

Onion Cultivars Released by La Consulta Experiment Station, INTA, Argentina

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The onion crop is of great importance in Argentina and, with garlic (*Allium sativum* L.), is the main fresh vegetable exported. The principal market for Argentine onions is Brazil, with significant exports to Europe and the United States. About 450,000 t of onions are produced yearly on 22,000 ha, for the fresh-market and dehydration industries (Galmarini, 1998). Onion seed production is also important in Argentina; ≈50,000 kg of seed is produced annually by domestic and international seed companies.

For decades, onion-breeding programs in Argentina have been developing short-, intermediate-, and long-day cultivars. Most Argentine cultivars trace back to local landraces, known as “Criollas,” that are becoming rare (Galmarini, 1994). Today, most of the cultivars used in Argentina originate from domestic breeding programs. However, few descriptions of these cultivars exist, other than those found in brief release notices.

The main onion-breeding program in Argentina is located at La Consulta Experimental Station (INTA) (lat. 33°44'S, long. 69°7'W). Other breeding programs emphasizing early maturing onions have been carried out at the San Juan Experimental Station (INTA) and the Santiago del Estero Experimental Station (INTA). Breeding work has also taken place in several national universities and local seed companies.

At La Consulta, the onion-breeding program was initiated by José Crnko in 1948. Crnko used local ‘Valenciana’ populations and selected for improved bolting resistance and keeping quality to produce synthetic cultivars. ‘Valenciana Synthetics 1 and 2’ were released in 1958 (Cavia and Crnko, 1958). ‘Valenciana Synthetic 14’ was released in 1966 and ‘Valenciana Synthetic 15’ in 1970, by Crnko and Lona (Crnko, 1998). Of these releases, only ‘Valenciana Synthetics 1 and 14’ were used for further breeding. Jorge Lona directed the onion breeding program from 1969 until 1976 and developed several male-sterile and maintainer lines, and the F₁ hybrid

‘Híbrido Industria INTA’. From 1978 to 1988, Rubén Oliva, who emphasized seed production, continued the program. Since 1988, Claudio Galmarini has been in charge of the program. In the 1990s, the fresh-market cultivars Cobriza INTA, Navideña INTA, and Antártica INTA were released (Galmarini et al., 1995). A special agreement was established between a dehydration company and La Consulta Experimental Station to develop open-pollinated populations and hybrids with high solids content. In 1997, the cultivar Refinta 20 was released (Galmarini, 1998). The cultivars released by La Consulta Experiment Station onion-breeding program account for more than 80% of the onions cultivated in Argentina.

The current goals of the program are early maturity, good storage ability, and introduction of resistance to pink root into intermediate and long-day, open-pollinated cultivars and F₁ hybrids. Classical breeding methods, including mass, pedigree, and recurrent selection, are being used. In vitro culture techniques (e.g., ovule and ovary culture) are used to hasten the production of homozygous lines by haploidy. Several haploid plants have been

produced and double haploids are being tested (Martinez et al., 1997). Randomly amplified polymorphic DNA (RAPDs) have been identified to fingerprint some of the new onion cultivars (Masuelli and Galmarini, 1996).

Origin and description

Recurrent selection was used to develop the new cultivars. ‘Valenciana’ populations were used to develop the cultivars Valcatorce INTA, Valuno INTA, Cobriza INTA, and Antártica INTA. ‘Valenciana’ populations trace back to ‘Grano’-type onions from the Valencia region of Spain; the long-storing cultivar Pukekohe Long Keeper of New Zealand and its Australian derivative cultivar Creamgold are believed to be derived from the same Spanish origin (Brewster, 1994). ‘Torrentina’ populations, which have been known for more than 100 years in Argentina and may have originated in southern Spain, were used to develop ‘Navideña INTA’. ‘Refinta 20’ originated from a selection from ‘Southport White Globe’ populations (Galmarini et al., 1997). S₁ family selection was the common strategy used for the development of ‘Navideña INTA’, ‘Cobriza INTA’ and ‘Refinta 20’, whereas mass selection was used in the case of ‘Valcatorce INTA’, ‘Valuno INTA’ and ‘Antártica INTA’. Currently available cultivars are described below and in Table 1.

‘Valcatorce INTA’ was selected from ‘Valenciana Synthetic 14’, requires 14-h photoperiods to produce bulbs, is a moderate to late-maturing cultivar, and has globe-shaped bulbs of medium size, two to three dark-brown scales (Fig. 1), pungent and firm flesh, bolting resistance, and excellent keeping quality (Table 1). It is sown from August to September and harvested from January to February. ‘Valcatorce INTA’ is the most commonly grown cultivar in Argentina, and is also grown in Chile and Uruguay (Escaff et al., 1973).



