

PHILIPPINE SCIENCE HIGH SCHOOL WESTERN VISAYAS  
Doña Lawa-an H. Lopez Campus  
Iloilo City

GROWTH POTENTIALS OF GRAFTED BOUGAINVILLEA  
CULTIVARS FROM DIFFERENT SCIONS

A Research Paper Presented to the  
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Iloilo City

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of the requirements in  
Science Research II

By:

Neil Bryan Q. Delfin  
Ham Christian C. Lico  
Albert B. Zapanta

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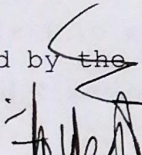
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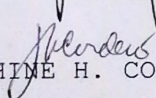
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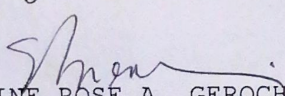
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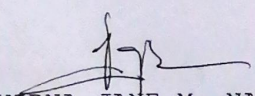
Neil Bryan Q. Delfin  
Ham Christian C. Lico  
Albert B. Zapanta

Approved by the Research Committee

  
MARVIN L. CADORNIGARA, Research Committee Chair

  
JOSEPHINE H. CORDERO, Member

  
EVALINE ROSE A. GEROCHI, Member

  
VIRNA JANE M. NAVARRO, Member

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NEIL BRYAN Q. DELFIN  
HAM CHRISTIAN C. LICO  
ALBERT B. ZAPANTA  
Researchers

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Abstract

This study determined the part of the bougainvillea plant, genus *Bougainvillea*, that would serve as the scion of choice in producing the best cultivar in terms of leaf number and leaf length. Different cultivars were subjected to whip grafting. The rootstocks were taken from one bougainvillea plant and the scion were taken from different parts of another bougainvillea plant. The quality of the cultivars was determined by the leaf number, and leaf length. In analyzing data gathered from this study, the mean and standard deviation, as well as the One-Way ANOVA were employed as statistical tools.

The results of this study showed that there was no significant difference in the yielded bougainvillea cultivars from the middle stem, axial branch and apical branch in terms of leaf number and leaf length indicating that the three scions have the same growth potentials.



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CULTIVARS FROM DIFFERENT SCIONS

Chapter 1

Introduction to the Study

Background to the Study

In 1768 when Admiral Louis de Bougainvillea began his long journey to the Pacific Ocean and discovered the vine that now bears his name, it was a botanical highlight of the voyage. Through the ensuing years, this Brazilian beauty has assumed its rightful place as one of the most popular, spectacular and beautiful tropical plants. The modern day hybrids of *Bougainvillea spectabilis*, *B. Brasiliensis* and *B. glabra* are among the most beautiful of flowering vines. These tropical members of the Nyctaginaceae (Four-O'Clock) family, are very vigorous, evergreen, woody vines with spines. The plant is unusual in several respects: it is sterile and propagated only from cuttings, does better in pots than in the ground, and rewards our neglect with abundant beauty. It bears no seeds, but mutates often, resulting in many varieties. Grown either as a shrub or climbing vine, it can summer on terraces, patios, decks,



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or at pool side. Although normally climbers, they can be trained to stay bushy as pot plants, hanging baskets, or as standard 3 or 4 feet high. They will bloom beautifully on branches on 18"-20" long. Keep all long shoots cut back to 18"-20" for best bloom. The vibrant color of this vine comes not from the small white tubular flowers, but from the 3 large paper-like bracts that surround each flower.

It is important to produce other varieties through grafting so that the undesirable traits of one variety could be replaced by the desirable traits of another variety. This will result into a grafting cultivar that will be efficient in every aspect.

In relation to this, the researchers also wished to know how to graft and know whether the middle stem, axial branch, or apical branch of the bougainvillea plant would serve as the best scion so as to maximize the potentials of the desired cultivar.

In this study, the researchers determined the growth potentials of the middle stem, axial branch, and apical branch of the bougainvillea plant in serving as the scion for grafting. The researchers compared the cultivars of each part in terms of leaf number, and leaf length.

The independent variable of this study was the source of the scion of the bougainvillea plant, i.e., middle stem, axial



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branch, and apical branch, while the dependent variables were the leaf number and leaf length of the resulting cultivars.

