

NORTHEASTERN AREA NURSERYMENS WORKSHOP

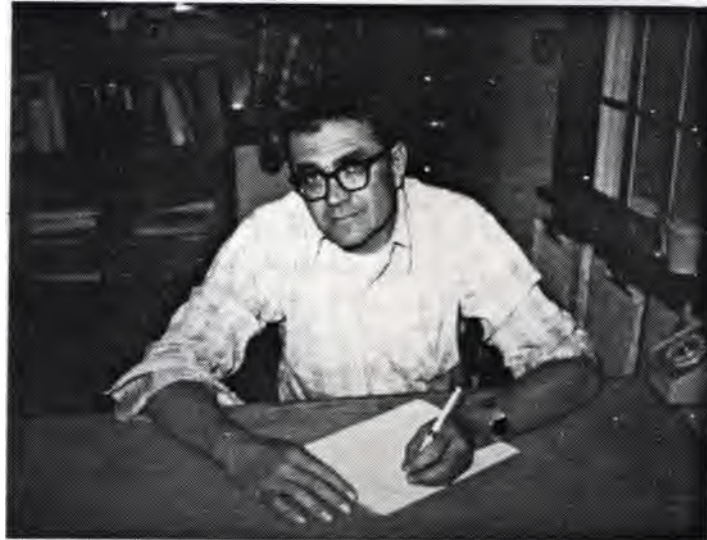
PROGRAM FOR NURSERY TOUR

AUGUST 20, 1987

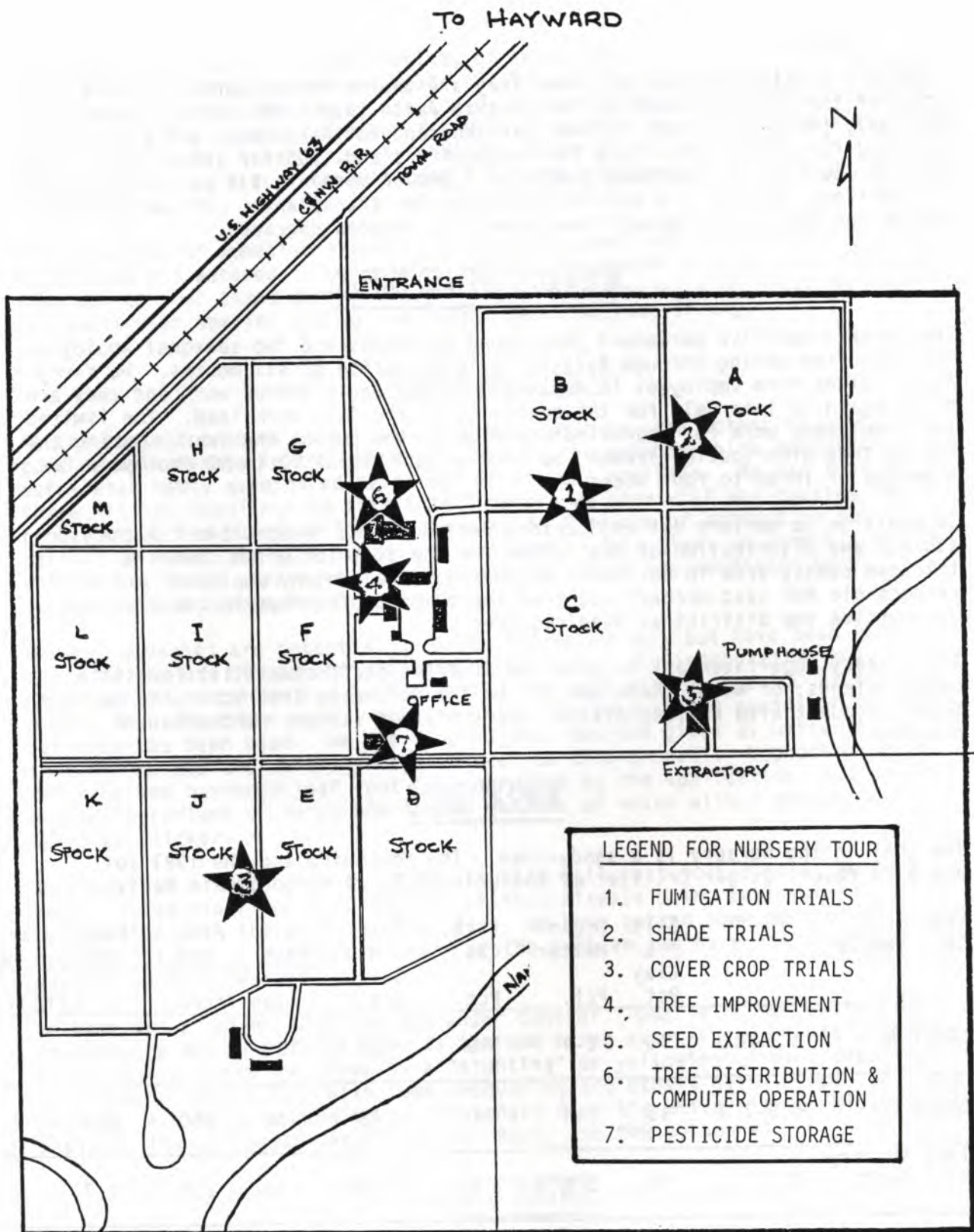
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1. FUMIGATION TRAILS (Scott Enebak, University of Minnesota)
2. SHADE TRAILS (Marge Palmer, USFS)
3. COVER CROP TRAILS (Marge Palmer, USFS)
4. STATE TREE IMPROVEMENT PROGRAM (Trent Marty, Wis. DNR)
5. TOUR OF SEED EXTRACTION FACILITY (Nursery Personnel)
6. TOUR OF NEW EMPLOYEE CENTER AND TREE DISTRIBUTION FACILITY (Nursery Personnel)
7. BON-VOYAGE

