Seeding Beneficial Groundcovers

By Bryan Davis, IPM Technician

A desirable year round groundcover provides many benefits to Christmas tree growers and helps protect water quality of mountain streams and rivers. Benefits of groundcover include keeping valuable topsoil in place, cooler soil temperatures, suppression of problem weeds, providing homes to beneficial insects and some species may even help provide nitrogen to trees. In the Spring of 2002 we began seeding small demonstration plots with twelve species of groundcover. By the summer of 2004 we began to see that a couple of species were standing out from the others in our demonstrations. We also seeded a plot in the fall of 2004 to compare spring versus fall seeding success. It has became clear that by seeding onto cleared land or to supplement an existing groundcover that growers can establish a beneficial groundcover that fits into a good overall IPM program.

Introduction: For many years numerous Christmas tree growers managed groundcovers by total elimination with herbicide. This type of management leads to soil erosion, increased soil temperatures, muddy fields during harvest and numerous complaints from local citizens. Thankfully, most growers are working away from bare ground farming thanks to development of safe and effective suppression herbicide rates. These rates let some species thrive while stopping nuisance weeds from growing. The seeding of desirable groundcovers allows growers to more quickly establish a year round groundcover. Several growers currently are using this practice and more are planning to seed fields in the future. The species evaluated were:

- Dutch white clover seeded at 10 lbs/acre (20-25lbs/acre heavy rate)
- mammoth red clover at 8-15 lbs/acre (12-20 lbs/acre heavy rate)
- birdsfoot trefoil at 10 lbs/acre (20-25lbs/acre heavy rate)
- hard fescue at 30 lbs/acre (50-70 lbs/acre heavy rate)
- creeping red fescue at 20 lbs/acre (30-40 lbs/acre heavy rate)
- small burnette at 20 lbs/acre (30-40 lbs/acre heavy rate)
- yarrow at 1 lb/acre (2 lbs/acre heavy rate)
- creeping bentgrass at 40 lbs/acre (60 lbs/acre heavy rate)
- highland bentgrass at 25-40 lbs/acre (40-60 lbs/acre heavy rate)
- lancelot plantain at 20 lbs/acre (30-40 lbs/acre heavey rate)
- tonic plantain
- spring oats at 120 lbs/acre (150-180 lbs/acre heavy rate)
- barley at 100 lbs/acre (125-150 lbs/acre heavy rate)
- winter wheat at 120 lbs/acre (150-180 lbs/acre heavy rate)
- Korean Lespedeza at 25 lbs/acre (40-60 lbs/acre heavy rate)

These species were evaluated to determine which ones could be most beneficial to Christmas tree growers relating to cost, germination success, Round-up tolerance, longevity and non-competitiveness with trees.

How Study Was Conducted: Beginning in the spring of 2002 four small demonstration sites were seeded. Each site was disked with a small disk before seeding and rolled after seeding to ensure seed to soil contact. Each species was seeded at recommended per acre rates. Adequate rainfall gave good germination at each site, but a summer drought stressed the plots until fall rains came. This gave us an idea of how well each species tolerated drought conditions after germination.

In the spring of 2003 five more plots were established. The same preparation was performed on these sites that had been done on previous sites. The rates were altered slightly to see if heavier seeding rates made any difference in how quickly each species was established. A much wetter spring and summer led to great germination and establishment at all sites. One problem we were dealing with was how to manage germination of summer annuals and other competitive weeds without damaging the seeded groundcover. Mowing was used as a means of control during the first year of establishment.

Four more plots were seeded in the spring of 2004, but instead of using small plots we looked at seeding several acres on two of these sites. The purpose of this was to determine the amount of labor required to seed larger plots by hand and to evaluate germination success with little or no prep work to the ground before seeding. At one site a tractor and disk was used to disk half of each plot before seeding. The second large site was cleared timber land with the stumps remaining. At this site, hand raking was done to half of each plot before seeding. At both sites germination was quicker in the plots that received tillage before seeding, but a few weeks later we had good germination over most all of the plots. The problem of competitive weed germination still needed to be addressed, so at one site a herbicide application was made approximately 2 months after seeding. Some of the groundcover was damaged by this application, but not as much damage as expected. The third larger site was seeded in September to look at fall versus spring seeding success. One different treatment was used here that previously had not been explored. A killing rate of Round-Up was used on part of the plot to eliminate any completion before seeding. This

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site also had pre-seeding tillage and no tillage at all. Good rainfall and extended warm weather enabled this plot to do very well, except for heavy germination of competitive weeds in the unsprayed areas.

Results and Discussion: After three growing seasons to evaluate performance of our plots, some key observations can be made. First, a nurse crop of oats, wheat, rye or barley can help prevent a lot of germination of problem weeds. Second, tillage leads to quicker germination but is not essential to provide good germination. Third, a fall seeding can provide excellent results, especially when combined with a pre-seeding herbicide application. Fourth, a light herbicide application can be made after seeding to suppress undesired weed growth. Lastly, after three seasons of observation we feel that dutch white clover is the overall best performer of all the species being evaluated. Birdsfoot trefoil also is an excellent choice but will climb into lower branches of trees if not suppressed. Both of these species work very well with chemical mowing rates and once established they help prevent germination of problem weeds. Another potential benefit of these species is the potential amount of nitrogen they can provide. We will be setting up studies beginning in 2005 to try and learn what amounts of nitrogen are provided to Christmas trees by these groundcovers. Yarrow can be mixed in with clover or trefoil at seeding to help with attracting beneficial insects and yarrow also responds well to chemical mowing. Hard fescue could also be used for seeding groundcover but can be competitive with trees if not kept killed around the tree. Creeping red fescue makes a good groundcover but is very aggressive and can engulf small trees if not managed properly. If one selects a grass the hard fescue does not get as large or spreads as rapidly.

In 2005 we will begin looking at ways other than hand seeding to seed large acreage, continue to look at seeding rates for the best species, look more into spring versus fall seeding, look more at pre-seeding herbicide applications to eliminate competition and begin to look into the amount of nitrogen provided by legumes.

Extension Agent Jim Hamilton Accepts New Position

Christmas tree Extension Agent, Jim Hamilton has accepted a job with Alabama A&M University in Huntsville and will be leaving Extension in March. Jim finished his doctorate in Forestry from NC State in July 2004, and will be teaching forestry and working with extension and outreach with minority landowners in Alabama in his new position.

Jim moved to Boone in 2002 to work with Extension with Watauga County's Christmas tree industry and worked closely with individual growers to make strides in Choose-and-Cut marketing, groundcover management in Fraser fir, and pesticide safety with Hispanic workers in the tree industry. Jim wrote and collaborated on a number of grants through Extension and with individual growers and organizations in the High Country and helped bring in over $125,000 in grant funding to groups and individuals he worked with.

Jim also used his Spanish language skills to initiate some innovative programs with workers in the Christmas tree industry to teach proper pesticide safety and integrated pest management to the industry's predominantly Mexican workers. He also developed educational programs, appeared on several media broadcasts, and wrote several pieces in local newspapers regarding the Hemlock Woolly Adelgid. Jim has been an asset to the community and Extension and will be missed.