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PRELIMINARY RECOMMENDATIONS FOR SEEDSPOTTING SUGAR PINE IN SOUTHWEST OREGON

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Experiments in seedspotting sugar pine have been conducted for more than 3 years in the South Umpqua drainage of southwestern Oregon. Observations from studies in progress and results of completed studies have indicated some of the necessary requirements for success. Though not complete and fully tested, this information is summarized for use in field projects. Some of the points discussed are equally applicable to direct seedings of other species, particularly ponderosa pine.

Seedbed Preparation

Sugar pine seedlings have germinated and survived best on bare or nearly bare mineral soil. Logging practices which scarify a high percentage of the ground surface are desirable. Scarification should not be deep, but should be widespread and sufficient to tear up the layer of undecomposed litter. Lightly used skidroads are good seedbeds if the soil has not been heavily compacted.

Slash and residual vegetation should be eliminated by burning for three reasons: (1) To increase the amount of bare mineral soil available for seeding, (2) to eliminate shelter and food for rodents and insects, and (3) to reduce competition from brush and herbaceous vegetation. A complete burn is desirable (figure 1). Isolated spots of vegetation and debris should be burned out. Fire-blackened surfaces have not increased seedling mortality.

Seeding should be done soon after seedbed preparations are complete and before ground cover develops. New vegetation is not needed to shade

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sugar pine seedlings. Vegetation is detrimental because it provides competition for moisture, and it often supports cutworms, grasshoppers, and other insects harmful to young seedlings.



Figure 1.--This clear-cut unit has been cleanly burned in a slash fire and is in excellent condition for seedspotting.

Rodent Control

Control of seed-eating rodents is usually a necessary preliminary step in seedspotting. Sugar pine seed is readily eaten by mice, chipmunks, and squirrels. In several seedings mice have been particularly active in clipping seedcoats from partly germinated seedlings in the spring. Good rodent control with either poison baits or repellents is therefore necessary for successful seeding.

Entirely satisfactory rodent control methods are presently not available. Sugar pine seed protection has been successfully achieved with the repellent, tetramine (tetramethylene disulpho tetramine). However, because of manufacturing difficulties tetramine is not available now. Should it become available, a tetramine protection treatment is recommended. Meanwhile, field tests of other promising repellents and rodenticides are continuing in cooperation with the U. S. Fish and Wildlife Service.



Figure 2.--Two sugar pine seedlings (1 year old) on a single seedspot. Where 2 seedlings survive, one (right) often grows much more rapidly than the second (left).

Repeated applications of poison bait have successfully protected seed from rodents in two studies. Wheat treated with 1080 (sodium fluoroacetate) was used in the fall; wheat treated with thallium sulphate was used in early winter; and wheat treated with 1080 was used again in the spring when germination began. For fall and winter poisonings, baits were placed in spots located about 50 feet apart and containing 10 to 20 kernels each. In the spring poisoning, about one-half pound of grain was broadcast per acre.

Repeat poisonings are practical but require attention throughout the period seed is exposed. Rodent population trends and seed-eating activity must be checked frequently. Prompt re-poisoning is necessary when seed depredation becomes serious.

Serious hazards to humans and wildlife are necessarily involved in the handling and application of poison baits. Methods used should always follow closely the recommendations and instructions provided by the U. S. Fish and Wildlife Service.

Seeding Method

A spacing of 4 x 8 feet between seedspots is recommended. Two seeds should be planted per spot and placed less than an inch below the surface. Experience has shown that we can reasonably expect one-half or more of the spots to be stocked with established seedlings at the end of two years (figure 2). In this way, an average spacing of 8 x 8 feet can be attained. The seeding density recommended allows some seed loss to rodents. Even with good rodent control, some seed will be eaten.

High-quality seed must be used in seedspotting to insure success. When only 1 or 2 seeds are sown per spot, seed must be of high quality or chances for failure are great. Seed with 80 percent or better

germination capacity is desirable. If possible, seed quality should be determined by germination test before sowing begins. The use of more seed when germination capacity is low is not recommended for two reasons: (1) Many spots will have no seedlings and others too many, and (2) hand feeding of seeding devices becomes more time consuming as the number of seeds per spot are increased.

