

## **BIBLIOGRAPHY**

BEN, EPLER. March 2013. Growth and Flowering of Benguet Lily (*Lilium philippinensis*) as Affected by Growing Media and Slow Release Fertilizer Application. Benguet State University, La Trinidad, Benguet.

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## **ABSTRACT**

This study was conducted at the Ornamental Horticulture Research Project Area of the Benguet State University, La Tinidad, Benguet from September 2012 to March 2013; to evaluate the growth and flowering performance of Benguet Lily applied with different kinds of slow release fertilizer and the growing media, 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 fertilizers in Benguet Lily cutflowers production.

Results show, that application 6/g of Multicote (17-17-17) per 15 cm black plastic bag is the best slow release for Benguet lily production grown in a 1:1:1 proportion of Mountain soil + cattle manure + alnus leaves compost for the production of benguet lily since it enhanced earlier flowering, promoted vegetative growth and produced tall plants and long stem cutflower. Both are recommended as a slow-release fertilizer and growing media for benguet lily cutflower production.



## RESULTS AND DISCUSSION

### Final Height at Harvest

Effect of growing media. Table 1 show that there were no significant differences on the height of Benguet lily at harvest. This may be due to the nutrient content of the growing media and the nutrient content of the slow release fertilizer applied.

Effect of slow release fertilizer. Highly significant differences were obtained on the final height at harvest as affected by different slow release fertilizers applied one month after transplanting. Application of Multicote (17-17-17) promoted more vigorous vegetative growth by producing the tallest plants with a mean of 40.46 cm at flowering among the fertilized plants. The Osmocote (18-6-12) treated plants were the shortest with a mean of 33.23 cm.

Interaction effect. Highly significant were obtained on the final height of Benguet lily at harvest affected by the interaction effect between different growth media different slow release fertilizers. The best combinations were the application of growth media of 1:1:1 mountain soil + cattle manure + alnus leaves compost and Multicote (17-17-17) gathered the highest mean of 40.98 cm.

### Number of Leaves per Plant at Flowering

Effect of growing media. Highly significant differences were obtained on the number of leaves per plant at flowering measured at harvest as affected by different growing media. Higher leaf count was obtained in plants grown in 1:1:1 mountain soil + horse manure + alnus leaves compost with 39.11 leaves per plant as shown in table 2.



However, it was comparable with those grown in 1:1:1 mountain soil + cattle manure + alnus leaves compost which had the mean of 35.94 leaves per plant at flowering.

Table1. Final height at harvest (cm)

TREATMENT	MEAN
<u>Growing Media</u>	
Mountain soil + horse manure + Alnus leaves compost	36.895 <sup>a</sup>
Mountain soil + Cattle manure + Alnus leaves compost	36.793 <sup>a</sup>
<u>Slow Release Fertilizer</u>	
Osmocote (18-6-12)	33.232 <sup>b</sup>
Multicote(17-17-17)	40.457 <sup>a</sup>

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

Table2. Number of leaves per plant at flowering

TREATMENT	MEAN
<u>Growing media</u>	
Mountain soil + horse manure + Alnus leaves compost	39.112 <sup>a</sup>
Mountain soil + Cattle manure + Alnus leaves compost	35.943 <sup>b</sup>
<u>Slow Release Fertilizer</u>	
Osmocote (18-6-12)	33.722 <sup>b</sup>
Multicote(17-17-17)	40.333 <sup>a</sup>

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



Effect of slow release fertilizer. Table 2 shows that there were highly significant effects on the different kinds of slow release fertilizers applied. Multicote (17-17-17) promoted vegetative growth by producing the highest leaf count with a mean of 40.33 leaves per plant at flowering while applied with osmocote (18-6-12) plants had the lowest count with a mean of 34.72 leaves at flowering.

Interaction effect. Highly significant were obtained on the number of Benguet lily at harvest affected by the interaction effect between different growth media different slow release fertilizers. The best combinations were the application of growth media of 1:1:1 mountain soil + horse manure + alnus leaves compost and Multicote (17-17-17) gathered the highest mean of 129.00 leaves at flowering.

#### Stem Thickness (6 cm above the soil)

Effect of growing media . There were no significant differences obtained with regards to the stem thickness at flowering. This may due to the inherent genetic characteristic of the plants.

Effect of slow release fertilizer.Table 3 shows that there were no significant differences on the effect of the different kinds of slow release fertilizers applied with regards to the stem thickness plant at flowering. This may due to the inherent genetic characteristics of the plants.

Interaction effect. The Table3 shows that there were no significant differences on the stem thickness (6 cm above the soil). This may due to the inherent genetic characteristics of the plants.



Days from Planting to Flower Bud Formation (0.50 bud size)

Effect of growing media. Highly significant differences were noted on the number of days from planting to flower bud formation as affected by growing media. A growing media with a ratio of 1:1:1 mountain soil + cattle manure + alnus leaves compost promoted earlier flower bud formation with a mean of 106.28 days compared to those grown in a media of 1:1:1 mountain soil + horse manure + alnus leaves compost which produced flower bud longer number of days with a mean of 115. 67 days.

