

Research Report

Development of a New *Hibiscus* Cultivar 'Daewangchun' with Vigorous Growth and Unique Red Eye through Interspecific Hybridization

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Abstract: A new *Hibiscus* cultivar 'Daewangchun', having vigorous growth, uniform plant habit, upright, compact branches, and a long red eye was developed through interspecific crosses between *H. syriacus* 'Samchully' (♀) and *H. sinosyriacus* 'Seobong' (♂). The *Hibiscus* breeding program was initiated in 2005 and *Hibiscus* × 'Daewangchun' was preliminarily selected as '05-R-204' in 2008 due to its vigorous growth and stable flower quality with rich pink flowers. The selected line was further evaluated for different growth characteristics, leaf shape, leaf size, and flowering characteristics, as well as tested for distinctness, homogeneity, and stability during 2010-2012. The new cultivar 'Daewangchun' had violet pink flowers (RHS N80C) with a long red eye spot, medium size and fan petals. The size of flower was 12.0 cm and size of the red eye was 3.0 cm. Leaves were 8.7 cm long and 4.7 cm wide. After plant characteristic evaluation for 3 years (2010-2012), 05-R-204 was registered as cultivar 'Daewangchun' (4731, No. of plant variety protection rights) in 2013. This newly developed cultivar 'Daewangchun' has tall vigorous growth and unique flowers with a long red eye and can be used as specimen plants in landscaping.

Additional key words: compact branches, *Hibiscus sinosyriacus*, *Hibiscus syriacus*, red eye spot

Introduction

In ornamentals, interspecific breeding is considered to be the most important source of genetic variation. The introgression of genes may be part of a breeding program towards disease resistance, better growth vigor, winter hardiness or morphological alteration in general. Both sexual and asexual hybridization, by pollination and protoplast fusion respectively, are fit to induce the desired introgression into the acceptor species. However, the number of possible genetic barriers is very high (Eeckhaut et al., 2006). The creation of interspecific hybrids, along with chromosome doubling technology, offers extended opportunities for ornamental breeders (Van Tuyl and Kim, 2003), as demonstrated in many genera (Sujatha and Prabakaran, 2003, Kobayashi et al, 2004, Van Huylenbroeck et al., 2004).

Geographically, *Hibiscus* is mainly distributed in tropical

and subtropical zones, with some species extending into the temperate regions of the world like; *Hibiscus syriacus* L. (althea or rose of Sharon) and *Hibiscus sinosyriacus* Bailey (Bates, 1965). The similarity in natural distribution pattern of these species is an indication of a similar tolerance to environmental factors (Bates, 1965). *Hibiscus syriacus* is the most popular species and about 40 different cultivars, with varying flower color and shape, are commonly in culture in Europe and a lot more genotypes are present in different collections (Van De Laar, 1997). Furthermore, large collections exist in Korea, where *Hibiscus* is the national flower (Yu and Yeam, 1987; Van de Laar, 1997).

Interspecific and even intersubgeneric hybridizations are highly interesting to combine desired traits from genetically distinct genotypes (Van Tuyl and De Jeu, 1997; Van Huylenbroeck and Van Laere, 2008). In an attempt to introgress an increased growth vigor and improved flowering into

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H. syriacus two different breeding strategies were followed. A first approach focused on creating hexaploid *H. syriacus* plants. The second strategy emphasized on the interspecific hybridization between *H. syriacus* and *H. paramutabilis*. When used as a seed parent, *H. paramutabilis* failed to set fruits (Van Laere et al., 2006). Also some interspecific breeding work involving more tropical species of *Hibiscus* is published (Tachibana, 1958; Kuwada, 1964). Attempts to create interspecific hybrids between *H. syriacus* and *H. rosa-sinensis*, especially to introduce new flower colors and forms, were not successful so far (Yu, et al., 1976; Paek et al., 1989).

A *Hibiscus* breeding program was initiated in 2005 to develop new *Hibiscus* cultivars with tall vigorous growth, upright, compact branches, and unique flower with long red eye through interspecific hybridization between *H. syriacus* and *H. sinosyriacus*.

