

Breeding of Summer-Autumn Flowering Chrysanthemum cv. Hakuryo with a little generation of malformed flower

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Chrysanthemum is the main element of flowering plant production in Nagasaki Prefecture. Its growing area spreads over 168 hectares and has an output of approximately 3,500 million yen. A summer-autumn flowering Chrysanthemum cv. Iwano-hakusen has come to a main summer-autumn Chrysanthemum cultivar in Nagasaki Prefecture because it is one of the labor-saving cultivars with no lateral shoot and does not require a shading apparatus controlling the day length for flowering. However, “Iwano-hakusen” has a problem that malformed flowers can be seen significantly among September-flowering type plants (fig. 1-A,B) due to high temperatures in September. This problem is serious because those malformed flowers cannot be commercialized and it directly affects the farmer’s business situation. Thus, developing a new cultivar of summer-autumn Chrysanthemum having minimum generation of malformed flowers had been desired. Therefore, we tried to breed a new cultivar having minimum generation of malformed flowers by using heavy-ion beam irradiation. As a result, we succeeded in breeding a new cultivar known as “Hakuryo” in 2014.

We irradiated C-ion beams (LET: 23keV/μm) of 10 Gy to “Iwano-hakusen” at RIKEN Nishina center in February 2011, and selected a new cultivar “Hakuryo”. We irradiated C-ion beams to 1,440 scions, and obtained 3,702 derivatives from the irradiated scions as a mother stock. Among the 3,702 derivatives, 1,620 showed malformations such as forked or fasciated stems. From the rest of the derivatives, 2,082 were planted and cultured under normal light culturing. After that we selected well-formed flowers on the first selection. The second selection of well-formed flowers in the next generation was performed in 2012. Then on the third selection, “Hakuryo” was isolated. Large-scale experimental production of “Hakuryo” was performed at the agricultural center field and at the local field. We applied for registration of the variety on the March 12, 2015 because the stability of characters was confirmed. “Hakuryo” is a variety of Summer-Autumn Flowering Chrysanthemum and has large white petals (White-group NN115-C on the R.H.S. color chart) (Fig. 1-C, D). It does not need a shading apparatus for flowering, and shipping from July to September is possible using long-day treatment under light culture. Since its neck is short, the balance of upper leaves arrangement is preferred in the market (Fig. 1-C). As compared to “Iwano-hakusen”, “Hakuryo”

has these following characteristics. Harvest in natural flowering is from the last ten days of May to the beginning of June, which is about 3 weeks earlier than “Iwano-hakusen”. The flowering days after the end of the long-day treatment is about 45 days. The stem grows faster and is 4 cm – 5 cm longer than “Iwano-hakusen”. The size of the flower at harvest is about the same or little bigger than “Iwano-hakusen”. The number of ray flowers is about the same or little lesser than “Iwano-hakusen”. The occurrence rate of malformed flowers is substantially less than that of “Iwano-hakusen” in September-flowering type plants, which is only about 10% (Fig. 2).

“Hakuryo” is becoming popular gradually because the commercializing rate has been increasing as the generation of malformed flowers decreases, so that farmers can expect financial stability. However, “Hakuryo” has two problems: its weight is slightly lighter because of its longer stem and leaf scorch is often seen. Therefore, we need to select a heavier line and establish a cultivation technique to improve the quality of “Hakuryo”.

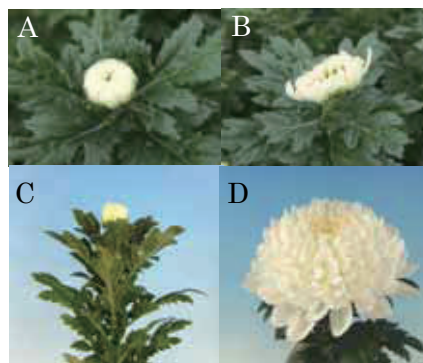


Fig. 1 The normal flower of “Iwano-hakusen” (A) and malformed flower (B). The upper side of “Hakuryo” (C) and in full bloom (D).

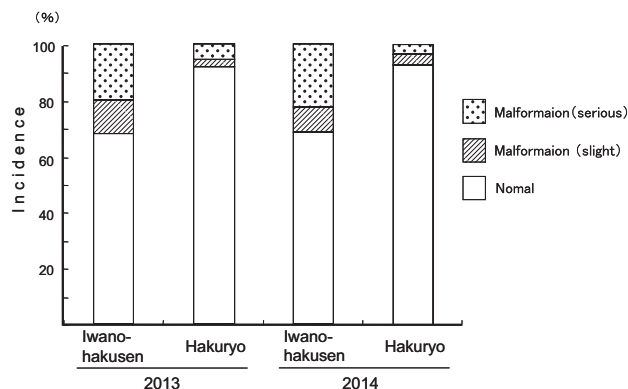


Fig.2 Incidence of Flower malformation in September-flowering type plants

※ 1) Short diameter/long diameter= 9/10 to 1/1 is normal, 4/5 to 9/10 is malformaion (slight), and 7/10 to 4/5 malformaion (serious)

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