‘Tainan No. 1’ Statice: An Early Flowering *Limonium* Cultivar

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Statice [*Limonium sinuatum* (L.) Mill.] is commercially grown as a cut-flower crop and used for both fresh and dry flower arrangements. Exposure to low temperatures at $11 \pm 2^\circ\text{C}$ at the seedling stage promotes flowering. Vernalization requirements differ among cultivars (Semeniuk and Krizek, 1973) and even in a population within the same cultivar (Shillo and Zamski, 1985). The genetic diversity is the result of floral dimorphism in the structure of pollen and stigma. The two known phenotypes, A/cob and B/papillate, exhibit self-incompatibility, whereas crosses between them are fully compatible and produce seeds (Baker, 1953, 1966). Most current statice cultivars are planted in the fall, experience natural cooling in winter, and then flower from spring to summer in the lowlands of Taiwan or other subtropical areas. However, growers have been seeking early-flowering statice cultivars that will produce cut flowers in the winter when the price is higher.

Mass selection is often applied in breeding for a lower vernalization requirement to obtain earlier flowering populations (Cohen et al., 1995). In this present work, ‘Tainan No. 1’ was developed through eight continuous generations of mass selection from the parental cultivar Fortress Mix. The horticultural traits of this newly released cultivar are described subsequently.

Origin

Seeds of ‘Fortress Mix’ were sown and planted in the field of Tainan District Agricultural Research and Extension Station (TNDARES) in Sept. 2000. Thirty to 50 early-flowering plants were selected and their open-pollinated seeds were collected, grown, and used for selection for five generations. In Sept. 2005, 50 seeds of the fifth generation

(89F1-2-2-3-1) and the parental cultivar Fortress Mix were sown in plug trays. When the plants had five to six leaves, they were planted in the TNDARES field (long. $23^\circ03'$ N, lat. $120^\circ20'$ E) in Oct. 2005 under natural day length of 11 to 12 h at temperatures of 18 to 28°C . Time from planting in the field to flowering (showing color of the first inflorescence), number, and average length of the inflorescences were recorded. Data were analyzed using *t* test. 89F1-2-2-3-1 flowered 80 d earlier and produced more inflorescences than ‘Fortress Mix’ (Table 1). The calyx color was

added to the breeding goal since 2005. In 2008, 89F1-2-2-1-1-1-1-1 was propagated in vitro from shoot multiplication named ‘Tainan No. 1’ (Fig. 1) for performance studies.

Description and Performance

The following color description was based on The Royal Horticultural Society’s (RHS) color chart (Royal Horticultural Society, 2007). The length of inflorescences of ‘Tainan No. 1’ ranges from 80 to 100 cm. The peduncle of the inflorescence is thick (5 to 10 mm) with sparse hairiness. The peduncle wing is broad with strong undulation. The ramification of the peduncle is medium and the lateral branches have an erect attitude. Numerous florets are arranged in corymb and drepanium. The calyx is funnel-shaped and purple-colored (RHS 86A), which is medium-sized (5.5 mm diameter). The corolla is white (RHS 155A), also medium-sized (5.0 mm diameter). The anthers are higher than the papillate-typed stigma.

A comparable study between ‘Tainan No. 1’ and a commercial, most similar cultivar, Million Purple, was conducted. Plants of both cultivars, propagated by tissue culture, were grown in 9-cm diameter pots in a nursery room at 24 to 36°C . When they had 10 to 15 leaves, they were transferred to the growth

Table 1. Flowering characteristics of field-grown 89F1-2-2-3-1 and its parental cultivar, Fortress Mix, in the field of Tainan District Agricultural Research and Extension Station from Oct. 2005 to Apr. 2006 (18 to 28°C , 11- to 12-h natural day lengths).

Cultivar/line	Time to flowering (d)	Number of inflorescences	Length of inflorescences (cm)
89F1-2-2-3-1	69.8	53.2	92.8
Fortress Mix	150.3	29.2	99.8
<i>t</i> test	**	*	NS

NS, *, **Nonsignificant or significant at $P \leq 0.05$ or 0.01 level, respectively.

Fig. 1. The inflorescences of *Limonium* ‘Tainan No. 1’.

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Table 2. Effect of pre-planting temperature treatments for 4 weeks on flowering characteristics of *Limonium* ‘Tainan No. 1’ and ‘Million Purple’ planted in the field of Tainan District Agricultural Research and Extension Station from Dec. 2008 to Apr. 2009 (15 to 28 °C, 10.5- to 12.5-h natural day lengths).

Cultivar	Day/night temp. (°C)	Time to flowering (d)	Number of inflorescences	Length of inflorescences (cm)
Tainan No. 1	15/10	70.3 a ^z	51.0 a	86.5 a
	35/30	82.7 b	49.7 a	80.3 ab
Million Purple	15/10	80.3 b	27.7 b	74.0 ab
	35/30	102.7 c	22.3 b	70.3 b
Significance				
Cultivar (C)		**	**	**
Temp. (T)		**	NS	NS
C × T		NS	NS	NS

^zMeans separation within columns by least significant difference test at $P \leq 0.05$.

NS, **Nonsignificant or significant at $P \leq 0.01$, respectively.

Fig. 2. Flowering performance of *Limonium* ‘Tainan No. 1’ (left) and the comparable cultivar Million Purple (right) in the plastic house of Tainan District Agricultural Research and Extension Station from 12 Nov. 2009 to Mar. 2010 (17 to 30 °C, 10.5- to 12.5-h natural day lengths).

rooms at pre-planting temperatures of 15/10 and 35/30 °C under a 12-h photoperiod with 150 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ photosynthetic photon flux provided from cool-white fluorescent tubes for 4 weeks. Fifteen plants from each temperature regimen were then planted on 6 Dec. 2008 in the field under 10.5- to 12.5-h natural day lengths at 15 to 28 °C for further growth. Time elapsed from planting to flowering and the number and average length of the inflorescences were recorded. The difference between the two cultivars was compared by least significant difference at $P \leq 0.05$. The average

time to flowering of ‘Tainan No. 1’ was earlier than those of ‘Million Purple’ by 10 and 20 d for the 15/10 °C and 35/30 °C pre-planting treatments, respectively (Table 2). Both cultivars exhibited flowering–heat –delay at 35/30 °C; however, the delay was longer in ‘Million Purple’. Regardless of the two pre-planting temperature treatments, ‘Tainan No. 1’ had more and longer inflorescences than ‘Million Purple’.

In another experiment, when the in vitro-propagated ‘Tainan No. 1’ and ‘Million Purple’ had 10 to 15 leaves, 25 plants of each

cultivar were planted on 12 Nov. 2009 at TNDARES in a plastic house (17 to 30 °C, 10.5- to 12.5-h day lengths) for 4 months. ‘Tainan No. 1’ flowered earlier and produced more inflorescences than ‘Million Purple’ as shown in Figure 2.

Uses

‘Tainan No. 1’ is selected for cut flower production in sub-tropical climates. In the lowland area of Taiwan, ‘Tainan No. 1’ can be planted in September and flowers naturally starting from November with peaked flowering in January and February. In contrast, current cultivars are normally planted in October and do not produce cut flowers until February. The cut inflorescences of ‘Tainan No. 1’ can be used in both fresh and dried forms, because the papery calyx remains open and retains its color.

Availability

Taiwan Plant Breeder’s Right has been granted by the Council of Agriculture, Executive Yuan, Taiwan, Republic of China. A limited quantity of liners may be available for research purposes only by sending a request to the first author (d96628002@ntu.edu.tw).

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