

# Seed Production

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*The World Seed Campaign of F.A.O.*

THE study of increasing the quantity and of improving the quality of the agricultural, horticultural and forest products of the world is the special concern of the Food and Agriculture Organisation of the United Nations. At their ninth session in Rome in 1957 they discussed the enormous gap which exists between the present world level of production in Agriculture, Horticulture and Forestry and that which could be obtained by application of existing scientific knowledge. The conference concluded that "the extensive use of high quality seed of improved 'varieties' is one of the most generally and economically applicable measures for increasing productivity and improving quality of agricultural, horticultural and forest products". It was decided to launch a seed campaign and designate 1960 or 1961 as the International F.A.O. Seed Year.

The term "Variety" as used in this article is not equivalent to the botanical category of '*Varietas*' or variety but to the new term Cultivar, which denotes an assemblage of cultivated individuals, which are distinguished by any characters, morphological, physiological, cytological, chemical and others, significant for the purpose of Forestry, Horticulture or Agriculture and when reproduced sexually, or asexually, retain their distinguishing factors.

The use of unsuitable seed in agriculture becomes apparent almost at once, whereas in forestry, poor results may not appear for some years. In the case of European larch of high Alpine origin, die-back does not show until it reaches the thicket stage. Hence the use of unsuitable seed in forestry may jeopardise the efforts and investments of many years. Not alone must seed be of superior variety, it must also be clean, viable and healthy, so as to avoid low yield of crops, or even failures.

Three important factors in seed production are :—(1) The identification of superior varieties; (2) The production of seed of good quality of these varieties; (3) That the supply of seed be so organised and regulated that it is possible to produce seed that is true to name and

satisfies certain minimum standards. Since good seed years occur at intervals of three to five years it is important that a complete collection of seed be made from all selected stands. Seed stands are classified as follows:—A plus stand is one in which over 75% of the trees are well shaped dominants, extreme forms absent and the crop free of disease. A near plus stand is one in which 50% to 75% of the trees are well shaped dominants and free from disease. A normal stand is one in which 25% to 50% of the trees are well shaped dominants. A minus stand is one in which less than 25% of the trees are well shaped dominants or any stand suffering unduly from disease or insect attack. Plus and near plus stands should be fully collected from and the seeds kept separate. Minus should never be collected from.

A superior variety of a forest tree is one which when grown on a range of sites gives rise to (a) vigorous crops, (b) straightness and cylindricality of stem, (c) resistance to disease and insect pests of economic importance, (d) ability to withstand adverse conditions, (e) ability to bear viable seed, (f) ability to produce timber of good quality and in some cases to produce valuable minor produce. By home collection from these varieties seed equal to or even better than that imported will be produced.

#### *Treatment of Seed Stands.*

Stands suitable for seed collection should be thinned to eliminate unsuitable tree types, to free the crowns of the seed trees, and in this way increase seed production. Partial girdling of the stems also increases seed production, but this treatment should be carried out before the end of April and in this way the trees are not damaged. It should not be applied if the trees are already flowering and fruiting satisfactorily. If stands are properly selected and orchards properly handled the supply of seed required for the annual programme should be available from home sources. Two types of seed orchard are envisaged. The first type contains clones of grafted plants derived from a common parent and planted, in such a way that each clone has an equal chance of pollination by all other clones, on sites isolated from pollen of the same or related species. The second type of seed orchard consists of selected plants raised from seed of a known good variety or produced by controlled pollination. These should be established at twice or three times normal spacing on good forest sites, well isolated from pollen from undesirable sources. The plants are encouraged by pruning to develop spreading crowns and seed of the new variety is produced after intensive pollination.

#### *Seed Collection.*

Collection of cones is now simplified by the introduction of the Swiss tree bicycle, with the additional advantage of the nylon safety

line. The scrambling net even though it appears on face value to be satisfactory has some disadvantages. The main one being in the cost of its erection. Four men require one-and-a-half hours to do the job. Its economical use is restricted to isolated trees of *Tsuga Heterophylla*, *Thuja*, and *Chamaecyparis Lawsoniana*, or trees on which two men would have from three to four days' collection without moving the net. These new aids to climbing have reduced the cost of collection considerably in other countries and if used properly could do the same here.

Collection of cones at the right time of year makes for easy extraction and gives the maximum yield per bushel. *Tsuga*, Cypressess, and silver firs shed seed very rapidly and they should be collected very quickly and before the cones are fully ripe. In the case of silvers collection should be completed as soon as the cones start to soften and their scales loosen otherwise a good percentage of seed will be lost. *Tsuga* and *Thuja* cones should be collected as soon as they start to change colour from bright green to golden. Spruces and Douglas fir should be collected when they reach a bright golden colour. In pines and larches seed shedding is slow and cones should be allowed to turn brown before collection begins as extraction is made very difficult by collection of unripe cones. In the transport of cones care should be taken that they are packed in a dry condition, as heating or moulding will set in if left too long in bulk, with a consequent deterioration in the seed. Broadleaved seeds should be packed for transport in hard containers as they are easily damaged or crushed in sacks.

#### Seed Extraction.

All seeds requiring heat for extraction are treated at Avondale in a timber drying kiln. Dry heat and steam are available from a boiler and so extraction is carried out by heating and damping. The optimum temperature ranges from 95° F. to 105° F. From tests carried out last year any further rise in temperature shows a marked drop in germination. Temperatures below 95° F. slow considerably the extraction rate and give little rise in germination. *Tsuga* was extracted at different temperatures, beginning at 130° F. and lowering by 5° each time until 90° F. The germination of each sample increased each time from 18% germination at 130° F. to 71% germination at 95° F. Below 95° F. showed no increase but the method of cleaning at the time did not enable the removal of non-viable seed from the sample. Extraction of *Tsuga heterophylla*, Douglas fir, Sitka spruce, Japanese larch and European larch is now much simplified by the use of a threshing mill fitted with an awner and piler through which the cones are passed. These have no further need of being placed in the kiln for extraction by heat. They are passed through the awner and piler in the cone state and the seeds are extracted, de-winged, cleaned, and all non-viable seed removed in one operation at a cost of eightpence per pound of clean seed. The germination as a result of this new method of extraction is

now 80% and the sample is equal to anything imported. In twelve hours working time 321 lbs. of Norway spruce and 300 of Sitka spruce were de-winged and cleaned at a cost of 8d. per lb. The process does not harm the seed as it is but a controllable current of air blowing against a screw type conveyor. With this new method the current year's collection could be made available for sowing the following Spring, thus avoiding storage of seeds and consequently a deterioration in quality. With these new aids to climbing, this new method of extraction which has revolutionised seed production in this country, and the full utilization of all seed sources available both in State and privately owned woodlands, it is now possible to supply the demands of home requirements for a twenty-five thousand acre programme and put in storage a reserve to cover poor seed years.

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