

INFLUENCE ON FLOWER COLOR BY PROPAGATION METHODS
ON BEGONIA ELATIOR HYBRIDS
(*Begonia x hiemalis* FOTSCH.)

Yutaka HAMADA

Ohshima Horticultural Research Institute,
Tokyo Metropolitan Agricultural Experiment Station.
Koshimizu 273-1, Motomachi, Ohshima-machi,
Tokyo 100-01, Japan

Abstract

Many cultivars of elatior type begonias (*Begonia x hiemalis* FOTSCH.) are found out as bud sports (bud mutations). And, often, the variation of characteristics are recognized in grower's field.

Checking the difference of characteristic by propagation methods, cultivar 'Aurore' of Schwabenland type and 'Aida' are recognized great variations of flower color by leaf cutting (in the case of cv. 'Aurore', first generation: 100% changed the flower color, and second generation: also 100% changed the flower color from mother plant, in the case of cv. 'Aida', first generation: 95.2% changed the flower color, and second generation: also 84.4% changed the flower color from mother plant). But, by top cutting, the variation of each cultivar are few (in the case of cv. 'Aurore', both of two generations: no changed the flower color from mother plant, and, in the case of cv. 'Aida', first generation changed only 7.2%, also second generation changed only 1.7%, it from mother plant).

Therefore, especially these two cultivars must be propagated by top cutting for keeping stability of the characteristics.

Introduction

Today, in Japan, elatior begonia production are over one million pots per year. Some young plant nurseries of elatior begonias are starting.

But, recently, we heard often some problems about changing variety's characteristics, specially flower color.

Therefore, this is, tested the influence on the variations (specially flower color) of characteristics by propagation methods of two varieties have some problems.

Materials and methods

1. Experiment 1

Checked the variations of characteristics, mainly flower color, on elatior type begonias at some growers' fields in Kanagawa area, Tokyo area and Chiba area of Japan

2. Experiment 2

At first, selected two varieties of elatior begonias have typical characteristics, those are Schwabenland cv. 'Aurore' (light pink flower) and cv. 'Aida' (red with white marginal variegation), as mother plants. And, continuously, propagated by two methods, leaf cuttings and top cuttings, checked the variations of flowers' colors of them by both propagation methods.

As checking methods, used visual check methods and used color difference meter (Model TC-1500MC of Tokyo Densyoku co. ltd.)

A disign of the experiments:

A group of ⇒ leaf cutting (1st generation) ⇒ top cutting (2nd generation)

mother plants ⇒ top cutting (1st generation) ⇒ top cutting (2nd generation)

Results

1. Separation of characteristics in growers' fields.

The results of investigation into the variations of characteristics on elatior type begonias were at Table. 1.

Table 1 -- Variations of flower color by propagation methods on elatior type begonias at growers' fields

type & variety	flower color	variations by leaf cutting
〈Schwabenland type〉		
Ingrid Marie	red with white margin	few variations
Aurore	light pink flower	great variations
〈Nixe type〉		
Nymphe	white with light yellow eye	few variations
Sybliee	bright pink	few variations
〈Ballerina type〉		
Baluga	apricot orange	few variations
〈T-series〉		
Toran	bright orange	few variations
Tacora	red	very few variations
〈The other type〉		
Lorina	dark pink	very few variations
Aida	red with white margin	great variations
type & variety	variations by top cuttings	directions of mutations
〈Schwabenland type〉		
Ingrid Marie	no variations	red flower ⇒ discolor
Aurore	no variations	light pink ⇒ white
〈Nixe type〉		
Nymphe	no variations	separated white & yellow
Sybliee	no variations	separated dark & light color
〈Ballerina type〉		
Baluga	no variations	separated dark & light color
〈T-series〉		
Toran	no variations	discolor
Tacora	no variations	discolor
〈The other type〉		
Lorina	no variations	separated dark & light
Aida	few variations	discolor

Particularly, these two varieties, cv. Aurore and cv. Aida, of many varieties have big problems (variations.).

2. Separation of flower color by propagation methods.

In this experiment, were used tow kinds of vegetative propagation methods, those are top cutting (definite bud) and leaf cutting (adventitious bud).

In the case of cv. 'Aida', by leaf cutting, first generation was changed 95.2% of flower color, second generation was changed 84.4% of flower color from mother plants. And, by top cutting, first generation was changed only 7.2%, and second generation was changed only 1.2% of flower color from mother stocks.

In the case of cv. 'Aurore', by leaf cutting, first and second generation were changed 100% of flower color from mother stocks. By top cutting, first and second generation were not any changed flower color from mother plants.

