# Evaluating Mediterranean Firs for Use in Pennsylvania©

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## INTRODUCTION

The true firs (*Abies* sp. Mill.) include over 40 tree species widely scattered throughout the northern hemisphere. Economically, firs remain underdeveloped in the U.S.A. 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. True firs are preferred as Christmas tree species by U.S.A. consumers due to their natural conical shape, pleasing aroma, stout branch structure, and generally excellent postharvest needle retention. Eastern U.S.A. Christmas tree growers have also been relying upon a very limited selection of fir species including *Abies fraseri*, *A. balsamea, A. balsamea* var. *phanerolepis,* and *A. concolor*. Unfortunately, all of the aforementioned native firs are extremely vulnerable to *Phytophthora* root rot and can be very site demanding (Frampton and Benson, 2004; Benson et al., 1998). Anecdotal evidence from garden and arboreta curators, horticulture researchers, and some non-replicated trials indicate that certain *Abies* species native to the Mediterranean region perform well under adverse conditions in the Mid-Atlantic and Northeast U.S.A. (Gutowski and Thomas, 1962).

## THE MEDITERRANEAN FIRS

The Mediterranean firs comprise a group of approximately 10 *Abies* species native to countries bordering, or in close proximity to, the Mediterranean Sea (Table 1). While this represents a vast geographic area, environmental conditions within the native ranges of these species share some common attributes. Summer climates tend to be hot and dry. Winters may be cool and moist, and many of the natural stands are at relatively high altitudes among mountain ranges.

## EVALUATIONS

Evaluations of exotic firs for use in landscapes and as new Christmas tree species are underway at numerous sites across the U.S.A. (Leege, 2002). These trials usually contain a wide array of species representing Mediterranean, Asian, and North American sources and evaluate general adaptability and growth rate, susceptibility to frost, and winter hardiness. The trials initiated at The Pennsylvania State University in 2005 focus on firs of Mediterranean origin, and include numerous Nordmann fir (*A. nordmanniana*) seed sources. In addition to the evaluation factors mentioned above, the Pennsylvania State University trials will eventually include needle retention studies, as well as tolerance to hypoxic soils and *Phytophthora* root rot disease, and susceptibility to arthropod pests. Little is

**Table 1.** Mediterranean firs grouped by geographic region.

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|---|---|
| The Iberian Family: Spain, Portugal, Morocco, Tunisia, Algeria | |
| *Abies pinsapo* | Spanish fir |
| *Abies pinsapo* var. *morocana* | Moroccan fir |
| *Abies numidica* | Atlas fir, Algerian fir |
| The Balkan Family: Greece, Sicily, Yugoslavia, Italy, Central Europe | |
| *Abies alba* | European Silver fir |
| *Abies borisii-regis* | King Boris fir, Bulgarian fir |
| *Abies cephalonica* | Greek fir |
| *Abies nebrodensis* | Sicilian fir |
| The Nordmann Family: Turkey, Georgia, Russia, Syria | |
| *Abies nordmanniana* | Nordmann fir |
| *Abies* ×*bornmuelleriana* | Bornmueller fir, Turkish fir |
| *Abies nordmanniana* subsp. *equi-trojani* | Trojan fir |
| *Abies cilicica* | Cilician fir |

known about the susceptibility of these firs to these key arthropod pests that feed on firs commonly cultivated in Pennsylvania. The results of the pest evaluation portion of this research will allow for the development of decision-making criteria to aid in integrated pest management programs for use in nurseries, Christmas tree farms, and in the landscape.

## DIAMONDS IN THE ROUGH

Currently none of the Mediterranean firs are experiencing wide use within the U.S.A. However, early observations and results from other trials indicate that several species are highly ornamental, widely adaptable, and could be profitable, if matched to appropriate markets.

**Greek fir, Spanish fir, and Moroccan fir:** Stunning, mature examples of Greek fir can be found scattered across the Eastern U.S.A. in public gardens and arboreta. With a broadly pyramidal growth habit, and beautiful glossy, deep green foliage, it is a wonder this tree has not received more attention. Similarly, Spanish fir and its smaller more compact cousin, Moroccan fir, possess extremely interesting ornamental features (Figs. 1 and 2). In addition, all three of these species are very adaptable to a wide range of soil conditions and perform quite well on difficult sites.

**Silver fir and Cilician fir:** The shade-tolerant native Eastern hemlock (*Tsuga canadensis*) has been ravaged by exotic insect pests in recent years (McClure and Cheah, 1999). Few, if any alternatives to our native hemlock have been promoted within the nursery and landscape industry. Anecdotal evidence suggests that both silver and cilician firs possess a high degree of shade tolerance, maintain good form, and exhibit acceptable growth rates in shaded, understory environments. While possessing a different form and texture than eastern hemlock, Cilician and Silver fir are attractive in their own right, and could be promoted as suitable alternatives to the insect-plagued hemlock.

**Nordmann fir and Turkish fir:** These two stately species hold perhaps more economic potential in the U.S.A. than all the other Mediterranean firs. Already Europe's premier Christmas tree, Nordmann fir is now gaining a foothold as a popular Christmas tree species in certain Pacific Northwest and Eastern U.S.A. markets.

**Figure 1.** The unique Spanish fir (*Abies pinsapo*) always attracts attention in the landscape due to its coarse needle texture and bottlebrush needle arrangement on the stem.

**Figure 2.** Form of Spanish fir (*Abies pinsapo*).

And with good reason. It possesses beautiful glossy foliage, excellent needle retention, and adapts well to the container environment, making it a perfect choice for the potted "living Christmas tree" market. Turkish fir is an equally handsome tree and studies suggest that it has some resistance to *Phytophthora* root rot disease (Hinesley and Frampton, 2000).

## CONCLUSIONS

Several *Abies* species of Mediterranean origin deserve wider use in American landscapes and as candidates for the cut Christmas tree market. Many occur naturally in regions with hot summers and pronounced drought and are well-suited to the eastern U.S.A. environment. Perhaps some of these promising Mediterranean fir selections have been neglected because their North American counterparts have not performed well under less than ideal conditions. As with all plant recommendations and introductions, replicated testing needs to continue in order to thoroughly evaluate the adaptability and suitability of these promising trees.

## LITERATURE CITED

**Benson, D.M., L.E. Hinesley, J. Frampton,** and **K.C. Parker.** 1998. Evaluation of six *Abies* spp. to phytophthora root rot caused by *Phytophthora cinnamomi*. APS Biol. Cult. Tests, 13:57.

**Frampton, J.,** and **D.M. Benson.** 2004. Phytophthora root rot mortality in Fraser fir seedlings. HortScience 39(5):1025–1026.

**Gutowski, R.,** and **W. Thomas.** 1962. Some outstanding firs for the Delaware Valley. Amer. Nurseryman 121(8):55–57.

**Hinesley, E.,** and **J. Frampton.** 2002. Grafting Fraser fir onto rootstocks of selected *Abies* species. HortScience 37(5):815–818.

**Leege, T.** 2002. An evaluation of exotic true firs in the inland northwest. Amer. Christmas Tree J. 76(3):48–51.

**McClure, M.S.,** and **C.A.S.-J. Cheah.** 1999. Reshaping the ecology of invading populations of hemlock woolly adelgid, *Adelges tsugae* (Homoptera: Adelgidae), in eastern North America. Biological Invasions 1:247–254.