AUBURN UNIVERSITY

Southern Forest Nursery Management Cooperative

Newsletter

FALL 2005

DIRECTOR'S REPORT

This has been one heck of a summer for me, both professionally and personally, and when I think back to the accident last April and how far I've come, even I am surprised. Despite my injuries, both real and imagined, and the tragic loss of Bill Carey, the Nursery Cooperative continued with the Contact Meeting in Chattanooga and conducted the Nursery Short Course in Auburn. For those within the Cooperative who helped out with both events, I thank you and appreciate your help in continuing with the research and outreach for the Nursery Coop.

With the shortening of the daylight and the cooler evening temperatures, the task of getting the seedlings out of the nursery and into the field is on everyone's mind. I've heard about excessive rains in some parts of the country and extreme drought in others. There was also Hurricane Katrina which interfered somewhat with the Nursery Short Course but, as we all know, it devastated the coastal communities of Alabama, Mississippi and Louisiana. Nurseries west and east of the Hurricane's track fared well. However, the Waynesboro Nursery lost a couple of equipment sheds and was without power for irrigation purposes. The Plum Creek Nurseries of Shubuta and Pearl River were without power as well. Despite the damage and inconvenience to all, the seedling crops faired well given the circumstances.

Because of the excess rainfall in some areas, I would like to remind Nursery personnel about the effects of lifting seedlings from areas that have had flooding. For more on flooding and lifting, see Research Report 01-14.

New Building Facilities

As if the summer wasn't busy enough, there was the move to the new School of Forestry and Wildlife Sciences Building in mid-August. It wasn't the actual move that made things difficult but the dismantling of the Nursery Cooperative's labs and offices in May for the scheduled June move. The weekly delays in the actual move date meant that items that were boxed up were sometimes needed again, thus requiring a search of boxes for something that you didn't think you were going to need. Nevertheless, we are in the new building and 98% up and running, as a few things aren't working just right. Those Coop members that attended the Nursery Short Course were the first to use the new facilities and they were given a chance to tour the new Nursery Cooperative Laboratories. The Advisory Meeting in November will allow others to view the new building as well.

Membership

As of this writing, the Nursery Cooperative still has 21 members. Despite the closing of the Hauss Nursery in Atmore and the consolidation of Boise Cascade into Forest Capital, I've received no notification

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from either the AFC or Forest Capital to cancel their memberships. I also had a couple of reassurances from International Paper that the possible and pending re-organization of their company will have no effect on seedling production or membership. One of the unintended outcomes of the Critical Use Exemption (CUE) was that in order to use MBr from the CUE in the South, one needed to be a member of the Nursery Cooperative. While there have been a couple of inquiries from non-member companies about joining the Nursery Cooperative, to date none have done so.

The Nursery Cooperative may soon have a new Associate Member: Cellfor, Inc. Cellfor has expressed an interest in joining the Coop beginning FY 2005-2006. Located in Vancouver, BC, CellFor is the world's leading independent supplier of high technology seeds to the global forest industry.

Short Course

Despite Hurricane Katrina, the 2005 Nursery Management Short Course was held in Auburn during the last week of August. There were some speakers and a few nursery personnel who could not make the trip because of the storm's aftermath. Nevertheless, 22 participants braved the blustery winds in Auburn to hear about irrigation, soil/plant/water relationships, insect and disease control, fumigation and sampling procedures. Based on comments from the participants, the course was well received and covered the right topics with the right speakers. We appreciate this kind of feedback and would also like to hear of any ideas or needs you might have for future Short Courses.

Advisory Meeting

The Advisory meeting is scheduled for Wednesday and Thursday, November 2 & 3, 2005, at the School of Forestry and Wildlife Sciences Building on Duncan Drive. One of the nice additions to the new building is a "conference room" that allows us to hold meetings of up to 150 people. This frees us from renting expensive rooms and purchasing expensive coffee. We are currently working on an agenda and are putting together the 2005 Accomplishments and the 2006 Work Plan and Budget. This will be following in a couple of weeks. Reservations for rooms can be made at any number of hotels in the area and a list for you to choose from, as well as directions to the new building and parking permits, will be provided.