So that, the variation by leaf cutting method was bigger than it by top cutting method (Table 2, Figure 1 and 2).

Table 2 -- Uniform Chromaticity Scale (L.a.b.) of center part of flower petals

variety name propagation methods color difference	Schwabenland type cv. Aurore					
	mean	top cuttings s.d.	c.v.	leaf cuttings mean	s.d.	c.v.
L (lightness)	61.1	2.3	3.9	73.0	1.1	1.5
a (hue:blue-yellow)	16.4	2.1	12.6	-3.5	0.7	20.4
b (hue:green-red)	10.1	1.2	12.1	9.1	2.5	27.1

variety name propagation methods color difference	cv. Aida					
	mean	top cuttings s.d.	c.v.	leaf cuttings mean	s.d.	c.v.
L (lightness)	38.1	2.7	7.0	53.6	8.9	16.7
a (hue:blue-gree)	44.4	4.0	9.0	21.2	13.3	61.9
b (hue:green-red)	18.1	1.0	5.4	17.4	2.5	14.5

Note 1 : As UCS (Uniform Chromaticity Scale), used Lab method was devised by Richard S. Hunter

Note 2 : s.d. means standard deviation

Note 3 : c.v. means coefficient of variation

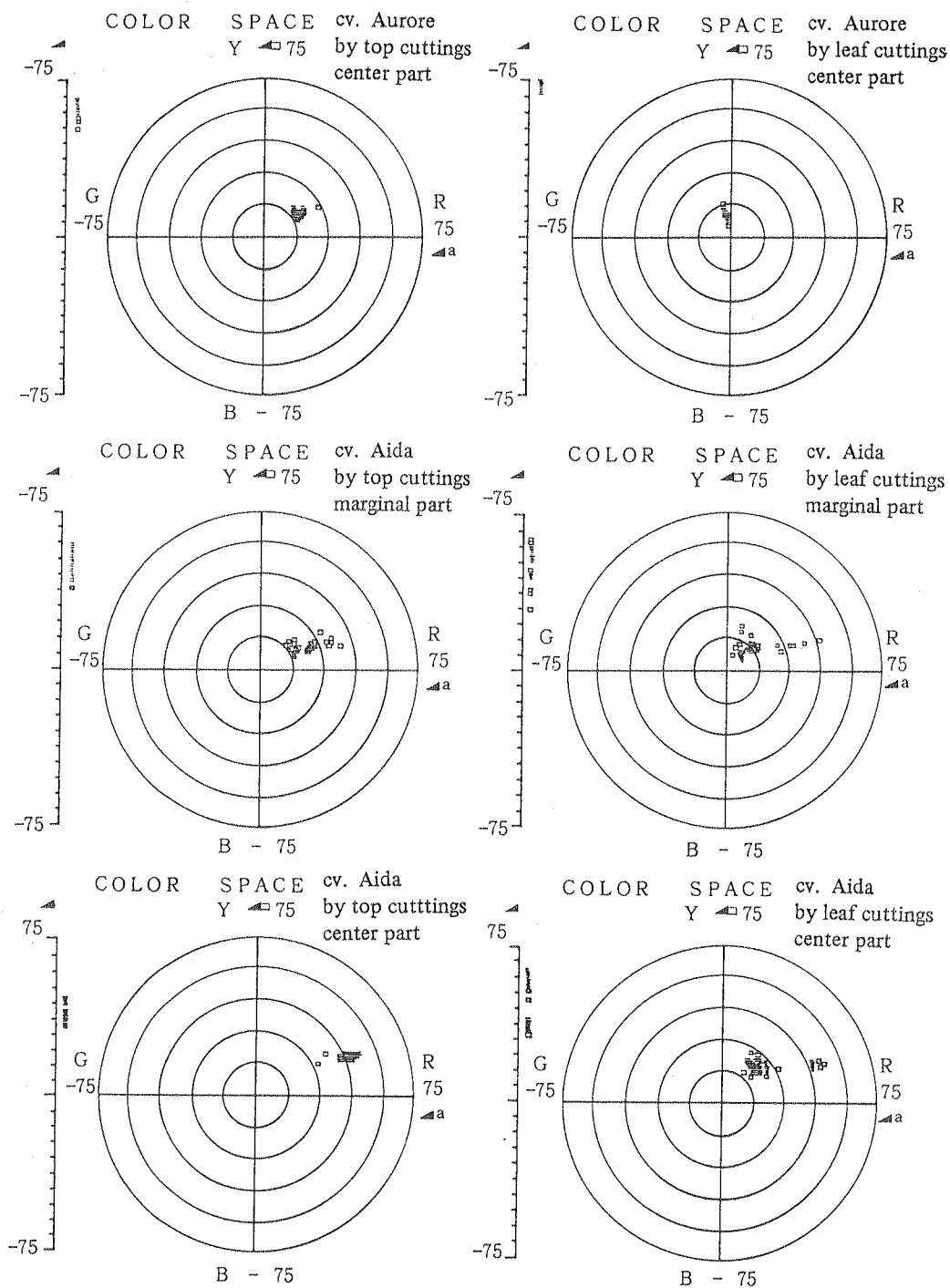


