

# GEOGRAPHICAL DISTRIBUTION OF *PINUS NIGRA*\*

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In the study of a widely distributed species such as *Pinus nigra* L. one is confronted with the labour of endeavouring to untangle a deal of contradictory statement and evidence. The results achieved are not what had been hoped, firstly because there is a scarcity of reliable written information in New Zealand, and not all of this was procurable, and secondly, because time did not permit the thorough sifting of what was available.

The first difficulty encountered was that of nomenclature. As is generally the case in species found in old civilized countries synonyms are rife and varieties numerous. As far as *Pinus nigra* is concerned this confusion or, if you like, this multiplicity of nomenclature is increased by the facts that: firstly, the species covers not only a large geographical range but an extensive national and, as a natural corollary, lingual range; secondly, by the fact that the various nations concerned have been at war with one another at least once during the past century; thirdly, because the writers on the subject were generally foreigners to the country concerned and probably not the best of linguists; fourthly, because their visits were as a rule brief and their opinions formed on that relatively small part of the forest they were able to visit; and finally, because they were too ready to establish varieties and species on purely vegetative differences. If *Pinus ponderosa*, a tree with an equally large geographical range, had been an old world species, I feel sure that it would have suffered from the same confusion and multiplicity of ill-defined varieties. However, as *P. ponderosa* occurs almost entirely in a zone that was explored in a relatively short recent period, and one that is to all intents and purposes inhabited by people speaking the same tongue, this confusion has not arisen, nor will it arise to any serious extent.

I can speak with personal experience only of the forests of Italy, and I have found on reading through various works in English that in all cases, the writers' visits to Italian forests were short and definitely confined to small areas of the pine forests. Their geography and place names are confused and in many cases quite incorrect, and one can only assume that their accounts of other forest areas may also be inaccurate and their findings based on insufficient evidence.

As a species *P. nigra* is confined to the Mediterranean basin and has a reported range from 4°W. to 42°E. longitude and from 35° to 48°N. latitude. Perhaps it would be clearer if I said from Central Spain in the west to the Caucasus in the east, from Algeria in the south to Vienna in the north. At this point it is desirable to clear up

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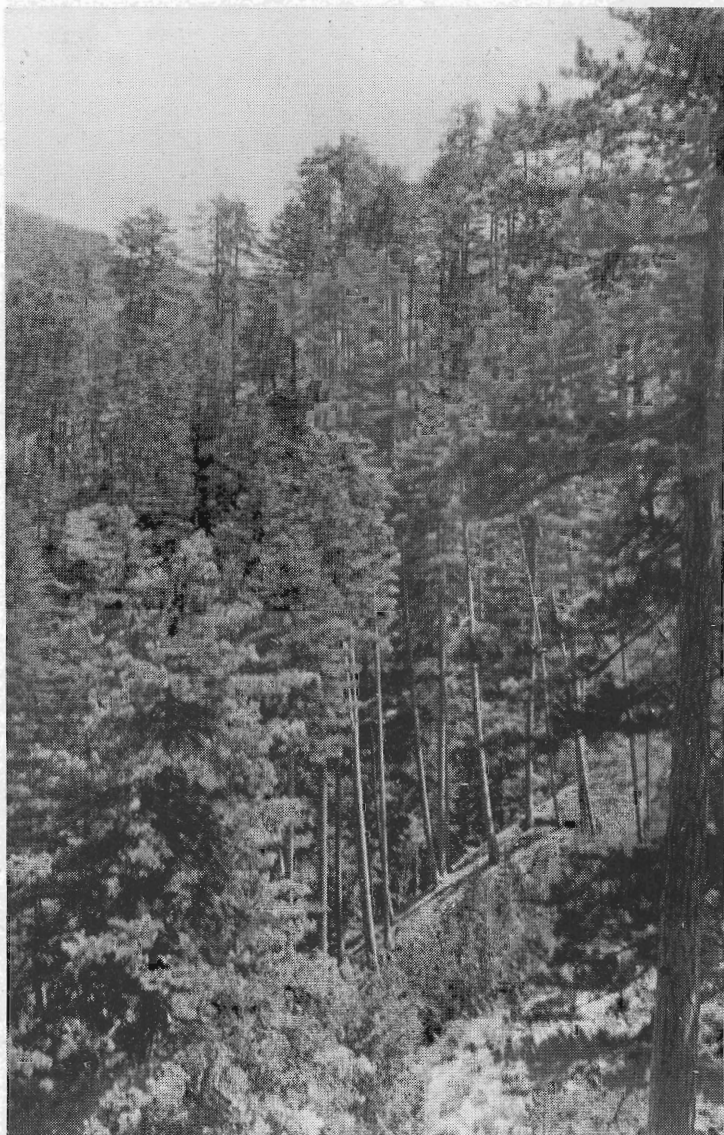
the matter of the southern limits of the range. Salvador writing in the *Revue des Eaux et Forêts* in 1927, mentions that the apparently spontaneous occurrence of *P. nigra* in the mountains of Edough in Algeria and in the island of Pantelleria was worthy of further investigation. However, as far as can be ascertained no one seems to have carried out any systematic work. I was in the area in 1943 but have only the vaguest recollection of a limited area of *P. nigra* forest at Edough; I cannot recall the form of the tree at all clearly beyond the fact that it gave the impression of being lightly branched. Perhaps I should explain that this lack of interest in the forest was due to the circumstance that at the time I was aiding a member of this Institute in displacing a goodly portion of Africa in a search for scorpions, toads and anything that crawled or hopped. I can testify that the soil is extremely rocky and, according to French authorities, the massif of Edough consists of gneisses and schists with calcareous bands.