Contact Meeting

The 2006 Contact Meeting will be held in conjunction with the Biennial Southern Forest Nurseryman's Conference in Tyler, Texas. Meeting dates for the SFNC meeting are July 10 through July 13, 2006. The Nursery Cooperative meeting will be Monday, July 10th, from 1:00 PM to 5:00 PM. We are currently working on study plans and research plots for the nursery tour with Harry Vanderveer of the Texas Forestry Commission. Please note that the registration for our Contact meeting is done through the Coop and NOT through the SFNC organization. As is the normal practice, we will have an indoor session of Coop Staff presenting their most recent research findings. More details will be forthcoming with the Spring 2006 Newsletter.

Filling Bill Carey's Position

Replacing the position made vacant by the untimely and unfortunate accident has been an awfully slow process at Auburn. After getting approval by the HR Department and advertising for the mandatory six weeks, we officially closed the position on August 1, 2005. This was also the time of the building move and vacations and, through the use of the Internet, David, Ken and I winnowed the 13 applicants down to four possible replacements. After another delay with respect to collecting letters of reference, we were able to schedule three applicants to interview for the position. These interviews will take place the last week in September and the first week of October, 2005. Specific dates and candidates will have been sent to the Advisory Members for their information and participation in the interview process.

New Faces

Hello, everybody! My name is Ana Luiza de Campos Paula (you may call me just Ana), and I am the new SFNMC Visiting Scientist / Research Scholar.

I received my bachelor's degree in Forest Engineering from the Universidade de Sao Paulo in Brazil two years ago and, just before coming to United States, I finished my MBA in Environmental Management. I have worked with urban forestry, silviculture, forest restoration, environmental certification and tree nurseries in both private and state organizations.

I am really excited and proud to be part of the Coop staff now! Living in a different country has been a rich experience for me. The bareroot system of production is new to me since in Brazil we have mostly

container nurseries. It is amazing to know more about another culture, learn another idiom (even though English is a universal language nowadays) and, of course, learn more about tree nurseries.

I really like forest and environment issues and I hope to continue studying and working with them when I return to my country in one year.

Finally, please be patient with me while I am learning this new job. I am trying to do my best.

Thank you,
Ana

Old Faces
Tommy Hill

Scott has asked me if I would write a few words since we are a little short with the absence of Bill's work. It has been especially difficult for me since I worked in the same lab with Bill, having his old office next to mine, but we have to move on. I look forward to working with the new person that Scott will be interviewing and hiring within the next few weeks or months. It will be hard to find someone to fill Bill's shoes.

For those of you who may not know much about me, I have lived my whole life in Lee County, Alabama. I grew up as a farm boy. Debbie, my wife of 34 years, and I live on a farm south of Auburn. Our closest neighbors are none other than David and Mary South and their daughter, Stevie. We have a daughter, Christie, and two grandchildren, Alli (7) and Will (3). They live just seven miles from us, so we can spoil them all the time and then give them back to Mom and Dad.

I somehow finally managed to fit in two Directed Spray Studies for David this summer. As you know, it is hard to put out herbicides that need 12 to 24 hours with no rain when it rained three or four times a day from mid June to late August. We also put in a MSMA study on flathead sedge this summer, and it looks GOOD. We may have to watch applying MSMA just after top pruning; this data will be collected this fall.

I have been blessed to work 14 years in tree improvement and 16 years as a technician with the Nursery Coop in the School of Forestry. I have made a lot of friends with Coop members, as well as students at Auburn.

If you have trouble reaching Scott, David or Ken, feel free to call me at 334.844.4998 or the Coop cell phone at 334.744.1340. My e-mail is hillthe@auburn.edu.

PESTICIDE NEWS

MSMA
David South

Monosodium methanearsonate (MSMA) is an organic arsenical herbicide and has been used to kill conifers in forests for more than 40 years. About 36 years ago, J.P. Fulmer (1969) reported that weekly, directed applications of MSMA (applied using a shielded applicator) controlled nutsedge in an ornamental nursery (*Ilex spp.*). However, there is no published record of it being tested in southern pine seedbeds. We and others assumed that since it was labeled for killing conifers (as an injection treatment), MSMA would likely kill young pine seedlings. Fortunately, a few managers learned that young southern pines were tolerant of broadcast applications of MSMA. They spread the word, and last year we established tests in pine seedbeds.