The relationship between the independent and dependent variables is presented in Figure 1.

Statement of the Problem and the Hypothesis

This study determined the part of the bougainvillea plant, genus *Bougainvillea* that served as the best scion in producing the best cultivar.

Specifically, it aimed to:

1. determine the (a) leaf number, and (b) leaf length of cultivars from the (1) middle stem, (2) axial branch, and (3) apical branch of the bougainvillea plant.

2. determine the significant difference in the (a) leaf number and (b) leaf length of the resulting cultivars from the (1) middle stem, (2) axial branch, and (3) apical branch of the bougainvillea plant.

It was hypothesized that there is no significant difference in the (a) leaf number and (c) leaf length of the resulting cultivars from the (1) middle stem, (2) axial branch, and (3) apical branch of the bougainvillea plant.



INDEPENDENT VARIABLE

DEPENDENT VARIABLE

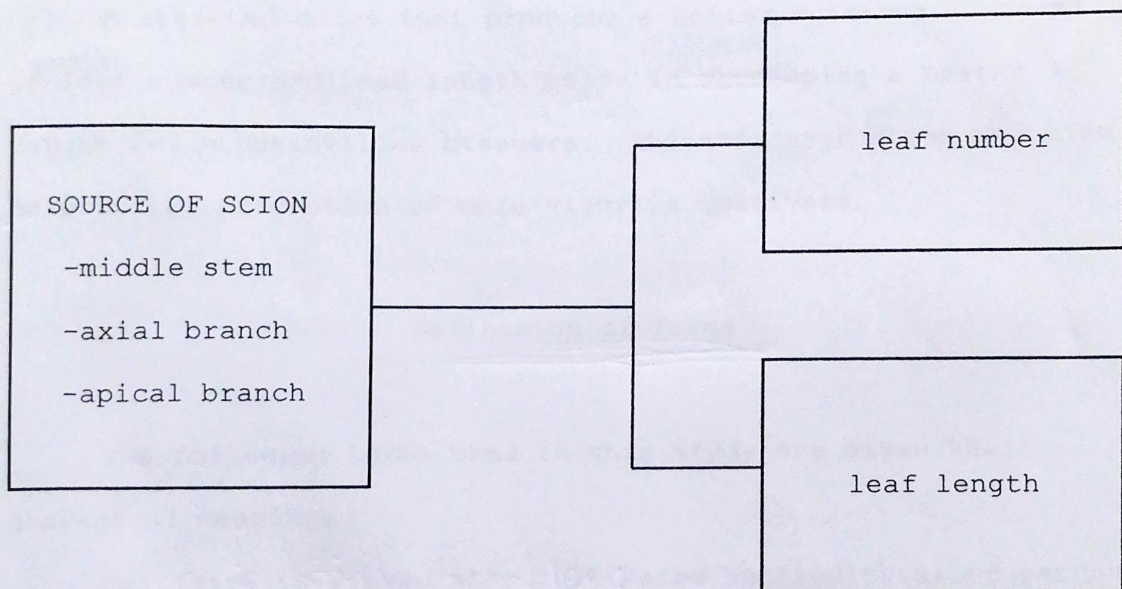


Figure 1. Quality of cultivar undergoing grafting from different scion sources in terms of leaf number and leaf length.



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Significance of the Study

The determination of the best scion for grafting does not only help in propagation of new varieties, but also in the production of varieties that could provide for all the possible uses of bougainvillea plants.

A selected scion that produces a better cultivar in terms of leaf number and leaf length helps in developing a better future for bougainvillea breeders. The efficient scion may also help in the production of more vigorous cultivars.

Definition of Terms

The following terms used in this study are given their conceptual meanings.

Cultivar- is a specially cultivated horticultural or garden variety of plant, flower, etc (Webster Comprehensive Dictionary, Encyclopedic Edition, 1992).

In this study, "cultivar" referred to the product of the grafted scion and rootstock, i.e., middle stem cultivar, axial branch cultivar, and apical branch cultivar.



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Graft- is a shoot inserted into a tree or a plant (Webster Comprehensive Dictionary, Encyclopedic Edition, 1992).

