

Ornamental Traits of *Katakuri* (*Erythronium japonicum* Decaisne) in a Naturally Established Population at Yokoyama Area, Ina City

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Summary

Ornamental traits of *Katakuri* (*Erythronium japonicum* Decaisne) were investigated in a naturally established *Katakuri* population at Yokoyama area, Ina city from the viewpoint of use as an ornamental crop and conservancy. All flowering plants measured had two leaves, showing many patterns of combination of spot colors in their surface. The combination of white and dark brown spots was the most frequent pattern. Nine ground colors on the petal were visually identified. The color represented as 7.5P 6/10 in the color index of Mansell book of color was most popular. Ten ground colors which formed the line-shaped figures in petals were visually identified. However, the figures in several plants were not visually clear. Additionally, petals showed various bending status. Thus, the population of *Katakuri* showed a wide variation of ornamental trait. The plants with deep violet petals are considered to be valuable as an ornamental crop.

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Key words: *Erythronium japonicum* Decaisne, variation of ornamental traits

Introduction

Katakuri (*Erythronium japonicum* Decaisne) is one of the popular wild plants which belong to *Lilium*. The pretty violet flowers are ornamentally appreciated in early spring. The whole plant is edible¹⁾. They can hardly be found around human habitations and the habitats of *Katakuri* become decreasing with the land development. *Katakuri* require much time for flowering: the period from seeding until flowering usually ranges 5-6 years. Pot culture of this species is difficult²⁾. Therefore they are not cultured generally in commercial base. Digging up and taking back of this species by man with the wild flower boom and consequent decrease of these is a serious problem. Therefore, to establish the culture method of this species is needed from the viewpoint of use as

horticultural plant and conservancy. In this study, ornamental traits of *Katakuri* were investigated to obtain basal data for utilizing this species as an ornamental crop.

Materials and Methods

Field research was done in a naturally established *Katakuri* population in a mountain at Yokoyama area, Ina city, Nagano prefecture in the daytime on 29 Apr. and 3 May 1992. Fifty flowering plants at a distance of more than 1m each other were selected at random and were subjected to measurement. Data were gathered on the traits as follows: leaf form-leaf number, length and width of the longest leaf; spot colors in leaf and the occupation rate of these in a leaf; flower form-flower stalk length, length and width of the longest petal, style length, length of the longest stamen, and length of the longest filament; ground color of petal and color of line-shaped figure in petal; manifestation of the line-shaped figure in petal and bending status of petal. Measurements which harm the plant, e.g., measuring fresh weight were not done. Flower colors were determined being compared with the color index in the Mansell book of color with the naked eye. Confidence limits at the 95% level were calculated for all characteristics. Leaves of all plants measured had spots formed with the colors: white, light brown, and dark brown; the spot color in a leaf was not always single. Since the variation of the spots in a leaf give visually different impressions, leaves were sorted according to the patterns of spot, then percentage of leaves in each group were presented. The sorting was done as related below. Each spot color in a leaf were grouped into four grades by the occupation rate in the leaf surface area: more than 50% in the leaf surface, 30-50%, under 30%, and non-observable. Then the leaf was judged visually to which grope of 12 combinations (3 colors \times 4 grades of occupation rate) it belonged to. Additionally, to know what occupation rate in a leaf surface area was the most *within each spot color*, percentages of plants with leaves showing each occupation rate of each spot color were calculated. An analysis on one color has nothing to do with other colors. Statistical significance among percentage data were tested by chi-square test for goodness of fit.

Table 1. Morphology of *Katakuri* leaf.

Characteristic	Mean	\pm	C. L. ^z
Leaf number	2.0	\pm	0.0
Leaf length ^y	121.7	\pm	4.7
Leaf width ^y	48.0	\pm	2.6
LW ratio ^x	2.6	\pm	0.1

z Confidence limit at the 95% level.

y mm.

x Leaf length / leaf width.

Table 2. Percentages of *Katakuri* plants with leaves with various patterns of spot.

Spot color with OPLS ^z			Percentage
White	Light brown	Dark brown	
◎	○	× ^y	2.0
◎	△	×	2.0
◎	×	○	4.0
◎	×	△	16.0
○	○	○	2.0
○	○	×	2.0
○	△	×	2.0
○	×	◎	2.0
○	×	○	8.0
○	×	△	8.0
○	×	×	2.0
△	△	△	2.0
△	△	×	6.0
△	×	◎	6.0
△	×	○	4.0
△	×	△	4.0
×	○	×	4.0
×	△	×	4.0
×	×	◎	4.0
×	×	○	8.0
×	×	△	8.0
Significance			**

^z Occupation percentage in a leaf surface.