MSMA has been used in cotton for decades to control annual grasses and sedges. It can be used in noncropland around pipelines and fencerows. Our tests this year indicate that a single application in June (¾ pound active ingredient per acre) can control flathead sedge (*Cyperus compressus*) with no injury to loblolly pine. At some nurseries, this annual sedge is difficult to kill using other herbicides. However, when attempting to control nutsedge, repeated applications are often needed. For example, one study found that 60 days after applying MSMA (2 pounds active ingredient per acre), the number of nutsedge shoots was reduced by 68% for yellow nutsedge and 48% for purple nutsedge (McElroy et al. 2003). Therefore, follow-up applications would be needed to provide greater control.

MSMA has medium to low mobility in sandy soils and might leach 20 inches in a Norfolk sandy loam. It is strongly adsorbed to soil particles, and the reported half-life averages about 6 months in nonirrigated soils. In California, under high irrigation, the half-life was about 55 days. MSMA causes cell membrane destruction and rapid desiccation. Uptake by roots is limited, and the primary pathway into plants is through the foliage.

Tommy Hill established a greenhouse study this summer to see if there was an interaction between top-pruning and MSMA treatment. As it turned out, MSMA treatment did not stunt pine seedlings if intact seedlings were treated. However, MSMA stunted seedlings that had been top-pruned prior to treatment. We plan on conducting more tests with MSMA next year.

24-C Labels for Regeneration Weevils

David South

This is an update on the insecticide Permethrin. Agriliance obtained 24-C labels several years ago for use of Pounce 3.2EC® in forest nurseries in AL, AR, FL, GA, LA, MS, NC, SC, TN, TX and VA. A number of managers have reported that Pounce® is hard to find this year. According to the company, there was an oversupply of Artic® in inventory last year. The shortage of Pounce® was intended to create a demand for Artic® to drive down inventory. They currently have no plans to phase out Pounce® and therefore, Pounce® availability should increase in 2006. However, Pounce is available from Agriliance in Ohio (1-937-767-3111; contact Mike Lower). Orders can be made in 4-gallon increments; four gallons is enough to treat 800,000 seedlings.

The Helena Chemical Company has a 24-C Label for Permethrin 3.2 EC® in NC, Micro Flo has obtained a 24-C label in SC, and Control Solutions has 24-C labels for WayLay® in MS, TX, LA and VA. This company is also in the process of obtaining additional 24-C labels in AL, AR, GA, NC and SC.

Pesticide Re-Registration for Forest Tree Nurseries

Scott Enebak

One item that frequently comes across my desk is a request for information pertaining to the re-registration for a pesticide that is used in the production of forest-tree seedlings. A year or so ago, it was Goal, and last spring, it was Thiram. With your data and letters, the rate of Goal was kept at 2 qts ai / acre / yr instead of the 1 qt ai/ acre / yr and Thiram was re-registered for continued use in forest-tree nurseries as a bird repellant. The reason for these requests is the Food Quality and Protection Act (FQPA), which has mandated that all pesticides labeled for use in the United States be examined and re-registered within 10 years and then every 15 years afterwards. There was a schedule that listed when each pesticide was to be evaluated that gave us an idea of what and when to expect a pesticide's re-evaluation. However, that schedule became outdated and woefully behind, and we were often caught off guard. Examples of those include Ferbam® and malathion.

In early August, the EPA updated and released a revised Schedule for Re-registration and Tolerance Assessment. The entire list can be accessed here: http://www.epa.gov/pesticides/reregistration/decision_schedule.htm. Most of these have no bearing on forest-tree nurseries, but a few are cornerstones in the production of pest-free seedlings. In Table 1, I've listed the pesticide, decision date and contact person for each compound up for re-registration. The Nursery Cooperative will submit comments to the appropriate contact person when the time comes; however, I have been told by a couple of EPA employees that letters from users go a long way and have a big impact on their decisions. The old adage "the squeaky wheel gets the grease" comes

Table 1. Upcoming pesticide re-registration dates.