In this study, 'grafted' referred to the scion and the rootstock of the bougainvillea cultivar after they have undergone grafting process.

[Growth] Potential- is the gradual increase of a living organism by natural process (Webster Comprehensive Dictionary, Encyclopedic Edition, 1992).

In this study, "growth potential" referred to the ability of the bougainvillea cultivar to grow naturally.

[Leaf] Length- is the distance measured along a line from end to end (Webster Comprehensive Dictionary, Encyclopedic Edition, 1992).

In this study, "leaf length" referred to the diameter of leaves that grew in the cultivar after one month of grafting.

[Leaf] Number- is the collection of units or individuals, whether large or small; an indefinite aggregation (Webster Comprehensive Dictionary, Encyclopedic Edition, 1992).

In this study, "leaf number" referred to the number of leaves that grew in the cultivar after one month of grafting.



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Rootstock- is the rhizome (Webster Comprehensive Dictionary, Encyclopedic Edition, 1992).

In this study, "rootstock" referred to the part of the graft to which the scion was inserted.

Scion- is a piece cut from a plant or tree; a twig or shoot used for grafting (Webster Comprehensive Dictionary, Encyclopedic Edition, 1992).

In this study, "scion" referred to the middle stem, axial branch, and apical branch inserted to the rootstock in grafting.

#### Scope and Delimitation of the Study

This study determined the part of the bougainvillea plant, genus *Bougainvillea* that served as the best scion in producing the best cultivar.

Specifically, it determined the leaf number and leaf length of cultivars from the middle stem, axial branch, and apical branch of the bougainvillea plant. It also determined the significant difference in the leaf number and leaf length of the resulting cultivars from the middle stem, axial branch, and apical branch of the bougainvillea plant.



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It was hypothesized that there is no significant difference in the leaf number and leaf length of the resulting cultivars from the middle stem, axial branch, and apical branch of the bougainvillea plant.

The independent variable of this study was the source of the scion of the bougainvillea plant, i.e., middle stem, axial branch, and apical branch, while the dependent variables were the leaf number and leaf length of the resulting cultivars.

This study employed One-Way Analysis of Variance as inferential statistical tool.

The grafting process consisted of seven parts, namely, selection of the stock and the scion, performing the graft, preparing the stock and the scion, cutting the stock, cutting the scion, fitting the stock and the scion, and wrapping the graft.

The study did not attempt to device a new grafting technique. Other qualities of the cultivar such as the name of the species was not be determined since it requires a longer procedure.

This study was conducted at the Zapanta residence in Tagbak, Jaro, Iloilo City from December 10, 2003 to January 11, 2004.



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Chapter 2

Review of Related Literature

This chapter consists of three topics, namely, (1) Grafting (2) The Limitations of Grafting, and (3) the Summary.

Grafting

The operation used in joining the cut surfaces of plants under circumstances that will allow physiological union. The supporting part is called the stock; the plant part that is grafted to it is called the scion. The scion may be a twig, stem, bud, or other part of a plant (Funk & Wagnalls New Encyclopedia, 1990).

The purpose of grafting is to grow new plants from a particularly good one, and is especially useful in taking advantage of the vigor of the stock plant. The pieces grafted onto it will grow more vigorously than on their own roots. Some plants have to be grafted because they cannot grow without the support of the stock plant.

Grafted plants are usually more uniform in their growth habit, flower, color, flowering season, fruit size, shape, and



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quality, etc., than seed-grown plants. They often begin to flower or bear fruit much sooner than plants grown from seeds. Grafting allows you to select a root system adapted for your climate and soil, or resistant to local pests and diseases (Rothenberger and Starbuck, 2002).

#### The Limitations of Grafting

Not all plants can be grafted. Generally, only plants that are closely related form a good graft union. Grafting is not a means of developing new varieties. The stock and scion must be compatible. Incompatible grafts may not form a union, or the union may be weak. A poor union results in plants that grow poorly, break off or eventually die.

The compatibility of plants has been determined through many years of trial (Rothenberger and Starbuck, 2002).

