Mediterranean Firs for Hardiness Zones 6 & 7

By Bob Girardin

Many areas of the country experience long periods of hot and dry conditions and have difficulty growing many of the true firs. With the demand for pine species as Christmas trees is waning and the public looking for a short needle tree with beautiful foliage growers are now turning their attention to feasibility of growing the Mediterranean firs.

Unlike North American firs, Mediterranean firs contain the hydrocarbon isoprene, which gives the needles a shiny look and protects the foliage from long periods of hot conditions.

Mediterranean firs are derived from calcareous soils (limestone) but these true firs also perform very well on acidic soils. To decide if Mediterranean firs will do well in your microclimate, visit your state's arboretums to see which true firs are thriving in that microclimate. During a visit to the Graver Arboretum in Stroudsburg, PA some other growers and I were impressed by how well the Mediterranean firs grew there. If Christmas tree growers in Pennsylvania are looking to diversify their plantings I highly suggest visiting the many arboretums in the state.

An article that appeared in the American Nurseryman (***Some Outstanding Firs for the Delaware Valley*** *by Robert Gutowski and William Thomas*) stated that, "in the Delaware Valley, where the piedmont meets the coastal plain the Mediterranean firs were proving to be valuable landscape plants". They concluded that the Mediterranean and Asian firs deserve more use in American landscapes. Many occur naturally in regions with hot summers and are well suited to this country's climate. Too many have been neglected because their North American relatives cannot tolerate the heat.

Some Mediterranean Firs By Bob Girardin

Abies alba – Southern and Central Europe including Corsica

- Well drained limestone soils
- Artificial plantation of this fir shows that a deep rich soil of sandy loam supports the best growth
- Strong sunshine is not good for the growth of this fir. A sheltered situation is specially adequate for its development

Abies nordmanniana – Turkey and Caucasia

- Grows on calcareous soils derived from limestone but it also occurs on soils of acid reaction
- It prefers a strong, deep loam rich in organic matter
- In general, fir trees that grow on deep loams show a strong tendency of resisting bitter coldness, long shade and strong wind.

- It thrives very well on bog and peat soils

Abies cephalonica - Greece

- Grows on soils derived from a white limestone. Often it is found on siliceous soil.
- Although this fir develops quite well in mountain hollows where the soil is rich and deep, together with the situation sheltered, yet it grows also well in the crevices of the rock in its native home
- Annual precipitation is between 28” and 59”

Abies equi-trojani - Mt. Ida in northwest Asiatic Turkey

- Grows on soils derived from limestone
- Climate is of a Mediterranean type
- Annual precipitation ranges between 39” and 59”
- It considered by some to be a cross between Abies cephalonica and Abies bornmueleriana
- It grows at elevations as low as 760 meters and as high as 2000 meters

Abies cilicia – Turkey and northern Syria

- Calcareous soils
- Climate in range of this fir is characterized by a hot, dry summer and a mild rainy winter which is typical of the Mediterranean region
- Annual precipitation is 39”

Abies numidica – Algeria

- Grows on soils derived from limestone. However, it is largely composed of stones and pebbles on its surface, yet there is a considerable mixture of organic matter below
- Annual precipitation ranges between 59” and 78”

Abies x bornmueleriana – Northwestern Turkey (Asia Minor)

- It is a natural hybrid between Abies cephalonica and Abies nordmanniana
- Does well on drier sites

Abies x borisii –regis - Mainly in the Balkans

- The altitudinal range of this natural hybrid fir varies greatly. It is found at altitudes as low as 450 meters and as high as 1800 meters
- It is a natural cross between Abies alba and Abies cephalonica

Note: *The information contained in this report was taken from* ***A Monograph of the Genus Abies*** *by Tang-Shui Liu*

A Closer Look at Mediterranean Firs

By Rick Bates, Department of Horticulture, Penn State University

The genus *Abies* (true fir) includes over 40 tree species widely scattered throughout the northern hemisphere. Economically, firs remain underdeveloped in the U.S. as a landscape plant due to a general reputation for sensitivity to hot, dry, urban conditions and a lack of consistent and replicated evaluation across a broad range of environments and conditions. Similarly, Christmas tree growers in many states have been relying upon a very limited selection of species (e.g., *Abies fraseri*, *A. balsamea*, and *A. balsamea* var. *phanerolepis*), which are increasingly vulnerable to several devastating pests. Anecdotal evidence from growers, arboreta curators, horticulture researchers and some non-replicated filed trials indicate that certain *Abies* species perform well under the hot, dry summers frequently encountered in the Mid-Atlantic and Northeast regions of the U.S. Indeed, healthy, attractive, and mature specimens of several *Abies* species native to the Mediterranean region can be located in Pennsylvania.

