 ^a

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

Effect of slow release fertilizer. Table 9 shows that there were no significant differences on vase life of the cutflower harvested. This may be due to the natural cutflower characteristics at harvest.

Interaction effect. Table 8 shows no significant differences on the interaction effect on different species and different slow release fertilizers applied. This may be due to the inherent characteristics of the plant at harvest.

Number of flower produced per plant.

Effect of different species. Highly significant differences on the number of flower of the two species of calla lily shown in Table 10. As observed during the research, the white calla lily species continuously produce flowers after it attains the reproductive stage



while yellow calla lily it will die after it reaches its reproductive stage. This may due to the different characteristics of the two species.

Effect of slow release fertilizer. Table 10 shows that there were no significant differences on the number of flower produced per plant. This may be due to the nature plant characteristics of the different species at reproductive stage.

Interaction effect. Table 10 shows no significant differences on the interaction effect on different species and different slow release fertilizers applied. This may be due to the inherent genetic characteristics of the plant.

Table 8. Flower bud length at harvest.

TREATMENT	MEAN
<u>Calla lily species</u>	
<i>Zantheschia aethiopica</i>	12.278 ^a
<i>Zanthesdia elliottiana</i>	8.189 ^b
<u>Slow release fertilizer</u>	
Osmocote (14-14-14)	9.867 ^b
Osmocote (18-6-12)	9.883 ^b
Multicote (17-17-17)	10.950 ^a

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



Table 9. Vaselife

TREATMENT	MEAN
<u>Calla lily species</u>	
<i>Zantheschia aethiopica</i>	9.222 ^a
<i>Zanthesdia elliottiana</i>	5.667 ^b
<u>Slow release fertilizer</u>	
Osmocote (14-14-14)	4.623 ^a
Osmocote (18-6-12)	2.101 ^a
Multicote (17-17-17)	1.350 ^a

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

Interaction effect. Table 10 shows no significant differences on the interaction effect on different species and different slow release fertilizers applied. This may be due to the inherent genetic characteristics of the plant.

Initial soil Analysis

The initial soil analysis before transplanting showed that the soil had 6.0 pH which is slightly acidic. The soil contains high amount of nitrogen, low amount of phosphorous and it had a sufficient amount of Potassium.



Table 10. Number of flowers produced per plant

TREATMENT	MEAN
<u>Calla lily species</u>	
<i>Zantheschia aethiopica</i>	1.889 ^a
<i>Zanthesdia elliottiana</i>	1.000 ^b
<u>Slow release fertilizer</u>	
Osmocote (14-14-14)	1.500 ^a
Osmocote (18-6-12)	1.333 ^a
Multicote (17-17-17)	1.500 ^a

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

Table 11. Initial soil analysis

pH	OM(%)	N (%)	P (ppm)	K (ppm)
6	19.87	1.68	11.94	108.57



Documents of the Study in Pictures

Figure 1 shows the different species of calla lily one month after transplanting applied with different slow release fertilizers, Figure 2 shows the flowering stage of *Zantedeschia aethiopicas* affected by different slow release fertilizers, and Figure 3 shows the flowering stage of *Zantedeschia elliottianaas* affected by different slow release fertilizers.



Figure 1. Different species of calla lily one month after transplanting applied with different slow release fertilizers



Figure 2. Flowering stage of *Zantedheschiaaethiopicas* affected by different slow release fertilizers



Figure 3. Flowering stage of *Zantedhesdiaelliottianaas* affected by different slow release fertilizers.

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 March 2013 to evaluate the growth and flowering performance of different species to the effect of the slow release fertilizer and to determine the best slow release fertilizer for calla lily production.

Results revealed that there is higher significant differences on the initial height, final height and final number of leaves at flowering, number of days from transplanting to flower bud formation to 50% anthesis, stem length and flower bud at harvest, vase life and lastly to the number of flower produced as affected by the different species of calla lily. Application of multicote promoted vegetative growth and producing the tallest plants.

The initial soil analysis before transplanting showed that the soil had 6.0 pH which is slightly acidic. The soil contains high amount of nitrogen, low amount of phosphorous and it had a sufficient amount of Potassium.



Conclusion

It is therefore concluded that the application of slow release fertilizer Multicote to any of the different Calla Lily species is highly significantly improve the vegetative growth producing taller plants with longer stems compared to other slow release formulations applied.

Recommendation

Based on the findings of the study, application of 6g multicote in the 15 cm PEP bags is the best for any of the different calla lily species; it is recommended as a slow-release fertilizer for different species of calla lily cut flower to produce taller plants with longer stems.



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