SOME NOTES ON PLUS TREE SELECTION OF PINUS PINASTER WITH PARTICULAR REFERENCE TO AGE.

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It is apparent that considerable differences of opinion exist amongst foresters and tree breeders, as to the most desirable age at which plus phenotypes should be selected for breeding purposes with this species.

In breeding either plants or animals, it is essential that, in selecting stock, the individuals must have reached maturity. So many changes can and do take place between birth and maturity, some of them not being manifest until late, that serious mistakes could be made by using immature breeding stock. Especially does this apply to the selection of the initial plus phenotypes on which a breeding programme is to be based.

The protagonists of the theory that plus phenotypes should be selected before maturity, contend that some faults such as internodal variations in verticallity and nodal swellings at the union of branches and trunk, become hidden with age. With Pinus pinaster it can be accepted that early variations in verticallity between nodes do become hidden in later years, but nodal swellings can readily be detected in this species up to eighty years.

With Pinus pinaster the main aim at least initially is to improve the bole form and vigor of the tree. Bole form in this species is so poor that it is imperative that a high priority be given to improving this factor. Branch size and angle, crown shape and size, wood qualities, insect and fungal resistance, drought tolerance etc. are all important factors requiring attention, but should yield priority initially to the improvement of bole form and vigor. A straight, vertical bole that is round in section and has a low taper is extremely rare in this species, and once this has been corrected the other factors which go to make a perfect tree can be added.

Experience in Portugal indicates that many factors affect bole development after the tree is 30 years of age. Establishment is by broadcast sowing and the resulting stands are very dense. Thinning commences in the third year, and again at seven or eight years after which there are about 1800 trees per acre remaining. At 27 years this figure is down to 650 trees per acre. Form in these young stands is reasonably good although butt sweep is common. However the impression is of a young forest of reasonably straight boles. In viewing stands of seventy to eighty years of age the impression is more of a forest in which the trees bend and bow and lean every which way. And this, despite a thinning schedule directed towards the preservation and encouragement of the best form trees. The inference is that the bole form tends to deteriorate with age instead of improving, and this contention is supported by the fact that it is easier to find plus phenotypes in yound stands than it is in mature ones.

Experience in the forest of Leiria indicates that apart from any genetical influence environment also has a marked effect on form. For instance trees almost invariably lean down hill and on very steep slopes this lean can be as much as 45 degrees. They tend to lean away from the winter gales which blow from the north west, and in exposed positions butt sweep is very much accentuated. Poor form is always more noticeable on unsuitable sites for the species and it has not been

possible to recognise a single plus tree on site qualities 4 & 5 and very few indeed on site quality 3.

To accentuate these influences sylvicultural practice also plays a part. Pinus pinaster is a very light demanding species and almost invariably tends to move towards any open space overhead. The crowns never interlace but remain separate entities for their entire life span. For instance if trees are left too close to one another, and there is an adjoining open space, they will grow away from each other and towards the opening. In addition the weight of the branches which develop on the unrestricted side cause the bole to bend or bow. Many instances of this can be seen in the forest.

On the other hand many trees which have unrestricted space in which to develop are bowed and bent which would appear to indicate the presence of a genetically controlled factor for an unstable bole. These trees tend to lean on to their neighbours and to force them also from a vertical position.

It can be postulated therefore that an inherent tendency in Pinus pinaster to bow and bend and to lean from the vertical can be aggravated by poor sylvicultural practice and also by an unfavourable environment. The bole form of this species can only be improved by sound breeding practice, and then must be encouraged to remain that way by attention to crown requirements in thinning.

Although the foregoing conclusions have been arrived at as a result of observation only it is considered that it would be unwise to select plus phenotypes, in this species, less than 50 years old.

We have based our work in Australia up to the present on plus phenotypes which were 30 years old at time of selection. This was unaviodable as trees of a greater age were not available to us. Fortunately it has been possible to locate some excellent trees in the Pinhal de Leiria, ranging in age from 50 to 90 years. It will be possible now to proceed with the improvement of this tree with much more confidence in the ultimate results.

It is assumed that the rotation age for Pinus pinaster in Western Australia in Western Australia will not be less than 50 years and may even approach the Portugese figure of 80 years. The closer the plus phenotypes are to the predetermined exploitation age for the species then the more reliable breeders they will prove to be.
