

CONSERVATION OF *LIMONIUM* SPECIES AND THEIR USE IN A BREEDING PROGRAM

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INTRODUCTION

The genus *Limonium* (fam. *Plumbaginaceae*) consists of about 300 species, well adapted to the Mediterranean environmental conditions, particularly to the southern regions of Italy where several wild species are endemics. *Limonium* is grown for use as a cut flower for both fresh and dry-flower arrangements. An inventory of botanical species of *Limonium* has been established at the Experimental Institute for Floriculture since 1998 and a conservation program (F.A.O. International Treaty on Phylogenetic Resources) was started in 2004 in Sanremo and Pescia (Fig. 1). The inventory includes the species shown in Table 1.

Other than for conservation purposes, this germplasm has been utilised also for a breeding activity. Wild ecotypes, botanical species and commercial varieties were utilized in an incomplete diallelic cross design since 1998 at the Istituto Sperimentale per la Floricoltura (I.S.F.) in Sanremo and Pescia (Burchi *et al.*, 2000). A first group of selected progenies derives from crosses among *L. latifolium*, *L. gmelinii*, *L. caspia*, *L. bellidifolium*, *L. otolepis* and *L. serotinum*. The first inter- and intra-specific hybrids, and also progenies deriving from open-pollinations and self-pollinations, were obtained in 1999. The selected progenies were evaluated in open air and in greenhouses in Liguria, Tuscany and Sicily in experimental trials and also by breeding companies for the development of new cultivars (Burchi *et al.*, 2003a; Farina *et al.*, 2004). All of these selected genotypes are suitable for cultivation in the Mediterranean environment, particularly in poor soils and marginal farms because they require low-energy for cultivation, minimum tillage and low input of fertilisers and pesticides. In these conditions, the new I.S.F. varieties show a productivity and commercial quality comparable and also higher than the commercial cultivars utilised as a control (Fig.2 and Table 2).

Table 2. Production and commercial quality of the new I.S.F. varieties (yellow colour) as compared to the control cultivars.

"Altaica" Group				
Genotype	Production (N. of stems per plant)	Stem height (cm)	N. of branches per stem	Stem weight (g)
I.S.F. 'VIOLET MAURY'	10.50	66.17	6.83	43.17
Emille	9.17	57.93	5.33	21.00
I.S.F. 'ELITOP1'	9.08	74.07	7.70	40.07
Lavand Emille	6.08	59.40	6.37	28.03
I.S.F. 'ELITOP2'	2.42	54.37	4.73	14.50

"Gmelinii" Group				
Genotype	Production (N. of stems per plant)	Stem height (cm)	N. of branches per stem	Stem weight (g)
I.S.F. 'JOLA'	3.75	74.90	8.77	72.37
I.S.F. 'ANALISA'	3.33	70.50	8.70	127.20
I.S.F. 'ELIFABI'	2.00	73.60	6.97	53.97
I.S.F. 'ELIBLU'	1.75	55.20	8.53	37.17
Blue Rock	1.58	68.70	12.50	163.53

"Latifolium Hybrids" Group				
Genotype	Production (N. of stems per plant)	Stem height (cm)	N. of branches per stem	Stem weight (g)
I.S.F. 'ELIEMI'	5.92	109.43	13.43	76.97
Avignon	5.33	105.83	10.33	49.77
I.S.F. 'ELIGIL'	4.08	93.60	9.93	51.30
Beltard	2.25	118.63	13.27	62.07
Ocean Blue	2.17	101.40	10.53	48.40
Misty Pink	1.42	103.47	9.97	59.43

The last group derives from a new breeding program started in 2001 with crosses among *L. aureum*, *L. sinensis*, *L. tetragonum*, *L. fortunei* and the commercial cultivars 'Lemon Star', 'Yellow Star' and 'Superlady'. The first hybrids were obtained in 2002: they show both the good agronomical and ornamental characteristics of the parental cultivars and the stress tolerance of the parental botanical species. The best progenies are going to be cloned and cultivated in plots in the next year (Fig. 6).



Fig. 6. Three examples of progenies obtained by crosses between *L. sinensis* and the commercial cultivars 'Lemon Star', 'Yellow Star' and 'Superlady'.