The Pennsylvania Department of Agriculture, in cooperation with the Pennsylvania Christmas Tree Growers Association, recently approved a grant to evaluate these overlooked firs – to thoroughly evaluate potentially valuable *Abies* species and to expand the use of *Abies* in the landscape and as a Christmas tree. Eight species of *Abies* from the Mediterranean region will be tested in replicated field trials at four distinctly diverse sites in Pennsylvania. The *Abies* species native to the Mediterranean region which we've selected to evaluate include: *A. cephalonica* (Greek fir), *A. pinsapo* (Spanish fir), *A. cilicica* (Cicilian fir), *A. alba* (Silver fir), *A. borisii-regis* (King Boris fir), *A. x bornmuelleriana* (Turkish fir), *A. nordmanniana* (Nordmann fir) and *A. numidica* (Algerian fir). The proposed evaluation will compare overall adaptability of these species to sites which vary in temperature, precipitation and snowfall, and exposure within USDA hardiness zones 4b to 7b. The species will be evaluated for cold hardiness, bud break characteristics, aesthetic quality, heat tolerance, and adaptability to standard nursery production techniques. Needle retention evaluations are also planned, where appropriate.

In concert with the evaluation for adaptability, the species will be evaluated for arthropod pest susceptibility. Some true fir species have exotic and native arthropod pests that cause injury and even death to plants growing in nurseries and landscapes. Threshold levels are not known for most of the key arthropod pests which attack *Abies* and very little information is presently available on the susceptibility of these 8 Mediterranean firs selected for evaluation. Several of the common pests represent serious pest management concerns among landscape, nursery, and Christmas tree growers in Pennsylvania and the Eastern United States, and threaten the planting and use of commonly grown *Abies* (e.g., *A. fraseri*, and *A. balsamea* var *phanerolepis*). Among the key arthropods, elongate hemlock scale, cryptomeria scale, pine needle scale, and hemlock scale are wide-spread throughout the eastern Midwest, Mid-Atlantic, and New England states, and represent a serious threat to the true firs. Beyond the armored scales

there are several key pests for which the industry is in dire need of threshold data and management strategies including the balsam woolly adelgid, balsam twig aphid, spruce spider mite, hemlock rust mite, eriophyid mites and bagworm. The results of the pest evaluation portion of this research will allow for future development of decision-making criteria to aid in integrated pest management programs for use in nurseries, Christmas tree farms and in the landscape.

Over time, we hope to develop in-depth profiles for each of the evaluated species. These 'Fir Profiles' will serve as an aid to nursery managers and Christmas tree growers when making key decisions concerning species selection, site selection and adaptability, Christmas tree suitability, and production methods. At present, *Abies concolor* (Concolor or white fir) and *Abies balsamea* var. *phanerolepis* (Canaan fir) are the only native fir Christmas tree species widely adapted to Pennsylvania's diverse and demanding landscape. We need a wider palate of firs to choose from. The Mediterranean firs may not prove to be the savior of any segment of our industry, but they do deserve a closer look. Based upon my early observations, Greek, Spanish and Algerian fir seem to hold real potential as landscape selections while Nordmann fir is perhaps the most promising Christmas tree species on the horizon.

Inland Empire Mediterranean Fir Trials

By Tom Leege

We have been very pleased with our experiences with most Mediterranean firs on our study area near Coeur d'Alene, Idaho. The best performing ones are: equi-trojani, nordmanniana, bornmulleriana, alba, and boris-regis. Abies numidica is not a consistent performer – some individuals look very good and others don't – it's almost like we got a poor seed source. Abies cilicia seedlings did not survive well, and we've had a lot of trouble with spring frost damage. Abies cephalonica is actually producing an acceptable Christmas tree, but frequent frost damage negatively affects the shape of some individuals.

All of the best performing species I mentioned are suitable for Christmas trees or ornamentals on our farm. They all seem to grow slightly slower than our native Abies grandis, but they should eventually make a nice addition to our local tree farmer's inventories. A few growers have already planted some because of our study results. We haven't sold any yet as Christmas trees, but we have dug and sold 5 species as ornamentals.

The key to any of these species is getting a reliable seed source where you can count on the trees being uniform and showing the characteristics you want. We definitely need to establish more seed orchards in the United States to produce quality seeds for the grower.

Firs for the Delaware Valley

By Anthony S. Aiello, Curator and Director of Horticulture, Morris Arboretum of the University of Pennsylvania

When visitors come to the Morris Arboretum they are impressed by our diversity of collections, which includes statuesque, mature specimens mixed with new plants – all within the setting of a historic landscape. One of our largest and most diverse plant collections consists of the conifers that are growing throughout our garden. Included in these conifer collections are over 70 taxa of *Pinus*, 50 taxa of *Picea*, 40 taxa of *Chamaecyparis*, approximately 30 taxa of *Abies*, and numerous others.

