

× *Polifreda* ‘Lindstrom’, a Cross Between False Aloe and Mexican Tuberose¹

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Abstract

× *Polifreda* ‘Lindstrom’ was developed at the University of Arkansas to increase the range of perennials available to horticulture in the American South. The cultivar was selected from 14 viable seedlings produced by crossing *Manfreda virginica* (L.) Salisb. ex Rose (male) and *Polianthes tuberosa* L. (female) via controlled pollination. Specimens have been grown at the University of Arkansas Agricultural Research Station in Fayetteville, Arkansas (USDA Zone 6b) since 2005 and propagated by either division or micropropagation. Desirable characters inherited from *P. tuberosa* include two flowers per node, a pleasant fragrance, and heat and drought tolerance. Characteristics resembling *M. virginica* include finely-denticulate leaf margins, a scapose raceme inflorescence type, and tolerance of winter temperatures as low as –25C (–11F). The intergeneric hybrid represents the first cultivar of the nothogenus × *Polifreda*. The cultivar epithet ‘Lindstrom’ was chosen to honor the contribution to horticulture of the late Jon T. Lindstrom, who was the instigator of the breeding program and a former associate professor at the University of Arkansas. It is proposed that × *Polifreda* ‘Lindstrom’ would be suited to either perennial borders or rock gardens, situated in full sun or partial shade.

Significance to the Nursery Industry

Mexican Tuberose, *Polianthes tuberosa* L., is an ornamental perennial with its use in Aztec traditions dating back over 400 years. In modern times, it is popular in the floriculture industry due to its longevity and fragrance, commercially cultivated for cut flowers and perfume worldwide (1).

Species and cultivars of *Manfreda* Salisb. and *Polianthes* L. are available from specialist nurseries. Both genera possess characteristics such as tolerance of heat and drought desirable to gardeners; yet many are limited as to where they can be grown successfully due to an inability to withstand freezing temperatures (4). Breeding efforts which began at the University of Arkansas in 2003 aimed to utilize the aforementioned desirable characters while addressing cold hardiness. By crossing *Manfreda virginica* (L.) Salisb. ex Rose (False Aloe) — a native of the eastern United States — and *P. tuberosa*, an intergeneric hybrid better adapted to the climate of the American South and novel aesthetics is proposed for use in the landscape.

Origin

The genera *Manfreda* and *Polianthes*, in the family Asparagaceae and subfamily Agavoideae, are comprised of 26 to 32 and 14 species respectively. Both genera inhabit extensive ranges across Mexico, to which *Polianthes* is endemic, while populations of *Manfreda* are also native to Guatemala, Honduras, El Salvador and the United States (2, 3, 4). *Manfreda* and *Polianthes* are closely related to *Agave* L., yet separated morphologically by vertical rhizomes with fleshy

roots, chartaceous or semi-succulent leaves without a terminal spine and soft marginal teeth, in addition to racemose or spicate inflorescences. Differentiation between *Manfreda* and *Polianthes* is based on flower number per node, flower color, stamen insertion and stigma form (5).

In 2003, *M. virginica* and *P. tuberosa* were acquired from Yucca Do Nursery (P.O. Box 1039, Giddings, TX 78942). In August 2003, stamens of *M. virginica* (male) were emasculated upon anthesis and controlled pollination was conducted three days later when the stigmas of *P. tuberosa* (female) became receptive. A total of 14 viable seedlings were produced from the cross, one of which was selected for a salmon pink coloration exhibited on the external portion of the tepals and a pleasant fragrance, akin to that of *P. tuberosa*. The selected hybrid exhibited both desirable aesthetic and aromatic attributes of *P. tuberosa* as well as demonstrating cold hardiness in Fayetteville, Arkansas, inherited from *M. virginica*.

Description

This hybrid is a perennial with a vertical, fleshy rhizome, leaves arranged in a rosette, and an aculous inflorescence. Mature height of flowering specimens is approximately 1.8 m (54.4 in). Leaves are sessile, semi-succulent, glabrous and linear-lanceolate, ranging from 22.4 to 28.2cm (8.8 to 11.1 in) in length and 11 to 19 mm (0.4 to 0.7 in) in width. Leaf margins are finely denticulate with a soft acuminate leaf apex and the leaf color is dark green (138A, RHS) with maroon (60B, RHS) basal mottling. The inflorescence is a scapose raceme, approximately 1.8 m (54.4 in) in length from ground level to the apex upon flowering with a width of 2 to 7 mm (0.07 to 0.27 in), and the peduncle is dark purple (79A, RHS) in color. Flowers are spirally arranged, pedicellate 3–10 mm (0.1–0.4 in) in length, and borne in pairs basally transitioning to single flowers at the distal portion of the peduncle. Pedicels are subtended by lanceolate bracts, gradually reducing in size towards the apex, and range between 5 and 210 mm (0.2 and 8.2 in) in length. Flowers are infundibular with recurved limbs, 51–53mm (2.0–2.1 in) long and 6 to 7 mm (0.2–0.3

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in) wide. The perianth is homochlamydeous with tepals 40 to 45 mm (1.6 to 1.8 in) in length and basally connate. The abaxial tepal surface is salmon pink (49C, RHS) in color, while coloration of the adaxial tepal surface is uniformly light cream (157D, RHS) (Fig. 1). Stamens are uniseriate, haplostemonous and filamentous. Stamens length ranged from 27 to 29 mm (1.0 to 1.1 in). Filaments are linear and light cream (157D, RHS) in coloration. Anthers are dithecal with a longitudinal dehiscence with a vivid yellow (9C, RHS) color. Pistil length ranges from 23 to 24 mm (0.90 to 0.94 in) and style color is light cream (157D, RHS).