To continue with the general distribution of the species: over this extensive geographical range the variations of climate, soil and site are immense and, as a result, we have the survival or, if you like, the emergence of a large number of variations of the species. Before going on with a description of the distribution of these varieties, I would like to digress a little and, by citing Busgen and Munch (1), refresh your memories on certain points concerning local races. Firstly, in the case of heredity Munch deduced that: "It is not the stem forms that are hereditary, only the disposition to them—external conditions determine how these dispositions work out." "If certain peculiarities in the heredity are not vital, for example certain colours and shapes in seed, leaf variations, tree form, various types may occur side by side—if the locality, especially the climate, is so conditioned that the form or particular physiological character of an individual is favoured or injured in a considerable degree the members of the crop best adapted to the effects of the locality sooner or later obtain an advantage and dispossess the less suitable." Briefly by natural selection we obtain local races. "It is possible to decide on the quality of the site by observing geotropic action—the better the site the better the form." "There is a correlation between the depth of tap root penetration and height growth. Hindrance to root penetration results in decreased height growth." "In windy areas, apart from purely mechanical distortion, high forest forms give place to creeping forms: . . . wind may overcome snow form." "Continued pasturage has a strongly selective effect, while man can unintentionally select bad form by continually felling the better trees for his own use . . . this latter influence is particularly strong in old civilized countries." Finally from the same book we have Baur being quoted as follows: "From a small pinewood a long series or sorts varying in size, rate of growth, quality of wood and needle form may be bred out." If these points are borne in mind the story of *P. nigra* becomes clearer and simpler.