Description and Performance

Origin

The breeding program which produced *Hibiscus* hybrid ‘Daewangchun’ extended over a period of some 7 years. The objective of the breeding program was to develop new *Hibiscus* cultivars with tall vigorous growth and upright branches interspecific hybridization between *Hibiscus syriacus* and *H. sinosyriacus*. The new *Hibiscus* plant developed after cross-pollination between *H. syriacus* ‘Samchully’ (Plant patent number 1481), as the female, seed parent and *H. sinosyriacus* ‘Seobong’ introduced from Belgium as the male, or pollen parent.

For the cross *H. syriacus* ‘Samchully’ × *H. sinosyriacus* ‘Seobong’, in total 55 *syriacus* flowers were pollinated. The crosses resulted in 47 fruits (85.5% successful pollinations)

which contained on average 5.3 seeds. Of the obtained seedlings 250 could be planted in the greenhouse. 230 F1 seedlings of *H. syriacus* ‘Samchully’ × *H. sinosyriacus* ‘Seobong’ transplanted in the field and then flowered in 2007. The new *Hibiscus* hybrid ‘05-R-204’ was discovered and selected in August, 2008 as a vigorous plant with in the progeny of the stated cross-pollination in an outdoor nursery environment in the Research Institute of Rose of Sharon and Tiger Lily, Chonan, Korea. Asexual reproduction of the new *Hibiscus* hybrid ‘05-R-204’ by hardwood grafting and softwood cuttings in a controlled greenhouse environment since the spring of 2010 has shown that the unique features of this new *Hibiscus* plant are stable and reproduced true to type in successive generations of asexual reproduction (Fig. 1). After the plant characteristics evaluation such as growth characteristics, leaf shape, leaf size, flower characteristics, and flowering for 3 years (2010-2012), it was named as ‘Daewangchun’ in 2013.

Asexual propagation of the selected ‘05-R-204’ by grafting had shown that the unique and distinguishing features of the plant are faithfully transmitted from generation to generation and appear to be fixed. The characteristics were evaluated based on the manual for agricultural investigation and guidelines for the conduct of tests for distinctness, uniformity and stability for *Hibiscus* (UPOV, 2005).

Description

Plants of ‘Daewangchun’ had vigorous growth, and upright branches with abundant production of violet-purple (N80C) (Royal Horticultural Society Flower Council of Holland, 2001) flowers of moderate size (11-13 cm) with red eye spot.

The ‘Daewangchun’ was a vigorous and tall sized plant with upright branches. 4-year-old plant of ‘Daewangchun’

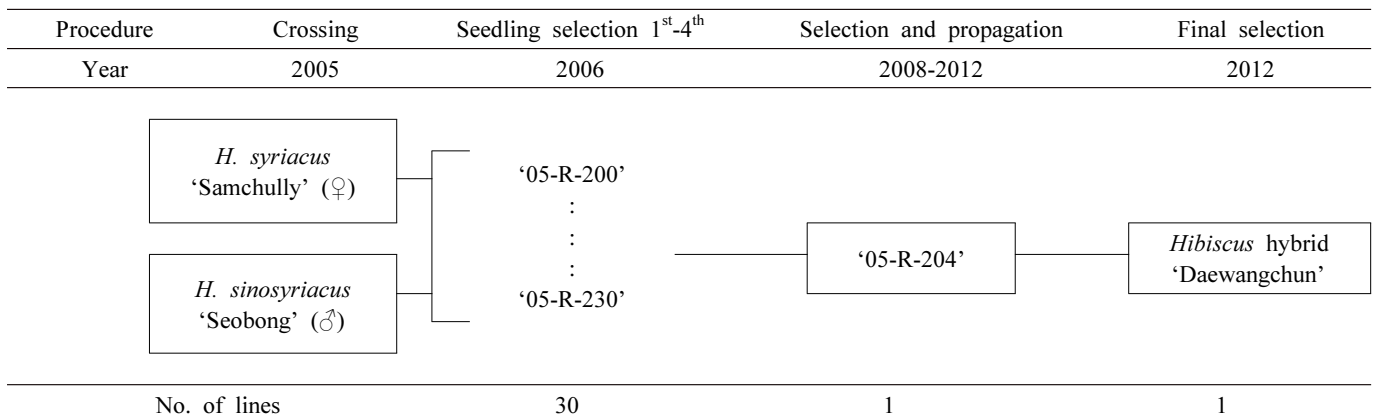


Fig. 1. Pedigree diagram of new F₁ hybrid, ‘Daewangchun’.

was 370 cm in height and 180 cm in crown width, and 1-year-old grafted plant was 115 cm in height and 30 cm in crown width. Plant height of new cultivar was taller than the parent plants and control (Table 1). 'Daewangchun' was more vigorous compared to *H. syriacus* 'Daeil'. Fig. 2 showed the overall appearance of the new *Hibiscus*, showing the colors as true as it was reasonably possible to obtain in colored reproductions of this type. Colors in the photographs

might differ slightly from the color values cited in the detailed botanical description which accurately described the colors of the new *Hibiscus* × 'Daewangchun' (Fig. 2). This cultivar was very fertile with abundant seed pods produced from insect pollination.