^y The symbols represent occupation percentage of each color in a leaf surface as follows :

◎ : >50% of leaf surface.

○ : 30~50%.

△ : <30 (0<).

× : Non-observable.

Combinations of symbols to which no plants belong are omitted.

** Significant at the 1% level by χ^2 test for goodness of fit.

Results and Discussion

All flowering plants measured had two leaves (Table 1). Length and width of the longest leaf were correlated significantly at the 1% level ($r=0.64$). This suggests that leaves are almost a similar shape. The ratio of length to width of the longest leaf was estimated 2.5-2.7 (at the 95% level). Results of the percentages of leaves with each pattern of spot are shown in Table 2. Many spot patterns were observed in leaves ; most frequent pattern was the combination of white spots (>50% in leaf surface) and dark brown ones (<30% in leaf surface). Percentages of plants with leaves showing each occupation rate of each spot color in leaf surface are shown in Table 3. For white, there was no significant difference of percentage of plants among each occupation rate. For light brown, plants with leaves not showing this color was the most frequent. No plants

Table 3. Percentages of plants with leaves with each occupation percentage in a leaf surface, of each spot color of leaf of *Katakuri*. The percentages are represented within each color.

Spot color	OPLS ^z	Percentage	Confidence limit ^y	
			Lower	Upper
White	>50% of LS ^x	24.0	13.1	38.2
	30~50%.	26.0	14.6	40.3
	<30 (0<).	22.0	11.5	36.0
	Non-observable.	28.0	16.2	42.5
	Significance	NS		
Light brown	>50% of LS	0.0	—	—
	30~50%.	10.0	3.3	21.8
	<30 (0<).	14.0	5.8	26.7
	Non-observable.	76.0	61.8	86.9
	Significance	**		
Dark brown	>50% of LS	12.0	4.5	24.3
	30~50%.	26.0	14.6	40.3
	<30 (0<).	40.0	26.4	54.8
	Non-observable.	22.0	11.5	36.0
	Significance	**		

z Occupation percentage in a leaf surface.

y At the 95% level.

x Leaf surface.

NS, ** Non-significant, significant at the 1% level, respectively, by χ^2 test for goodness of fit.

Table 4. Morphology of *Katakuri* flower.

Characteristic	Mean	±	C. L. ^z
Flower stalk length ^y	155.2	±	8.7
Length of the longest petal ^y	54.2	±	2.1
Width of the widest petal ^y	8.9	±	0.5
LW ratio ^x	6.2	±	0.3
Style length ^y	27.1	±	0.8
Length of the longest stamen ^y	28.1	±	0.8

z Confidence limit at the 95% level.

y mm.

x Petal length / petal width.

had leaves with the light brown spot of which occupation rate in leaf surface is more than 50%. For dark brown, less than 30% and above 0% of occupation rate in leaf surface was the most frequent.

Table 5. Percentage of *Katakuri* plants with each petal color.

Color index ^z of petal color		Percentage	Confidence limit ^y	
			Lower	Upper
7.5P	5/10	14.0	5.8	26.7
7.5P	6/8	12.0	4.5	24.3
7.5P	6/10	28.0	16.2	42.5
7.5P	7/6	8.0	2.2	19.2
10P	4/10	18.0	8.6	31.4
10P	5/8	2.0	0.0	10.7
10P	6/6	2.0	0.0	10.7
10P	6/8	14.0	5.8	26.7
10P	7/6	2.0	0.0	10.7
Significance		**		

^z According to the color index of Mansell book of color.

^y At the 95% level.

** Significant at the 1% level by χ^2 test for goodness of fit.

Table 6. Percentage of *Katakuri* plants with each color of line-shaped figure in petal.

Color index ^z of figure color		Percentage	Confidence limit ^y	
			Lower	Upper
2.5RP	2.5/4	0.0	2.0	10.7
2.5RP	3/6	30.0	44.0	58.8
2.5RP	8/4	0.0	2.0	10.7
7.5P	3/6	0.0	2.0	10.7
7.5P	3/8	2.2	8.0	19.2
7.5P	5/8	0.0	2.0	10.7
10P	2.5/4	0.0	2.0	10.7
10P	3/4	0.0	2.0	10.7
10P	3/6	8.6	18.0	31.4
10P	3/8	8.6	18.0	31.4
Significance		**		

^z According to the color index of Mansell book of color.