Effect of slow release fertilizer. Highly significant differences were obtained on the number of days from transplanting to flower bud formation as affected by different slow release fertilizers applied one month after transplanting. Application of Multicote (17-17-17) promoted earlier reproductive growth by producing the flower buds earlier

Table 3. Stem thickness (6 cm above the ground)

TREATMENT	MEAN
<u>Growing media</u>	
Mountain soil + horse manure + Alnus leaves compost	0.415 <sup>a</sup>
Mountain soil + Cattle manure + Alnus leaves compost	0.562 <sup>a</sup>
<u>Slow release fertilizer</u>	
Osmocote (18-6-12)	0.422 <sup>a</sup>
Multicote(17-17-17)	0.555 <sup>a</sup>

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



with a mean of 108.61 days while plants applied with Osmocte (18-6-12) treated plants were the longest days to achieve the flower bud formation at the mean of 113.33 days.

Interaction effect. Highly significant were obtained on the days of planting to flower bud formation (0.5 cm bud size) of Benguet lily at flowering as affected by the interaction effect between different growth media different slow release fertilizers. The best combinations were the application of growth media of 1:1:1 mountain soil + cattle manure + alnus leaves compost and Multicote (17-17-17) gathered the highest mean of 118.22 cm.

#### Days From Flower bud Formation to Tight Bud Stage.

Effect of growing media. Table 5 shows that there were no significant differences on the number of days from bud formation to tight bud stage in benguet lily cutflowers.

Effect of slow release fertilizer. Likewise Table 5 shows that there were no significant differences on the effects on the different kinds of slow release fertilizers with regards to the number of days from bud formation to tight bud stage. Means ranges from 1.00 to 1.17 days.

Interaction effect. Table5 shows that there were no significant differences on the days from flower bud formation to tight bud stage. This may due to the inherent genetic characteristics of the plants.

#### Cutflower Stem Length at Harvest (cm)

Effect of growing media. Table 6 shows that there were no significant differences on the stem length of cutflower at harvest of Benguet lily measured at harvesting.



Effect of slow release fertilizer. The effect of slow release fertilizers applied with regards to the cutflower stem length at harvest was highly significant as shown in table 6. Plants applied with Multicote (17-17-17) produced the longest cutflower stems with a mean of 36.03 cm. This was followed with the plants applied with osmocote (18-6-12) which had a mean of 29.80cm at tight bud stage.

Interaction effect. Table 6 shows that there were no significant differences on the stem length at harvest affected by the interaction effect between the different growing media and different slow release fertilizer. This may be due to the inherent genetic characteristics of the plants.

Length of Flower at Tight Bud Stage at Harvest (cm)

Effect of growing media. Highly significant differences were obtained on the length of flowers at tight bud stage at harvest as affected by different growing media

Table 4. Days from planting to flower bud formation (0.5 cm bud size)

TREATMENT	MEAN
<u>Growing media</u>	
Mountain soil + horse manure + Alnus leaves compost	106.278 <sup>b</sup>
Mountain soil + Cattle manure + Alnus leaves compost	115.665 <sup>a</sup>
<u>Slow release fertilizer</u>	
Osmocote (18-6-12)	113.333 <sup>a</sup>
Multicote(17-17-17)	108.610 <sup>b</sup>

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



Longer flower buds at tight bud stage of 13.45 cm were recorded in plants grown in a medium of 1:1:1 Mountain soil + cattle manure + alnus leaves compost. Plants grown in a medium of 1:1:1 mountain soil + cattle manure + alnus leaves compost leaves produced the shortest stems with a mean of 13.18cm at harvest.

Effect of slow release fertilizer. Likewise highly significance differences on the length of Table the flowers at tight bud stage at harvest were shown in Table 7. Application of Multicote.(17-17-17) produced the longer cutflower size which had a mean of 13.63 cm. This was followed by plants applied with Osmocote (18-6-12) with a mean of 12.94 cm.

Interaction effect. Significant differences were obtained on the days from flower bud formation to tight bud stage by interaction effect between different growing media and different slow release fertilizers. The best combination were the application of growth media having a ratio of 1:1:1 mountain soil + cattle manure + alnus leaves

Table5. Days from bud formation to tight bud stage.

TREATMENT	MEAN
<u>Growing media</u>	
Mountain soil + horse manure + Alnus leaves compost	1.167 <sup>a</sup>
Mountain soil + Cattle manure + Alnus leaves compost	1.000 <sup>a</sup>
<u>Slow release fertilizer</u>	
Osmocote (18-6-12)	1.000 <sup>a</sup>
Multicote(17-17-17)	1.167 <sup>a</sup>

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

Table 6.Cutflower stem length at harvest (cm)





TREATMENT	MEAN
<u>Growing media</u>	
Mountain soil + horse manure + Alnus leaves compost	32.322 <sup>a</sup>
Mountain soil + Cattle manure + Alnus leaves compost	33.528 <sup>a</sup>
<u>Slow release fertilizer</u>	
Osmocote (18-6-12)	29.823 <sup>b</sup>
Multicote(17-17-17)	36.027 <sup>a</sup>

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

compost and slow release fertilizer muticote (17-17-17) gathered the highest mean of 13.85 days.

