BIBLIOGRAPHY

CHAVEZ, JOANA MARIE C. OCTOBER 2009. Acceleration of Flowering in Milflores (*Hydrangea macrophylla*) as Affected by Gibberellic Acid Application. Benguet State University, La Trinidad, Benguet.

Adviser: Araceli G. Ladilad, PhD

ABSTRACT

The study was conducted at the Ornamental Horticulture Research Area, Benguet State University, La Trinidad, Benguet from November 2008 to May 2009 to determine the best GA_3 concentrations that could effectively enhance the flowering of milflores, determine the effect of the different rates of GA_3 in the growth and flowering of two varieties of milflores, and to determine the economics of applying gibberellic acid in *Hydrangea* potted plant and cutflowers production.

The two varieties of milflores, namely: Cv Lemon Zest and Nikko Blue were observed after treatment with 0, 250, 500, 750, 1000 ppm GA_3 applied two times at weekly intervals.

Cultivar Nikko Blue showed earlier flower bud formation and flower development, had the most number of laterals produced per plant, had the highest number of cutflowers produced per plant and had the longest vaselife of cutflowers. Cultivar Lemon Zest produced the tallest plants at flowering, had the highest number of leaves per plant, had the biggest blooms at 50% anthesis, had the biggest stem diameter and had the longest stem length.

On the other hand, plants treated with 500 ppm GA_3 , were the earliest to form flower buds and first to reach harvesting stage (41.82 and 37.07 days) after transplanting, and had the highest number of cutflowers produced.

Plants applied with 750 to 1000 ppm GA_3, produced higher number of leaves and had longer vaselife of cutflowers with a mean of 8.28 days from holding in the tap water only, to the onset of senescence.

Plants sprayed with 750 ppm GA_3, were the tallest plants at flowering (83.40 cm) and had bigger stem diameter (0.86 cm) while plants treated with 1000 ppm GA_3 had the biggest blooms at flowering and longest stem compared to plants sprayed with the other GA_3 concentrations.

However, economically, application of 500 ppm GA_3 is recommended to the two varieties of milflores grown in the study to enhance flowering, since both had the highest ROI of 79.00% and 82.55%, respectively for Cvs. Lemon Zest and Nikko Blue.

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INTRODUCTION

Milflores (*Hydrangea macrophylla*) is one of the 80 species of genus hydrangea. They are shrub in the *Saxifrage* family native of Japan. Flowers are large, branched globose cyme of the hortensia or mop- head type with abundant, mostly sterile, individual florets, 4-5 petal- liked sepals per flower (Anon., 2002).

Hydrangea macrophylla is an old fashioned plant with a great look for today's gardens. This striking black- stemmed plant of Japanese origin had been popular for over a century in England. It bears large, rose to blue heads of the hortensia or mop- head type. Even the casual observer will notice the crisp contrast of blackish- purple stems, pale flowers, and light green foliage. *H. macrophylla* was identified as a plant with potential value and highly attractive as a pot plant or summer flowering shrub in the garden border in sunny locations or in partial shade (Anon., 2002).

Recent studies claim that flowering of most plants could be regulated through the use of plant growth regulators in which gibberellic acid is one of them.

Plant hormones such as gibberellins can be of help in hastening and promoting uniform flowering. Gibberellins are a group of plant hormones that plays an important role in producing growth effects in plants. These alter the growth of plants since their application have caused rosette plants to elongate in a manner suggestive of bolting. This hormone has also been known to enhance flowering of plants by increasing the gibberellins level of the plant through nitrogenous application. Gibberellins cause or promote by either facilitating the formation of flowering hormones in the leaves or their expression in the growing bud (Mastalerz, 1977).

However, its effect on the flowering of milflores has not been studied in the

locality.

This study was conducted at the Ornamental Horticulture Research Area, Benguet State University, La Trinidad, Benguet from November 2008 to May 2009 to determine the best GA_3 concentration/s that could effectively enhance the flowering of milflores, to determine the effect of the different rates of GA_3 in the growth and flowering of two varieties of milflores and to determine the economics of applying gibberellic acid in *Hydrangea* potted plant and cutflowers production.

REVIEW OF LITERATURE

Gibberellins

Gibberellic acid is a growth regulator which can produced wide varieties of plant responses such as breaking dormancy, induction of flowering, parthenocarpic fruit set and sex expression. Gibberellins are naturally occurring hormones that have been isolated from higher plant tissues. They similarly as IAA (indole acetic acid), another kind of hormone, to promote cell elongation, induce parthenocarpy, promote cambial activity and issue new RNA and protein synthesis (Devlin, 1977).

In the mid- 1950's, certain cold requiring species applied with GA_3 were induced to flower without a low temperature treatment. It was also found that GA_3 induced the flowering of some photoperiod sensitive plants (Lang *et al*., 1957).

Application of GA_3 to grasses such as rice causes both leaf and stem elongation. In broad-leaf plants the stimulation of stem growth is more dramatic. Cabbage may elongate to as height as 6 feet and bush may become a climbing pole bean (Leopold and Kreidmann, 1964).

Gibberellins appear to affect almost all plant organs from root to flower, fruit and seed development. Shein and Jackson (1972) reported that gibberellic acid applied to decapitated stems, petioles or to buds promote growth of buds in the axile of trifoliate leaves but seldom increased the growth of buds in axile of primary leaves.

Gibberellins does not only induced cell elongation but also promotes flowering on most ornamental and vegetable crops. Application of GA_3 as foliar spray to stem apices at 10 to 100 ppm hastens flowering by 10 days to 4 weeks in petunia, stock, larkspur, English daisy, China aster, and gerbera (Weaver, 1972).

According to Caluya and Imlan (1939) as cited by Andres (1987) the GA_3 induced the rapid elongation of plants in general. Even as early as one week after the first application. The treatment plants were already taller than the untreated plants. The more concentrated the growth regulator, the higher was the weekly height increment in stem length.