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John Borkenhagen, Superintendent



HAYWARD STATE NURSERY

Trees are usually shipped out when they are two or three years old. The price of the trees is based on the cost to raise them. The costs of the trees for 1987, for graded stock is \$180 per thousand for hardwoods, \$65 per thousand for 2-0 conifers, \$88 for 3-0 conifers and \$205 for transplants. The cost for bulk stock (ungraded orders of 3,000 or more) is \$34 per thousand for 2-0 conifers, \$50 for 3-0 conifers and \$146 for transplants. Approximately 95% of the stock distributed from Hayward is shipped ungraded.

NURSERY STAFF AND DUTIES

The nursery has five permanent year-round employees and two seasonal employees who work from spring through fall for a total period of six months. We carry five limited term employees in May and June for early summer work and they are hired again in late July for the beginning of the fall work load. The limited term employees work for approximately five months during the year. During the spring tree distribution season, we hire an additional 70 to 80 employees for a period of three to four weeks.

In addition to nursery duties, nursery personnel are responsible for the storage and distribution of pesticides for the district which covers a thirteen county area in northwest Wisconsin. The nursery employees are also responsible for seed orchard and tree improvement plantings in the district and outside the district as need requires.

The nursery superintendent is also the district staff specialist for state owned islands, of which there are 333 in the Northwest District. The Nursery Superintendent also advised district personnel on various reforestation programs.

NURSERY SOILS

The soil in the nursery is a sandy-loam. The following are the 1987 soil analysis result as per Dr. Iyer of the University of Wisconsin in Madison.