#### Summary

Grafting is one way of propagating new plants and, if done properly, could produce a very commendable cultivar. However, not all plants could be grafted and before grafting, a lot of preparation is required.



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Chapter 3

Research Design and Methodology

This study aimed to determine the leaf number, and leaf length of cultivars from the middle stem, axial branch, and apical branch of the bougainvillea plant.

It also determined the significant difference in the leaf number and leaf length of the resulting cultivars from the middle stem, axial branch, and apical branch of the bougainvillea plant.

It was hypothesized that there is no significant difference in the leaf number and leaf length of the resulting cultivars from the middle stem, axial branch, and apical branch of the bougainvillea plant.

The Research Design

This study determined the part of the bougainvillea plant, genus *Bougainvillea*, which would serve as the best scion in producing the best cultivar in terms of leaf number and leaf length.



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The rootstock, which is *Bougainvillea*, was taken from one bougainvillea plant and the scion was taken from the middle stem, axial branch, and apical branch of another bougainvillea plant.

The growth potentials of the cultivar were determined by comparing the leaf number and leaf length.

There were nine rootstocks from a bougainvillea plant and nine scions. The scions consist of three middle stems, three axial branches, and three apical branches.

#### Materials and Equipment

The materials used in this study were a knife, grafting tape, cellophane, bougainvillea plant, genus *Bougainvillea*, for the scion, and bougainvillea plant, genus *Bougainvillea*, for the rootstock.

A good-quality knife, able to hold a sharp edge, was the key to good grafting. Almost any good pocketknife can be very useful.

A clear cellophane was used to wrap the graft.

An ordinary tape was used to seal the cellophane that enclosed the graft.



### General Procedures

This study involved the following phases:

#### Preparing the stock

Branches of large trees or the trunk of a small tree were sawed off to provide stock for the scions. A smooth, knot-free, straight-grained section was selected. The branch was cut off at a right angle to the grain. The bark was checked to be tight enough to form a successful graft.

#### Preparing the Scion

The scion for the cleft graft was made from 1-year-old wood about 1/4 inch in diameter. The top and bottom of a scion stick was properly identified.

A long, smooth cut was made from the lowest bud towards the base. The cut had a surface 1 to 1-1/2 inches long. A second cut of the same length was made on the other side of the scion.

#### Inserting the scion

The crack was opened wide enough for the scion to be inserted easily. With cambiums in contact, the scion was



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inserted toward the outside. Although maximum contact was obtained with straight positioning, a slight slant helped ensure contact.

Growing the cultivar

The cultivars from three different scions were allowed to grow for four weeks.

Constant watering was ensured and the growth of the cultivars was monitored daily.

Counting the leaf number

The leaf number was determined by counting the number of leaves that developed in each cultivar for four weeks.

Measuring the leaf length

The leaf length was determined by measuring the diameter of the leaves.



Statistical Data Analysis

Data gathered from this study were treated statistically, with the mean and the standard deviation as descriptive statistical tools, and the One-Way Analysis of Variance as inferential statistical tools.

The mean was employed to express the average value of the leaf numbers and leaf lengths while the standard deviation was employed to evaluate the spread of the individual leaf numbers and leaf lengths from their means.

The One-Way Analysis of Variance was employed to determine the significant differences in the leaf number and leaf length of cultivars from the middle stem, axial branch, and apical branch.



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Chapter 4

Results

This study aimed to determine the leaf number, and leaf length of cultivars from the middle stem, axial branch, and apical branch of the bougainvillea plant. It also determined the significant difference in the leaf number and leaf length of the resulting cultivars from the middle stem, axial branch, and apical branch of the bougainvillea plant.

It was hypothesized that there is no significant difference in the leaf number and leaf length of the resulting cultivars from the middle stem, axial branch, and apical branch of the bougainvillea plant.

Leaf number of the cultivars from the middle stem, axial branch, and apical branch

The mean value for the leaf number of the middle stem cultivar was 5.33 leaves.

Data are presented in Table 1.

The mean value for the leaf number of the axial branch cultivar was 4.67 leaves.

Data are presented in Table 1.