Chemical	Decision Date	Contact Information
Ferbam dimethylidithio-carbamate salts	Sept 2005	Amaris Johnson 703.305.9542 johnson.amaris@epa.gov
chloropicrin	April 2006	Nathan Motti 703.305.0208 mottl.nathan@epa.gov
dimethoate	Dec 2005	Stephanie Plumber 703.305.0076 plummer.stephanie@epa.gov
fluazifop-p-butyl (Fusilade)	July 2005	Lance Wormell 703.603.0523 wormell.lance@epa.gov
malathion	Dec 2005	Tom Moriarty 703.305.0024 moriarty.thomas@epa.gov
methanearsonic acid (MSMA)	July 2006	Dirk Helder 703.305.4610 helder.dirk@epa.gov
methyl isocy-anate (MITC)	March 2006	Mark Seaton 703.306.0469 seaton.mark.@epa.gov
triadimefon	June 2006	John Pates 703.308.8195 pates.john@epa.gov
dazomet (Basamid)	June 2007	Mark Seaton 703.306.0469 seaton.mark@epa.gov
napropamide (Devrinol)	September 2005	Demson Fuller 703.308.8062 fuller.demson@epa.gov
fomesafen (Relfex)	November 2005	Stephanie Plummer 703.305.0076 plummer.stephanie@epa.gov
methyl bromide	March 2006	Susan Bartow 703.308.0065 bartow.susan@epa.gov
metam sodium	March 2006	Cathryn O'Connell 703.308.0136
permethrin (Pounce/ Ambush)	June 2006	Jacqueline Guerry 703.305.0024 guerry.jacqueline@epa.gov
sethoxydim (Vantage)	January 2006	Amaris Johnson 703.305.9542 johnson.amaris@epa.gov

into play here, and I tell my Forest Health class that there are a lot more non-foresters than foresters and that non-foresters tend to be a lot more vocal than foresters. So don't be afraid to write EPA and tell them how you use a specific pesticide.

MBr Issues

Scott Enebak

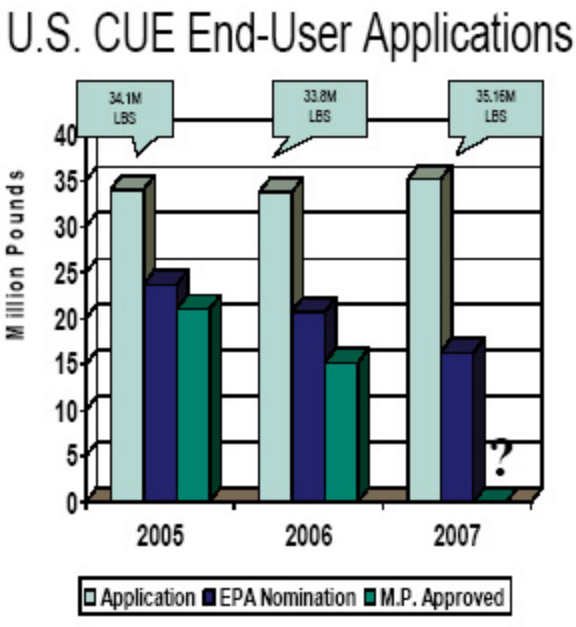
The 2007 CUE for MBr was submitted to the EPA in August 2005 and the application should be brought forward to the Meeting of the Parties in Prague in November 2005. At that time the delegates to the Treaty will meet to discuss the merits of the applications submitted by the parties. It is at this time when the U.S. State Department gets involved along with members of EPA and USDA, and politics trumps any science in the document. At last year's meeting, members from Congress did not like what they saw happening to the U.S.'s CUE nominations. This resulted in the Congressional Hearings in Washington, D.C. in March 2005 (see Spring 2005 Newsletter), to which Bill Carey was invited to testify on behalf of the forest-seedling industry. The bottom line at the hearings was that Congress was watching how the U.S. was representing and protecting their constituents' concerns. Again, and as always, if you have any concerns about MBr and the CUE process, feel free to let your elected representatives know. When the CUEs are awarded, I will pass on the amounts to Coop Members.

