SEED CONE PROCESSING AT THE BEND PINE NURSERY

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The Bend Pine Nursery is located on the eastern foothills of the Cascade Mountains, near 3,500 foot elevation. Weather during much of the cone processing season is typically hot and dry. Seed cone flaring is done in improvised storage and unique driers. The seed extractory uses typical seed processing equipment and procedures. In the four seasons that the extractory has been in operation, seed processing costs have been lower than previous regional averages.

1. CONE FLARING

Ranger districts package cones in half-filled burlap bags and provide all the necessary after-ripening. Cones are scheduled for delivery to the extractory to provide adequate cone flaring time and adequate cone volume for the extractory to operate without interruption.

Delivered cones are stored in two, 100-foot long, plastic-covered, bed houses. Bed houses are unheated and extensively ventilated to the outside air. During September and October sunny weather, bed house temperatures typically range from 90100°F and from 25-30% relative humidity. At night temperatures typically range from 40-60°F and from 35-40% relative humidity. At night, uncontrolled higher humidities and lower temperatures significantly reduce the drying rate.

Cone lots are removed from bed house storage after they have lost approximately 70% of their moisture, usually this takes from one to two weeks. Next cones are removed from their sacks and placed in screened trays that hold about a bushel of cones each. Seven trays are placed on framed pallets. Loaded pallets are then stacked by fork lift in tiers of 3 high, for a total of about 100 pallets per drier. Two nursery tree coolers are used as flaring driers. Air temperature is raised to either 80 or 95°F, depending on the species being dried, by using the combination of warm outside air; eight one horsepower fans circulating air in the drier; and one dehumidifier, with a capacity of 500 lbs. of water per day, for each drier. Both high and low temperature and high and low humidity controls are set to the desired range. Thereafter, drying conditions are primarily regulated automatically by the cooler machinery. Cones are typically flared in a drier in two to four days depending on species. One cone drier holds between 350 to 400 bushels and normally supplies the extractory with cones for two to three work

days. Use of these tree coolers as cone driers extends the usable season of these expensive buildings by three to four months.

A minimum of seven people is needed per eight hour shift in bed houses, to receive cone deliveries, store cones, tray cones, stack pallets in the driers, clean cone trays, and to maintain records. On peak years a night watchman is sometimes employed for security reasons as well as to monitor and shut down equipment and provide cleaning and maintenance work.

Quality control is monitored by a skilled person, independent from production, who spot checks procedures, records, and machinery settings. This person recommends immediate corrective action for any observed problems and reports directly to the extractory supervisor those problems found.

2. SEED PROCESSING

The primary seed extractory equipment consists of:

2 modified corn tumblers
1 scalper
1 mortar mixer used as wet dewinger
2 MEDC dry dewingers
2 M2B air screen cleaners
1 small gravity table
1 pneumatic separator
small seed lot processing machines

Twelve people are needed in the extractory for optimum efficiency to process seed. The crew typically works only eight hours per day and can process from 150-250 bushels per shift, depending on the size of the seed lots, amount of debris in the seed, and quality and species of cone lot.

After processing, seeds are dried using screened trays in a "hot room" at either an 80^0 or 95^0F temperature and 25-35% relative humidity. Temperature, humidity, and seed dryness are monitored hourly and controlled manually. Once dried, seeds are sampled for various laboratory tests. Then, the seeds are weighed and packaged in 7 mil. plastic-lined , canvas bags for freezer storage.

Quality control is monitored during seed processing by one experienced person, independent from production, who spot checks records, equipment settings, as well as visually and x-ray examining of seeds. Also, each seed lot that is completed is x-rayed and checked by both the extractory Work Leader and the quality control person to assure that seeds meet processing standards. Any errors discovered are immediately recommended for correction.

3. SPECIAL PROCESSES PROCEDURES

A. Cone Delivery:

Occasionally, delivered cones fail to have all required records and data and must be rejected until the discrepancy can be corrected. The most common problems are: lack of certification, incorrect sack labeling, and incorrect sack count, most of which are easily corrected.

B. Serotinous Cones:

Some forests have serotinous lodgepole pine cones. Lodgepole pine cones are first flared by the standard method. Seed lots showing a high percentage of serotinous cones are then separated and processed over a scalper having a modified screen to separate the serotinous cones from the flared cones. The segregated, serotinous cones are then fully closed by a cold water flushing followed by plunging them into boiling water for 30 seconds. Next they are drip-dried in trays for two to four hours, then re-flared in driers. This hot water dip method has increased lodgepole pine seed yields by about 25%.

C. Seed Drying:

On one occasion local weather was so low in humidity that seed was dried adequately during processing. Now, during hot dry weather conditions, all seed must be monitored frequently to avoid excess drying. Seeds below recommended moisture content are subjected to high humidities until they are within recommended moisture range.

D. Cone Flaring Driers:

Experience with the cone flaring driers has shown certain precautions are needed. Pallets must be stacked two feet between tiers to optimize air flow and minimize drying time. Wet cones cannot be loaded in with flared dry cones or the flared cones will close. Sacked cones require twice as long to flare because burlap sacks significantly impede air flow. Cones can be flared about twice as fast using drying trays. Cones commonly get tightly locked together in flaring trays and must be agitated by hand to prevent cone scales from case hardening and not flaring fully.

This "batch system" of cone flaring requires careful attention to assure that only fully flared cone lots are sent to the extractory. Sometimes parts of a lot must be returned from the extractory for cold water treatment and reflaring to maximize seed recovery.

Frequently wet cones can load a drier with more humidity in the air than the dehumidifiers can handle. This humid air can be purged quickly by opening cooler doors for one half to two hours, thereby expediting cone flaring operations.

E. Seed Accountability:

From sad experience, we have discovered the necessity of keeping work station log books for each seed lot received. At each work station, the work leader records the date of processing, the number of containers and seed lot number. Sometimes, all or part of a lot becomes misplaced or a lot must be located for some administrative reason. Work station log books help locate where the lot is in the extractory.

We must count cone tags at each processing to verify the completeness of a seed lot. So far, the above procedures have helped prevent both seed misplacement and accounting errors during processing.

4. EXTRACTORY MODERNIZATION

This year the seed extractory facilities are being expanded and modernized. The two bed houses are to be replaced by one large, mechanized, solar cone storage building. Roof fans are to be added to the cone driers to automatically exhaust excessive moist air. The extractory building is being expanded and upgraded; and a larger seed storage freezer is being constructed. Once modernization is completed, the extractory will be capable of processing all species and greater volumes of cones.

REFERENCES

THEISEN, Peter A., 1979, Report on Tree Seed Extractory and Storage Needs in Region 6; Region 6 2470 Memorandum dtd, June 25, 1979.