Leaves were alternate and oval shape. The leaf apex was acute, the base shallowly acute. Leaf margins were irregularly dentate. The leaves were 8.7 cm long and 4.7

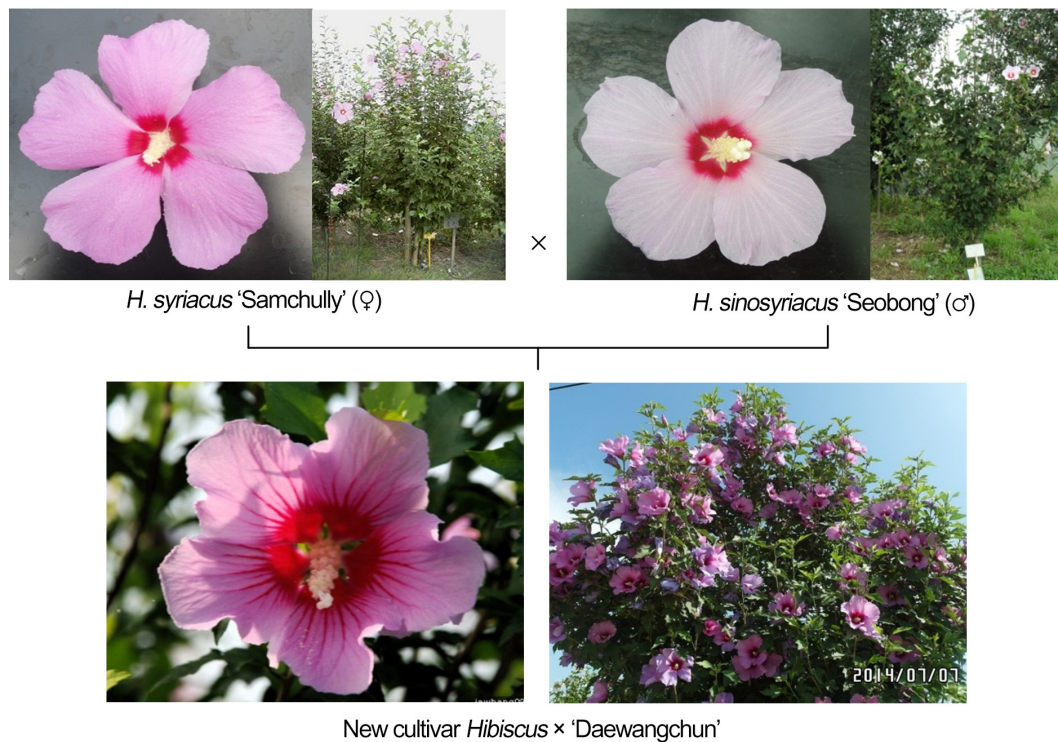


Fig. 2. Flower and plant shape of female, male plant, and new cultivar 'Daewangchun' from interspecific hybridization (2012 and 2014).

Table 1. Growth characteristics of new cultivar 'Daewangchun' from interspecific hybridization.

Cultivar	Plant	Plant height (A)	Plant width (B)	Index (A/B)	Plant type	Direction of branch
Daewangchun	4-year-old grafted plant	370.0 ± 8.9 ^z	180.0 ± 84.5	2.1 ± 82.0	Very tall type	Upright
	1-year-old grafted plant	115.0 ± 84.5	30.0 ± 84.5	3.8 ± 81.0	Very tall type	Upright
Samchully (Female plant)	4-year-old grafted plant	200.0 ± 811.2	120.0 ± 88.9	1.7 ± 81.3	Tall type	Horizontal
	1-year-old grafted plant	70.0 ± 84.7	55.0 ± 84.7	1.3 ± 81.0	Tall type	Horizontal
Seobong (Male plant)	4-year-old grafted plant	175.0 ± 810.5	225.0 ± 815.0	0.8 ± 80.7	Medium type	Horizontal
	1-year-old grafted plant	55.0 ± 87.5	70.0 ± 85.0	0.7 ± 81.5	Medium type	Horizontal
Daeil (Control)	4-year-old grafted plant	225.0 ± 810.5	155.0 ± 87.5	1.5 ± 81.4	Tall type	Semi upright
	1-year-old grafted plant	75.0 ± 85.0	62.0 ± 85.0	1.2 ± 81.0	Tall type	Semi upright