The other source of MBr for forest-tree nurseries is the use of quarantine pre-shipment (QPS) MBr. To date, forest-tree nurseries have inter-state use of QPS. As long as seedlings are being shipped across state lines, they can fumigate nursery soils to produce those seedlings. Last year, there was an amendment that requires the Secretary of Agriculture, "upon request of State, local, or tribal authorities, to determine whether a MBr treatment or application required by those authorities to prevent the introduction, establishment or spread of plant pests or noxious weeds should be authorized as an official control or official requirement." The administrator of the Animal and Plant Health Inspection Service (APHIS), acting for the Secretary, will determine if MBr will be considered as an official quarantine treatment within 90 days of a request by State, local or tribal authority. From that we contacted the various State Plant Protection Officers (SPPO) to get their help in drafting such language and had Dr. Tomm Johnson attend the 2004 Advisory Meeting to discuss how to proceed. Language was drafted by Dr. Johnson for Alabama to allow intra-state QPS, but got bogged down in hurricanes Ivan and Katrina and in Sudden Oak Death. Therefore, not much has happened with respect to intra-state QPS since November 2004.

Since so little progress has been made with the SPPO route, I have been working with some individuals in an attempt to formulate and come up with some language from states where EPA indicated that intra-state movement did qualify for QPS MBr which could be used throughout the southern United States for forest-tree seedlings. When the language is complete, I will pass it on to you so that you can forward to your state plant protection office.

There are two issues on the horizon that will most likely affect the availability of MBr in the future. The first item is QPS gas. The Montreal Protocol provides for the use of quarantine and pre-shipment uses of MBr for International Trade. However, the use of QPS for inter-state use has caught MeBTOC's eye and they have requested from EPA and USDA amounts of QPS MBr that are being used by the various sectors. The understanding and feeling among those who work with this group is that MeBTOC is going to disallow all non-international use of QPS MBr. This would make intra- and inter-state movement of forest tree seedlings and QPS MBr a moot issue. The only question is when MeBTOC will move to disallow any QPS MBr. It could be next year or in 10 years.

The other item is CUE MBr gas. Over the past three years, the amount of MBr requested from the United States commodity groups has remained relatively constant, some 34 million lbs. However, EPA's approval of commodity groups has decreased every year, and the amount of CUE awarded by the Parties has been less than what the EPA requested each year. The MP amount awarded for 2007 will be known in November 2005. These trends are noted in a figure provided by Steve Godbehere of Hendrix and Dail. The trend for continued availability of MBr using the CUE process does not favor U.S. interests.



GOALTENDER®

David South

This year, 2005, was the first year that GoalTender® was used operationally in forest nurseries, and it has received great comments from both pine and hardwood managers. In pine seedbeds, it has been applied as the first postemergence application (about 4 or 5 weeks after sowing). Use at this time repairs the "chemical barrier" and reduces the amount of weed seed that germinates during week 5 or 6. This formulation is safer for newly emerged pines than the old GOAL 2XL® formulation. One bonus is that some managers have noticed good activity on newly emerged morningglory and some have noticed activity on young nutsedge.

The real surprise this year was how safe GoalTender® was on hardwoods at the East Tennessee Nursery. This spring, Tom Strickland applied GoalTender® to a number of fall sown hardwoods. The herbicide was washed off soon after application. Tom makes the application in the early morning when the dew is still on the leaves (and irrigation is applied immediately). According to Tom, this has really cut down on handweeding times.

In early June, GoalTender® was applied over the top of various field-grown deciduous trees, and then irrigation was quickly applied to wash the herbicide off the foliage. The herbicide rate was 4 oz of product per acre and was applied on or about June 13. Photos (taken on June 16) compare treated with untreated seedlings (www.sfws.auburn.edu/sfnmc/intro/goaltender.html). In general, the oaks were relatively tolerant of the treatment while injury was greatest on Eastern ninebark. Spring-sown yellow poplar was also initially injured by this treatment (but as the plants aged, tolerance increased).

Thiram Seed Treatment

David South

The Thiram 42-S (fungicide)® label allows us to use two quarts per 100 pounds of conifer seed, but most nursery managers apply one quart per 100 pounds of seed. Unfortunately, some recent publications have added confusion since some authors still test the old direct-seeding rate of two gallons per 100 pounds of seed (Mann 1970). However, the old direct-sowing labels are no longer in effect. Therefore, nursery managers should ignore the 8 quart rate (the old direct-sowing recommendation) and should apply no more than 2 quarts per 100 pounds of longleaf pine seed. In fact, some laboratory tests have shown that treating with 4.75 quarts per 100 pounds of seed can reduce germination of longleaf pine (Barnett 1995).