In trials thus far, seed has been planted with the aid of dibble sticks or other simple seeding devices and the soil firmed by light pressure with the foot. In good weather, 2 acres per man-day can be seedspotted with present tools. Wet or frozen ground may cut this rate in half. Dependable self-feeding tools for seedspotting could greatly increase the amount of ground covered in a day.

A small exploratory test indicates that broadcast seeding of sugar pine cannot be recommended. At least three factors adversely affect broadcast seeding:

1. Seed on top of the ground is found more readily by rodents than covered seed.
2. Sugar pine seeds do not work into the soil surface as well as smaller seeds, allowing the germination root or radicle less chance to get well buried before it is dehydrated.
3. Because sugar pine exhibits slow and variable germination, surface-sown seeds run a greater risk of exposure to dry weather while germinating than either ponderosa pine or Douglas-fir.

Seedspotting minimizes the effects of all three factors.

Time to Seed

With sugar pine, fall seeding is recommended for four reasons: (1) Seed does not need to be stratified in advance of planting; (2) fall-planted seeds germinate earlier in the spring, giving the seedlings a better start; (3) fall-sown spots attract fewer rodents than spring-sown spots; and (4) fall seeding is easier and faster since the soil is drier and more readily worked. Longer periods of good weather are more frequent in the fall.

Although seed is exposed to rodents for a longer time in fall seeding, several studies have demonstrated that the seed can be effectively protected through the use of repellents or repeated baiting.

Choice of Seedspot Locations

Observations made on staked seedspots have forcefully demonstrated that success can be increased by placing seedspots in good locations. A 4 x 8 spacing should not be followed rigidly. Some guides to aid in placing seedspots are as follows:

1. Avoid placing seedspots in small depressions where water may accumulate. Use midslopes on edges of depressions so that the seed does not drown or float away. Many places on a clear-cut have standing water during wintertime.
2. Avoid small drainage channels where the seed may wash away. These include not only small, obvious draws, but also those locations where water may be channeled into skid tracks, log-created depressions, and along the foot of small dirt ridges left by skidding.
3. Avoid locations in heavy vegetation. If brush is widespread, choose the most open area and, if practicable, clear away competing vegetation around the seedspot.
4. Seedspot on the shady side of logs and debris. Shade cast by chunks and branchwood is good since it protects the seedling stem, yet allows full sunlight to reach the top.
5. Avoid placing seedspots too far under large logs. These areas are used as runways by mice and are sheltered from beneficial light rains.
6. Do not plant in woody debris unless the seed can be placed in contact with mineral soil.
7. Seedspotting can be used in rocky areas, but choose spots between the rocks where mineral soil is present.
8. On skidroads locate seedspots in the least compacted places.
9. Avoid placing seedspots on top of mounds of earth since the disturbed soil often has little capillary action and becomes very dry in the summer. Locations near the base of such mounds are good.
10. Do not seedspot in soil covering air pockets. Dirt which loosely covers woody debris often contains air pockets which cause extreme soil dryness.

11. Do not seed in gopher-undermined soil. Harmful gopher activity can be minimized by locating seedspots adjacent to solid obstructions or beside existing gopher tunnels.
12. When seeding alongside stumps, choose a location where the seedling root will be in position to grow between major stump roots. Stump roots are usually visible aboveground.
13. Avoid soil that has been burned red by the slash fire. Seedlings can grow well in burned soil, but there is a greater chance for damping-off.
14. Avoid seedspotting mounds, bottom edges of ridges, or furrows subject to considerable soil movement. More stable soil is often only a foot or two away.
15. Close proximity to rapidly spreading brush should be avoided if the brush threat can be recognized. Otherwise the seedling can readily be overtopped before it gets started.
16. Areas containing a mixture of wood and soil should be avoided unless mineral soil predominates and no large air spaces are present.
17. Place seedspots along the edges and in the less-used center of skidroads that may receive use by man or animals.
18. If necessary, kick away any duff or litter present so that seed is deposited in mineral soil.
19. In clay soil, firm the ground very lightly in wet weather so that compaction will not retard seedling emergence.
20. Avoid stump holes because they often stand full of water in the winter. When placing spots around stump holes or upturned roots, avoid loose soil.

Chances for successful seedspotting should be improved considerably by following these recommendations. Additional information will be reported as soon as tests now in progress are completed.