Characters of this hybrid, such as linear-lanceolate leaves, paired flowers at nodes, recurved tepal limbs, a light cream adaxial tepal surface and filaments as well as fragrance, resemble *P. tuberosa*. This hybrid's finely-denticulate leaf margin, racemose inflorescence, and linear-lanceolate bracts resemble *M. virginica*. Maroon basal leaf mottling and a salmon pink coloration of the adaxial tepal surface are novel characters, while stamen and style length and anther size and color are intermediate between *M. virginica* and *P. tuberosa*.

Cultural Conditions, Adaptability and Performance

Specimens have grown readily at the University of Arkansas Agricultural Research Station in Fayetteville, Arkansas (USDA Zone 6b) since 2005. Specimens were located in full sun with no irrigation in a silt loam/silty clay loam soil. No significant pest or diseases were observed to effect field



Fig. 1. \times *Polifreda* 'Lindstrom' in flower at the University of Arkansas Agricultural Research Station in Fayetteville, Arkansas.

grown specimens. Flowering has occurred each year since planting in 2005, surviving winter low temperatures of -25°C (-11°F) in 2011, -15°C (5°F) in 2008 and -14°C (7°F) in 2005. Abundance of flowering may decrease over time, but it is surmised that division of the multiple crowns which develop could help rejuvenate flowering.

Propagation

Propagation of this hybrid was done by either micropropagation or division. The following protocol was employed in the micropropagation procedure:

Immature inflorescences 15 to 20 cm (5.9 to 7.9 in) in length were harvested and the upper 4 cm (1.6 in) was removed. The inflorescence segment was rinsed under running water for one hour, rinsed for one minute in 95% ethanol then sterilized in a 10% solution of commercial bleach for 12 minutes. Under a laminar flow hood, the inflorescence section was rinsed twice in sterile water. The upper 2.5 cm (1 in) of the inflorescence was used as the final explant. Sheathing bracts on the inflorescence were removed and the inflorescence was divided into sections, each containing a node. These nodes were placed in Linsamaier and Skoog media with $25\ \mu\text{M}$ 6-benzyladenine and $0.5\ \mu\text{M}$ naphthaleneacetic acid at pH 5.7. Shoots developing from these inflorescence nodes were subcultured every six to eight weeks. Shoots were rooted *ex vitro* by dipping the base of each shoot in Hormex #8 (Brooker Chemical Corporation, Chatsworth, CA, 91313), planting the shoots in a 1:1 Fafard #2 (Sun Gro® Horticulture, Agawam, MA, 01001): perlite mix and placing the pot in a plastic bag. Rooting occurred in 3 to 4 weeks. Tissue-cultured shoots will flower after 10 to 15 months when grown in the greenhouse or after two growing seasons when planted directly in the field.

Cultivar Name

This is the first release in the new nothogenus \times *Polifreda*. The name was deemed most appropriate as it combined the names of both parent genera *Manfreda* and *Polianthes*, while an alternative, *Mananthes* Bremek., is an existing genus in the Acanthaceae (6).

The cultivar epithet 'Lindstrom' was devised to honor the late Dr. Jon T. Lindstrom, who initiated and led intergeneric breeding efforts between *Manfreda* and *Polianthes* at the University of Arkansas between 2003 and 2013. The release of \times *Polifreda* 'Lindstrom' aims to partially fulfill his objective of devising perennials possessing heat and drought tolerance for employment in low input landscapes (7).

Landscape Uses

Use in the landscape would be best suited to areas in full sun or partial shade with adequate drainage. The utility of \times *Polifreda* 'Lindstrom' is diverse due to the lack of supplementary irrigation required; however, a perennial border or rock garden would be ideal localities for planting.

Availability

\times *Polifreda* 'Lindstrom' is not yet available in general commerce. Propagules by division can be obtained by contacting Tina Buxton at 316 Plant Science, Department of Horticulture, University of Arkansas, Fayetteville, AR 72701 or cbuxton@uark.edu.

Literature Cited

1. Barba-Gonzalez, R., J.M. Rodríguez-Domínguez, M.C. Castañeda-Saucedo, A. Rodríguez, J.M. Van Tuyl, and E. Tapia-Campos. Mexican geophytes I. the genus *Polianthes*. *Floriculture and Ornamental Biotechnology*. 6:122–128.
2. Castillo-Cruz, C. 2009. Sistemático del genero *Manfreda*. PhD Dissertation. National Autonomous University of Mexico, Mexico City, Mexico. p. 21–22.
3. Solano, E. and T.P. Fera. 2007. Ecological niche modelling and geographic distribution of the genus *Polianthes* L. (Agavaceae) in Mexico: Using niche modelling to improve assessments of risk status. *Biodiversity Conservation* 16:1885–1900.
4. Verhoek, S.E. 1998. Agavaceae. p. 60–70. *In*: K. Kubitzki (editor). *The Families and Genera of Vascular Plants: Monocotyledons: Liliaceae (except Orchidaceae)*. Springer, Berlin, Germany.
5. Verhoek-Williams, S.E. 1975. A study of the tribe Poliantheae (including *Manfreda*) and revision of *Manfreda* and *Prochnyanthes* (Agavaceae). PhD Dissertation. Cornell University, Ithaca, NY. p. 7–126.
6. IPNI. 2013. The international plant names index — *Mananthes* Bremek. <http://www.ipni.org/ipni/mananthes.do>. Accessed July 9, 2013.
7. Lindstrom, J.T. 2006. Intergeneric hybrids between *Polianthes* and *Manfreda*. *Southern Nur. Assoc. Res. Conf.* 51:599–601.