Figure 1 — Color spaces of flower petal on two elatior begonia varieties by top cutting and leaf cutting.
 left figure : top cutting plants (& mother plants)
 right figure : leaf cutting plants

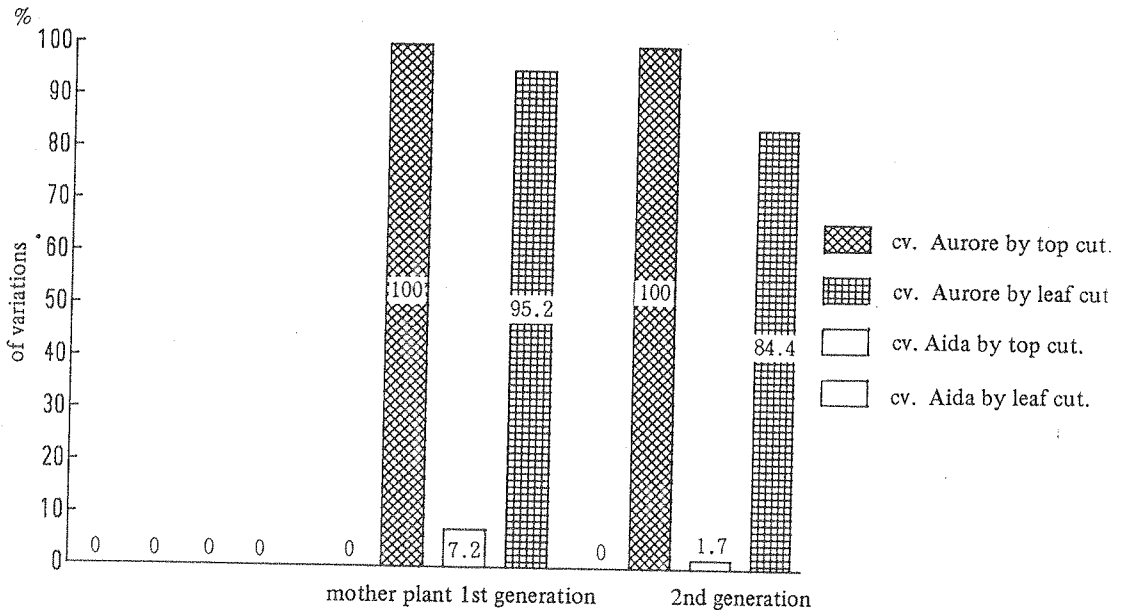


Figure 2 — Variation rates of flower color compared with mother plant.
1st generations were propagated by two cuttings methods, that is, top cutting and leaf cutting, but 2nd generations were only propagated by top cutting.

3. The directions of characteristics separations (mutations).

As same as the other many flower plants, in this elatior type of begonias, almost variations were discoloring directions of flower color (Table 1).

4. For keeping stability of the varieties' characteristics.

Not few varieties of elatior type begonias were bred by using radial rays (X-ray, γ -rays etc.) (Table 3). At cell level, potentially, many mutations (variations) were possible to make appearance.