Year of Soil Sample	PH	Silt & Clay Pct.	Organ. Matter Pct.	Exch. Cap. Pct.	Total N Pct.	Avail.	Avail.	Exch.	Exch.
						P205	K20	CA	Mg
						Lbs./Acre		Me/100g	
GRADE B	5.5-6.5	10	2-4	5.0	.09	120	150	2.0	0.7
GRADE C	5.8-7.3	15	2-4	7.0	.12	150	250	4.0	1.2
1987 Nursery Soil Tests	5.5	15	2.8	5.8	.108	212	299	2.7	0.9

Soil amendments to open areas consists of sedge peat for organic matter, dolomitic limestone, ammonium nitrate (33.5-0-0), sulfate of potash (0-0-50), and 0-10-30. These amendments are added in quantities capable of maintaining a soil fertility level of between B and C as recommended in the book "Soil and Plant Analysis for Tree Culture" by Wilde, Corey, Iyer and Voight. A cover crop of silver hull buckwheat is used for summer fallow and winter rye for winter fallow.

A combination of ammonium nitrate, sulfate of potash and 16-20-0 is used in solid form and watered in on growing stock. The number of applications vary from one to four times during the growing season depending on requirements of the particular species and soil nutrient deficiencies, if any.

Insects and Disease

At the present time we only have one insect that has the potential of causing considerable damage in the nursery. This is the cutworm which decapitates or defoliates newly germinated seedlings of all our conifers. We had lost up to three million seedlings to this insect before we knew what was causing the problem. We use Diazinon 50% at the rate of 4 quarts of product in 100 gallons of water per acre to control cutworms. This gives us complete control with two or three sprays at 5-7 day intervals after the seedlings have germinated and damage is noticed.

Several diseases are potential problems in the nursery but have been held in check by the use of appropriate control measures. *Cylindrocladium* and damping-off are controlled by fumigating the soil with Mylone 50D at 400 pounds of product per acre. More recently, Basimid at 250 pounds of product per acre has been used. We are finding that Basimid gives us better control than Mylone 50D and we are switching over to this product. *Lophodermium* in red pine and hardwood leaf spot is controlled by the application of 2 pounds active ingredient of Maneb 80W in 100 gallons of water with 3 ounces of spreader-sticker.

We also have a minor problem with jack pine gall rust (oak-pine). We have been running experiments on control of this disease using Bayleton in conjunction with the US Forest Service. We have gotten some control with this product but due to the minor nature of the problem, we have not initiated massive control measures.

We have two problems that are not under control. One is in our white pine that may be a root-rot the same as the one being experienced at Wisconsin's Wilson Nursery and the other is a "stunting" or yellowing of pine seedlings in late June or early July with some recovering and others dying. Both of these problems are being worked on by researchers from the University of Wisconsin at Madison, the US Forest Service in St. Paul, and DNR personnel.

WEED CONTROL

Mylone 50D or Basimid is used as a soil sterilant in early August for the control of soil-borne pathogens. These two fumigants also have properties that give us considerable weed control in the early part of the growing season.

Dacthal 75W is applied to all new seedbeds except for the Hybrid Aspen. We apply these pesticide at the rate of 8 pound of active ingredient per acre in 50 gallons of water immediately after the beds are seeded. We also use Dacthal 75W for control of weeds in our older hardwoods at the same rate. We apply the Dacthal to our established hardwoods in early to mid September. Hand weeding is used exclusively throughout the summer in the actively growing hardwoods. We also use the Dacthal-hand weeding technique to control weeds in conifers such as larch and cedar which have a low tolerance for many herbicides.

Goal 1.6E is used on all conifer stock after they have been emerged for 6-7 weeks, except for those species mentioned previously. One application of Goal is applied in mid to late June at the rate of 1.25 quarts per acre of product in 100 gallons of water. In years of extreme weed growth, another application may be applied in late July or early August. In normal years this application is not needed. We routinely apply another spray of Goal in mid September to all tolerant stock. This is applied at the 1.25 quart per acre rate.

All walkways and pipelines are cultivated by tractor four or five times throughout the summer. The roadsides and larger open areas are roto-tilled. Hand weeding is used periodically to control weeds that came through the herbicide applications and mechanical control measures.

