

Breeding of summer-autumn-flowering small-flowered spray-type chrysanthemums cultivar ‘Nagasaki SWC1’ by heavy-ion-beam irradiation

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In Nagasaki Prefecture, the small-flowered spray-type chrysanthemums is promoted for planting in open fields because producers can cultivate it at low cost. It has a great demand during Obon (early in August) as a funeral flower in Japan. It is necessary to ship three colors of flowers (red, white, and yellow) simultaneously from the market. However, the shipment time is unstable because of bloom delays or bud departing at the early stage caused by high temperatures during the cultivation period. Therefore, the development of a new cultivar that enables a stable shipment time has been desired to meet the needs of the market. We conducted cross-breeding and selected a superior red lineage for which the blooming time can be controlled using long-day treatment under lighting (Fig. 2(a)). In this study, we irradiated this superior red lineage with a heavy-ion beam to obtain cultivars of different colors that have the same shipment time as the superior red lineage. It has been reported that the flower color of the original cultivar is important to obtain a wide mutation spectrum of the flower color in *Chrysanthemum*.¹⁾ This cultivar was thought to be suitable for inducing mutations of the flower color such as white or yellow. As a result, we succeeded in developing a new cultivar known as ‘Nagasaki SWC1’ with white flowers in 2018.

We irradiated 27 scions of the superior red lineage with C-ion beams (LET: 23 keV/ μm) at a dose of 5 Gy at RIKEN Nishina Center in January 2015. We planted and pinched the irradiated scions as a mother stock, following which we picked scions. We planted these scions in the field and obtained 984 candidate mutant plants, including 49 flower-color mutants. Some of these mutants were chimera. Therefore we isolated the plants with only white flowers in the first selection. We multiplied these plants and cultivated them in the field in 2016. Subsequently we selected a superior plant named ‘W1-1’ in the second selection. The third selection was performed in 2017 to confirm its stability of characteristics and flower color. The final experimental production of ‘W1-1’ was performed at the field of an agricultural center, and ‘W1-1’ gained high evaluation in a test of adaptability to local fields in 2018. We named this superior cultivar ‘Nagasaki SWC1’ and applied for the registration of this variety on March 18, 2019.

‘Nagasaki SWC1’ has a white (white-group 155-C on the R.H.S. color chart) single flower (Fig. 2(b)). It

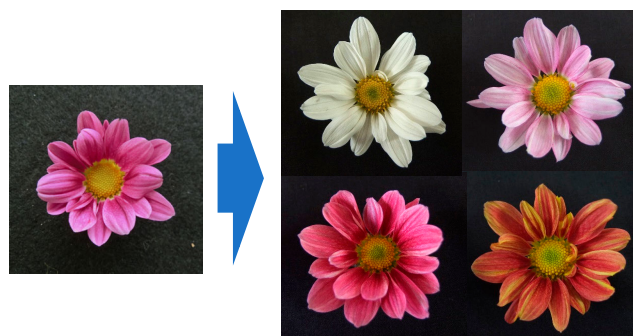


Fig. 1. Original flower and the flower-color mutants.



Fig. 2. Original flower (a) and a new cultivar ‘Nagasaki SWC1’ (b).

blooms in the middle of July under natural long days. It is also possible to control blooming by long-day treatment under light culture and adjust the shipment time to the period of highest demand which is early August. Furthermore, ‘Nagasaki SWC1’ has a small unnecessary inferior branch. This characteristic provides a labor-saving plant shape which is suitable for bouquet making. These characteristics of ‘Nagasaki SWC1’ are inherited from the superior red lineage. Therefore, red and white flowers can be shipped simultaneously in the period of highest demand. This is a great advantage for producers, and an increase in their income can be expected. Presently, we are working on breeding a yellow flower line. Our aim is to breed a new cultivar for a set of three colors of small-flowered spray-type chrysanthemums.

Reference

1) K. Tamaki *et al.*, Hort. Res. (Japan) **16**, 117 (2017).

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