In dealing with the actual species, I am not going to try to pin down definite names, rather I am going to attempt to deal with two main types, the Corsican and the Austrian, plus a third intermediate and minor division or type. Firstly the Corsican: *P. nigra* var. *corsicana*. Its distribution is given by Dallimore and Jackson (2) as Spain, Corsica, South Italy and Greece. Elwes and Henry (3) give the distribution as Corsica, Sicily, South Italy and Greece. The closely allied var. *calabrica* is listed by both authorities but they are discreetly silent on the matter of its habitat. Then if we turn to the Empire Forestry Handbook we find that under Standard Nomenclature of Softwoods, Corsican pine is listed as *P. nigra* var. *calabrica*. Secondly, the Austrian type: According to Dallimore and Jackson it is found in Austria, Servia, Hungary and the Crimea. Elwes and Henry give its distribution as Austria, Hungary, Croatia, Bulgaria, Bosnia, Herzegovina, Dalmatia, Asia Minor and the Crimea. They state that the type is absent from Montenegro but that *P. leucodermis* takes on a form that is difficult to separate from that of the typical Austrian pine. Central and Northern Italy are mentioned in neither manual. Even in these two main varieties the confusion, as you see, is considerable; then if we proceed to the lesser known ones: *hispanica*, *salzmanni*, *pyrenaica*, *cebennensis*, *tenuifolia*, *monspeliensis*, *caramanica*, *pindica*, *taurica*, *poiretiana*, *dalmatica*, *fenzlii* and *pallasiana* we start feeling a little dizzy. For example, in the case of *pallasiana* we have a variety founded on seeds sent from the Crimea to England. The English variety is described as having the lower branches ascending parallel to the trunk, however this peculiarity has not been recorded outside England; pines on the Crimea are recorded as being of the Austrian type. If we deal with countries, or rather with zones, at least we will deal with most of the types of trees recorded and at the same time leave the matter of nomenclature in the outer darkness.

Starting in Central Spain in the west we find a fine-neededled, lightly branched tree of good form. Its forests cover an area of over 250,000 hectares, something in the neighbourhood of 600,000 acres. All writers agree that it is a good type tree and that, although inferior to the Corsican, it definitely belongs to that group. As we travel north to the Pyrenees we find the same type on both sides of the range, growing on oolitic and dolomitic soils. Going down into France, the species is found in the Cevennes where, on poor sites and under man's influence, the tree is typically Austrian in form.

In Corsica, it is generally agreed that the species attains its optimum form and it is found in pure stands over large areas in the centre of the island, between the elevations of 2,800 and 5,100 feet. Snow and low temperatures are experienced during the winter months, annual precipitation being about 70 inches. Skies are generally overcast and cloudy, clear days are few. The forest soils are coarse, rocky and of granitic origin. The Corsican type has been described many times and I will content myself with saying that it is noted for having, in common with the Calabrian type, a light elongated crown



Mature *Pinus nigra*, Calabria, Italy. Note regeneration in open space in foreground.

Photo : A. N. Sexton.

and curled or twisted needles. Elwes (3) mentions that in many of the older stems the leading shoot bends over and lies almost parallel to the ground, trees having this peculiarity are also to be found in Calabria.

The timber of Corsican pine is of good quality and valued, not only for the evenness of texture and regularity of annual rings, but also for its cylindrical straight trunk. It is famous for its dark-red heartwood having strength properties comparable with those of larch and American pitch pine. For over a century Mediterranean shipyards have given Corsican pine preference over all other local pine timber. Merendi (4) considers that climate and site make the type what it is and, although he considers the Corsican pine produces better timber in Corsica than Calabrian pine does in Italy, yet he sounds a note of caution against wholesale planting of the type in Italy before definite results have been obtained from the experimental plantings at Vallombrosa Research Station. In other words natural selection under different conditions may allow a different form to assert itself. Although, to the best of my knowledge, no one has dared to suggest that inferior types do exist in Corsica, I feel sure that an unbiased search would find them. This assumption is borne out by observations in some of our older Corsican pine areas in New Zealand, areas in which can be discovered at least a dozen variations from the classical type. I also understand that trees, grown from a seed-lot of Corsican pine received in New Zealand by the State Forest Service in 1928, exhibit a large range of type differences. Unfortunately I have not been able to locate the country of origin of this seed.

Before leaving Corsica I would like to point out that the tree, growing in extremely favourable climatic and site conditions has not been exposed to destructive selection by man for anything like so long a period as those growing on the mainland.