IRRIGATION

Water for stock irrigation is pumped from the Namekagon River. Two centrifugal 30 HP pumps are used to supply approximately 1,000 gallons per minute at the pump location. A total of 14 lines can be operated with a length of 500 feet. This is a total area of approximately 4 acres. In a two hour period, one-half inch of water can be put on this area. This irrigation system was converted from an oscillating type to a Rainbird system about 7 years ago.

CONIFER SEED EXTRACTION

The Hayward Nursery is the only Wisconsin state nursery with a conifer seed extraction and storage facility.

The kiln is a forced-air type capable of processing 20 to 25 bushels in an eight hour shift. The kiln was designed by engineering and forestry people working for the Department. The original plan was to install two kilns; however, due to the termination of the soil bank program and a cut in production, the second kiln was never built. In recent years, with increased production, rather than install a second kiln, we have elected to run the one kiln on a 24 hour, seven day week basis. This gives us a processing capacity of over 500 bushels per week and we do not anticipate we will ever need to increase it by installing the second kiln.

We have two Crippen seed cleaning machines; a dewinger Model EP-26 and a fanning mill Model A-334. Due to the possibility of seed injury, we very seldom, if ever, use the dewinger anymore. Some years ago we experienced a

delay germination problem in red pine which was traced to the dewinger. After that occurred, we switched to the time-proven method of wetting the seed and drying it to separate the wings. It is a very satisfactory method and no injury can occur to the seed. Some species, such as eastern white pine, can be dewinged by simply running the seedlot through the fanning mill.

The seed cone extraction and seed cleaning operation is done using one person per shift. To our knowledge, this is one of the more efficient extraction operations.

The spent cones that come out of the kiln are sold to wreath and specialty product manufacturers throughout the United States. We solicit bids for the spent cones with a minimum of \$2.00 per bushel. In recent years we have been able to sell all of our cones except the eastern white pine.

COMPUTER USE

An IBM PC-XT is used to process tree orders at the nursery. Information is transferred from our Griffith Nursery in March of each year. The Griffith Nursery processes all orders up to this time; thereafter all three nurseries process the orders and they are entered into the master computer file at Griffith. This can be done because each nursery is working against their own inventory at this time rather than the state-wide inventory.

Tree orders, daily shipping schedules, shipping labels, address labels, etc. are all printed by the computer. This used to be a very labor intense endeavor which has been made relatively fast and simple when done by the computer.

The computer has also been used to build and maintain files for all state owned islands in the Northwest District, the state tree seed inventory, and the Northwest District pesticide inventory, to name a few.

TOUR STOPS AND PRESENTATIONS
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I. TREE DISTRIBUTION AND EMPLOYEE FACILITY

This building was constructed in 1986 at a cost of approximately \$500,000. The building was designed by nursery personnel with final plans completed by an architect.

The environmental room (cooler) was designed for overwinter storage to stock, storage of cones, as well as storage of stock in the spring. The room is designed so it can be held at 24° to 28° F. and also 34° to 38° F. The compressors can also be deactivated so the evaporator fans can be run to eliminate humidity to help dry cones during storage. There is a misting system so constant humidity can be maintained and a fire sprinkler system was installed to meet state safety codes. This was necessary due to the styrofoam used for insulation.

2. SEED EXTRACTORY

See Conifer Seed Extraction for summary in previous section.

3. TREE IMPROVEMENT

The reasons why Wisconsin is involved in tree improvement will be discussed, including the major goals and economics of tree improvement in the state. A brief overview of the main species involved in the tree improvement program including southern Appalachian white pine, white spruce "super seedlings," southern Ontario white spruce, jack pine breeding populations, red pine seed orchards and the black walnut program.

