

# PRODUCTION OF AFGAHNISTAN CHRISTMAS TREES

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Forests of the Southwest produce neither the quantity or quality of Christmas trees necessary to meet consumer demands. Failure to shift production from forest to intensely managed plantations will cause greater dependence on imported trees and economic loss to local retail businesses. Much needed are conifer species and production methods adapted to aridity, intense insolation and extreme temperatures.

A pine introduced to the Southwest from Asia more than 15 years ago has many attributes of the ideal Christmas tree, and may serve a major role in the transition from forest to plantation production. The original seed collection was made by J.R. Harlan in or near the town of Laskargah, in the Helmand Valley of southern Afghanistan. Employed by the New Crops Research Division of the U.S. Department of Agriculture, Harlan noted the fast growth of the pine. Also recorded was that the pine seemed able to withstand very hot weather, and by virtue of its crown form might be suited to Christmas tree production in the United States.

The original collection was assigned Plant Introduction number 271431. A collection subsequently made near Herat in 1965 received a new number (P.I. 303638) because it was not certain that it and the 1961 collection were from identical species. Seedlings grown from the original seed at the Plant Introduction Station, Glen Dale, Maryland, were distributed to cooperators in New Mexico and California in the fall of 1961. Stored seed provided a second distribution in the spring of 1964.

Classification of the pine has been somewhat confusing. Harlan made no reported effort to identify

his collection beyond genus. Reports based on pressed specimens lacking reproductive structures (cones) indicated the pine was Pinus halepensis (Aleppo pine). Because Aleppo pine and P. brutia are similar in all but cone and seed morphology, these characters are much needed in identification. Cones of P. halepensis are stalked and reflexed (turned back toward the branch), whereas P. brutia cones project and are attached almost directly to the branch. (sessile). Seeds of P. brutia are much larger than P. halepensis, 11,000 and 29,000 seeds to the pound respectively.

Discussed in our previous paper, the question of classification was almost certainly answered by W.B. Critchfield's interpretation of pressed and living specimens, and studies performed at Placerville, California. According to the U.S. Forest Service researcher, the low elevation pine of Afghanistan is a cultivated race belonging to the P. brutia group. He indicated that it is probably derived from P. eldarica, itself a sub-species or variety of P. brutia. Frederick Meyer, taxonomist of the National Arboretum in Washington, D.C., concluded the pine is not P. halepensis, following examination of New Mexico specimens grown from the seed collected in 1961. A small plantation established in Las Cruces unquestionably supports these conclusions and interpretations.

The numerous trade and vernacular names given the pine, further confuse the issue. We suggest that producers adapt the name Afghan pine. Synonyms include Quetta, Eldar, and Mondell. All but the last suggest, of course, the geographic origin of seed used to grow the domesticated pine of southeast Asia.

Recently planted in southern New Mexico was a seed source study comprised of more than 20 collections of the *P. halepensis*/*P. brutia* complex. Results should enrich our knowledge of taxonomical relationships and will evaluate the potential use of each group for windbreak, Christmas trees, and ornamentals. Although seedlings are less than 2 feet tall, height growth, color, and form differences are quite noticeable. A Russian seed source, for example, possesses few lateral branches and more blued foliage than other seedlots. These also appear more attractive to jackrabbits as shown by nipped foliage and stems.

Seed received from Quetta (Pakistan), Afghanistan, and Karadji (Iran) are represented in slightly older plantations. In the seedling stage, Iranian seedlings seem to grow more slowly, but possess a bluer foliage, intermediate between Afghanistan and Russian sources. In plantations two to seven years old, Afghanistan and Pakistan seedlings have consistently shown fast growth and conical form. Seed source has been important in predicting performance in plantations for both Christmas trees and ornamental use.

#### Christmas Tree Production ✓

Early seed production of Afghan pine should gradually reduce dependence on foreign sources for seed. Ovulate cones are generally produced by age 4 and mature in 3 years. Cones are serotinous and are produced almost yearly. Seed germination is generally 70-90 percent if empty seeds are removed by flotation, 70 percent otherwise. Seeds maintain viability over a long period of time when placed under refrigeration at 32-34° F. Although germination may be inhibited by temperatures much above 80° F., seed stratification (cold-moist treatment) is not required. Seedlings will emerge in 7-21 days in the greenhouse. Emergence may take longer in nursery beds where soil moisture and temperature are less easily

maintained near optimum levels.

Today more and more trees are being produced in containers. Containerization has been used extensively in arid land afforestation and has been highly successful with Afghan pine. Seedlings grown in 10-cubic-inch book planters or polyethylene tubes, showed excellent survival following late February or mid-October planting in southern New Mexico. Because bare-rooted seedlings must be lifted and planted while dormant, transplanting is confined to a few months in spring and fall. Containerization greatly extends the planting season and makes planting possible during seasons of predictable rainfall. Increased survival and growth result.

