

QUALITY CONE COLLECTION 1

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ABSTRACT

Good forest management depends on the fast reforestation of logged areas with the right species of seedlings that are vigorous and healthy and from the proper area of location. To produce vigorous healthy seed and seedlings, proper quality cone collection and handling is a must. To accomplish quality cone collection, a lot of technical and biological know-how, as well as "Common Sense" must be exercised. To accomplish the job, proper planning and good existing seed bank records are needed.

INTRODUCTION

This presentation will focus on the collection of cones from Douglas-fir, since we have had very little experience collecting cones from other species. However, most basic principles and common sense will apply to any other species. The harvest of cones is the same as the harvest of other farm or orchard crops. Since the seed from cones generally is not consumed as food, but to produce seedlings, seed source and identity maintenance becomes highly important.

Most conifer forest tree species produce cones at irregular intervals. Douglasfir produces cones at 3 to 5 year intervals and good heavy crops occur at about 7 year intervals. The quality of seed is low and the cost to produce seed is high during low and medium cone years, whereas just the opposite is true during years when cone production is high. At the same time, seed is being used up every year for reforestation. Proper seed bank inventories and planning cone harvests accordingly is critical.

PLANNING TO COLLECT CONES

The first step is to determine from the seed bank inventories what species need to be collected, from what areas and elevations, and how much seed is needed in each seed lot to replenish the seed bank. This should be updated annually, regardless whether a cone crop is on its way or not. It is also a good idea to identify those seed lots in which seed needs have become critical, so that they will be high priority in case of budget cuts or if a poor cone crop exists and collection is much more expensive.

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The next step is to inventory those collection areas in which cones need to be collected. A potential cone crop can be determined when reproductive buds have developed. A good time for Douglas-fir is April and May. During these 2 months reproductive buds have well developed or are open, depending on elevation and they are easily recognized, even on large trees, with binoculars. It is also possible at this time to identify the potential crop as light, medium or heavy. A general rule for Douglas-fir is that if cones are present only in the upper 1/3 of the crown, it is considered to be a light crop, if they are present in the tipper 1/2 of the crown it is considered a medium crop and if cones are found in all parts of the crown it could be a potential heavy crop. To do this inventory it is important that one becomes thoroughly familiar with the "Reproductive Cycle" of each species inventoried.

Based on the inventory a collection plan must be developed that contains at least the following items:

1. Labor needs.
2. Equipment needs.
3. Transportation needs.
4. Prices and costs.
5. Collection methods.
6. Training.
7. Buying stations.
8. Seed extraction contracts.

The final determination for a collectable cone crop must be made as close to collection time as feasible by determining seed set and quality in the cones. This is evaluated by the cut test. The cone is sliced in half and the cut embryos are counted on one side. On Douglas-fir 5 cut embryos is considered to be a medium crop and 7 a heavy crop. After this test has been done for all collection areas the final selection of collection areas, the collection sequence, and priorities must be established.

CONE COLLECTION AND HANDLING

Collect cones as close to maturity as possible. This sometimes is difficult to do because of timing, or economic reasons. If this is the case, cones can be picked somewhat premature and through various methods, after-ripened, depending upon species. Maturity of cones must be determined prior to collection, and some of the following symptoms can be used:

1. Overall color of cones.
2. Color of scales or bracts.
3. Size of seed.
4. Color of cut endosperm.
5. Size of embryo.
6. Separation of seed from bracts.

Again symptoms change with species, and the "Reproductive Cycle" of the species to be collected must be fully understood.

The following methods can be used to collect cones:

1. Standing trees.
 - a. Climbing and hand picking.
 - b. Ladders and hand picking (also power ladders and man lifts).
 - c. Mechanical shakers.
2. Felled trees.
3. Topping of trees.

4. Squirrel caches.

The size, location, value and species of the tree determines what method to use. Sometimes economic reasons will also influence the type of method used.

The cone is a living organism, and handling of that organism during and after collection is very critical in order to produce top quality seed. Rough handling can damage the embryo in those seeds where the embryo does not fully occupy its cavity between the endosperm. Seed also can be damaged by temperature extremes, too much moisture, or lack of oxygen. To avoid seed damage the following procedures should be observed at all times:

1. Avoid rough handling of cones.
2. Store cones in sacks loosely. A good rule of thumb is to fill a sack one-half full with cones, (or one bushel of cones in a 2 bushel sack), and then tie the sack on the very top. This leaves the cones loose in the sack, air can move through it easily, and when the cones dry there is plenty of room for expansion and the cones will not case harden.
3. If interim storage in the field or at buying stations is needed, cones must be stored on racks in a shaded area. Sacks must be stored on these racks so that air can move around them freely.
4. When shipping cones to the extractory, use open trucks, do not stack sacks more than 2 high, use racks to space out the sacks, do not transport cones during extremely hot weather, otherwise use refrigerated trucks.
5. Often extended cone storage is required prior to extraction. Storage must be well ventilated, cool and dry. Various cone shed designs are available.
6. Protect cones at all times from rodent damage. This is particularly important for small lot tree improvement cones. It is amazing how fast a squirrel can go through a bushel of cones.

CONE AND SEED IDENTIFICATION

The best cone collection and seed treatment is of no value, unless proper cone and seed identification and records are maintained. The Bureau of Land Management is using a cone tag that can be used for reforestation cone collections (large lots) as well as tree improvement cone collections (small lots). The cone tag consists of two parts, the lower part is placed inside the sack of cones and the upper part is tied to the top of the bag on the outside. Each set of tags stays with the cone and seed lot at all times, even in the seed bank storage. We are using various colors to identify B.L.M. Districts.

All small lot collections are accompanied by a list of collections, usually in numerical order by parent trees. We have a standard form for this and it is also used as a work sheet for seed extraction and testing. All seed information is key-punched off of these sheets and put into computer storage, which is up-dated annually.

CONCLUSION

In order to accomplish quality cone collections it is important to do the following:

1. Know the "Reproductive Cycle" of the tree species to collect.

2. Know your seed bank needs.
3. Inventory and evaluate possible cone crops.
4. Develop a detailed cone collection plan.
5. Pick cones at the proper maturity.
6. Pick and handle cones properly.
7. Maintain cone and seed identity and records.

PUBLICATTONS CTED

To finish up, I would like to recommend a publication that I feel would help anybody very much that is starting to collect cones:

"Guideline to Collecting Cones of B.C. Conifers", by Dobbs, B.C.; Edwards, D.G.W.; Konisha, G. and Wallington, D. Published by the British Columbia Forest Service and Canadian Foresrt Service, Joint Report No. 3, March, 1976.