#### Vaselife of Cutflowers Held in Tap Water Only

Effect of growing media. Table 8. Shows that there were no significant differences on the vaselife of benguet lily as affected by growing the different media.

Effect of slow release fertilizer. Highly significant differences were noted on the vaselifeofBenguet lily cutflowers shown in table 8. Plans applied of Multicote (17-17-17) producedcutflower with a the longest vaselife which had a mean of 13.63 while plants applied osmocote has the shortest vaselife which had a mean of 13.00 days.

Interaction effect. The Table8 shows that there were no significant differences on the vaselife of the cutflowers as affected by the interaction effect between the different



Table 7.Length of flower at tight bud stage at harvest (cm)

TREATMENT	MEAN
<u>Growing media</u>	
Mountain soil + horse manure + Alnus leaves compost	13.177 <sup>b</sup>
Mountain soil + Cattle manure + Alnus leaves compost	13.452 <sup>a</sup>
<u>Slow release fertilizer</u>	
Osmocote (18-6-12)	3.000 <sup>b</sup>
Multicote(17-17-17)	13.628 <sup>a</sup>

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

growing media and different slow release fertilizer. This may due to the inherent genetic characteristics of the plants.

#### Initial Soil Analysis

The initial soil analysis before transplanting showed that the soil had on the growing media of 1:1:1 mountain soil + cattle manure + alnus leaves compost is 5.69 pH which is slightly acidic.The soil contains high amount of nitrogen, high amount of phosphorous and it had a high amount of Potassium. On the other hand growing media of 1:1:1 mountain soil + horse manure + alnus leaves compost were acidic pH of 3.68. The soil contains low amount of nitrogen, least amount of phosphorous and it had a high amount of Potassium.



Table 8. Vase life of cutflower held in tap water only (days)

TREATMENT	MEAN
<u>Growing media</u>	
Mountain soil + horse manure + Alnus leaves compost	7.555 <sup>a</sup>
Mountain soil + Cattle manure + Alnus leaves compost	7.667 <sup>a</sup>
<u>Slow release fertilizer</u>	
Osmocote (18-6-12)	7.388 <sup>b</sup>
Multicote(17-17-17)	7.833 <sup>a</sup>

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

Table 9. Initial soil analysis of the different growing media

TREATMENT	pH	OM (%)	N (%)	P(ppm)	K(PPM)
Mountain soil + horse manure + alnus leaves compost	3.68	17.18	0.32	11.94	108.57
Mountain soil + Cattle manure + alnus leaves compost	5.69	19.85	0.68	689.80	604.87



## Documents of the Study in Pictures

Figure 1 shows the Benguet lily one month after transplanting applied with different slow release fertilizers in different growing media, figure 2 shows the vegetative stage of Benguet lily affected by different media and different slow release fertilizers, figure 3 bud formation of Benguet lily affected by different media and different slow release fertilizers, and figure 4 shows the flowering stage of Benguet lily affected by different media and different slow release fertilizers.



Figure 1. Benguet lily one month after transplanting applied with different slow release fertilizers in different growing media



Figure 2. Vegetative stage of Benguet lily affected by different growing media and different slow release fertilizers



Figure 3. Bud formation of Benguet lily affected by different growing media and different slow release fertilizers



Figure4. Flowering stage of Benguet lily affected by different growing media and 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 evaluate the growth and flowering performance of Benguet Lily in different kinds of slow release fertilizer and the growing media, 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 Benguet Lily production.

Results revealed that there is highly significant differences on the final height and final number of leaves at flowering, number of days from transplanting, stem length of cutflower harvest, and lastly vase life as affected by growing media and slow release fertilizer.

Application of multicote promoted vegetative growth and producing the tallest plants.

The initial soil analysis before transplanting showed that the soil had on the growing media of 1:1:1 mountain soil + cattle manure + alnus leaves compost is 5.69 pH which is slightly acidic. The soil contains high amount of nitrogen, high amount of phosphorous and it had a high amount of potassium. On the other hand growing media of 1:1:1 mountain soil + horse manure + alnus leaves compost were acidic pH of 3.68. The soil contains low amount of nitrogen, least amount of phosphorous and it had a high amount of Potassium.



## Conclusion

It is therefore concluded that the application of slow release fertilizer Multicote and growing media having a ratio of 1:1:1 mountain soil + cattle manure + alnus leaves compost to 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/15 cm of Multicote in Benguet lily plants grown in to the growing media of a ratio of 1:1:1 mountain soil + cattle manure + alnus leaves compost is the best for Benguet lily cutflower production to produce taller plants with longer stems.





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