Three applications of 1000 ppm GA_3 at weekly intervals significantly promoted earlier flowering, faster flower development, improved flower quality, produced bigger sized blooms at harvesting and produced taller plants with longer floral stems of anthurium cv. Kansako (Galimba, 1993). It was also reported that gibberellic acid treatment greatly affected the flowering to Mr. Lincoln roses (Mendoza, 1993). GA_3 of 500 ppm with two applications significantly enhanced cutflower production, increase yield, higher number of leaves per plant anthesis, bigger flower buds and blooms, higher leaf area and leaf area index at flowering and promoted longer vaselife.

Weier (1947) stated that gibberellins applied to long day rosette plants produced flowers under short to long day. Likewise, gibberellins inhibited flower initiation in many other plants especially woody plants. It has been reported that flowering in Azalea was hastened from 25 to 59 days when sprayed with GA_3 in comparison to plants which received cold treatments for 30 days prior to forcing (Barbara and Pokorny, 1961).

In general, gibberellins are a group of plant hormones that promotes plant growth, they are used for encouraging plant growth, hastening germination, encouraging growth in cold weather, increasing the size of some fruits, increasing the yield of some crops, and breaking the dormancy of various seeds. The response of gibberellins varies with the plant species.

Flowering and Flowering Requirement of Milflores

Flowers of most hydrangeas are pH sensitive with dark purple or blue flowers in acidic soils, white or dull green in neutral earth, and pink in alkaline soil (Anon., 2002). Research has determined that milfores need plenty of light to keep blooming, but cannot tolerate the direct afternoon sun. While they are in bloom, milflores need enough amount of water, and when they finish blooming, they need much less, but they should not be allowed to dry out. Most local water is very alkaline and it may affect the color or the blooms. Milflores stay in the best condition if they are keep cool, around to 50-60 degrees, and they like average to high humidity. Milflores are fed every other week with a half-strength water soluble fertilizer.

MATERIALS AND METHODS

Materials

The materials used in the experiment were: flowering milflores plants (Lemon Zest and Nikko Blue), GA_3, polyethylene black plastic bags (7"x11") with the potting mix of 1:1:1 garden soil, compost and rice hull, pesticides (insecticides and fungicides), fertilizers, greenhouse tools, watering can, identifying tags

Methods

The study was laid-out in Completely Randomized Design (CRD) following the factorial arrangement with two varieties of milflores as Factor A and the different concentration of GA_3 as Factor B. Each treatment was replicated three times with three sample plants per treatment.

The treatments were as follows:

Factor A	=	Variety
V_1	=	Lemon Zest
V_2	=	Nikko Blue

Factor B	=	GA_3 Concentration (ppm)
C_1	=	0 (control)
C_2	=	250
C_3	=	500
C_4	=	750
C_5	=	1000

One year old plants were used in the study. All plants will be grown in 7”x11” polyethylene black plastic bags with 1:1:1 garden soil, compost, rice hull.

Milflores plants were treated with the different concentrations of GA_3 two times at weekly intervals, two weeks after transplanting.

All cultural practices required for growing milflores were employed uniformly on all treatments.

The data gathered and subjected to variance analysis and mean separation by Duncan’s Multiple Range Test (DMRT) were as follows:

A. Vegetative Growth

1. Final height per plant at flowering (cm). This was taken by measuring the plant from base to the tip at full bloom flowering (50% anthesis).

2. Number of leaves per plant at flowering. This was done by counting the number of leaves per plant at flowering.

3. Number of laterals per plant at flowering. This was done by counting the number of laterals per plant at flowering.

B. Reproductive Growth

1. Days from transplanting to flower bud formation (1cm. bud size). This was obtained by counting the number of days from planting up to the time the plants initiated flower buds.

2. Days from flower bud formation to harvesting (50% anthesis). This was obtained by counting the number of days from the time the plants started to form flower buds up to harvesting stage.

C. Cutflower Quality

1. Stem length at harvest (cm). This was obtained by measuring the stem length of each cutflower harvested.

2. Flower diameter of cyme at harvest (cm). This was the diameter of flower taken at 50% anthesis.

3. Stem diameter (cm). This was obtained by using veneer caliper to measure the diameter of the cutflowers at full bloom stage.

4. Vaselife. The number of days from holding up to the onset of senescence was recorded.

D. Cutflower yield. This was obtained the number of flowers produced for the duration of the study per plant.

E. Occurrence of Insect Pests and Diseases. All insect pests and diseases observed during the study were identified.

F. Cost and Return Analysis. All expenses incurred during the study were recorded and the return on investment (ROI) was computed using the formula:

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

G. Meteorological data. This was taken from BSU PAGASA station. The data were include: daylength (minutes), rainfall (mm), temperature (^{o}C), relative humidity (%).

H. Documentation of the study in pictures. Documentation of the study was done through pictures.

RESULTS AND DISCUSSION

Final Plant Height at Flowering

Effect of variety. Results show highly significant differences on the final plant height of the two milflores varieties measured at flowering (Table 1). It was noted that Lemon Zest were taller than Nikko Blue with plant heights of 83.40 and 60.20 cm, respectively. This signifies that Lemon Zest had better effect on GA_3 concentration in terms of plant height.

Effect of GA_3 concentration. Highly significant differences were obtained on the final height of milflores as affected by different GA_3 concentrations. Tallest plants were obtained from those applied with 750 ppm GA_3 with a final height of 81.28 cm followed by those treated with 500, 1000 ad 250 ppm of GA_3 with means of 80.28, 79.11 and 70.22 cm, respectively. Shortest plants were obtained from the untreated plants (control) with a mean of 44.61 cm.

These findings conform with the earlier results of the study of Mastalerz (1977) as cited by Weaver (1972) that GA_3 induced stem elongation of plants.

Interaction effect. There were no significant interaction effect between the two milflores varieties and the different GA_3 concentrations on the final height measured at flowering.

Number of Leaves Per Plant at Flowering

Effect of variety. Table 2 shows significant differences on the number of leaves produced at flowering. Lemon Zest had the highest number of leaves per plant at flowering compared to Nikko Blue with only 93.47 leaves per plant.