Thiram was developed in 1931 and is now the second most used fungicide (by weight) in southern pine nurseries. Although it is a fungicide, thiram is used as a bird repellant to protect seed between sowing and germination. In one study where seeds were direct-sown in the woods, thiram-treated seeds produced 6,500 seedlings per acre compared to 33 seedlings for non-treated seed (Meanley et al. 1957). At some nurseries, the thiram treatment was omitted from longleaf pine seed, and this resulted in extensive damage by birds. At some container nurseries, managers have had to use nets to protect untreated longleaf seed from birds.

Most nursery managers use Gustafson's Thiram 42-S® to treat seed. However, Gustafson no longer exists since Bayer CropScience purchased the company last year. Thiram 42-S® is still sold under the Gustafson label but, in the future, it will be sold under the Bayer label. So do not get upset if dealers say that they no longer carry Gustafson products, just ask them for the Bayer equivalent.

PRODUCTION TECHNOLOGY

Seedling Tip Blight

Scott Enebak

I have received two samples in the mail and one e-mail with images concerning tip blight or tip dieback of loblolly pine. Looking back through the Coop Newsletters and judging from the literature, I have found that tip blight was more common in the late 1970's but would sporadically appear. Therefore, disease symptoms may not be familiar to some. With seedling tip blight, the terminal inch or two of tissue is killed and the stem tissue usually turns purplish and dries up. Sometimes the seedling dies, but usually the disease is almost self-limiting as the necrosis stops where a lateral bud starts to grow.

Tip blight typically shows up in August or September and is mostly gone by October. However, it can appear anytime after it gets hot enough for seedlings to wilt slightly in the afternoon. Dieback usually appears to be random and diffusely scattered through a nursery without evidence of infection centers or secondary spread, sort of like a random shotgun blast. Sometimes, there can be more disease among seedlings with restricted root systems, such as those in intermittent wet-spots or where the undercut is nearer the bed surface. This may indicate a role for temporary wilts in infection and disease progression.

The only journal article found for loblolly or slash

pine was a 1982 article by Jim Rowan. There are a couple of nursery proceedings by Charles Affeltranger (1983 and 1988), but the "disease" doesn't even get a mention in the Forest Nursery Pests Handbook.

Actually, tip blight is a syndrome or a collection of symptoms as several fungal species are typically isolated from symptomatic tissues (*Fusarium, Diplodia, Phomopsis,* etc.) and experimentally, though apparently not in nature, infection requires wounds. Fungicidal sprays have not been cost effective and outplanted symptomatic seedlings survive as well as healthy ones (Rowan 1982, Affeltranger 1982).

When asked my opinion of spraying either regularly or in association with top-clipping to reduce the incidence of tip blight, I am non-committal. I have learned that the disease will "go away" and the seedlings will get better anyway and data show the disease does not affect outplanting survival. Although he presented no data to support the claim, Affeltranger reported that spraying with fungicides reduced incidence but was not cost effective. However, fungicidal sprays probably "buy" some peace of mind, and I always suggest that a couple of control plots be left to see if the disease incidence is different. This way, you really know if your treatment was effective or not. Thus, knowing the psychology of nursery managers and the premium for a restful night's sleep, I think that most nursery mangers spray and we never hear anymore about tip blight.

