Fall Planting in Northern California

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Abstract

Fall planting has become an important part of Roseburg Resources Company forest management program. The current program averages 300,000 seedlings planted in the fall. The majority of sites are high elevation units, which have a small planting window in the spring when enough moisture is available. However, early successes with fall planting have led us to look at other sites which may be suitable. In mediterranean climates, maximizing initial root growth and soil moisture will enhance seedling survival and growth dramatically. Company research has indicated as much as a 50% to 100% increase in stem volume 2 years after planting with fall versus spring planting on high elevation sites. The entire process of preparing for a fall plant is different than for in the spring. Seedling condition, site preparation, soil temperature, soil moisture, storage and transportation issues are all critical factors in determining the success of the fall plant.

Key Words

Outplanting, fallow cropping, seedling conditioning, planting suitability, herbicides, container seedlings

Prior to Logging

Our fall planting program begins long in advance of logging. Moisture management is probably the biggest difference between preparing for a fall and a spring plant. In fall, seedlings may have to withstand fairly substantial periods without rainfall after planting. Therefore, we manage our units to retain the maximum amount of moisture possible. Typically we do not fall plant on sites that receive less than 40 inches of annual precipitation.

It is important to evaluate each unit on an individual basis to determine whether or not it is suitable for fall planting. Typically the sites that work best for our program generally have deep soils, good water holding capacities, high site quality, and usually higher elevation. North or east facing slopes also protect seedlings from excessive dry periods post planting. Most of our fall planting program involves higher elevation sites. Snow melt may not occur until late June, or even July, when spring rains have already ended and the only new moisture available is from snowmelt. Temperatures may also exceed 100 °F (38 °C) by the time these higher elevation units open up. Therefore, we felt less stress would be put on the seedlings by planting in fall. Higher site ground with deep soils have also worked fairly well at lower elevations as long as these sites had good water holding capacities. Well drained sandy soils should be avoided.

At least 1, if not 2, years prior to logging, we are spraying pre-harvest, as a site preparation tool, all vegetation in the understory of stands to be logged. This technique has several advantages. The main benefit is that we are able to use chemicals that more effectively control vegetation. We would not be able to use these chemicals directly prior to, or after planting because of seedling toxicity problems. This allows for more effective control of the woody brush and avoids re-sprouting of brush after it has been disturbed by logging activity. A second benefit is that we seem to be able to use lower rates of chemical than would be required to control open grown brush. This is most likely because the brush is somewhat stressed from the conifer overstory and is not as hardy. In the long-term, controlling the understory brush also allows us to use lower rates of residual herbicides, such as hexazinone, prior to planting because we are only worried about controlling herbaceous vegetation and not woody brush. Application costs are also dramatically less than a release application because applicators do not have to worry about hitting seedlings.

Due to the long-term control achieved with the pre-harvest applications, our logging units are staying clean for 2 to 3 years post-planting. Therefore, there

is significant financial as well as growth implications from the treatments, as we are negating at least one if not more release applications.

Logging and Site Preparation

The timing of logging operations is more critical for fall planting than with a spring plant. For fall planting, logging must occur early in the season. In our region, we try to have fall plant units logged by late April or early May at the latest, when there is still plenty of available soil moisture. Any mechanical site preparation should occur immediately afterward and hopefully be completed by the end of May.

Ripping is a very valuable tool that also compliments the fall planting process. By breaking up any compaction which has occurred on the site, fall planted seedlings have unrestricted space to put on their late flush of roots. The ripping also decreases surface runoff, concentrating most moisture in the rips. Currently, our program is to rip virtually all ground under 30% slope.

Fallow Cropping System

The combination of pre-harvest site preparation treatments and early logging and site prep will ensure that planting units sit vegetation free throughout summer. This will maximize the amount of soil moisture retained, since there is no transpiration occurring from brush or trees. This is especially critical on better drained soils with limited water holding capacity. On our soils with good water holding capacities, soil moisture can be found at depths of 2 to 3 inches (5 to 7.5 cm) at the end of the growing season on fallow units; on units without the fallow cropping system, soil moisture occurs at depths of 8 to 10 inches (20 to 25 cm).

The fallow system gives added insurance to planting success, especially if a prolonged dry spell occurs after planting. On good soils, there is also the potential to plant even if only a limited amount of rain has occurred on the site.

Seedling Conditioning

Our fall planting program is entirely focused on container stock. The early initial root growth produced from container stock is critical in dry climates to maximize rooting depth, taking advantage of maximum available soil moisture. Bareroot stock does not have the ability to grow new roots nearly as well as container stock. Container trees also allow for added flexibility to hold seedlings over if adequate fall planting conditions do not materialize. Nursery managers are also better able to manipulate the growing environment for container stock to prepare it for a fall plant compared to bareroot stock.