Fig. 1. Bulbs of onion cultivars Valcatorce INTA, Cobriza INTA, Antártica INTA, and Navideña INTA.

Table 1. Mean^z performance of onion cultivars released by La Consulta Experiment Station INTA onion breeding program.

Trait	Cultivar					
	Valcatorce	Valuno	Cobriza	Antártica	Navideña	Refinta 20
Bulb shape	Round	Round	Round	Round	Round, slightly Top-shaped	Round
Bulb skin color	Dark-yellow	Yellow	Dark-brown	White	Light-yellow	White
N° of colored scales	3	3	4.5	2	2.5	2
Bulb diameter (cm) ^y	7.3 ± 2.3	9.1 ± 2.6	7.0 ± 1.6	6.7 ± 1.7	7.9 ± 2.6	6.0 ± 1.8
Bulb weight (g) ^x	210 ± 31.6	250 ± 33.3	194 ± 22.7	170 ± 20.6	230 ± 28.3	120 ± 17.6
Total solids (%) ^w	13.1 ± 2.3	13.0 ± 2.7	13.3 ± 2.1	14.0 ± 2.6	10.2 ± 2.4	20.9 ± 1.9
Maturity (days) ^v	128 ± 11	144 ± 13	131 ± 12	136 ± 16	107 ± 9	139 ± 12
Storage ability ^u (days)	185 ± 21	154 ± 29	180 ± 18	145 ± 19	123 ± 24	153 ± 17
Yield (t·ha ⁻¹)	51.7 ± 11.8	60.1 ± 16.6	50.5 ± 11	45.3 ± 9.6	53.2 ± 21.3	33.8 ± 8.7
Bolting (%) ^t	0	2	0	1	0	1

^zMeans over at least 2 years (1995–97) at La Consulta (lat. 33°44'S, long. 69°7'W, and 940 m elevation).

^yThe equatorial bulb diameter was measured.

^xThe standard plant density was 32 plants per m².

^wMeasured after a month in storage. Expressed as a percentage of relative to fresh weight after drying the bulbs to constant weight in an oven.

^vDays from transplanting to 80% of collapsed foliage.

^uNumber of days until 50% sprouted under ambient conditions at La Consulta.

^tPercentage of flowering plants recorded in the season (transplanting on the first week of September).

'Valuno INTA' was selected from 'Valenciana Synthetic 1'; requires 14-h photoperiods to produce bulbs; is a moderate to late-maturing cultivar; has a lighter yellow color; larger bulbs (Fig. 2), and shorter keeping time than 'Valcatorce INTA' (Table 1). It is sown from August to September and harvested from January to March.

'Cobriza INTA' was selected from a 'Valenciana' population using S₁ family selection (Galmarini et al., 1995). It has photoperiodic requirements for bulb formation similar to those of 'Valcatorce INTA', medium-sized, globe-shaped bulbs, with four to five dark-brown scales (Fig. 1), pungent and firm flesh, bolting resistance, and excellent keeping quality (Table 1). The yields and production cycles are similar to those of 'Valcatorce INTA' (Table 1). 'Cobriza INTA' may have a great impact on the domestic onion market, because it yields as well as 'Valcatorce INTA', but is of better quality.

'Navideña INTA' was selected from local 'Torrentina' populations from the north of Mendoza and San Juan provinces (Galmarini et al., 1995). It requires 13-h photoperiods for bulb formation and has brown globe bulbs with two to three colored scales (Fig. 1). The bulbs are less pungent than those of the 'Valenciana' types; the flavor was estimated using a taste panel, as described by Wall and Corgan (1992). At Mendoza, it reaches maturity at the end of December.

'Antártica INTA' was selected from white bulbs segregating in 'Valenciana' populations. These bulbs were combined to develop a white population from which the new cultivar was selected (Galmarini et al., 1995). 'Antártica INTA' has photoperiodic requirements for bulb formation similar to those of 'Valcatorce INTA' and good keeping quality (Fig. 1). The production cycle is also similar to 'Valcatorce INTA'.

'Refinta 20' originated from 'Southport White Globe' after mass selection for high solids (Galmarini et al., 1997). It has white, pungent bulbs (Fig. 2) and an average total solids content of 20%, more than 3% higher than the total solids of the populations



Fig. 2. Bulbs of onion cultivars Refinta 20 (top) and Valuno INTA (bottom).