In Sicily the tree is variously described as *P. nigra* var. *corsicana* or var. *calabrica*. Limited forest occur on the slopes of Mt. Etna from 3,000 to 4,000 feet, but they are not exploited to any extent commercially. From photos the trees appear to be of good form, lightly branched and similar to those found in Calabria.

In Southern Italy the tree occurs over a long range, from Aspromonte near the straits of Messina to the Sila massif.\* It is found over a range of elevations varying from 2,600 to 6,000 feet on coarse sandy soils of granitic origin. The climate is continental one of severe winters and hot dry summers. The average annual precipitation of the forested areas is between 40 and 60 inches, the greater part deriving from winter snowfall. Generally the climate differs from that of Corsica in having a lower rainfall, a definite summer period without rain, greater extremes of temperature and very much greater light intensity, with usually four or five months of cloudless skies.

\* See "Some Mediterranean Forests, II Southern Italy," by A. N. Sexton. *N.Z.J. For.*, Vol. V, No. 3, 1946.

These climatic differences coupled with the fact that the forests have been subjected to destructive type selection for some two thousand years, go a long way to explain why in this zone, to the chagrin of neat-minded botanists, are to be found, growing side by side, type specimens of every recorded variety of *P. nigra* together with odd specimens of *P. leucodermis*. The timber produced is considered inferior to that of Corsican pine, but from some areas, notably those most difficult of access from the sea coast, the same mature dark-red heart timber is obtainable.

In Abruzzo, a province of Central Italy, is to be found a small area of a tree type that stands midway between the good Calabrian and the Austrian types. The description (4) resembles that of the tree found in Central Spain and, when the soil, climate and latitudinal range is considered, one is led to the assumption that in these two sites the same type, form or variation, call it what you will, has emerged. The Villetta Barrea pine, as it is called, has been used extensively and successfully in reforestation on the bare arid zones of the Central Appennines.

The northernmost point of the Austrian pine zone is near Vienna and in southern Austria the tree occurs abundantly on alpine glacial chalk to an elevation of about 4,000 feet. In Hungary it is found in the Lower Danube area where it grows on stony mountains and calcareous soils. It is found in Carinthia, Galicia, Istria, Croatia, the island of Cherso and in Bulgaria on the Rhodope Mountains. In Bosnia it is found in the south-east on palaeozoic rocks and occasionally on limestone and serpentine. Austrian pine grows in Dalmatia and Hertzgovina but not in Montenegro. In the Crimea the species is recorded on dry calcareous soils on the western margin of the Black Sea and in the Caucasus in small areas.

Again, as this variety has been described many times, I will not bore you with details; enough to say that it is of little or no value as a timber tree, but of great value as protection forest or as a nurse crop for better timber-producing species. The value of its heavy needle cast, hardy nature and capacity to grow on the poorest soils has been long recognised by European foresters, and during the last half century has played a major part in protection work in Southern and Central Europe. Merendi in his book on reforestation (5) mentions three things that are worthy of record: firstly, that on poor soils the trees must be closely spaced; secondly, that though the species is frequently found on soils of calcareous origin, yet its resistance to alkalinity rapidly decreases with rise in soil moisture content; and finally, that the planting failures that have occurred have all been in places where the tree has been introduced into warmer zones.

The final area to be considered is that of Greece, Crete, Asia Minor and Cyprus. Here the issue is very confused, but as far as can be judged there exists a condition similar to that found in Calabria; that is to say a series of types appear to exist together. *P. nigra* var. *corsicana* is recorded in Greece, Crete and Cyprus. *P. nigra*

var. *pindica*, described as being of the Corsican form is recorded in the Thessalian Olympus and in the Pindus Mountains. *P. nigra* var. *taurica*, also a Corsican form, is found in the Taurus and Antitaurus Mountains. *P. nigra* var. *austriaca* and var. *caramanica*, a large-coned Austrian type are both found in Greece and Asia Minor. If we consider the climatological and latitudinal range in combination with destructive selection carried out over several thousand years I think that the assumption that this is another stage in the Corsican-Calabrian zone, will not be very far wrong.

