LIFT AND PACK PROCEDURES AT THE J. HERBERT STONE NURSERY Fred Zensen

ABSTRACT: Provides an explanation of methods used for lifting and packing of tree seedlings at the J. Herbert Stone Nursery. Procedures outlined include lifting guidelines, processing, techniques, and review methods.

INTRODUCTION

Lift 6 pack is the culmination of 2-3 years of nursery work. It is the climactic moment in the life of a tree seedling at a nursery. This is the time when the fruits of our labor are actually seen. No matter how often you walk the seedbeds and observe, dig tree samples, or count seedlings, you cannot truly know how your stock measures up until it is lifted, graded and packed. When the numbers of packed seedlings are tabulated, then the nursery manager can accurately figure the income for the year. Therefore, the importance of the lift and pack operation is paramount in tree seedling nurseries.

PRE-LIFT PREPARATION

At the J. Herbert Stone Nursery, the actual lift and pack season is late November *through* March, with target dates being December through February. The capacity of J. Herbert Stone Nursery is 36 million 2-0 tree seedlings per year.

Planning for lift and pack begins with the preparation of our lifting contract in early July. Estimates of the footage to be lifted are made and contract is submitted to the business management group for publication and solicitation.

Personnel required to lift and pack 36 million seedlings is 230 employees: 25 permanent, 205 temporary. This includes our office staff. The bulk of the 230 employees are hired for processing of seedlings; grading, packing, storage and shipping, and quality monitoring.

Our next order of business is the annual clients meeting held in October. This meeting is a two day affair which allows our clients an opportunity to view their stock and compare abstract inventory numbers and scatter diagrams to tangible tree seedlings. It is difficult to convey a picture of

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seedling morphology to clients in a numeric matrix, therefore, we request our clients to make every effort to attend this meeting. The second day of our meeting is a discussion of various topics of mutual interest to our clients and ourselves. Attendance often numbers 85 or better. Our clients are National Forest Ranger Districts in Oregon and California as well as Bureau of Land Management Resource Areas in Oregon and number about 70. With as diverse a group of clients as this, we find it very helpful for all concerned that we are all on a relatively similar wave length regarding how we do business at J. Herbert Stone Nursery.

Of paramount importance at our clients meeting is the distribution of our seedling order form. These forms are used as our lift and pack request and the source documents for billing and order explanations. Information provided on the form includes desired seedlings, grading specifications, special instructions (moss, bundling, double sort, transplant, early or late lifting dates), and billing instructions. These forms are to be returned to the nursery no later than November 15.

LIFTING

Lifting begins in early December, weather permitting. Often we must cease operations due to rain or frosty, frozen conditions. One must realize that nursery managers tend to prefer odd weather conditions during this time of the year. Foggy days with temperatures in the mid-40 degree Fahrenheit range make nursery managers get all misty eyed. Scheduling of seedlings to be lifted is accomplished primarily on a species basis, although December is somewhat mixed. With clients from the Oregon coast to the Malheur mountains of Eastern Oregon, the needs are quite varied. As it usually works out, everyone wants their stock lifted at the same time. We make every effort to honor special requests but mass lifting is the norm.

Lodgepole pine and western larch are lifted first in December. These species usually require longterm storage, as they are generally planted on eastside Cascade sites. Long-term storage can often mean up to 6 months in the coolers. This requires two critical features. First, ideal storage conditions--95 percent relative humidity, 33-36 degrees Fahrenheit and second, a storage monitoring system that features an alarm when conditions are less than or more than ideal. At J. Herbert Stone Nursery, we have equipment which meets both conditions and is operable. Another component of proper longterm storage is the condition of the seedlings themselves. Have they been mishandled? Is there too much moisture on the foliage? These points all contribute to the well being of seedlings stored

for long periods of time. Our clients have had excellent results with stock stored for up to 6 months. Lakeview Ranger District, Fremont National Forest, planted lodgepole pine lifted in December as late as July 4, with 98 percent survival and acceptable growth.

Much of our 1-0 for 1-0 ship is lifted in December. We normally work until Christmas week and cease operations until the New Year's celebration is completed. Douglas-fir, ponderosa pine, Abies species, sugar pine, western white pine, western redcedar, incense cedar and spruce are lifted in this order if at all possible.

Lifting guidelines at the J. Herbert Stone Nursery have been established based upon historical records and professional opinion. To date, we have no researched lifting windows, but rather extrapolate the Oregon State University Douglas-fir guidelines of December 15 - March 15. Our track record has borne out our procedures. We will be actively participating in a number of lifting window studies this next year. We hope they will provide us with data to support what we are doing today. Guidelines have been established for Plant Moisture Stress during the lifting operation. These guidelines have been separated into early morning and daytime rates. In the early morning when frosty or frozen conditions tend to abound the applicable guidelines are 10-15 bars on bed seedlings. After seedlings have been lifted and are in containers for at least 15 minutes, PMS is again taken. If PMS has dropped 3 bars or more, lifting continues with PMS taken every 15 minutes. If PMS drops by 3 bars the second time, testing is ceased unless there is a drastic weather change. During the day, seedling PMS may rise due to evapotranspiration, particularly on sunny and/or windy days. Higher PMS may be accepted under these conditions: 15 bars Douglas-fir and pines. When PMS reaches 15 bars in Douglas-fir or 18 bars in the pines, PMS will be taken on seedlings which have been lifted and in a seedling container for 15 minutes. If PMS has dropped 3 bars or more, lifting continues. If at any time PMS exceeds these conditions, the lifting supervisor is notified and the appropriate action is taken.

