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© 3. Production of conifer bareroot seedlings using controlled release fertilizer.
Vande Hey, J. M. Native Plants Journal 8(3):288-293. 2007.

ABSTRACT

We grow a variety of 2+0 bareroot conifer species with controlled release fertilizer (CRF), supplemented with conventional fertilizers, because the seedlings grow well, the process is cost effective, and less nitrogen needs to be applied, which reduces the potential for environmental contamination because of leaching. Incorporating CRF in autumn before autumn sowing helps retain the fertilizer prills in the seedbeds during the first growing season and makes a steady supply of fertilizer available even when wet spring soils prevent conventional fertilizer applications.

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KEY WORDS

bareroot production, *Larix laricina*, *Picea glauca*, *Picea mariana*, *Pinus banksiana*, *Pinus resinosa*, *Pinus strobus*, *Thuja occidentalis*

NOMENCLATURE

USDA NRCS (2006)

Figure 1. A Gandy® drop spreader is an effective machine for applying controlled release fertilizer. At Wilson State Nursery we found Diffusion® fertilizer flowed well through this piece of equipment. Photo by Joseph M Vande Hey

PRODUCTION OF

CONIFER BAREROOT SEEDLINGS

USING CONTROLLED RELEASE FERTILIZER

| Joseph M Vande Hey

The Wisconsin Department of Natural Resources, Wilson State Nursery, is located along the Wisconsin River in southwestern Wisconsin and has been producing seedlings since 1952. Historically, we divided our conifer (Pinaceae) crops into 2 groups depending on their growth characteristics, and each was fertilized accordingly. One group included eastern white pine (Pinus strobus L.), white spruce (Picea glauca (Moench) Voss), black spruce (Picea mariana (P. Mill.) B.S.P.), and eastern whitecedar (Thuja occidentalis L.). During the 1+0 year, these species received calcium nitrate (15N:0P2O5:0K2O:17Ca) every 7 to 10 d at 112 kg/ha (100 lb/ac) per application between mid-May and the end of July (about 8 applications). In addition, we applied di-ammonium phosphate (DAP; 18N:46P2O5:0K2O) at 112 kg/ha (100 lb/ac) twice, once in late May and again in late June. Total nitrogen (N) applied during the first year was approximately 179 kg/ha (160 lb/ac). During the 2+0 season, we again applied calcium nitrate every 7 to 10 d at 112 kg/ha (100 lb/ac) per application between mid-May and the end of July (about 8 applications; 179 kg N/ha [160 lb N/ac] total). Therefore, total N applied to produce these 2+0 seedlings was about 358 kg N/ha (320 lb N/ac).

The second group of conifers included red pine (Pinus resinosa Ait.), jack pine (Pinus banksiana Lamb.), and eastern tamarack (Larix laricina (Du Roi) K. Koch). During the 1+0 season, these species received ammonium sulfate ($21N:0P_2O_5:0K_2O$:24S) every 7 to 10 d at 112 kg/ha (100 lb/ac) between mid-May and the end of July (about 8 applications). Total N applied during the first year was approximately 188 kg N/ha (168 lb N/ac). During the 2+0 season, we applied ammonium sulfate every 7 to 10 d at 112 kg/ha (100 lb/ac) between mid-May and the end of July, ensuring we made 10 applications (235 kg N/ha [210 lb/ac]). Therefore, total N applied to produce these 2+0 seedlings was about 423 kg N/ha (378 lb/ac).

In 2000, the Wilson State Nursery cooperated with Dr Jaya Iyer and Jaslyn Dobrahner of the University of Wisconsin, Madison, Soil Science Department, to research and develop a controlled release fertilizer (CRF) regime for the nursery. Our goals were to maintain seedling quality, reduce nitrogen leachate, reduce cost (including labor), and minimize tractor compaction in our fields. Eastern white pine was grown using only a polymer-coated controlled release fertilizer, Polyon® ($19N:6P_2O_5:12K_2O$; 5 to 6 mo release rate; Pursell Technologies Inc, Sylacauga, Alabama), as the source of N as compared with Wilson State Nursery's conventional regime described above. We found very little difference between fertilizer regimes with regard to seedling morphology or seedling nutrient concentrations. Therefore, in 2002, we began using polymer-coated controlled release fertilizers operationally, and we were quickly confronted with some challenges.

CHALLENGES OF USING CRF

The first challenge of using CRF was that the polymer coating became somewhat sticky in the Gandy® drop spreader (Gandy Company Owatonna, Minnesota), which made it difficult to apply at a uniform rate (Figure 1). We had to clean the spreader every couple of bags to remove fertilizer buildup. Second, CRF had a tendency to float off the seedling beds during heavy rains (Figure 2). Third, using the 5 to 6 mo release rate CRF, 2+0 seedlings appeared lighter green during needle elongation in spring and again in late summer even though foliar nutrient analyses failed to show a deficiency; this was most pronounced during 2002 when we experienced a cool spring.