Table 1. Final plant height at flowering (cm)

TREATMENT	MEAN
Variety	
Lemon Zest	83.40[a]
Nikko Blue	60.20[b]
GA_3 Concentration (ppm)	
0 (control)	44.61[c]
250	73.72[b]
500	80.28[a]
750	81.28[a]
1000	79.11[a]

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

Effect of GA_3 concentration. There were no significant effects of the different GA_3 concentrations on the number of leaves produced per plant at flowering. Plants applied with 750 and 1000 ppm GA_3 produced the highest number of leaves at flowering with a mean of 107.06 followed by those applied with 500 and 250 ppm of GA_3 having means of 104.61 and 98.28, respectively. The lowest number of leaves counted was obtained from untreated plants (control) which had a mean of 88.22 leaves per plant at flowering.

Interaction effect. No significant interaction effects were obtained between the two milflores varieties and the different GA_3 concentration in terms on the number of leaves produced at flowering.

Table 2. Number of leaves per plant at flowering

TREATMENT	MEAN
Variety	
Lemon Zest	108.62[a]
Nikko Blue	93.47[b]
GA_3 Concentration (ppm)	
0 (control)	88.22[a]
250	98.28[a]
500	104.61[a]
750	107.06[a]
1000	107.06[a]

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

Number of Laterals Per Plant at Flowering

Effect of variety. Table 3 shows the number of laterals produced per plant at flowering as affected by two varieties of milflores. Significant differences were noted on the number of laterals per plant at flowering as affected by two varieties of milflores. Nikko Blue had the highest number of laterals with mean of 10.80 laterals per plant at flowering compared to Lemon Zest with only 9.24 laterals per plant.

Effect of GA_3 concentration. There were no significant differences on the number of laterals produced per plant at flowering as affected by different GA_3 concentrations (Table 3). Plants applied with 500 ppm GA_3 produced the highest number of laterals at flowering with a mean of 10.67 followed by those applied with 250, 1000 ppm GA_3 and untreated plants (control) with a means of 10.17, 9.89 and 9.78, respectively. The lowest

Table 3. Number of laterals per plant at flowering

TREATMENT	MEAN
Variety	
Lemon Zest	9.24[b]
Nikko Blue	10.80[a]
GA_3 Concentration (ppm)	
0 (control)	9.78[a]
250	10.17[a]
500	10.67[a]
750	9.61[a]
1000	9.89[a]

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

number of laterals was obtained from those applied with 750 ppm which had a mean of 9.61 laterals per plant at flowering.

Interaction effect. There were no significant interaction effects obtained between the two milflores varieties and the different GA_3 concentration in terms on the number of laterals per plant at flowering.

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

Effect of variety. Table 4 shows highly significant differences among the two varieties of milflores with regards to the number of days from transplanting to flower bud formation. Earliest to initiate flower buds was the cultivar Nikko Blue with 41.82 mean

days from planting, while cultivar Lemon Zest delay in the flower initiation with 61.53 mean days from planting.

Effect of GA_3 concentration. There were no significant differences obtained on the number of days from transplanting to flower bud formation as affected by the different GA_3 concentrations applied on the two milflores varieties. The untreated plants required the longest duration to flower with mean of 60.11 days from planting. Plants treated with 500 ppm GA_3 initiate flower buds earlier with mean of 40.33 days compared to plants treated with 750, 1000 and 250 ppm with a means of 51.39, 52.72 and 53.83 days, respectively from planting.

Table 4. Days from transplanting to flower bud formation (1 cm bud size)

TREATMENT	MEAN (days)
Variety	
Lemon Zest	61.53[a]
Nikko Blue	41.82[b]
GA_3 Concentration (ppm)	
0 (control)	60.11[a]
250	53.83[a]
500	40.33[a]
750	51.39[a]
1000	52.72[a]

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

Interaction effect. There were no significant interaction effect observed between the different varieties of milflores and the different GA_3 concentrations on the number of days from transplanting to flower bud formation.

Days from Flower Bud Formation
to Harvesting (50% anthesis)

Effect of variety. Results showed significant differences on the number of days from flower bud formation to harvesting as affected by the two varieties of milflores (Table 5). The earliest to reach the harvesting stage were cultivar Nikko Blue with means of 37.07 days from flower bud formation stage. Cultivar Lemon Zest had delayed flower development and were the latest to reach harvesting stage with mean of 40.42 days from flower bud formation stage.

Effect GA_3 concentration. Significant differences were observed on the number of days from flower bud formation to harvesting stage of milflores as affected by GA_3 application. Delayed flower development were observed on plants which were not applied with GA_3. Plants treated with 500 ppm GA_3 were the fastest to initiate flower development among the treatments, thus, the earliest to reach harvesting stage having an average of 33.72 days from flower bud formation stage compared to 1000, 750 and 250 ppm with an average of 36.83, 37.56 and 41.28 days, respectively from flower bud formation.

Interaction effect. There were no significant interaction effects observed between the two varieties of milflores and the different GA_3 concentrations with regards to the number of days from flower bud formation to harvesting.

Table 5. Days from flower bud formation to harvesting (50% anthesis)

TREATMENT	MEAN (days)
Variety	
Lemon Zest	40.42[a]
Nikko Blue	37.07[b]
GA_3 Concentration (ppm)	
0 (control)	44.34[a]
250	41.28[a]
500	33.72[b]
750	37.56[b]
1000	36.83[b]

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

Stem Length at Harvest

Effect of variety. Table 6 shows highly significant differences on the stem length of two varieties of milflores at harvest. Plants of cv. Lemon Zest were significantly taller compared to cv. Nikko Blue with a mean stem length of 63.12 cm.

Effect of GA_3 concentration. Highly significant differences were observed in the stem length of the milflores as affected by different GA_3 concentrations (Table 6). Plants sprayed with 1000 ppm GA_3 significantly produced longer flower stem which had mean of 69.00 cm compared to untreated plants which are the shortest with amean of 30.86 cm.

