SMALL SEEDLOT EXTRACTORY
DORENA TREE IMPROVEMENT CENTER

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In June, 1980, construction was completed on a new seed plant at Dorena Tree Improvement Center. The main function of the building is to extract, process, and store all tree improvement seed for Region 6. The new building is 60'x 140' with 8400 square feet of floor space, and it was built at a cost of approximately $520,000.

The major advantages that this building has over our previous facility is that we have more space for seed processing and cone storage. Operations that have previously been compressed in small spaces or divided into different buildings are now integrated into one building and arranged to provide an efficient flow of work. Dust and debris are removed from the processing area, and they are not allowed to build up and cause health, fire, and explosion hazards.

Since many of you have visited many extractories and are already familiar with extractory equipment, I shall not go into exhaustive descriptions of how extractory machinery operates. Rather, I shall concentrate on unique aspects of our operation which may be of interest to you.

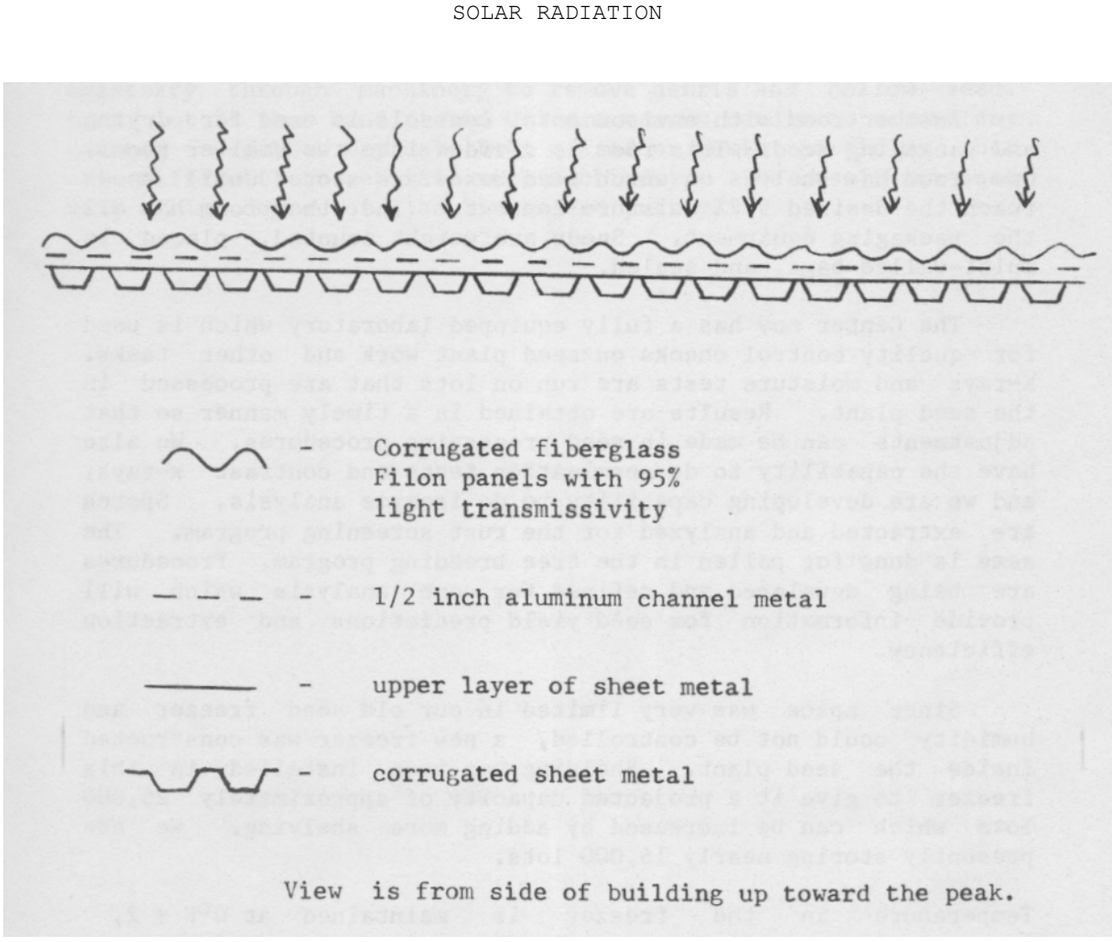
The major difference between our extractory at Dorena and a standard extractory is the size of lots that we extract. Since our goal is to obtain only 3500 seeds for tree improvement use, the size of lots that we extract is usually quite small. Whereas most extractories measure cones and seeds in bushels and pounds respectively, our seed lots can be measured in ounces and an individual seed count is kept on each lot. Rarely do we have to process more than one quarter bushel per lot.

