REPORT ON A RECONNAISSANCE OF PINUS SYLVESTRIS IN SPAIN

Ernst J. Schreiner
In charge, Forest Genetics Research
NortheasternForest Experiment Station
Forest Service, U.S. Dept. Agriculture
Upper Darby, Pennsylvania

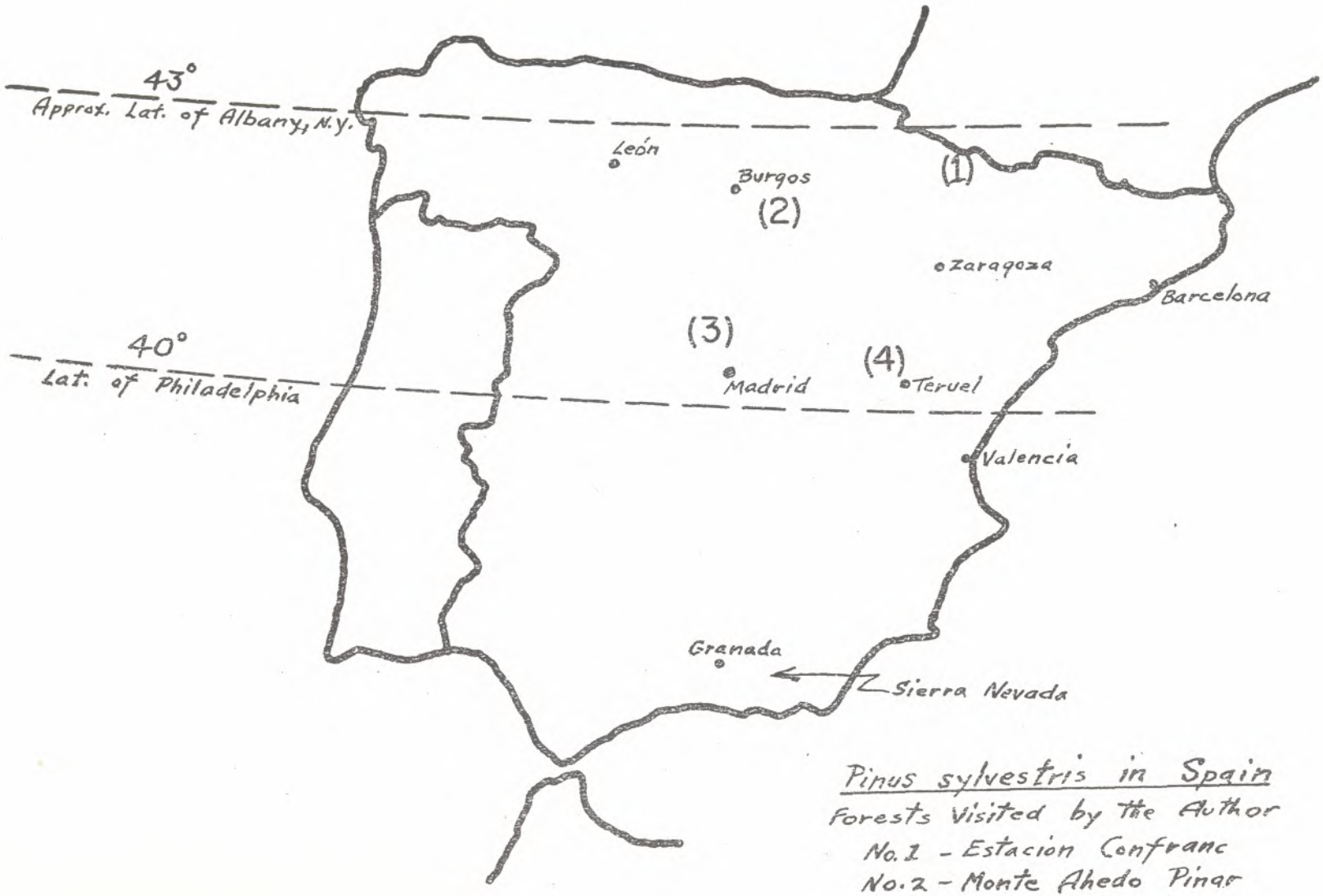
Scotch pine is one of the very few exotic timber species that have been used for reforestation in our region. In spite of the fact that it's generally poor timber form brought it into early disfavor with many foresters, the demand for planting stock has never disappeared completely. And in recent years the growing market for Scotch pine Christmas trees has fostered an increasing surge of interest in this species. Although different inherent characteristics are desired for timber and for Christmas tree production, there are no reasons to assume that they may not be found in the same race.