Result shows that GA_3 treated plants had significantly longer stem at flowering compared to the untreated plants. Likewise, it was observed that as GA_3 concentration

Table 6. Stem length at harvest (cm)

TREATMENT	MEAN
Variety	
Lemon Zest	63.12[a]
Nikko Blue	50.17[b]
GA_3 Concentration (ppm)	
0 (control)	30.86[d]
250	55.96[c]
500	59.33[a]
750	68.07[a]
1000	69.00[a]

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

was increased, there is a corresponding increase in the length of stem of milflores cutflowers at harvest.

Interaction effect. The interaction effects between the milflores varieties and the different GA_3 concentration on stem length at harvest was not significant.

Flower Diameter at 50 % Anthesis (cm)

Effect of variety. Table 7 shows that there were no significant differences obtained with regards to flower diameter measured at 50% anthesis. However, results showed that bigger blooms were obtained from cultivar Lemon Zest with mean flower diameter of 17.53 cm. smallest blooms were exhibited by cv. Nikko Blue with mean flower diameter of 16.78 cm.

Table 7. Flower diameter at 50% anthesis (cm)

TREATMENT	MEAN
Variety	
Lemon Zest	17.53[a]
Nikko Blue	16.78[a]
GA_3 Concentration (ppm)	
0 (control)	16.56[a]
250	16.33[a]
500	16.68[a]
750	17.91[a]
1000	18.31[a]

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

Effect of GA_3 concentration. There were no significant difference obtained with regards with flower diameter measured at 50% anthesis of two milflores varieties as affected by different GA_3 concentrations applied. However, results showed that plants treated with 1000 ppm had the biggest flowers with a mean of 18.31 cm followed by plant treated with 750 ppm with a mean of 17.91 cm. the smallest blooms were obtained from untreated plants, and those sprayed with 500 and 250 ppm with means of 16.56, 16.68 and 16.33 cm, respectively.

Interaction effect. There were no significant differences obtained between the milflores varieties and the different GA_3 concentrations applied with regards to flower diameter of milflores at 50% anthesis.

Stem Diameter at Harvest (cm)

Effect of variety. Table 8 shows that the effect of two varieties of milflores on the stem diameter at harvest were not significant. Cultivar Lemon Zest had bigger stem diameter compared to Nikko Blue having mean of 0.86 and 0.81 cm, respectively.

Effect of GA_3 concentration. There were no significant differences obtained with regards to the stem diameter at harvest as affected by GA_3 concentrations. However, result shows that plants applied 750 ppm GA_3 had bigger stem diameter of cutflowers with mean of 0.88 cm while the smallest stem diameter were gathered from the untrated plants and those plants applied with 250 ppm GA_3 with a means of 0.79 cm.

Table 8. Stem diameter at harvest (cm)

TREATMENT	MEAN
Variety	
Lemon Zest	0.86[a]
Nikko Blue	0.81[a]
GA_3 Concentration (ppm)	
0 (control)	0.79[a]
250	0.79[a]
500	0.85[a]
750	0.88[a]
1000	0.86[a]

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

Interaction effects. There were no significant differences were obtained between the two varieties of milflores and different GA_3 concentrations with regards to stem diameter at harvest.

Vaselife

Effect of variety. The average vaselife of milflores cutflowers as affected by different varieties of milflores used is shown in Table 9. highly significant differences were obtained on the vaselife of cutflowers. Cv. Nikko Blue which had the longest vaselife while the cutflower Lemon Zest had the lowest vaselife of cutflowers held in tap water only under room temperature.

Effect of GA_3 concentration. Table 9 shows that there were no significant differences obtained with regards to the number of days of aesthetic life of cutflowers of two varieties as affected by different GA_3 concentrations applied. However, cutflowers from plants treated with 750 and 1000 ppm GA_3 has the longest vaselife with means of 8.28 days from holding. Shorter vaselife were obtained on cutflowers from plants not applied with GA_3, and from those treated with 500 and 250 ppm with mean of 7.61, 7.89 and 7.83 days, respectively.

Result show that cutflowers from GA_3 treated plants had longer vaselife compare to those obtained from the untreated plants.

The result confirmed with the earlier findings of Krishnamoorthy (1981) that GA_3 application delays senescence. Delay in senescence is accompanied by delay in the loss of chlorophyll protein and RNA. This is accomplished by both preventing the degradation of these components and also by increase in their synthesis.

Table 9. Vaselife

TREATMENT	MEAN (Days)
Variety	
Lemon Zest	7.27[b]
Nikko Blue	8.69[a]
GA_3 Concentration (ppm)	
0 (control)	7.61[a]
250	7.83[a]
500	7.89[a]
750	8.28[a]
1000	8.28[a]

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

Interaction effect. There were no significant differences obtained with regards to the vaselife of the milflores cutflowers as affected by the combined effect of the different milflores varieties and the different GA_3 concentrations.

Cutflower Yield Produced

Effect of variety. The average number of cutflowers produced per plant is shown in Table 10. Significant differences were obtained on the two varieties of milflores with regards to the average yield of cutflowers per plant. Results show that Cv. Nikko Blue produced higher number of cutflowers per plant compared to Cv. Lemon Zest which produced lesser of cutflowers produced per plant.

Effect of GA_3 concentration. Table 10 shows the response of milflores based on the number of cutflowers produced per plant as affected by GA_3 applied with different concentrations. Plants treated with 500 ppm GA_3 produced more cutflowers. However, it is comparable to the plants treated with 250 ppm GA_3. Untreated (control) plants obtained lowest number of cutflowers per plant but it was comparable to the plants treated with 750 and 1000 ppm GA_3.

Interaction effect. There were no significant interaction effect obtained on the average number of cutflowers produced as affected by the two varieties of milflores and the different GA_3 concentrations.

Table 10. Cutflower yield produced per plant from February 2009 to May 2009

TREATMENT	MEAN
Variety	
Lemon Zest	9.24[b]
Nikko Blue	10.80[a]
GA_3 Concentration (ppm)	
0 (control)	9.78[a]
250	10.17[a]
500	10.67[a]
750	9.61[a]
1000	9.89[a]

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

Occurrence of Insect Pest and Diseases

Insect pest and diseases observed during the study were identified. The insect pest noted during the conduct of the study were snail and slugs and were controlled by hand picking, while the diseases identified were powdery mildew and black spot and were controlled by applying 4-7 tablespoon of Curazeb in 16 liters of water.

