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GROWTH AND FLOWERING OF PETUNIA (Petunia hybrida) AS AFFECTED BY DIFFERENT KINDS OF SLOW RELEASE FERTILIZERS.

ABSTRACT

The study was conducted at the Ornamental Horticultural Research Area, Benguet State University, La Trinidad, Benguet from January to April, 2006 to evaluate the growth and flowering of petunia as affected by different kinds of slow release fertilizer treatments in petunia potted plant production.

Results showed that there was no significant effect of the different slow release fertilizers applied on the final height at flowering, number of laterals per plant and number of leaves per plant counted at flowering. However, significant effects were obtained on the application of slow release fertilizers with regards to the duration to flowering; number of flowers per plant; and size of flowers at 50% anthesis.

More flowers and earlier flowering were noted in plants applied with Multicote at the rate of 17-17-17 while bigger blooms were measured in plants applied with Osmocote at 14-14-14.

Based on the above findings, Multicote at the rate of 17-17-17 is recommended for potted petunia production to enhance flowering and produce higher number of flowers. On the otherhand, Osmocote at the rate of 14-14-14 is recommended for the production of bigger blooms in potted petunia.

INTRODUCTION

Petunia is one of the most popular flowering annuals that belongs to the Family Solanaceae. It has pubescent branches with leaves that are alternate, soft and the entire flowers are showy.

Petunia are usually propagated by seeds and they thrive well either in full sun or in partial shade. It has different types and varieties with different colors which range in the different shades of white, purple, reds, with five lobed calyx and funnel or salver shaped corolla, with five lobed, stamens which are attracted to the tube. These plants are usually grown at 12-15 °C. A growth retardant is recommended to keep plants with compact growth in pots, (Ruggrero, 2002).

Osmocote and Multicote fertilizer formulations, which are slow, release fertilizers that can be applied in soil from of yield capacity to permanent wilting point, and in moisture levels with no significant differences in the rate of nutrient release in a wide ranges of soil pH from 4.0 to 6.9. When the various formulations are applied, the nutrients are released over a period of time. Osmocote (14-14-14) has 3-4 months longevity. Multicote granule is a mixture of NPK encapsulated in a biodegradable polymer coating that contains chlorine. Osmocote granules are cooled with resin and when moisture penetrates the coating, it will make the nutrient salts soluble.

The culture of bedding plants in which petunia is included,only started as a hobby but now has become a lucrative business because these plants provide beauty to indoor and outdoor areas of buildings. Shade and some measure of climatic control are needed for their proper growth. Their presence in homes and buildings add a touch of nature to the atmosphere.

It is hoped that the results of this study will help the flower growers increase their income in terms of volume and quality of their crops. It will also help in knowing the best rate and kind of slow release fertilizer in petunia that will promote and hasten the vegetative growth and improve their flowering.

MATERIALS AND METHODS

The materials to be used in this study were shoot tip cuttings of petunia (' Rose Picotee' variety), ANAA, slow release fertilizers (Multicote and Osmocote) formulations, measuring sticks, labelling materials, farm tools and polyethylene plastic bags (5x5x8 cm), sandy loam soil as growing media, (1:1:1 compost, garden soil and rice hull).

Experimental design and treatments. The treatments were laid out following the Completely Randomized Design (CRD) with 3 replications.

The treatments were as follows:

T0 – Unfertilized (Control)
T1 – Osmocote 14-14-14 at 6g/pot
T2 – Osmocote 18-16 -12 at 6 g/pot
T3 – Multicote 17-17-17 at 6 g/pot

Planting

Shoot tip cuttings of petunia about 8-10 cm long were rooted in plastic trays. Prior to rooting, the stem ends of the cuttings were dipped in 100 ppm ANAA solution for 30 minutes. After rooting, the seedlings were transplanted in 5x5x8 cm polyethylene plastic bags.

Fertilizer Application

The different SRF treatments were incorporated in the growing media (sandy loam soil) prior to transplanting of the rooted cuttings of petunia.

Care and Maintenance

Recommended cultural management practices such as : weeding, crop protection (spraying with fungicide or insecticide), irrigation were applied uniformly to all plants.

Data Gathering

The following data were gathered and subjected to analysis of variance and mean separation test by Duncan's Multiple Range Test (DMRT).

A. Vegetative Growth

1. **Final height at flowering (cm).** This was obtained by measuring the final height of the plants from the base up to the tip of the flowers, (at 50% opening stage).