The possibility of Spanish P. sylvestris for planting in our region has haunted me since 1952, when the excellence of native Scotch pine was called to my attention during a 10-day visit in Spain. There are excellent natural stands of Scotch pine in Spain (see cover picture) between the approximate latitudes of Philadelphia, Pa., and Albany, N. Y. An opportunity for a reconnaissance of the Spanish P. sylvestris and P. nigra. materialized in May 1955. The efficient, generous and friendly cooperation of the Spanish Forest Services[1] made it possible to inspect the best natural stands of these two pine species in the 4 weeks available for this study. (A report on P. nigra is in preparation). The foresters in Madric, Zaragoza, Burgos, and Siles showed me much and taught me well. We plan, with their help, to obtain seed from some of the best stands during the next heavy seed-year, probably 1957.

Distribution in Spain

The most important commercial forests of Scotch pine are in the Sierra de Guadarrama (Province of Segovia) and in the Iberian Cordillara (Provinces of Burgos, Soria, Cuenca, and Teruel). It occurs naturally but is less important in the Pyrenees, in the Province of Leon, and in the old Kingdom

[1] Patriminio Forestal del Estado, and Direccion de Montes. Dr. Pauline Martinez Hermosilla is Director General of both Services.



Pinus sylvestris in Spain

Forests Visited by the Author

No. 1 - Estación Confranc
No. 2 - Monte Ahedo Pinar
No. 3 - Monte Balsain
No. 4 - Monte Puerto Orihuela

of Galicia. P. sylvestris reaches its most southerly limit in the Sierra. Nevada where it is reported to be "montana" type, of poor timber form.

It is a mountain species in Spain, occurring between elevations of approximately 3000 and 7000 feet. In the Sierra Nevada it extends to 8000 feet. It reaches its best development on north slopes between 3000 and 5000 feet in the Province of Burgos; farther south, in the Sierra de Guadarrama and in the more southerly Iberian Cordillara (Cuenca and Teruel), between 4000 and 5000 feet. The annual Precipitation at these elevations ranges from 27 to 43 inches. The heavier rainfall and the higher humidities during the growing season are found in the more northerly mountains. Insufficient rainfall and low humidity during the growing season seem to be responsible, in part, for the lower elevational limit of the species at approximately 3000 feet.

P. sylvestris requires an acid soil; it is very poor or completely absent on calcareous outccops in the natural forests. The predominant calcareous soils below 3000 feet may also limit its lower altitudinal range.

Stem Form, Growth, and Foliage Color

The stem form of the best Spanish types in forest stands is excellent. The trees are straight and clean-boled. The strikingly red bark fits my recollection of the Riga variety, and it may match the reportedly redder bark of the variety scotica (which I have not seen).

Average annual increment is reported to vary from 15 to 40 cubic feet per acre per year. Since slow and uniform growth brings the highest price[2] increased growth-rate has not been an objective in management. Diameter and height growth of native Scotch pine, as it is managed. in Spain, is at least as good as the growth reported[3] for P. sylvestris rigensis planted in 1827 at the Arboretum des Barre, near Paris, as the following tabulation shows:

[2] The best grade, slow-growth, even-grained, clear lumber was selling fo per cubic foot at the mill in the Forest of Balsam.

[3] Annales de L'Ecole Nationale de Eaux et Foret. V. 9 (1944) pp. 164-165 .

Item	Age	Average d.b.h.	Average Height
	Years	Inches	Feet
Native P. sylvestris Province of Burgos (Ave. all sides)	150	20	80
Native P. sylvestris Forest of Balsain (On the best sites)	120	19	98
P. s. rigensis Arboretum des Barre	111	14-15	65-82

The juvenile height growth of naturally seeded Scotch pine in Spain indicates good growth vigor. The height growth of 10- to 1 -year-old reproduction averages 10 to 12 inches per year on good sites. On one of the best sites, individual 14-year-old trees were observed that had averaged 18 inches per year.