Cost and Return Analysis

The economics of using GA_3 in potted milflores production is shown in Table 11. Results shows that the highest return on investment (ROI) were obtained from Cv. Nikko Blue applied with 500 ppm GA_3 with 82.55% while the lowest ROI with 73.97% were obtained from Cv. Lemon Zest applied with 250 ppm GA_3.

Meteorological Data

Table 10 presents the meteorological data obtained from BSU-PAGASA, Balili, La Trinidad, Benguet from November 2008 to May 2009.

Relative humidity continued to increased from November to May during the study period. The minimum and maximum temperature had the highest temperature during the month of November. Rainfall was highest during the month of April while the month of February had the longest daylength.

Table 11. Cost and return analysis

	Lemon Zest					Nikko Blue				
	C_1	C_2	C_3	C_4	C_5	C_1	C_2	C_3	C_4	C_5
Production Cost (Php)										
Planting Materials	445.00	445.00	445.00	445.00	445.00	400.00	400.00	400.00	400.00	400.00
Verellix (GA_3)	-	50.00	100.00	150.00	200.00	-	50.00	100.00	150.00	200.00
Fertilizers										
14-14-14	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Chemicals										
Fungicides	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Labor										
Weeding	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Watering	179.00	179.00	179.00	179.00	179.00	179.00	179.00	179.00	179.00	179.00
Spraying	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Fertilizer Application	18.50	18.50	18.50	18.50	18.50	18.5	18.50	18.50	18.50	18.50
Harvesting	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50
TOTAL	776.00	826.00	876.00	926.00	976.00	731.00	781.00	831.00	881.00	931.00
Gross Income	1367.00	1437.00	1567.00	1641.00	1714.00	1277.00	1387.00	1567.00	1577.00	1667.00
Net Income	591.00	611.00	691.00	715.00	738.00	546.00	606.00	686.00	696.00	736.00
ROI (%)	76.16	73.97	78.88	77.21	75.61	74.69	77.60	82.55	79.00	79.05
Rank	7	10	4	6	8	9	5	1	3	2

*Selling Price: potted Lemon Zest= Php 50.00; potted Nikko Blue= Php 40.00

*Berellix (GA_3): C_1= control (untreated); C_2= 250 ppm GA_3; C_3= 500 ppm GA_3; C_4= 750 ppm GA_3; C_5= 1000 ppm GA_3

Table 12. Meteorological data

MONTH	DAYLENGTH	RAINFALL	TEMPERATURE ^{o}C		RELATIVE HUMIDITY
			Minimum	Maximum	
Nov-08	304.6	3.10	16.2	25.2	75.2
Dec-08	369.8	0.1	13.6	24.4	82.0
Jan-09	349.0	0.03	13.1	24.6	85.0
Feb-09	393.0	3.5	13.6	24.8	85.0
Mar-09	266.9	1.6	14.8	25.1	86.0
Apr-09	278.6	12.9	16.0	24.7	89.0
May-09	276.5	11.6	15.8	24.4	89.0

Milflores plants before GA_3 application

Cultivar Lemon Zest at flowering

Cultivar Nikko Blue at flowering

Figure 1. Overview of the experiment

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The study on the flowering of two varieties of milflores as affected by the application of different GA_3 concentrations was conducted at the Benguet State University, La Trinidad, Benguet.

The earliest to initiate flower buds and first to reach harvesting stage was Cv. Nikko Blue applied with 500 ppm GA_3. These plants had the highest number of laterals per plant produced at flowering. Delay in flowering was noted in the untreated (control) plants

With regards to plant height, the tallest plants were observed from Cv. Lemon Zest applied with 750 ppm GA_3, while the shortest plants were observed from Cv. Nikko Blue which were not treated with GA_3.

On the number of leaves per plant, plants of cv. Lemon Zest applied with 750 to 1000 ppm GA_3, had the highest number of leaves per plant while the untreated plants of Cv. Nikko Blue had the lowest number of leaves per plant.

Plants treated with 1000 ppm GA_3 of Cv. Lemon Zest had longer stems, while the shortest stems were observed from cv. Nikko Blue which were not treated with GA_3.

With regards to cutflower quality, bigger blooms were observed on Cv. Lemon Zest sprayed with 1000 ppm GA_3 measuring 17.53 cm at 50% anthesis. On the other hand, cv. Nikko Blue applied with 250 ppm GA_3 had smaller blooms with a mean of 16.33 cm flower diameter.

Cultivar Lemon Zest applied with 750 ppm GA_3 had the bigger stem diameter with 0.88 cm at harvest; while the untreated plants of Cv. Nikko Blue and those applied with 250 ppm GA_3 had the smallest stem diameter at flowering.

Plants treated with 250 to 1000 ppm GA_3 had longer vaselife compared to the untreated plants. However, increasing concentrations of GA_3 to 1000 ppm tends to lengthen the vaselife of milflores cutflowers.

On the other hand, higher number of cutflowers produced per plant was recorded on Cv. Nikko Blue. Results shows that plants treated with 500 ppm GA_3 produced more cutflowers.

The highest return on investment (ROI) were obtained from Cv. Nikko Blue applied with 500 ppm GA_3.

Conclusion

Based on the above findings, it is concluded that application of 500 to 1000 ppm GA_3 were the best concentrations that will enhance flowering and improve cutflower quality of milflores.

Recommendations

Application of GA_3 can be recommended in growing milflores for cutflower production under La Trinidad, Benguet conditions at concentrations of 500 to 1000 GA_3.

However, application of 500 ppm GA_3 can be used for economic reasons.