^zMean ± standard deviation (n = 5).

cm wide. They were medium to dark-green in color. The intensity of the green coloring depended upon the nitrogen nutrition of the plant. The new 'Daewangchun' in well grown plants attained a diameter of leaf shoulder of 3.5 cm and a petiole of 2.5 cm (Table 2). The flower diameter of *Hibiscus* × 'Daewangchun' was 12.0 cm and very large

as compared with contrastive cultivar, 'Daeil' with 11.47 cm. The corolla was composed of five slightly fan type of petals, 7.2 cm long by 5.5 cm at the widest point. The petals were violet purple (N80C) (Table 3, 4). The red eye spot was slightly darker red (59A) in color for 3.0 cm (Table 3, 4). 'Daewangchun' had longer red eye than other

Table 2. Leaf characteristics of new cultivar 'Daewangchun' from interspecific hybridization.

Cultivar	Shape	Apex	Base	Margin	Leaf		Petiole length (cm)	Diameter of leaf shoulder (cm)
					length (cm)	width (cm)		
Daewangchun	Oval	Acute	Acute	Serrate	8.70 ± 2.3 ^z	5.40 ± 1.2	2.50 ± 0.7	3.50 ± 0.4
Samchully (Female plant)	Elliptical	Acuminate	Acute	Crenate	4.80 ± 1.5	2.30 ± 0.7	0.30 ± 0.5	1.90 ± 0.2
Seobong (Male plant)	Oval	Acute	Round	Serrate	10.43 ± 0.7	8.73 ± 0.4	4.50 ± 0.3	4.70 ± 0.5
Daeil (Control)	Ovate	Acute	Cordate	Serrate	7.95 ± 1.3	4.95 ± 1.7	1.60 ± 0.5	3.02 ± 0.3

^zMean ± standard error (n = 10).

Table 3. Flower characteristics of new cultivar 'Daewangchun' from interspecific hybridization.

Cultivar	Flower color	Flower color in RHS color chart	Degree of petal overlap	Eye spot color	Serration of petal	Petal shape
Daewangchun	Violet purple	RHS N80C	Overlap (I-c ^z)	59A	Medium	Fan (II-type ^y)
Samchully (Female plant)	Pink	RHS 84C	Overlap (I-c)	60D	Weak	Fan (II-type)
Seobong (Male plant)	Pinkish violet	RHS 78C	Overlap (I-c)	60B	Weak	Fan (II-type)
Daeil (Control)	Violet pink	RHS N78C	Overlap (I-c)	59C	Medium	Fan (II-type)

^zUPOV TG/(I-a: Single flower and not overlapping; I-b: Single flower and slightly overlapping; I-c: Single flower and overlapping).

^yUPOV TG/(I-type: Spatulate; II-type: Fan; III-type: Spoon).

Table 4. Flower size of new cultivar 'Daewangchun' from interspecific hybridization.

Cultivar	Diameter of flower (cm)	Petal			Length of red eye (cm)	Length of radiation line (cm)
		Length (cm) (A)	Width (cm) (B)	Index (A/B)		
Daewangchun	12.0 ± 0.7 ^z	7.2 ± 0.5	5.5 ± 0.7	1.3 ± 0.6	3.0 ± 0.3	2.0 ± 0.2
Samchully (Female plant)	11.7 ± 1.2	6.1 ± 0.7	3.2 ± 0.4	1.9 ± 0.5	1.8 ± 0.4	1.2 ± 0.1
Seobong (Male plant)	12.4 ± 1.4	7.1 ± 0.4	4.8 ± 0.5	1.5 ± 0.5	1.5 ± 0.2	1.4 ± 0.3
Daeil (Control)	11.4 ± 1.7	5.8 ± 1.1	4.9 ± 0.5	1.2 ± 0.8	1.2 ± 0.5	1.6 ± 0.4

^zMean ± standard error (n = 10).

species of *Hibiscus*. Upon anthesis in the early morning the flower petals reflexed, then gradually returned to nearly right angles to the central axis and remained thus for the life of the flower (Table 4). *Hibiscus* 'Daewangchun' started to flower each year in early July and continued for about four months, depending upon environmental conditions. The flowering of 'Daewangchun' initiated on July 5 and then total blooming duration was 102 days in Chonan, Korea. The plants then produced sporadic flowering until frost (Table 5).