Probably the most important factor contributing to increased success of fall planting has come from advances made in the nursery regarding the conditioning of seedlings geared for fall planting. It is most important to know what stocks will be fall planted at the time of sowing, so that the nursery knows what growing regime to use.

Seedlings grown for a fall plant are generally sown earlier than trees for a spring plant, and are usually grown under slightly warmer conditions to accelerate growth rates. The main purpose of this is that the trees will be put under blackout in the greenhouse sooner than trees for spring planting, so they have a longer period to harden off before going out to the field. Trees grown under these conditions will be better prepared for potentially harsh conditions which can occur in the field. It is imperative, however, that the nursery does not blackout the seedlings for too long. Seedlings grown under excessive blackout regimes can go too far into dormancy and shut down caliper growth as well as root growth. The key is to blackout seedlings just enough so they set bud and stop their height growth. However, seedlings should still be able to put on caliper and actively grow new roots.

One treatment which has become more popular in recent years is the addition of slow release fertilizers to the container medium. While significant gains in growth can be achieved, there are several drawbacks. The first is that the nursery needs to pay special attention to salinity levels while seedlings are being grown. If seedlings are not flushed on a regular basis or let to dry down too much, salt levels can increase, damaging or killing roots. The second downfall is the incidence of animal browse in the field once the seedlings are planted. Deer and elk have a special preference for fertilized seedlings. The forester should be aware of potential browse problems and take measures to protect seedlings. Our experience is that big game repellents are a better solution than netting or tubing, even if it has to be reapplied. Netting and tubing tend to deform trees and cause them to lay down under heavy snows.

On the positive side, the replicated field trials outplanted by our company have shown substantial gains in seedling volume with slow release fertilizers planted in fall for the first couple of years after planting. However, these initial differences in growth have dissipated over time. The fertilizer effect is not

as profound, and more lethal, to seedlings with a spring plant. Fall planted trees have a better chance of overcoming fertilizer issues due to the flushing of fall rains, naturally decreasing the salt levels.

Transportation and Storage

Transportation and storage play a key role in the success of a fall planting program. When conditions favorable to planting occur, seedlings must be lifted and shipped quickly to capitalize on planting conditions. Seedlings should be shipped at 40 °F (4.4 °C). Seedlings should not be shipped at temperatures lower than this to avoid putting the trees into dormancy. The trees should be actively growing when received.

The problem with storing trees in warmer conditions is that it creates an ideal environment for pathogens and fungi, such as *Botrytis*. Therefore, it is critical to plant seedlings as quickly as possible in fall. Seedlings stored at 40 °F (4.4 °C) have roughly 10 days, in our experience, before fungi problems become evident. Therefore, we try to have our fall planting program completed within 1 week. If you have a small amount of trees to plant, seedlings can be stored on the unit for immediate planting with boxes open in the shade. Seedlings should be packed standing up, allowing for maximum aeration, and be packed without plastic liners or with plastic liners that allow air-flow, so trees can respire. Plastic liners may also cause excessive temperature conditions for seedlings. If you have to cooler store trees prior to planting, seedlings should be stored no cooler than 40 °F (4.4 °C). It should be the goal to get trees out of storage as quickly as possible.

Planting

Before seedlings are ordered for delivery from the nursery, it is imperative to have optimal soil moisture for planting. This usually involves at least one good rainfall event. Our rule of thumb is to have at least 2 inches of rain prior to fall planting before seedlings are lifted. However, this varies somewhat with soil type. Soils that have high water holding capacities, high organic matter, and are of better site qualities usually require somewhat less rain than the 2 inch standard.

It is critical in fall that seedlings be planted quickly. The longer the time in cooler storage, the greater the risk to the seedling. Contracting enough tree planters to complete the planting program within 1 week is our company goal. This usually involves several planting crews and requires adequate supervision. One crew usually requires 2 planting inspectors to ensure a correct planting job is done.

Planting spots must be cleared of all debris and dry soil. Planting spots are scalped until soil moisture is reached. If planting units are ripped, seedlings should not be planted in the bottom of the rips unless the rips have settled over a winter. Otherwise, loose soil on the edge of the rips will fill in the bottom of the rip, burying the seedlings. It is our practice to scalp to soil moisture half way up the shady side of the rip, to create a planting spot that will not cave in but still provide the benefits of uncompacted growing space.

Planting micro-sites is critical in fall. This is especially true if prolonged dry periods follow planting. Planting on the north to east side of any object in the unit will provide higher soil moistures and lower temperatures more conducive to seedling establishment.

Conclusions

Fall planting can be a valuable tool in a reforestation program. Planning and logistics can be an overwhelming obstacle, but critical to a successful program. Plan early and pay attention to detail. A last minute plan to fall plant will almost surely fail or have unintended results. With proper planning and site selection, the results can be phenomenal.