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APPENDICES

Appendix Table 1. Final height at flowering (cm)

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
V1C1	56.33	62.33	64.33	182.99	71.00
V1C2	93.67	84.00	83.67	261.34	87.11
V1C3	86.33	82.67	93.33	262.33	87.44
V1C4	90.33	83.00	100.67	274.00	91.33
V1C5	93.00	92.67	84.67	270.34	90.11
SUB-TOTAL	419.66	404.67	426.67	1251.00	85.40
V2C1	23.00	35.67	26.00	84.67	28.22
V2C2	56.67	61.00	63.33	181.00	60.33
V2C3	65.67	67.67	86.00	219.34	73.11
V2C4	64.00	66.67	83.00	213.67	71.22
V2C5	64.67	67.00	72.67	204.34	68.11
SUB-TOTAL	274.01	298.01	331.00	903.02	60.20
TOTAL	693.67	702.68	757.67	2154.02	72.80

TWO-WAY TABLE

GA_3 CONCENTRATIONS (ppm)	VARIETY 1	VARIETY 2	TOTAL	MEAN
0 (Control)	71.00	28.22	99.22	49.61
250	87.11	60.33	147.44	73.72
500	87.44	73.11	160.55	80.28
750	91.33	71.22	162.55	81.28
1000	90.11	68.11	158.22	79.11
TOTAL	85.40	60.20	727.91	72.91

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
TREATMENT	9	10076.74	1119.638	23.15	2.39	3.46
FACTOR A	1	4036.336	4036.336	83.47**	4.35	8.10
FACTOR B	4	5749.207	1437.302	29.72**	2.87	4.43
A x B	4	291.195	72.799	1.51ns	2.87	4.43
ERROR	20	967.088	48.354			
TOTAL	29	11043.83				

**- highly significant
ns- not significant

Coefficient of variation= 9.68%

Appendix Table 2. Number of leaves per plant at flowering

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
V1C1	102.33	113.00	81.00	296.33	98.78
V1C2	129.67	113.33	86.00	329.00	109.67
V1C3	127.67	124.67	99.00	351.34	117.11
V1C4	115.67	123.67	89.33	328.67	109.56
V1C5	116.00	119.33	88.67	324.00	108.00
SUB-TOTAL	591.34	594.00	444.00	1629.34	108.62
V2C1	84.00	80.67	68.33	233.00	77.67
V2C2	91.33	91.67	77.67	260.67	86.89
V2C3	114.33	79.00	83.00	276.33	92.11
V2C4	95.67	113.33	84.67	313.67	104.56
V2C5	100.33	131.33	86.67	318.33	106.11
SUB-TOTAL	485.66	516.00	400.34	1402.00	93.47
TOTAL	1077.00	1110.00	844.34	3031.34	101.05

TWO-WAY TABLE

GA_3 CONCENTRATIONS (ppm)	VARIETY 1	VARIETY 2	TOTAL	MEAN
0 (Control)	98.78	77.67	176.45	88.23
250	109.67	86.89	196.56	98.28
500	117.11	92.11	209.22	104.61
750	109.56	104.56	214.12	107.06
1000	108.00	106.11	214.11	107.06
TOTAL	108.62	93.47	1010.46	101.05

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
TREATMENT	9	3969.663	441.074	1.34	2.39	3.46
FACTOR A	1	1722.783	1722.783	5.24^{*}	4.35	8.10
FACTOR B	4	1542.442	385.611	1.17^{ns}	2.87	4.43
A x B	4	704.439	176.11	0.54^{ns}	2.87	4.43
ERROR	20	6575.133	328.757			
TOTAL	29	10544.8				

*- significant
ns- not significant

Coefficient of variation= 17.94%

Appendix Table 3. Number of laterals per plant at flowering

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
V1C1	10.00	12.67	5.67	28.34	9.44
V1C2	9.33	9.33	10.00	28.66	9.55
V1C3	9.67	12.67	9.33	31.67	10.56
V1C4	8.33	8.33	8.33	24.99	8.33
V1C5	8.67	10.00	6.33	25.00	8.33
SUB-TOTAL	46.00	53.00	39.66	138.66	9.24
V2C1	9.67	9.33	11.33	30.33	10.11
V2C2	9.33	10.33	12.67	32.33	10.78
V2C3	14.33	8.33	9.67	32.33	10.78
V2C4	11.33	10.33	11.00	32.66	10.89
V2C5	12.00	11.00	11.33	34.33	11.44
SUB-TOTAL	56.66	49.32	56.00	161.98	10.80
TOTAL	102.66	102.32	95.66	300.64	10.02

TWO-WAY TABLE

GA_3 CONCENTRATIONS (ppm)	VARIETY 1	VARIETY 2	TOTAL	MEAN
0 (Control)	9.44	10.11	19.55	9.78
250	9.55	10.78	20.33	10.17
500	10.56	10.78	21.34	10.67
750	8.33	10.89	19.22	9.61
1000	8.33	11.44	19.77	9.89
TOTAL	9.24	10.80	100.21	10.02

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
TREATMENT	9	31.397	3.489	1.03	2.39	3.46
FACTOR A	1	18.127	18.127	5.33^{*}	4.35	8.10
FACTOR B	4	4.106	1.027	0.30^{ns}	2.87	4.43
A x B	4	9.163	2.291	0.67^{ns}	2.87	4.43
ERROR	20	67.963	3.398			
TOTAL	29	99.360				

*- significant
ns- not significant

Coefficient of variance= 18.39%

Appendix Table 4. Days from repotting to flower bud formation (1 cm bud size)

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
V1C1	79.33	57.33	81.33	217.99	72.66
V1C2	115.00	59.67	41.00	215.67	71.89
V1C3	43.67	44.67	47.33	135.67	45.22
V1C4	68.00	55.00	47.67	170.67	56.89
V1C5	75.67	61.00	46.33	183	61.00
SUB-TOTAL	381.67	277.67	263.66	923	61.53
V2C1	46.67	52.00	44.00	142.67	47.56
V2C2	27.00	49.33	31.00	107.33	35.78
V2C3	27.00	53.00	26.33	106.33	35.44
V2C4	43.33	43.00	51.33	137.66	45.89
V2C5	41.00	53.00	39.33	133.33	44.44
SUB-TOTAL	185.00	250.33	191.99	627.32	41.82
TOTAL	566.67	528.00	455.65	1550.32	51.68