For the information of our Christmas tree growers, I observed the strongest bluish-green individuals on north slopes in the Province of Burgos. Here the foresters expressed the opinion that the bluish color is associated with vigorous growth. But the fact that green and bluish trees of apparently equal age and growth rate were observed in close proximity indicates probable individual variation similar to that in our blue spruce (Picea pungens). The local foresters were of the opinion that the bluish color persisted into the winter--most important for Christmas tree use. Strongly bluish individuals appeared to be less common in the forests of Segovia, Cuenca, and Teruel.

Taxonomy

The time available for this reconnaissance was too short for an adequate taxonomic study; and travel by air, railroad and bus made it impossible to carry equipment for collecting and drying herbarium specimens. Of the small number that were collected and mailed, green, to the United States, some failed to arrive.

Spanish taxonomists believe there is raciation (resulting from geographic isolation) in Spain, but they report that these races cannot be distinguished by taxonomic characteristics. Hr own observations are in accord. The specimens collected from the four regions that represent geographically isolated populations show statistically significant variations between trees within the same region, in needle length, in cone length, and in the ratio of cone length to width. But the differences between regions are not statistically significant on the basis of the limited number of samples collected for this study, as the following tabulation shows:

Location 1/	Needle Length			Cones			
				Length			Ratio
	Min.	Ave.	Max.	Min.	Ave.	Max.	L/W
	In.	In.	In.	In.	In.	In.	
(1) Estacion Confranc	0.9	1.5	2.2	1.6	1.7	1.8	1.80
(2) Monte Ahedo Pinar	1.2	1.8	2.6	1.4	1.8	2.1	1.94
(3) Monte Balsain	0.9	1.8	2.8	0.9	1.6	2.1	1.90
(4) Monte Puerto Orihuela	0.8	1.4	2.1	1.4	1.8	2.0	1.80
All Samples	0.9	1.7	2.8	0.9	1.7	2.1	1.88

1/ Numbers refer to map on page 39.

The specimens collected in Spain fit the general species description. Needle length varies from 0.9 to 2.8 inches; the average of all samples is 1.7 inches. Cone length varies from 0.9 to 2.1 inches and averages 1.7 inches. These dimensions are slightly lower than those commonly accepted for the type and somewhat higher than those for var. scotica.

Management

Scotch pine is usually managed in pure stands, but it may also be grown in mixture with Quercus tossa and other native hardwoods. In the Forest of Palsain (Sierra de Gudarama) there are 18,500 acres of pure P, sylvestris and 8,600 acres in mixture with Q. tossa.

Management is not intensive by European standards. Exclusive dependence on natural regeneration, with or without site preparation, often results in patchy stocking. Young stands are maintained at high density, they are apparently seldom thinned (other than the removal of dead or dying trees) before the 60th or 70th year. Slow and uniform growth, which brings the highest price, is maintained by high density.

The average rotation is from 120 to 150 years but the stands are neither even-aged nor all-aged. Excellent individuals or small groups up, to 200 or even 250 years old may be present in maturing stands with an age range of from 90 to 125 years. These maturing stands in all regions are quite open, with grass arid often heavy sod ground cover because grazing is an integral part of the forest economy. Young stands are protected from grazing (without fencing) by the vigilance of the forest guards, who check herders using the forests.

FIELD TRIP

Dr. R. P. Murphy, Head of the Department of Plant Breeding, conducted the Conference members on a most interesting field trip to see some of the plant breeding work at Cornell.

The Conference members were shown examples of fundamental breeding research and of applied crop-improvement breeding. The clear and interesting presentations by Dr. Murphy and his colleagues brought home to all the listeners the dependence of successful crop-plant improvement upon basic genetical research.

The methods by which improved varieties and hybrids are maintained and multiplied for commercial distribution, was especially interesting to many of the members.

DINNER AND PICTURE SESSION

The Conference dinner at the Statler Club was the beginning of a very pleasant social evening for the 82 members, ladies, and teenagers who attended.

The informal "Picture Show" followed the dinner. More than 150 color slides were presented by members to illustrate various aspects of their work.