To sum up : We have two main divisions of the species :

The first the southern or Corsican-Calabrian-Eastern Mediterranean belt. Here we have, lying between latitudes  $38^{\circ}$  and  $42^{\circ}$ N. a belt containing good type trees. In it occurs two zones ; the first, a minor one, includes the central massif of Spain and Central Italy, these are both arid regions, with calcareous soils, both produce a type of tree intermediate between Corsican and Austrian pine. The second zone, a major one, includes Corsica, Calabria and the Eastern Mediterranean. The soils of Corsica and Calabria both derive from granites and part at least of the Eastern Mediterranean area consists of soils derived from igneous rocks. Climate is similar, the whole zone having a heavy rainfall and a snow period of at least three months. In Corsica there has been a relatively short, in Calabria a relatively long, and in the Eastern Mediterranean a very long term of destructive selection by man.

The second division is the Northern or Pyrenees-Cevennes-Austria-Jugo-Slavia-Caucasus belt. Here we have between latitudes  $42^{\circ}$  and  $48^{\circ}$ N. a belt of poor type trees, poor type, that is, as far as timber production is concerned. Soils are nearly all of calcareous origin—oolithic, dolomitic and glacial chalk. I am not going to attempt to detail the climate over the whole belt, but, with the exception of the Cevennes and possibly the Pyrenees, it is a rigorous one of cold winters and heavy snows. Man's influence has not been so important as he has had a greater choice of species for use in industry. In consideration of all this I think it is safe to state that the present distribution of the varieties or types is due to three main factors : Firstly climate, secondly soils and finally man's influence. Two further points stand out clearly throughout the story : Where we want timber trees and where climate and soil are suitable we must draw our stock from the southern belt ; where we need protection and climate is rigorous and soils poor, we must take our stock from the northern belt, knowing that later we may be able to replace mere protective cover with a timber crop.

New Zealand is a young, raw country still in the last stage of pioneer exploitation. As a nation we are young, raw and uncultured in the sense that we have little that is really our own—our own music, art, and literature is negligible. This is understandable, it follows a clear pattern that has been traced by all New World nations, but it is one that must pass as we move out of the first pioneering

stage. We are inclined to be too literal, wanting to see something for our money, in hard cash and personal progress. In forestry in New Zealand this trait is clearly marked; we want a quick cash return in our own lifetime. All this is understandable but as we develop as a nation this outlook will pass and we will plan more for the future. It is then that *P. nigra* types or varieties will take their proper place in our forest economy, as soil protectors, as nurse crops and as timber producers.

### Summary

*Pinus nigra*, like many other species found in Old World countries, suffers from having a confusion of ill-defined names and varieties. In this species with a natural range from Spain to Asia Minor and from Austria to Algeria, the confusion is abnormal. Site and man's influence have both played a major part in the selection of tree types.

For ease of treatment the species is split into two divisions. The first, the Southern Division, consists of the better timber tree, the so-called Corsican type. Its natural growth range is bounded by latitudes 38° and 42°N.; soils are of igneous origin and the selective influences of climate and man have played a major part in establishing tree types. The second or Northern Division is that of the protection forest tree, the Austrian pine. Latitudinal limits are 42° and 48° N.; soils are mostly calcareous in origin. In this division climate has played the major part in establishing the tree type.

Both the Corsican and the Austrian pine have their place in a balanced forest economy; the former as a timber producer; the latter as a protector of forest soils and of future timber crops.

### References.

- (1) Busgen and Munch (1935). The Structure and Life of Forest Trees. English Translation by T. Thomson. Chapman and Hall Ltd., London.
- (2) Dallimore and Jackson (1931). Handbook of Coniferae. Arnold and Co., London.
- (3) Elwes and Henry (1907). The Trees of Great Britain and Ireland. Printed privately.
- (4) Merendi, A. (1942). Principali Species da Rimboschimento: Conifere. Rome.
- (5) Merendi, A. (1940). Come si Rimboschisce. Rome.