2. **Number of laterals per plant at flowering.** This was gathered by counting the number of lateral stems produced per plant from February to April 2006.

3. **Number of leaves per plant.** The number of leaves per plant was counted at flowering.

4. **Number of flowers produced per plant.** The number of flowers produced after three months from transplanting was recorded.

B. Reproductive Growth

1. **Flower size (cm).** This was done by measuring the diameter of the first flower at full bloom stage.

2. **Days from transplanting to flower bud formation (0.5 cm bud size).** This was gathered by counting the number of days from transplanting to flower bud formation stage.

C. Initial soil analysis

Initial soil analysis was taken before transplanting to determine the pH, N, P, and K levels of the soil.

D. Cost and return analysis

This was obtained by recording all expenses incurred in the different fertilizer treatments in petunia potted plants production and the gross receipt obtained. The following formula was used:

$$ROI = \frac{\text{Net income}}{\text{Total Expenses}} \times 100$$

RESULTS AND DISCUSSION

Final Height of the Plants

The final height of the petunia plants were measured at 50% anthesis. Results show that there were no significant differences in the plant heights measured as affected by slow release fertilizer materials applied (Table 1). However, those applied with Multicote (17-17-17) were taller with a mean of 37.00 cm compared to Osmocote (14-14-14) treated plants with a mean of only 31.60 cm and those applied with Osmocote (18-16-12) with a mean of 24.67 cm at flowering.

Table 1. Final height at 50% anthesis

TREATMENT	MEAN (cm)
Unfertilized (Control)	30.77a
Osmocote (14-14-14) at 6g/pot	31.60a
Osmocote (18-16-12) at 6g/pot	24.67a
Multicote (17-17-17) at 6g/pot	37.00a

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

Number of Laterals Produced per Plant at Flowering

Results of the number of laterals per plant at flowering shows that there was no significant differences among the treatments (Table 2). However, plants treated with Osmocote (18-16-12) produced the lowest number of laterals with a mean of 2.67 per plant at flowering; while those applied with Multicote (17-17-17) produced a mean of 3.33 laterals while the application of Osmocote (14-14-14) produced the highest number of laterals with a mean of 3.67.

Table 2. Number of laterals produced per plant at flowering

TREATMENT	MEAN (cm)
Unfertilized (Control)	3.33a
Osmocote (14-14-14) at 6g/pot	3.67a
Osmocote (18-16-12) at 6g/pot	2.67a
Multicote (17-17-17) at 6g/pot	3.33a

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

Number of Leaves at Flowering

Table 3 shows that there was no statistically significant effects of the different kinds of slow release fertilizer applied on the number of leaves at flowering. However, the application of Multicote (17-17-17) enhanced the development of more leaves with a mean of 26.00 per plant. The least number of leaves was recorded from plants applied with Osmocote (18-16-12) with a mean of 20.00 and the unfertilized plants with a mean of 21.00 leaves per plant at flowering.

Table 3. Number of leaves per plant at flowering

TREATMENT	MEAN (cm)
Unfertilized (Control)	21.00a
Osmocote (14-14-14) at 6g/pot	24.00a
Osmocote (18-16-12) at 6g/pot	20.00a
Multicote (17-17-17) at 6g/pot	26.00a

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

Number of Flowers Produced per Plant

Table 4 shows the number of flowers produced per plant three months from transplanting. Plants applied with Multicote (17-17-17) , the unfertilized plants and the application of Osmocote (18-16-12) produced significantly more flowers per plant with means of 22.67, 22.00 and 15.33; respectively compared to plants applied with Osmocote (14-14-14) which had a mean of 13.00 flowers per plant throughout the flowering period.

Table 4. Number of flowers produced per plant

TREATMENT	MEAN (cm)
Unfertilized (Control)	22.00a
Osmocote (14-14-14) at 6g/pot	13.00b
Osmocote (18-16-12) at 6g/pot	15.33ab
Multicote (17-17-17) at 6g/pot	22.67a

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

Flower Size at Full Bloom Stage (cm)

The flower size of the petunia plant at full bloom stage is shown in Table 5. Results show that unfertilized plant produced significantly smaller flowers with a mean of 7.07 cm compared to the other treatments. Plants applied with Osmocote (14-14-14) produced the biggest flowers with a mean of 7.43 cm. This was followed by plants applied with Osmocote (18-16-12) and the multicote with the means of 7.10 and 7.03; respectively.