4. EFFECTS OF SHADE AND MULCH ON "STUNTING" OF WHITE SPRUCE

Stunting of white spruce is a common problem in several Lake States nurseries. Stunted seedlings are characterized by purple discoloration of foliage, low foliage phosphorous content, early cessation of growth in the first growing season, and have few ectomycorrhizal roots. In May 1986, an experiment was established to determine the effects of shade and mulch on stunting. Shade cloth (50%) attached to wire screens and/or sawdust mulch were applied to emerging white spruce growing in fumigated or non-fumigated soil. In September, incidence of stunting and characteristics of seedlings (e.g. nutrient content, percent mycorrhizal colonization, shoot and root weight) in each treatment were determined. Preliminary results will be discussed.

5. EFFECT OF COVER CROPS AND FUMIGATION ON "STUNTING" OF SUGAR MAPLE AND WHITE CEDAR.

Stunting of hosts of vesicular-arbuscular mycorrhizae is a serious problem in Lake States nurseries. Stunted seedlings are characterized by premature bud set and leaf abscission, low foliage phosphorous content, small size, and have few mycorrhizal roots. An experiment was established

in 1985 to determine the effects of cover crops and fumigation on stunting of sugar maple and white cedar. In June, 10 ft. x 4 ft. plots were sown with buckwheat, sorghum-sudangrass or left fallow. In August, half of the plots were fumigated. The experimental area was then seeded with sugar maple and white cedar. During 1986, stand density, incidence of stunting and seedling characteristics were evaluated. Preliminary results will be discussed.

6. THE TREATMENT OF SOIL BORNE PATHOGENS AND ITS EFFECTS ON SEEDLING SIZE AND NUMBERS

The discussion will include soil-borne plant pathogen populations both prior to and subsequent to fumigation. Seedling mortality from pre-and post-emergence damping-off. Decline of seedling density over the growing season and seedling weights and lengths as they correlate to treatments.

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Computer Operations



Computer Operations



Forbo Mechanical Weeder Demonstration



Forbo Mechanical Weeder Demonstration



Fumigation Trials



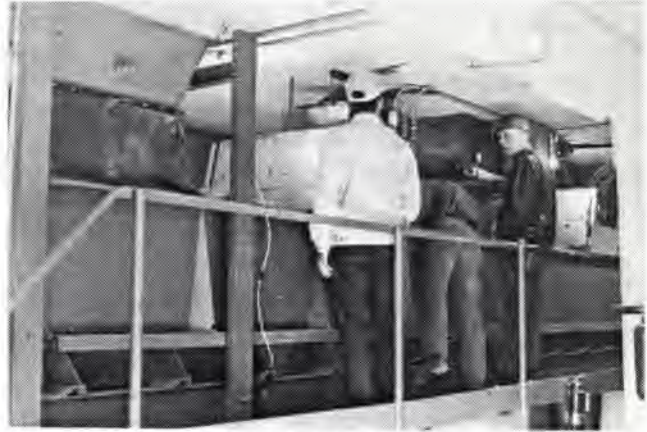
White Spruce Shade Trials

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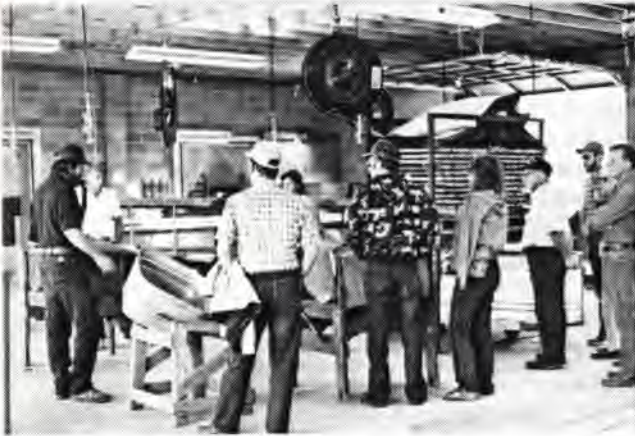
August 20, 1987



Love Seeder



Seed Extraction



Tree Packing Area



Forbo Tree Lifter Demonstration



Red Pine Seed Orchard



Successful Red Oak Grafts
for future seed orchards.