^y At the 95% level.

** Significant at the 1% level by χ^2 test for goodness of fit.

The flower morphology is shown in Table 4. Length and width of the longest petal was correlated significantly at the 1% level ($r=0.53$). This suggests that petals are almost a similar shape. Style length was not correlated with length of the longest stamen.

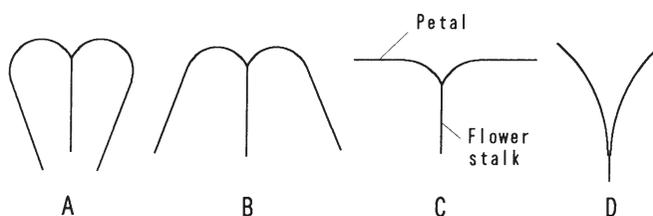
Percentages of plants with each petal color are shown in Table 5. Nine petal colors

Table 7. Percentage of *Katakuri* plants with different manifestation of line-shaped figure in petal.

Status of manifestation of figure	Percentage	Confidence limit ^z	
		Lower	Upper
Manifest	88.0	75.7	95.5
A little faded	10.0	3.3	21.8
Faded	2.0	0.0	10.7
Significance	**		

^z At the 95% level.

** Significant at the 1% level by χ^2 test for goodness of fit.

Fig. 1. Bending status of petals of *katakuri*

A : petals bend backward at angles of 180 degrees or more.

B : petals bend backward at angles of 90 degrees or more and less than 180 degrees.

C : petals bend at an angle of about 90 degrees.

D : petals bend at angles of less than 90 degrees.

were identified in the plants measured. Plants with petals emerging the color represented as 7.5P 6/10 were the most frequent. However, some of the petal colors were difficult to discriminate each other with the naked eye only or without indexes like Mansell book of color. Grouping into three : dark purple, light pink and the middle of the two may be suitable from the viewpoint of utilization as an ornamental plant. Although the existence of plants with white flowers is reported³⁾, we could not find plants with white flowers in the population we investigated.

A petal of *Katakuri* has a line-shaped figure. Percentages of plants with each color of the line-shaped figures in petals are shown in Table 6. Ten colors were identified in the plants measured. However, minute discrimination of the colors seems to be unnecessary from the viewpoint of utilization as an ornamental plant. More important point is the manifestation of the line-shaped figure. About 90% of the plants measured had petals with visually manifest figures (Table 7). The figures were not clear in about 10% of the plants.

Katakuri tend to flower with their petals bending backward. There were variations of the bending status and it gave visually different impressions of flower. In this investiga-

Table 8. Percentage of *Katakuri* plants with various bending status of petal^z.

Bending status of petal	Percentage	Confidence limit ^y	
		Lower	Upper
A ^x	40.0	26.4	54.8
B	26.0	14.6	40.3
C	14.0	5.8	26.7
D	20.0	10.0	33.7
Significance	**		

^z Determined at noon.

^y At the 95% level.

^x According to Fig. 1.

** Significant at the 1% level by χ^2 test for goodness of fit.

tion, plants were grouped into four by the differences of the bending status of petal as shown in Fig. 1. The percentages of plants with different bending status of petal are shown in Table 8. Flowers with their petals bending backward at the angles of more than 180 degrees were most frequent. Although what makes the difference is not clear, the bending status may vary depending on time.

A population of *Katakuri* showed variation of the ornamental traits as related above. There are valuable plants such as the ones with deep violet petals. Leaves of *Katakuri* showed various patterns of spot and these are also valuable as ornamental plants. To clarify how the traits vary with the heredity and the environmental condition is necessary for the selection of valuable plants for use as ornamental plants.

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伊那市横山地区の自然群落における カタクリの観賞的形質

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要 約

園芸植物としての利用と保護の観点から伊那市横山地区における自然群落でカタクリの観賞植物としての特質の調査を行った。開花株の葉数はすべて2枚であった。葉の斑紋には多数のパターンがみられたがその中で白と濃茶の組み合わせのものが最も多かった。花弁色は肉眼で9種類の色が識別された。花弁色で最も多かったのはMansell book of colorにおけるcolor index 7.5P 6/10であった。花弁の上の線状の模様は10色が肉眼で識別された。しかし数個体の植物ではこの模様は希薄であった。また花弁の反り状態に個体間で違いがみられた。このようにカタクリの群落においては多くの表現形質の変異がみられ、花弁の紫色の濃いものなど園芸的にも価値の高いものがみられた。

キーワード：カタクリ，観賞的形質