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Table 1

Means of the leaf number and leaf length of grafted bougainvillea cultivars from the middle stem, axial branch, and apical branch

Plant Part	N	Mean of Final Parameter Values	S.D.
LEAF NUMBER			
Middle Stem	3	5.33	1.15
Axial Branch	3	4.67	.58
Apical Branch	3	5.00	1.0
LEAF LENGTH			
Middle Stem	3	1.700 cm	.200
Axial Branch	3	1.433 cm	.153
Apical Branch	3	1.567 cm	.153

The mean value for the leaf number of the apical branch cultivar was 5.00 leaves.

Data are presented in Table 1.



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The data shows that the leaves of the middle stem, axial branch, and apical branch cultivars did not differ much in quantity.

Leaf length of the cultivars from the middle stem, axial branch, and apical branch

The mean value for the leaf length of the middle stem cultivar was 1.700cm.

Data are presented in Table 1.

The mean value for the leaf length of the axial branch cultivar was 1.433cm.

Data are presented in Table 1.

The mean value for the leaf length of the apical branch cultivar was 1.567cm.

Data are presented in Table 1.

The data showed that the length of the leaves of the middle stem, axial branch, and apical branch cultivars did not differ much in length.



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significant difference in the leaf number and leaf length of bougainvillea cultivars from the middle stem, axial branch, and apical branch

The One-Way Analysis of Variance showed that there was no significant difference in the mean leaf number among the cultivars from the middle stem, axial branch, and apical branch, as reflected by  $F(2) = .375$ ,  $p > .05$

Data are presented in Table 2.

It also showed that there was no significant difference in the mean leaf length among the cultivars from the middle stem, axial branch, and apical branch, as reflected by  $F(2) = 1.846$ ,  $p > .05$ .

Data are presented in Table 2.



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Table 2

One-Way Analysis of Variance of the significant difference in the leaf number and leaf length of grafted bougainvillea cultivars from the middle stem, axial branch, and apical branch

VARIABLE	Sums of Square	df	Mean Square	F	Sig
<b>LEAF NUMBER</b>					
Between groups	.667	2	.333	.375	.702
Within the group	.5333	6	.889		
Total	6.000	8			
<b>LEAF LENGTH</b>					
Between groups	.107	2	.05333	1.846	.237
Within the group	.173	6	.02889		
Total	.280	8			



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Chapter 5

Summary, Conclusions, and Recommendations

This study determined the part of the bougainvillea plant, genus *Bougainvillea*, that served as the best scion in producing the best cultivar.

Specifically, it aimed to:

1. determine the (a) leaf number and (b) leaf length of cultivars from the (1) middle stem, (2) axial branch, and (3) apical branch of the bougainvillea plant.

2. determine the significant difference in the (a) leaf number and (b) leaf length of the resulting cultivars from the (1) middle stem, (2) axial branch, and (3) apical branch of the bougainvillea plant.

It was hypothesized that there is no significant difference in the (a) leaf number and (b) leaf length of the resulting cultivars from the (1) middle stem, (2) axial branch, and (3) apical branch of the bougainvillea plant.



### Summary

The results of this study are summarized as:

1.a. The mean value for the leaf number of the middle stem, axial branch, and apical branch cultivars were 5.33, 4.67 5.00 leaves, respectively.

1.b. The mean value for the leaf length of the middle stem, axial branch, and apical branch cultivars were 1.700 cm, 1.433 cm, and 1.567 cm, respectively.

2.a. No significant difference was observed in the mean leaf number among the cultivars from the middle stem, axial branch, and apical branch.

2.b. No significant difference was observed in the mean leaf length among the cultivars from the middle stem, axial branch, and apical branch.

### Conclusions

The bougainvillea cultivars produced by the researchers for this study yielded no significant difference in terms of leaf number and leaf length of bougainvillea cultivars from the middle stem, axial branch, and apical branch.



The researchers concluded that scions taken from the middle stem, axial branch, and apical branch of a bougainvillea plant have the same growth potentials when grafted.

#### Recommendations

Since the scions from the middle stem, axial branch, and apical branch of the bougainvillea plant have the same growth potentials when grafted, it is recommended that any part of the bougainvillea plant, whether middle stem, axial branch, or apical branch, be used when grafting.



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