5712 – TREE SEED

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.01 Purpose. This section provides standards and guidelines for tree seed management in forest development work.

.02 Objectives. The objective is to provide tree seed of the best possible quality for use in forest development work.

.03 Authority. (See 5700.03)

.04 Responsibility. (See 5700.04)

.05 Definitions. (Reserved)

.06 Policy. (See 5700.06)

5712 – TREE SEED

.1 Seed Quality. The highest quality seed is used on each reforestation project. In general, seed quality judged according to source, genetic characteristics and termination potential.

.11 Source. Seed is usually most suited to areas where climatological conditions approximate those from where the seed was collected.

A. Area Zones. Standard seed zone maps are available in most states. These maps are constructed from data showing maximum, minimum, and average temperatures and precipitation, and lengths of dry and frost free periods. Normally, seed collected within a particular zone is used for reinforcing areas in the same zone.

B. Elevational Bands. Elevational bands may be designated in 500 feet or other intervals. If seed from the elevation to be treated is not available, use seed from higher instead of lower bands.

.12 Germination. Seed should meet the following germination standards:

Species	% Germination
Douglas-fir – Pseudotsuga menziesil	70
Noble fir – Abies procera	45
White fir – abies concolor	45
Western hemlock – Tsuga heterophylia	60
Ponderosa Pine – Pinus ponderosa	75
Sugar pine – Pinus lambertiana	75
Sitka spruce – Picea sitchensis	70
Jeffrey pine – Pinue Jeffreyi	75
Shasta fir – (Abies Magnifica)	45
Grand fir – Abies grandis	45
Western Redcedar – Thuja plicata	60

.13 Genetic Characteristics. Seed must be the best available in terms of genetic characteristics exhibited by the producing trees such as rapid growth rates, drought or disease resistance, seed production, or qualifies that enhance the value for a specific product.

.2 Estimating Seed Crops. When local seed is to be procured, or is required for natural regeneration, the manager should have up-to-date information relative to the next seed crop. The following guidelines are intended to help estimate the crop.

2.1 Estimating Cone Crop.

A. Early Evidence. A very general idea of the next cone crop may be obtained by examining cone buds. New cones may first be detected in late fall or early winter provided the examiner can identify cone producing buds from others. The three types of buds are as follows:

1. Vegetative Buds. Vegetative buds produce next year's needles. All terminal and some lateral buds are vegetative. They are light green and have a "pebbly" appearance beneath the bud scales when viewed with a hand lens.

2. Female or Cone Buds. These are usually found a short way back from the terminal buds. They are usually larger and plumper than vegetative buds. Their tightly compressed miniature scales and bracts beneath the bud scales may be seen when examined with a hand lens. They are usually light green but may be dark green or purple.

3. Male or Pollen Buds. These are light green or purple, and have a coarse granular texture when examined with a hand lens.

B. The First Cone Crop Forecast. By early summer, it should be possible to make a fairly accurate estimate of the year's cone crop. Once this is completed, plans should be started for the seed procurement program. The following procedure is recommended for determining the cone crop for a given area:

1. Determine the average number of pickable trees per acre.

2. Determine the total number of cones on one-fourth of the pickable crown of a number of sample trees.

3. Compute the average number of cones per entire tree.

4. Determine the number of bushels per tree by dividing by the average number of cones per bushel for the trees species involved.

5. Multiply bushels per tree X trees per acre X acres samples to determine the total cone crop for a given area.

C. The Final Cone Crop Forecast. Before making final plans for seed collection (such as bid advertisements or hiring men for force account work), make a final observation. Since unfavorable weather or insect attacks may completely invalidate earlier forecasts, the final observation should also include an examination of cones to inspect seed condition.

.22 Predicting Seed Yield. Use the following formula to predict the seed yield (in lbs.) per bushel of cones.

$$Y = \frac{NSC \times NCB}{NSP}$$

Y = Predicted yield in pounds per bushel of cones.

NSC = Average number of seeds per cone. Determined by examination of a random cone sample.

NCB = Average number of cones per bushel.

NSP = Average number of seeds per pound.

Species	Average Number of Cones per Bushel	Average Number of Seeds per Pound
Douglas-fir	1,000	40,000
Noble fir	80	14,000
White fir	200	15,000
Western hemlock	15,000	297,000
Lodgepole pine	3,000	135,000
Ponderosa pine	250	12,000
Sugar pine	20	2,100
Sitka spruce	1,500	210,000

.3 Cone Collection and Handling.

.31 Collection Opportunities. Cones are collected from the following sources:

A. Squirrel Caches. This is normally the quickest and cheapest method in areas where there is a good population of active squirrels. Only caches located in uniform stands of desirable qualify should be used. Do not collect seed from caches located within 500 feet of undesirable seed producing trees.

B. Standing Trees. Picking is done by climbing trees and using a long handled hook to pull in branches. Safety must be emphasized. Pickers should be equipped with safety belts. An important consideration in picking from standing trees is yield per tree. Only under extraordinary circumstances, such as very desirable qualify seed or dire need for seed from a particular locality, should a low yielding tree be climbed and picked.

C. Felled Trees. Trees will not be felled for the purpose of seed collection. The method applies only to trees felled in logging operations or windthrow. The method is best for large coned species but may be expensive if picking is delayed by the felling operation.

D. Felled Cones. This method may be practical following severe windstorms that may occur during the cone collecting period, particularly with large cones.

.32 When to Collect. Cones must be collected during a short period of time following ripening of cones and maturing of seed. Since this period varies with the locality and between years, the collector must know the following methods of determining ripeness.

A. Cone Appearance. Cone color changes from green to brown, or other color depending on the species. Many times, however, the cones open and seed escapes soon after cone color changes.

B. Seed Appearance. When ripe, the seed coat becomes dark in color and hard. The kernel is solid, rather than soft or shrunk away from the seed coat.

C. Specify Gravity. Cone weight decreases with ripeness. For some species, a test may be made by observing the manner in which ripe cones, free of insect damage, float in various liquids. Sugar pine cones, for example, float in kerosene more than one-half above liquid level of one-half kerosene and one-half linseed or SAE 30 motor oil.

.33 Handling. Label all cone containers to show species, zone, elevation, collection area, and year of collection. Store cones in sacks so that free air can circulate around them.

.4 Seed Procurement and Handling.

.41 Procurement. Seed may be procured by contract or purchase order. Seed that does not meet the requirements of reforestation areas may be exchanged for more desirable seed owned by other forest managers—Federal, state, or private.

.42 Handling. Tree seed must be handled with extreme care to prevent damage and insure that seed is applied to areas to which it is best suited. Seed is stored and shipped in four mil polyethylene bags placed in tight containers such as hardboard drums and labeled as required in .33. When storing seed for short periods, such as a week or two, keep at room temperature or cooler in open containers to prevent heating. For long-term storage, such as from one year to the next, keep at a six to eight percent moisture content and a constant temperature of 0°F. Avoid rapid thawing and refreezing. Do not handle frozen seed more than necessary.

.5 Seed Testing. Seed test results are needed before payment to seed dealers for the purchase of seed and before seed is exchanged. In such instances where seed is stored for more than a year, seed tests may be desirable, but not always needed. Under proper storage conditions most seed, with the possible exception of Abies and Sugar Pine, can be kept for quite extensive periods without losing viability. Also, it is desirable to test seed before and after treatment with rodenticides. All seed tests must be made by reputable seed testing laboratories in accordance with the publication Sampling and Testing Western Conifer Seeds, prepared by the Western Forest Tree Seed Council.