TWO-WAY TABLE

GA_3 CONCENTRATIONS (ppm)	VARIETY 1	VARIETY 2	TOTAL	MEAN
0 (Control)	72.66	47.56	120.22	60.11
250	71.89	35.78	107.67	53.84
500	45.22	35.44	80.66	40.33
750	56.89	45.89	102.78	51.39
1000	61.00	44.44	105.44	52.72
TOTAL	61.53	41.82	516.77	51.68

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
TREATMENT	9	4871.756	541.306	2.21	2.39	3.46
FACTOR A	1	2914.222	2914.222	11.89^{**}	4.35	8.10
FACTOR B	4	1233.712	308.428	1.26^{ns}	2.87	4.43
A x B	4	723.822	180.955	0.74^{ns}	2.87	4.43
ERROR	20	4901.263	245.063			
TOTAL	29	9773.019				

**- highly significant
ns- not significant

Coefficient of variation= 30.29%

Appendix Table 5.Days from flower bud formation to harvesting (50% anthesis)

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
V1C1	44.67	50.00	50.00	144.67	48.22
V1C2	42.00	53.67	46.67	142.34	47.45
V1C3	38.33	32.67	31.33	102.33	34.11
V1C4	36.00	37.33	34.67	108.00	36.00
V1C5	33.00	35.33	40.67	109.00	36.33
SUB-TOTAL	194.00	209.00	203.34	606.34	40.42
V2C1	49.67	32.00	39.67	121.34	40.45
V2C2	29.00	44.67	31.67	105.34	35.11
V2C3	32.33	35.00	32.67	100.00	33.33
V2C4	38.33	44.00	35.00	117.33	39.11
V2C5	38.33	40.67	33.00	112.00	37.33
SUB-TOTAL	187.66	196.34	172.01	556.01	37.07
TOTAL	381.66	405.34	375.35	1162.35	38.75

TWO-WAY TABLE

GA_3 CONCENTRATIONS (ppm)	VARIETY 1	VARIETY 2	TOTAL	MEAN
0 (Control)	48.22	40.45	88.67	44.34
250	47.45	35.11	82.56	41.28
500	34.11	33.33	67.44	33.72
750	36.00	39.11	75.11	37.56
1000	36.33	37.33	73.66	36.83
TOTAL	40.42	37.07	387.44	38.75

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
TREATMENT	9	743.667	82.63	3.15	2.39	3.46
FACTOR A	1	84.437	84.437	3.22*	4.35	8.10
FACTOR B	4	407.873	101.968	3.89*	2.87	4.43
A x B	4	251.357	62.839	2.40ns	2.87	4.43
ERROR	20	524.131	26.207			
TOTAL	29	1267.798				

*- significant
ns- not significant

Coefficient of variation= 13.21%

Appendix Table 6. Stem length at flowering (cm)

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
V1C1	35.17	36.33	35.50	107.00	35.67
V1C2	60.67	61.30	59.77	181.74	60.58
V1C3	62.33	64.17	63.50	190.00	63.33
V1C4	72.00	72.17	83.83	228.00	76.00
V1C5	84.00	83.33	72.67	240.00	80.00
SUB-TOTAL	314.17	317.3	315.27	946.74	61.12
V2C1	25.00	27.09	26.08	78.17	26.06
V2C2	51.00	50.00	53.00	154.00	51.33
V2C3	53.00	54.00	59.00	166.00	55.33
V2C4	52.00	54.00	74.40	180.40	60.13
V2C5	59.00	55.00	60.00	174.00	58.00
SUB-TOTAL	240.00	240.09	272.48	752.57	50.17
TOTAL	554.17	557.39	587.75	1699.31	55.65

TWO-WAY TABLE

GA_3 CONCENTRATIONS (ppm)	VARIETY 1	VARIETY 2	TOTAL	MEAN
0 (Control)	35.67	26.06	61.73	30.87
250	60.58	51.33	111.91	55.96
500	63.33	55.33	118.66	59.33
750	76.00	60.13	136.13	68.07
1000	80.00	58.00	138.00	69.00
TOTAL	61.12	50.17	566.43	56.65

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
TREATMENT	9	7199.896	799.988	30.46	2.39	3.46
FACTOR A	1	1256.733	1256.733	47.85**	4.35	8.10
FACTOR B	4	5733.49	1433.373	54.58**	2.87	4.43
A x B	4	209.673	52.418	2ns	2.87	4.43
ERROR	20	525.252	26.263			
TOTAL	29	7725.148				

**- highly significant
ns- not significant

Coefficient of variation= 9.05%

Appendix Table 7. Flower diameter at 50% anthesis (cm)

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
V1C1	16.17	17.5	15.83	49.50	16.50
V1C2	17.33	16.17	17.33	50.83	16.94
V1C3	17.90	15.77	16.03	49.70	16.57
V1C4	17.17	20.10	16.83	54.10	18.03
V1C5	16.67	20.17	21.50	58.34	19.45
SUB-TOTAL	85.24	89.71	87.52	262.47	17.50
V2C1	16.33	14.83	18.67	49.67	15.61
V2C2	16.17	15.33	15.17	46.83	16.56
V2C3	17.87	17.17	15.33	50.37	16.79
V2C4	17.03	19.50	16.83	53.36	17.79
V2C5	17.50	16.67	17.33	51.50	17.17
SUB-TOTAL	84.90	83.50	83.33	251.73	16.78
TOTAL	170.14	173.21	170.85	514.2	17.14

TWO-WAY TABLE

GA_3 CONCENTRATIONS (ppm)	VARIETY 1	VARIETY 2	TOTAL	MEAN
0 (Control)	16.50	15.61	32.11	16.06
250	16.94	16.56	33.5	16.75
500	16.57	16.79	33.36	16.68
750	18.03	17.79	35.82	17.91
1000	19.45	17.17	36.62	18.31
TOTAL	17.50	16.78	171.41	17.14