Weather conditions are given the following definitions during lifting:

Ideal - overcast or foggy; temperature 45 °F; relative humidity 80 percent or higher; wind <5 mph.

Favorable - high overcast, 50 percent sunny; temperature 45-65 °F; relative humidity 60 percent or greater, wind <5 mph.

Somewhat Favorable - cloudy but 50 percent sunny; temperature occasionally rises over 65 °F; relative humidity 50 percent or greater; wind <3 mph.

Unfavorable - anything other than above.

PROCESSING OF SEEDLINGS

In the packing shed, seedlings are graded, pruned, packed, sampled for testing, and sent to cold storage. Procedures and seedlings are monitored very carefully. In fact, we have a staff of six people whose sole function is quality monitoring. Quality monitoring consists of checking the seedling morphological characteristics for compliance with the clients' orders, monitoring bag counts and root length, PMS and adherence to nursery grading standards for quality. This information is posted for all to see as well as provided immediately to the work leader responsible for the particular grading table monitored. Ten percent of the seedlings are also sent to independent testing laboratories for determination of frost hardiness, root growth capacity, and stress analysis.

After the seedlings are brought in from the field, they are immediately placed in pre-cooler storage until they are processed. This pre-cooler storage is usually for a minimum of 48 hours. PMS is monitored to ensure that it is at or below S bars. Seedlings are then brought into the grading tables as needed to complete the order. Once processing is completed, they are immediately placed in cold storage until shipped to our clients. Storage conditions are maintained at 33-35 °F and 95 percent or better relative humidity. These are considered optimum conditions for seedling storage.

SEEDLING STORAGE

Seedlings are kept in storage until they are requested by our clients. This can often be as long as six months. Storage conditions are constantly monitored and an alarm system is in operation to notify us of equipment failure. A constantly updated inventory is maintained. As shipping requests arrive, a schedule is developed. Seedlings are shipped by contracted carrier in a refrigerated van. Seedlings are generally shipped palletized. This eliminates unnecessary handling which could place additional stress on the seedlings. It also allows our clients to unload the trucks with a forklift and place the seedlings in interim storage undisturbed.

SITE VISITATIONS

During the field season, members of the Nursery staff visit with our clients on site for the purpose of review of nursery stock, problem solving and prevention, and performance of J. Herbert Stone Nursery seedlings. We attempt to visit at least six clients per year. We are also available to respond to those clients who request such a visit. These visitations are beneficial for both parties. Nursery personnel are given the opportunity to observe planting sites and operational reforestation practices, as well as get a better idea of techniques and responsibilities of clients regarding seedlings. We have an exchange of ideas and listen to the needs, wants, and desires of our clients. They in turn see the interest we have in the reforestation process and our willingness to respond to their needs. These visits have done quite a bit to foster good communication and cooperation between ourselves and our clients.

REVIEWS

To review our process, the season can be divided into different areas. First is the planning stage which actually begins in June prior to lifting. Second is the implementation stage including contract award, lifting, processing, storage, shipping, and cleanup. Third is review. This final stage is in many respects the most important. It includes not only the official testing results, but our site visitations and clients meeting after field season. Another method of checking what and how we accomplish is by a continuous critique of our methods. This is accomplished by weekly meetings and through a participatory management technique known as quality circles. Members of our work force volunteer to serve on one of two eight-member quality circles. The circles are facilitated by a nursery employee trained for this task. The mission of these circles is problem solving and problem prevention. We have been quite successful with this technique and have established a permanent quality circle consisting of our full time employees which meets during the rest of the year.

Another method of review is our mid and end of season critiques. These are divided by work area. The employees in the individual areas present their views of what worked and why, what did not work and *why*, and possible methods of improvement. Through these techniques, we have been able to constantly improve and refine our methods of doing business. Not all ideas are implemented, but many more are than not. Our employees are the experts at the particular task, and more often than not, are more efficient at the task than we as managers can envision. Employee involvement will enhance a project.

CONCLUSION

Lift and pack season at the J. Herbert Stone Nursery is a very busy time of the year. It entails total involvement by all nursery personnel. The commitment to produce high-quality, growing and surviving seedlings at the J. Herbert Stone Nursery is total. We are constantly seeking methods to improve our seedlings. In addition to our seedlings, our most important resource is our personnel and they are fully aware of the philosophy and commitment to quality which exists at the J. Herbert Stone Nursery. We feel that our methods and results are top notch and the growth and survival of our seedlings bear this out. Yet we will not stagnate with our procedures and as new, more efficient, more scientific approaches become available we will alter our methods to comply with these, but not at the sacrifice of quality.