Our collection focuses on species and not cultivated varieties of *Abies*, and several of our historic fir specimens are among the largest of their kind in eastern North America. These are clearly well adapted to the growing conditions of our region. Many of our mature fir specimens such as *Abies cephalonica*, *A. holophylla*, and *A. homolepis*, date from the Victorian estate of John and Lydia Morris's time. The origin of these plants is unclear although we know that John Morris purchased plants from Veitch nurseries in England as well as Andorra Nurseries in Philadelphia, and received plants form the Arnold Arboretum's early plant expeditions. We continue to add to our collection through plant exploration, especially in Korea and China, and through plant exchanges. Our collection represents the breadth of distribution of firs, with some from North America, Europe, Asia Minor, and Asia.

The goal of our fir collection is to display a diversity of fir species and evaluate them for their adaptability to the mid-Atlantic region. The conditions at the Morris Arboretum include acidic and well-drained soils, a variety of topography and associated microclimates, hot and humid summers, and relatively mild winters. Rainfall averages approximately 45 inches yearly, there is regular snow cover, and we experience moderately cold winters (USDA Zone 6B) and warm summers. Because firs are generally mountain and sub alpine species, cold-hardiness is not the limiting factor for growing many fir species in the Delaware Valley. Rather, they are limited by our summer temperatures, and especially our hot summer evenings, which are especially stressful for this genus

Among the best firs for our area are those native to the Mediterranean region, Balkan and Caucasus Mountains, and Asia Minor (Turkey). Species native to these areas are very well suited to growing in the Mid-Atlantic region. Among the best of the Mediterranean species is *A. cephalonica,* native to Greece but well-suited for our area. Our towering specimen has a 39 inch DBH and is over 100 feet tall and its dark green needles show no signs of stress in our summers. Because of its ultimate size, Greek fir is suitable mostly for large spaces.

Arguably the best fir for the mid-Atlantic is the Nordmann fir (*A. nordmanniana*), one of the handsomest species with its deep black-green needles. Growing in the Arboretum one will find old specimens and a handsome 40-year-old specimen of *A. nordmanniana* ssp. *equi-trojani* collected in Turkey. In our greenhouse are a number of young plants of *A. nordmanniana* ssp. *equi-trojani* being grown on to a

size suitable for planting. In 2004, the Arboretum participated in a plant collecting expedition to the Republic of Georgia and returned with a large seed collection of Nordmann fir. We have had a high percentage of germination of these small seedlings and the plants grown from these will represent an important new source of genetic material for this valuable species.

Another excellent fir for our area is *Abies cilicica*, native to the Cilician Taurus Mountains of southern Turkey, and growing naturally with the hardy cedar-of-Lebanon (*Cedrus libani* ssp. *stenocoma*). Our Morris-era specimen is an extremely tall and narrow plant and I have rarely seen these species planted. We have one young plant coming along in our greenhouses, and I am eager to grow and evaluate more plants of this species.

With numerous beautiful firs to choose from, my favorites remain the Spanish fir (*A. pinsapo*) and the Moroccan fir (*A. pinsapo* var. *marocana*) – a slower-growing species native to both sides of the Straights of Gibraltar. Being native to a region of hot summers, *A. pinsapo* is well adapted to growing in our area, and its growth rate makes it suitable for modestly-sized gardens. Spanish firs have beautiful, short, blue-green needles which spread radially from the branches at nearly right angles and are accentuated by upright purple cones in spring.

As I visit other arboreta around the country I am always on the lookout for interesting firs and first saw wonderful specimens of Moroccan fir at the Arnold Arboretum. One of the most beautiful firs that I encountered at the Arnold Arboretum was the King Boris fir, *Abies* ×*borisii-regis* (*A. alba* × *A. cephalonica*). This species is arguably the most handsome that you will experience anywhere, with extremely dark green, healthy, and lustrous needles. This underrated native to Greece deserves to be much more widely grown.

One would expect the King Boris fir to perform well in New England but I was surprised and impressed to see it doing beautifully when I visited the Holden Arboretum outside of Cleveland this past fall. Not surprisingly, an *Abies nordmanniana* ×*cephalonica* hybrid was also a standout among the Holden's impressive conifer collection. Not far from the Holden is the wonderful Brotzman's Nursery, where among other horticultural gems another fir hybrid caught my eye, *Abies* ×*vilmorinii* (*A. cephalonica* × *A. pinsapo*). Clearly, these Mediterranean firs and hybrids grow very well under a wide range of conditions.

I am hard-pressed to think of another plant group from the Mediterranean and adjacent areas that performs as well for us as *Abies*. By growing, promoting, and distributing these wonderful plants, hopefully we can introduce these to a wider gardening public.

Conclusions

Before you make any large plantings of the Mediterranean firs I would first make a visit to your states arboretums to observe their plantings of Mediterranean firs. Secondly I would look for growers in your state who are having success growing these firs. Finally I would encourage your Christmas Tree Association to initiate trials of the true firs.

This article appeared in Christmas Trees Magazine in my column Exotic Update July 2006.