The stiff, upright main stems of *H.* × 'Daewangchun' apparently were derived from *H. syriacus*. It seemed to be increased vigorous growth into *H. syriacus* by interspecific hybridization with *H. sinosyriacus*. The flower color in *Hibiscus* × 'Daewangchun' was darker pink than those of *H. syriacus* 'Samchully' and *H. sinosyriacus* 'Seobong'. In size, the flowers of *H.* × 'Daewangchun' were larger than in any of its parent cultivars. In pose, the flowers of *H.* × 'Daewangchun' somewhat resembled those of the species *H. syriacus* in that the flowers expanded their petals widely. Meanwhile, the oval three-lobed leaves of 'Daewangchun' also resembled those of *H. sinosyriacus* in shape and also resembled those of *H. sinosyriacus* in shape. *H. sinosyriacus* was allied to *H. syriacus*, but had broader leaves, with three short triangular lobes (Bates, 1965; Bean, 1973).

Plants of the new *Hibiscus* were more vigorous than parents and plants of the control 'Daeil'. *Hibiscus* × 'Daewangchun' differed primarily from parent plants in growth habit, flower size, and length of red eye spot as plants of the new *Hibiscus* were more vigorous growth and had larger flowers than plants of 'Daeil'. 'Daewangchun' differed from plants of the female and male parents in flower size and color as

plants of the parents had smaller and lighter pink-colored flowers.

Notes for Production

The new *Hibiscus* × 'Daewangchun' plant grows in well-drained soil. It easily grows in average and medium moisture in full sun to part shade. Best flowering occurs in full sun. It prefers moist, organically rich soils, but tolerates poor soils and some drought. It is very tolerant of summer heat and humidity. Prune to shape in spring. Pruning back to 2-3 buds in late winter may produce larger blooms. It is easily propagated by stem cuttings. May be grown from seed, but seedlings may not have the exact same flower color as the parent. Larger flowers may be obtained by pruning back hard to 2-3 buds in early spring. Otherwise, prune to shape (Table 6).

Plant Breeder's Right and Availability

An application was filed for variety protection of 'Daewangchun' at the Korea Seed and Variety Service (Application no. 2013-210) and the plant variety protection rights have been registered as grant number 4731 on April 15, 2013. Additional information or a list of nurseries propagating 'Daewangchun' is available on written request to Research Institute of Rose of Sharon and Tiger Lily (RIRS & TL), Chonan, Korea (e-mail: shimkk@chol.com). In addition, specimens of the releases have been deposited in the Research Institute of Rose of Sharon and Tiger Lily where it will be available for research purposes. The cultivar had been already released by RIRS & TL, Chonan, Korea and has been selling as commercial variety for domestic market.

Table 5. Flowering characteristics of new cultivar 'Daewangchun' from interspecific hybridization in 2012.

Cultivar ^z	Flower longevity (hr)	Anthesis	Flower shedding	Blooming duration (day)
Daewangchun	13 ~ 15	5 July	Oct. 15	102
Samchully (Female plant)	13 ~ 15	10 July	Sept. 22	75
Seobong (Pollen parent)	13 ~ 15	20 June	Sept. 7	77
Daeil (Control)	10 ~ 12	30 June	Oct. 16	108

^zAll cultivars were cultivated in Cheonan city, Chungcheongnam-do Province.

Table 6. Production method of new cultivar 'Daewangchun' from interspecific hybridization.

Cultivation condition			Pruning		Propagation method
Soil type	Moisture	Light	Time	Method	
Sandy loam	Medium	Full sun to part shade	Spring	Pruning back hard to 2-3 buds	Stem cutting

It is requested that appropriate recognition be made if this germplasm contributes to the development of a new breeding lines or cultivars.

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