Table 3 — Some commercial mutants of *Begonia eleatior* hybrids

Name of new cultivar	Place and date of release (or approval) and name of principal worker (s) and institute	Conditions and data of mutagenic treatment	Main improved attributes of cultivar
Turo	The Netherlands, 1973 J. Doorenbos, Dep. Hort., Wageningen	Leaf irradiation 1500-2500 rad X-rays [clone Le 1, from F ₁ of cross <i>B. bertinii</i> com- pacta 'Leuchtfeuer' X <i>B. socotrana</i>]	Flower more vivid
Tiara	The Netherlands, 1975 J. Doorenbos and K. Karper, Dep. Hort., Wageningen	X-rays, 1972 [So-1]	Yellow flower color
Improved Aphrodite Rose (Enchantress)	U.S.A., 1974 Mikkelsens Inc., Ashtabula, Ohio	γ -rays, 1972 [Aphrodite Rose]	Ruffled flower, light rose red; propagates by leaf cuttings
Fantasy	U.S.A., 1975 Mikkelsens Inc., Ashtabula, Ohio	γ -rays, 1972 [Aphrodite Rose mutant]	Upright, compact slow growing; leaf propagated, deep rose-red color
Aphrodite Joy	U.S.A., 1974 Mikkelsens Inc., Ashtabula, Ohio	γ -rays, 1972 [Aphrodite Rose]	Bright pink ruffled flowers; more vigorous and larger flowers than cv. Aphrodite Pink
Aphrodite Twinkles	U.S.A., 1974 Mikkelsens Inc., Ashtabula,	γ -rays, 1972 [Aphrodite Rose]	Dwarf, compact, slow growing, upright, pink flowers
Aphrodite Peach	U.S.A., 1974 Mikkelsens Inc., Ashtabula, Ohio	γ -rays, 1972 [Aphrodite Rose]	Peach colored flower, very floriferous, small foliage; short, compact; self branch- ing; extremely high bud count on leaf cuttings
Elegance	U.S.A., 1975 Mikkelsens Inc., Ashtabula, Ohio	γ -rays, 1972 [Aphrodite Rose mutant]	Very large double flowers, pink; very ruffled edges; propagates by leaf cuttings, except during summer
Heirloom	U.S.A., 1975 Mikkelsens Inc., Ashtabula Ohio	Fast neutrons, 1973 [Schwabenland Pink]	Deep bright pink color flowers; easier to propagate than parent; little serration on edges of leaves; more re- sistant to mildew
Northern Sunset	Canada, 1976 J.M. Malour, Agric. can. Res. Stn, Ottawa, Ont.	3kR X-rays [Renaissance]	Semidouble rose colored flower
Hoblanche	The Netherlands, 1977 W.J. Hobstede, Huissea	2.5krad X-rays, 1973 [pink sport of cv. Vuurgloed]	White flower color

Therefore, for mother plants, always select mother plants with typical characteristics of the varieties, and have to propagate by methods that is easy to stabilized the characteristics, habits, flower color, etc..

Discussion

Many varieties of elatior types' begonias were found out from bud mutation, so that, potentially, it was easy to guess occuring bud mutations (Table 3).

Especially, these two varieties, 'Aurore' and 'Aida', of them were easy to change the flower color, and it must be propagated with definite bud, that is, by top cutting for keeping stability of the flower color.

Reducing to the variations and productions with uniform characteristics will be avairable for economical nursery production.

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エラチオール・ベゴニア *Begonia* × *hiemalis* FOTSCH. の繁殖方法が花色に及ぼす影響

浜 田 豊*

概 要

エラチオール・ベゴニアの品種の多くは、枝変わり(芽条変異)として、見いだされた。現在、生産者の栽培圃場でも、しばしば、形質の変異が認められている。

そこで、ここでは、繁殖方法によって形質、特に、花色に変異を起こし易いシュバベンラント Schwabenland 系の品種“オーロラ”(淡いピンクの一重)と北欧系の品種“ノーベンバークート”の枝変わりの“アイーダ”(赤に白のふく輪、一重)を供試して、定芽を利用する天芽挿し繁殖と不定芽を利用する葉柄挿し繁殖を行い、親株の花色と第1世代および第2世代の花色の変異を比較した。

その結果は次の通りであった。

- 1) シュバベンラント系品種“オーロラ”は定芽利用の天芽挿し繁殖では、第1世代、第2世代ともに花色の変異は認められなかった。しかし、不定芽を誘導させる葉柄挿し繁殖では第1世代、第2世代とも親株の花色と異なり、褪色の方向へ100%変異した。
- 2) 北欧系の品種“アイーダ”では、天芽挿し繁殖を行なうことによって、第1世代では7.2%、第2世代では1.7%の変異が認められ、葉柄挿し繁殖では、95.2%、第2世代では、84.4%の変異が認められた。

したがって、繁殖方法によって変異し易いこれらの品種は、その形質が安定し易い定芽挿し繁殖、すなわち天芽挿し繁殖法による増殖をしなければならない。

一般的に、エラチオール・ベゴニアの突然変異は周辺キメラと考えられており、その育種過程における化学薬品(コルヒチンなど)や放射線(X-rayおよび γ -rayなど)処理が変異の発現頻度を大きくしているものと考えられる。

* 東京都農業試験場大島農業試験地