Fig. 1. Inventory of *Limonium* botanical species at the Experimental Institute for Floriculture, Pescia.



Fig. 2. The I.S.F. variety Violet Maury.

Table 1. The botanical species of *Limonium* belonging to the inventory.

Species	No. of accessions
<i>L. artunsi</i>	1
<i>L. fortunei</i>	3
<i>L. sinensis</i>	3
<i>L. tetragonum</i>	3
<i>L. aureum</i>	1
<i>L. bellidifolium</i>	2
<i>L. caspia</i>	2
<i>L. otolepis</i>	3
<i>L. binervosum</i>	4
<i>L. deracifolium</i>	1
<i>L. bonduelli</i>	1
<i>L. sinuatum</i>	5
<i>L. dumosum</i>	1
<i>L. tataricum</i>	3
<i>L. gmelinii</i>	5
<i>L. gougetianum</i>	1
<i>L. puberulum</i>	1
<i>L. latifolium</i>	5
<i>L. perezii</i>	4
<i>L. speciosus</i>	1
<i>L. serotinum</i>	1
<i>L. purpuratum</i>	1
<i>L. peregrinum</i>	1
Commercial varieties	19
Wild ecotypes	24

A second group derives from the cross *L. bonduelli* x *L. sinuatum* (Statice). *L. bonduelli* is a Mediterranean wild species that could be utilised for commercial production. The traits that should be improved are the productivity, the flower colour variety (*L. bonduelli* is only yellow) and the stem (too high and thin in the wild species). The first interspecific hybrids were selected in 2000. The genotypes of three selected populations (the hybrids *L. bonduelli* x *L. sinuatum* and the selected progenies deriving from the parents) were evaluated in greenhouses in Pescia, in comparison with commercial cultivars of Statice (Burchi *et al.*, 2005). The selected hybrids resulted to be characterized by a stem production significantly higher than the other populations, a stem significantly shorter and harder than *L. bonduelli* and a number of branches per stem significantly higher than *L. sinuatum* and the commercial varieties (Fig. 3). Furthermore, the stems do not show the typical wings of the Statice cultivars and the flowers show new different colour combinations of the calyx and the corolla (pink, yellow, violet, white, etc.) (Fig. 4).

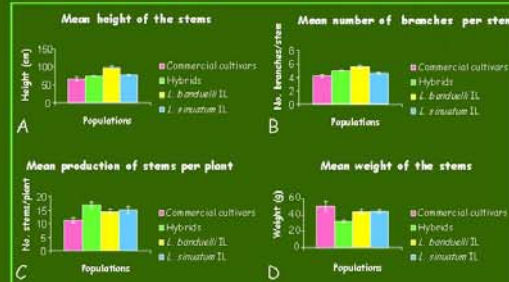


Fig. 3. Histograms show the means of 4 populations with standard errors of the following traits: Mean height of the stems(A); Mean number of branches per stem(B); Mean production of stems per plant(C); Mean weight of the stems(D). IL: *L. sinuatum*.



Fig. 4. Examples of different colour combinations of the calyx and the corolla in the hybrids *L. bonduelli* x *L. sinuatum*.

The third group derives from selected progenies of *L. tataricum* (Burchi *et al.*, 2003b). This species could not be crossed with any other species, so only one new variety was obtained by this breeding activity. This variety is a selection from free pollination of *L. tataricum* and is characterized by a good production, a high number of flowers per stem and a very attractive architecture of the inflorescence. The colour of calyx and the corolla is white: this is a typical characteristics of this variety because the colour of the corolla in *L. tataricum* is commonly pink or light-violet (Fig. 5).

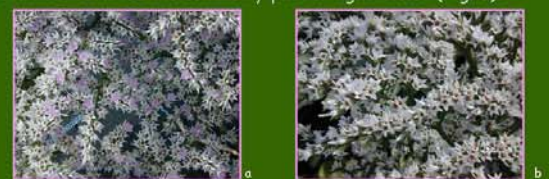


Fig. 5. *L. tataricum*, cv. Pink Fire (a) and White Fire (b).

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