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
TREATMENT	9	30.553	3.395	1.66	2.39	3.46
FACTOR A	1	4.211	4.211	2.06^{ns}	4.35	8.10
FACTOR B	4	18.952	4.738	2.31^{ns}	2.87	4.43
A x B	4	7.39	1.847	0.90^{ns}	2.87	4.43
ERROR	20	40.94	2.047			
TOTAL	29	71.493				

ns- not significant Coefficient of variation= 18.31%

Appendix Table 8. Stem diameter at harvest (cm)

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
V1C1	0.80	0.97	0.80	2.57	0.84
V1C2	0.77	0.87	0.80	2.44	0.81
V1C3	0.87	0.97	0.77	2.61	0.87
V1C4	0.9	0.97	0.80	2.67	0.89
V1C5	1.00	0.83	0.87	2.70	0.90
SUB-TOTAL	4.34	4.57	4.04	12.99	0.86
V2C1	0.90	0.53	0.80	2.23	0.74
V2C2	0.77	0.70	0.83	2.30	0.76
V2C3	0.90	0.77	0.83	2.50	0.83
V2C4	0.93	0.87	0.80	2.46	0.82
V2C5	0.83	0.77	0.86	2.60	0.87
SUB-TOTAL	4.33	3.64	4.12	12.09	0.80
TOTAL	8.67	8.21	8.16	25.08	0.83

TWO-WAY TABLE

GA_3 CONCENTRATIONS (ppm)	VARIETY 1	VARIETY 2	TOTAL	MEAN
0 (Control)	0.84	0.74	1.58	0.79
250	0.81	0.76	1.57	0.79
500	0.87	0.83	1.70	0.85
750	0.89	0.82	1.71	0.86
1000	0.90	0.87	1.77	0.89
TOTAL	0.86	0.80	8.33	0.84

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
TREATMENT	9	0.07	0.008	0.92	2.39	3.46
FACTOR A	1	0.025	0.025	2.90^{ns}	4.35	8.10
FACTOR B	4	0.039	0.01	1.16^{ns}	2.87	4.43
A x B	4	0.006	0.002	0.18^{ns}	2.87	4.43
ERROR	20	0.170	0.008			
TOTAL	29	0.240				

*- significant
ns- not significant

Coefficient of variation= 11.04%

Appendix Table 9. Vaselife

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
V1C1	7.00	7.33	6.33	20.66	6.89
V1C2	7.00	7.33	7.00	21.33	7.11
V1C3	6.67	7.67	6.33	22.01	7.34
V1C4	7.67	7.67	7.67	23.01	7.67
V1C5	7.67	7.67	8.00	23.34	7.78
SUB-TOTAL	36.01	37.67	35.33	110.35	7.36
V2C1	8.33	8.33	8.33	24.99	8.33
V2C2	9.00	8.33	8.33	25.66	8.55
V2C3	9.00	8.33	9.33	26.66	8.89
V2C4	9.00	8.33	9.33	26.66	8.89
V2C5	9.33	9.00	8.00	26.33	8.78
SUB-TOTAL	44.66	43.32	43.32	130.3	8.69
TOTAL	80.67	79.99	78.65	240.65	8.03

TWO-WAY TABLE

GA_3 CONCENTRATIONS (ppm)	VARIETY 1	VARIETY 2	TOTAL	MEAN
0 (Control)	6.89	8.33	15.22	7.61
250	7.11	8.55	15.66	7.83
500	7.34	8.89	16.23	8.12
750	7.67	8.89	16.56	8.28
1000	7.78	8.78	16.56	8.28
TOTAL	7.36	8.69	80.23	8.02

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
TREATMENT	9	18.019	2.002	10.18	2.39	3.46
FACTOR A	1	15.109	15.109	76.85^{**}	4.35	8.10
FACTOR B	4	2.079	0.52	2.64^{ns}	2.87	4.43
A x B	4	0.831	0.208	1.06^{ns}	2.87	4.43
ERROR	20	3.932	0.197			
TOTAL	29	21.951				

**- highly significant
ns- not significant

Coefficient of variation= 18.39%

Appendix Table 10. Cutflower yield produced per plant from February 2009 to May 2009

TREATMENT	REPLICATION I	II	III	TOTAL	MEAN
V1C1	10.00	12.67	5.67	28.34	9.44
V1C2	9.33	9.33	10.00	28.66	9.55
V1C3	9.67	12.67	9.33	31.67	10.56
V1C4	8.33	8.33	8.33	24.99	8.33
V1C5	8.67	10.00	6.33	25.00	8.33
SUB-TOTAL	46.00	53.00	39.66	138.66	9.24
V2C1	9.67	9.33	11.33	30.33	10.11
V2C2	9.33	10.33	12.67	32.33	10.78
V2C3	14.33	8.33	9.67	32.33	10.78
V2C4	11.33	10.33	11.00	32.66	10.89
V2C5	12.00	11.00	11.33	34.33	11.44
SUB-TOTAL	56.66	49.32	56.00	161.98	10.80
TOTAL	102.66	102.32	95.66	300.64	10.02

TWO-WAY TABLE

GA_3 CONCENTRATIONS (ppm)	VARIETY 1	VARIETY 2	TOTAL	MEAN
0 (Control)	9.44	10.11	19.55	9.78
250	9.55	10.78	20.33	10.17
500	10.56	10.78	21.34	10.67
750	8.33	10.89	19.22	9.61
1000	8.33	11.44	19.77	9.89
TOTAL	9.24	10.80	100.21	10.02

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	COMPUTED F	TABULAR F 0.05	TABULAR F 0.01
TREATMENT	9	31.397	3.489	1.03	2.39	3.46
FACTOR A	1	18.127	18.127	5.33^{*}	4.35	8.10
FACTOR B	4	4.106	1.027	0.30^{ns}	2.87	4.43
A x B	4	9.163	2.291	0.67^{ns}	2.87	4.43
ERROR	20	67.963	3.398			
TOTAL	29	99.360				

*- significant
ns- not significant

Coefficient of variance= 18.39%