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'New Mexico Verde' and 'New Mexico Azul' Selections of White Fir

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Studies comparing growth and crown attributes of white fir grown from seed collected throughout the southern Rocky Mountains have related several traits to the geographic origin of seed. The more notable trends include faster growth of trees originating in New Mexico or Arizona as compared to those from Utah and Colorado, and a color shift from green to blue-green foliage as seed origin moves from southern to northern New Mexico (Fisher and Davault, 1978; Wright et al., 1971). Foliage color in white fir influences consumer preferences for Christmas trees (Harrington, 1994). Regional Christmas tree growers and nurseries, as well as those in upper midwestern states desiring shorter production cycles, can benefit from white fir seed collected in New Mexico. However, the phenotypic variability remaining within seed sources in crown traits such as foliage and branch whorl symmetry, shearing response, and foliage color can influence market quality (Harrington, 1994).

The New Mexico State Univ. Agricultural Experiment Station announces the release of 'New Mexico Verde' and 'New Mexico Azul' selections of *Abies concolor* (Gord. & Glen.) Lindl. "Verde" and "azul" respectively mean green and blue in Spanish and bring attention to the distinctive foliage color of each selection. 'New Mexico Verde' meets the need for a white fir cultivar with rapid growth, uniformly high-quality form, and green color. 'New Mexico Azul' grows less rapidly than 'New Mexico Verde', but combines good form with an unusually attractive blue-green foliage.

Origin

These cultivars were selected from clonal stock obtained by successfully rooting stem cuttings using the procedure of Wagner et al. (1994). Source plants for these selections came from a statewide provenance evaluation (Fisher and Davault, 1978) of the species planted in

Mora, N.M. (elevation 2195 m), in 1977. Seed for the source plant of 'New Mexico Verde' was obtained originally from a provenance seed collection made near Cloudcroft, N.M. (elevation 2438 m). Seed for the source plant of 'New Mexico Azul' was collected near Los Alamos, N.M. (elevation 2621 m).

Description

Sierra Nevada and Rocky Mountain populations of white fir have been recognized occasionally as distinct varieties, var. *lowiana* (Gord.) Lemm. and var. *concolor*, respectively (Cronquist et al. 1972; Wright et al., 1971). The crown of var. *concolor* typically is more closed than is the crown of var. *lowiana* (den Ouden and Boom, 1965). In the Southwest, white fir occurs at elevations from 1676

to 3048 m (Fowells, 1965). In the interior and Rocky Mountain parts of its range, forest-grown white fir is seldom more than 38 m tall, with diameters rarely exceeding 1 m (Fowells, 1965). Trees typically have distinctly whorled, horizontal branches with smooth grayish bark. Among individual trees, the linear, often sickle-shaped leaves can vary in length (3-7 cm), in position of secondary stem attachment (e.g., arising from lower vs. upper one-half of stem diameter), and in their degree of upward and forward curvature (Cronquist et al., 1972). Trees originating from New Mexico's southern provenances grow faster than those from material originating from provenances farther north in the state.

'New Mexico Verde' is derived from a provenance that had the highest average 10-year growth rate of the 15 New Mexico provenances evaluated. The source plant exceeded the study average by 19% in height growth, achieving a height of 2 m within 10 years under plantation culture. The source plant also has deep dark-green needles (5 GY, 4/6; according to Munsell color chart; Wilde and Voigt, 1977). Leaves encircle the stem and are rather uniform in length (39-44 mm), averaging 41 mm (Fig. 1).

'New Mexico Azul' originates from a provenance that produces a large proportion of blue-foliaged individuals. The bright blue foliage of the source plant for this selection stood out among all individuals in the provenance



Fig. 1. Two-year-old rooted cutting of 'New Mexico Verde'.

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Fig. 2. Two-year-old rooted cutting of 'New Mexico Azul'.

trial. The source plant is blue-green (2.5 G, 6/2) with leaves 29 to 33 mm in length, projecting on the upper half of stems (Fig. 2).

Foliage color has been stable from season to season and over the life of all white fir hedged parent stock established as seedlings in 1977. Rooted cuttings reproduced the morphological and foliage color features of the parent stock. For clarity, 'New Mexico Verde' and 'New Mexico Azul' offer advantages that must be weighed by the grower. If growth is a decisive factor, 'New Mexico Verde' is the logical choice because it would probably reach Christmas tree harvest size 1 year earlier. If the marketplace prefers blue-green trees, then the use of 'New Mexico Azul' may be the logical choice.

Propagation

Stem cuttings from these sources have rooted consistently in excess of 60% when exposed to an appropriate amount of chilling (Wagner et al., 1994). Less than 15% of rooted stem cuttings from this tree failed to produce an erect growth form after 2 years. No attempts have been made to graft cuttings.

The propagation process used by Wagner et al. (1994) recommends taking cuttings in early January in northern New Mexico. Before sticking, harvested cuttings are recut to 12.5 cm and needles are removed from the lower 2.5 cm of the stem. Then, cuttings receive a quick dip [a solution of 1250 ppm IBA (indolebutyric acid) and 1250 ppm NAA

(naphthalenacetic acid)] before sticking into Ray Leach C-10 "Cone-trainers" (Stuewe and Sons, Corvallis, Ore.) filled with a 1 vermiculite : 1 perlite mix (v/v). Propagation bench bottom heat (180°C) and overhead misting are provided within a fabric tent. More details are available from the authors.

Availability

Stem cuttings and/or rooted stem cuttings will be made available upon request for 5 years following the release date by New Mexico State Univ., Mora Research Center. Stem cuttings from the source plant will be made available in late December, based on chilling unit accumulation. Currently, hedges are being developed from rooted cuttings of the source plant. These hedges will be used to generate stem cuttings to satisfy requests for propagules. Rooted stem cuttings also will be made available on a first request system. Individual requests should not exceed 10 stem cuttings or five rooted stem cuttings. Commercial distribution of 'New Mexico Verde' and 'New Mexico Azul' is made through the New Mexico Crop Improvement Association, New Mexico State Univ., Box 3CI, Las Cruces, NM 88003; phone 505/646/4125.

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