Perhaps the most unique feature of our building is the solar roof. This roof has been designed to utilize the entire roof as a collector, and the roof functions like a large greenhouse. Visible and ultraviolet light are transmitted through Filon R panels and are intercepted by highly absorptive paint on a sheet metal surface immediately beneath the fiberglass panels. Infrared radiation is then conducted downward through sheet metal and warms air between the upper layer of sheet metal and a lower layer of corregated sheet metal. Figure 1 depicts this configuration as seen from the side of the building looking upwards towards the peak of the roof. The heated air then moves upward and is collected in a plenum at the peak of the roof and is then sucked downward and distributed throughout the building by an elaborate ducting system. An electric hot water boiler

provides heat when the solar roof is not providing a sufficient amount.

Half of the building provides inside storage for up to 5,000 lots in a semicontrolled environment. If we receive more lots, other storage facilities will have to be obtained. 75°F and 40% R.H. with good air circulation are the average conditions maintained during cone storage.

Figure 1. Seed Plant Roof



A special room has been designed into the building for flaring cones that do not flare in the large cone storage room. After resoaking, difficult lots are placed on racks in this room which has a complete set of environmental controls. Conditions can be created to flare even the most difficult lot. 85°F and 25% R.H. are usually maintained in this room although other combinations are easily attainable.

The seed processing room contains cone tumblers, seed clippers, Silen blowers, and hand-picking tables. This equipment is similar to that used in large lot extractories except that it is usually much smaller. A vacuum system has been designed into this room to remove cone dust from processing. Dust produced by the tumblers and clippers is immediately sucked outside where it is deposited in a baghouse. This minimizes the health hazard to employees of inhalation of cone dust plus it controls the fire and explosion hazard. All electrical equipment in the processing area is sealed to prevent an electrical arc from setting off an explosion. Empty cones are ground into dust in a hammermill and hauled away in a dump-bed pickup.

Another room with environmental controls is used for drying and packaging seed. This room is divided into two smaller rooms. One room has shelves on which seed boxes are stored until seeds reach the desired 5-7% moisture content. The other room has all the packaging equipment. Seeds are weight counted, placed in multi-walled bags, and sealed.

The Center now has a fully equipped laboratory which is used for quality control checks on seed plant work and other tasks. X-rays and moisture tests are run on lots that are processed in the seed plant. Results are obtained in a timely manner so that adjustments can be made in seed processing procedures. We also have the capability to do germination tests and contrast x-rays, and we are developing capability to do isozyme analysis. Spores are extracted and analyzed for the rust screening program. The same is done for pollen in the tree breeding program. Procedures are being developed and refined for cone analysis which will provide information for seed yield predictions and extraction efficiency.

Since space was very limited in our old seed freezer and humidity could not be controlled, a new freezer was constructed inside the seed plant. Shelving has been installed in this freezer to give it a projected capacity of approximately 25,000 lots which can he increased by adding more shelving. We are presently storing nearly 16,000 lots.

Temperature in the freezer is maintained at 0°F ± 2, but relative humidity presently fluctuates between 40 and 60 percent. Due to some design and contractual problems, we did not obtain optimum control of humidity. The Una-Dyn Company is presently working with us to adapt their AM-15 dehumidifier to our special environmental requirements on an experimental basis. We are ultimately hoping to control humidity at 25% R.H.

To provide longer storage longevity we have adopted a new packaging system which has been in use at the National Seed Lab in Fort Collins, Colorado. The key feature of this packaging system is the multi-walled bag which is made of four materials, bonded together; an inside layer of polyethylene film, 15 mil. thick; a second layer of aluminum foil, 30 mil. thick; a third layer of 7 mil. polyethylene film; and an other layer of Kraft paper, 25 mil. thick. Each bag is sealed in a special heat sealer. This packaging system is a vast improvement over our former system of packaging in single-walled polyethylene film. After sealing the new bag is basically as air tight as a tin can and should be capable of storing seed for ten years or longer. It is quite easy to remove seed from the new package and reseal it. Perhaps the biggest drawback is that the new packages are more fragile and care must be taken not to tear a hole in them.

A key difference between our extractory and a large-lot extractory is the attention directed to individual lots and sometimes even to individual seeds. Lots are run repeatedly as necessary through machinery to remove debris and hollow seed. Each lot is then hand picked using a vacuum needle to remove any damaged seed that may have been missed or resin particles that are difficult to separate with machinery. The result is seed with a high degree of cleanliness and purity.