Greenhouse growth of Afghan seedlings is much more rapid than Douglas fir, white fir, ponderosa pine and blue spruce. Seedlings growing in one-gallon containers attain a height of 18-24 inches at the end of one year. Seedlings maintained in Las Cruces in one-gallon containers for 5-6 years, show that stock can be held almost indefinite in this condition. However, transplant growth noticeably suffers since normal growth is arrested for many years.

United States scientists visiting Asian countries have witnessed the intensive efforts being made to reclaim denuded forest land from fire, excessive cutting and over grazing. High transplant survival requires supplemental water, hauled weekly to the planting site during the first growing season. Supplemental water is applied biweekly and monthly the second and third growing seasons. After this, the tree is left to grow on the meager rainfall available. In southern New Mexico, the approach has been to supplement 8 inches rainfall with 3-5 flood irrigations amounting to 12-15 inches. Although seedlings can survive on much less water, growth noticeably suffers and clearly

(continued on Page 6)

shows the benefits of supplemental irrigation.

In southern New Mexico, Afghan pine is dormant only 3-4 months of the year. It is not uncommon for 3-5 flushes of growth to occur, each producing up to 8 inches new growth. Cumulative growth is phenomenal when compared to native conifers. Seedlings planted in 1972 averaged 25 feet of height growth measured in the fall of 1978. Afghan pines have reached 50 feet in less than 15 years in Las Cruces and may ultimately reach up to 100 feet.

Irrigated plantations in southern New Mexico generally reach 6 feet within 2-3 years and add an additional three feet each following year (Picture on Cover). An Afghan Christmas tree is produced in about one-half the time required for Scotch and Austiran pines. Growth would be hastened by transplanting from one-gallon cans, providing roots are not excessively bound.

Rapid growth does not sacrifice dense crown form since growth is attained through frequent flushes creating no more than 8-10 inches between whorls of 3-7 lateral branches. Lateral branches respond similarly and because low branches are retained, contribute to the pyramidal and dense crown form desired by producers.

Planted at 5 x 5 feet spacing, 75-90 percent of the trees growing in Las Cruces produce U.S. Choice grade without pruning. Pruning and shearing will benefit trees with multiple leaders or lacking fullness. Multiple flushing should provide considerable opportunity for correcting form defects. Stump culture is a definite possibility and should allow harvest at two year intervals.

Finished Christmas trees do not have the heavy resin commonly associated with Scotch pine. Needle retention is excellent, limbs are

upright and limber. Northern European Scotch pine seed sources commonly produce yellow-green foliage. Because this is genetically controlled, yellowing is not corrected by fertilization. Afghan pine consistently produces green foliage without fertilization. However, it is likely that nitrogen fertilization will increase foliage density of trees growing on low nutrient sites.

Attention should be given to minimum winter temperatures to avoid plantation failure. Data gathered thus far indicate that Afghan pine should not be planted above 5,000 feet in the Southwest. Required are about 200 frost-free days with minimum temperature above 0°F. The USDA Plant Hardiness Zone 7 provides a reasonable safe boundary for planting in the Southwest. Westward, Afghan pine will grow well in areas where Monterrey pine is established.

No serious insect or disease problems have been observed in Las Cruces. Chlorosis exhibited by seedlings grown in a nursery in Israel was caused by the absence of a mycorrhizae forming fungus in the soil. Limb rusts (Peridermium spp.) observed in California have not been seen in the Southwest. Trees planted near Los Angeles and along the Aspshton Peninsula (Russia) in an industrial zone have not shown smog injury.

Afghan pine appears well adapted to alkaline soils, common to the southern Great Plains. Heavy clay soils or poorly drained areas should be avoided because Afghan pine seem intolerant to low soil oxygen.

#### Important Considerations

Following is a list of limitations and desirable attributes of Afghan pine. These should be weighed by the producer, considering commercial production.

(Concluded on Page 7)

Limitations of Afghan Pine include:

1. The pine should be confined to Hardiness Zone 7, and further restricted to light textured and well drained soils. Highly humid areas should be avoided since soil moisture remains high over long periods and reduces soil oxygen.
2. The pine does not appear reliably hardy above 5000 feet, and may suffer if temperature falls much below 0° F.
3. Seed source may contribute measurably to field performance and producers must be exceedingly cautious in purchasing the seed.
4. Afghan pine needles are larger and thicker than those of eastern white pine. This may be undesirable to some buyers.

Considerations in favor of the Afghan pine include:

1. More hardy than Aleppo and Italian Stone Pines, also from the Mediterranean area and commonly grown in the Southwest.
2. Seems highly adapted to the aridity, extreme temperatures, and alkaline soils of the Southwest.
3. Is suited to transplanting following Christmas. Many of the conifers used in southern New Mexico and Arizona for Christmas trees, would not tolerate the climate and soils of these areas.
4. Can be used for establishing local choose-and-cut retail producers.
5. Can produce 5-7 feet Christmas trees in no more than 3 years; Scotch pine requires twice the time.
6. Transplants easily.
7. Requires minimal pruning and should respond favorably to shearing.

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