Table 5. Flower size at full bloom stage (cm)

TREATMENT	MEAN (cm)
Unfertilized (Control)	7.07b
Osmocote (14-14-14) at 6g/pot	7.43a
Osmocote (18-16-12) at 6g/pot	7.17b
Multicote (17-17-17) at 6g/pot	7.10b

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

Days from Transplanting to Flower Bud Formation

Days from transplanting to flower bud formation was significantly affected by the application of different slow release fertilizers. Table 6 reveals that the unfertilized plants flowered significantly earlier with a mean of 61.67days. This was followed by plants fertilized with Multicote (17-17-17) at 62.33 days compared to plants fertilized with Osmocote (14-14-14) and Osmocote (18-16-12) with means of 78.33 days.

Cost and Return Analysis

The lowest total cost of production and net income were obtained from the untreated plants with Php 301.00 and Php 132.74 obtained from Osmocote 18-16-12.

In terms of return on investment (ROI), the highest was obtained from the application of Multicote 17-17-17 with 79.48% while the lowest was obtained from the application of Osmocote 18-16-12 with only 38.22%, (Table 7).

Table 6. Days from transplanting to flower bud formation

TREATMENT	MEAN (cm)
Unfertilized (Control)	61.67c
Osmocote (14-14-14) at 6g/pot	78.33a
Osmocote (18-16-12) at 6g/pot	78.33a
Multicote (17-17-17) at 6g/pot	62.33b

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

Table 7. Cost and return analysis for 24 potted plants

PARTICULAR	CONTROL	SLOW RELEASE FERTILIZER		
		OSMOCOTE 14-14-14	OSMOCOTE 18-16-12	MULTICOTE 17-17-17
A. COST OF PRODUCTION				
Planting materials at Php 5 each	120.00	120.00	120.00	120.00
Fertilizers		41.76	41.76	28.80
Pesticides	20.00	20.00	20.00	20.00
Plastic pots	96.00	96.00	96.00	96.00
ANAA for rooting	8.00	8.00	8.00	8.00
Labor at Php 150.00/md				
Weeding	18.75	18.75	18.75	18.75
Watering	18.75	18.75	18.75	18.75
Spraying	9.50	9.50	9.50	9.50
Fertilizer Application		4.50	4.50	4.50
Transportation	10.00			
TOTAL	**301.00**	**331.07**	**331.07**	**383.55**
B. GROSS INCOME				
24 potted flowering plants at Php 25/pot		600.00		600.00
24 potted flowering plants at Php 20/pot	480.00		480.00	
NET INCOME	**199.00**	**252.74**	**132.74**	**265.10**
ROI (%)	**66.11**	**72.78**	**38.22**	**79.48**
RANK	**3**	**2**	**4**	**1**

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The study was conducted to evaluate the growth and flowering of petunia as affected by the kind of slow release fertilizers applied and to determine the economics of using the different fertilizer treatments in petunia potted plant production. The study was conducted at the Ornamental Horticulture Research Area, Benguet State University, La Trinidad Benguet from January 2006 to April 2006.

Results revealed that there was no significant effects of the application of different slow release fertilizers and the untreated plants in terms of the final height at flowering, the number of laterals per plant, the number of leaves per plant at flowering and duration of flowering. However, significant effects were noted in the duration of flowering, number of flowers per plant and size of flowers at 50% anthesis. The largest flowers were measured in plants fertilized with Osmocote 14-14-14 with means of 7.43 cm while plants fertilized with Multicote 17-17-17 flowered earlier and produced the highest number of flowers per plant.

The initial soil analysis done before planting the petunia showed that the soil had a pH of 6.0 which is slightly acidic. The soil had low amounts of nitrogen and phosphorus and a deficient amount of potassium

Conclusion

The application of the slow release fertilizer' Multicote at 17-17-17 on petunia plants significantly increased the number of flowers produced during the entire flowering period. Osmocote 14-14-14 significantly improved the flower size by enhancing the production of larger flowers. Application of Multicote (17-17-17) hastened flowering among the treated plans.

Recommendation

Based on the findings of the study, application of Multicote (17-17-17) produced more flowers per plant during the flowering period. With regards to increasing the flower size, Osmocote at 14-14-14 was the best slow release fertilizer and is therefore recommended for bigger blooms in potted petunia production.

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