Genetic Effects on Outplanting Survival

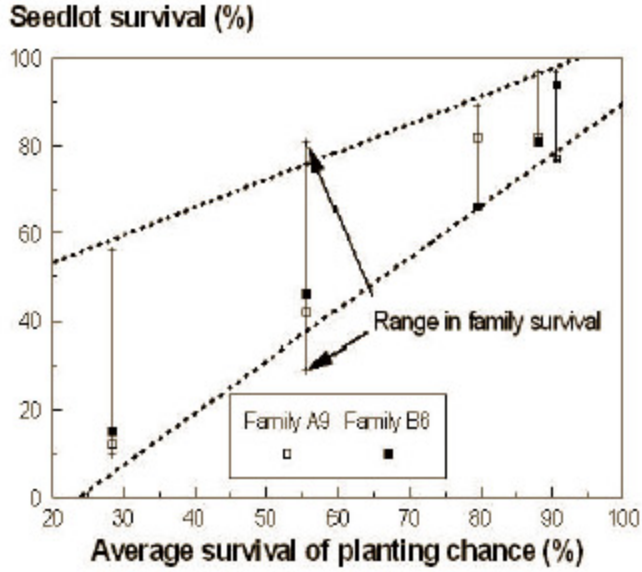
David South

Some Coop members have asked the question "Is outplanting survival related to genetics?" The answer is YES. This explains why slash pine is not planted in Kentucky and why 7-56 is not planted on the Cumberland plateau. For loblolly pine, the heritability for survival can range from 0.49 to 0.89 (Table 2 on page 13 of the 1995 Annual Report (39th) of the NCSU Tree Improvement Cooperative).

When a moist site is selected for a progeny test location, the variation in survival by family will often be minimal (especially when container-grown seedlings are planted by researchers and trees are given adequate weed control). In such a study the heritability for survival will be close to zero since few seedlings die. This does not mean that outplanting survival is not affected by genotype. For example, when the site is adverse or when a drought occurs soon after planting, heritability increases as the survival rate declines. In other words, the range in survival due to family differences is easier to detect when the survival rate for the site is 50% (when compared to 95%). The figure below was developed using data from a progeny test in North Carolina (Beineke 1966). When survival for the planting chance was high (91%), the variation in first-year survival among 30 families ranged from 77% to 97% and survival was not significantly related to family. However, when average survival was 28%, the range was from 10% to 56% and survival was significantly related to genotype.

In Beineke's study, two families (A-9 and B-6) had the lowest average survival (less than 60% on average). When average survival was 56%, A-9 had 42% survival and B-6 had 46% survival. For this planting chance, survival of these families was 10 to 13 percentage points below average. In contrast, when average survival was 88%, these families were only 5 to 6 percentage points below average. The A-9 family was tallest in height in the nursery, had few lateral roots, transpired more per day than other genotypes and had a low root-growth potential.

There are four basic approaches to the operational use of A-9 type families. Some will outplant A-9 in blocks and hope that good environmental conditions will occur after planting. Others will attempt to improve survival by culturing A-9 differently in the nursery (perhaps with top-pruning or growing this family in containers). Some will use A-9 as part of a mixed-seedlot and rely on other families to mask the survival effects in the field. The fourth option (which is rarely taken) is to rogue this family from the seed orchard.



Morphological and Nutritional Development of Three Hardwood Species

Humberto Santos & Ken Mc Nabb

Demand for nursery production of hardwood species has held steady over the past several years and may have actually increased. This is likely related to fed-

eral cost share programs, particularly those related to wetland restoration. Unfortunately, compared to conifers, there is a limited amount of peer-reviewed scientific literature for hardwood nursery culture. This lack of information is further complicated by the large number of hardwood species produced. Guidelines describing typical hardwood seedling development have not been published, and yet an understanding about morphological and nutritional characteristics is the foundation for developing management practices to produce quality hardwood seedlings.

One goal for this research project is to characterize the development of three common hardwood species growing in a southern nursery: yellow poplar, green ash and Nuttall oak. All three species were periodically sampled from 6 blocks in a single bed. Each block was one bed wide by 16' long. Seedlings within blocks were sampled in the months of May, July, September, and November using a 1'x 4' counting frame. Sample plots were randomly distributed within the block, with 3' buffers between them. All seedlings were taken to laboratory facilities in Auburn for measurement and chemical analysis.

Biomass, nutrient concentration and nutrient content will be plotted over time for various seedling morphological components. Some preliminary results indicating variability in species morphology can be found in Table 1. Interestingly, the R^2 relationship between RCD and the number of FOLR was 0.68, 0.61, and 0.69 for yellow poplar, Nuttall oak, and green ash, respectively, indicating a relatively constant relationship across three genera. These and other data were collected for May, July, and November as well following the 2004 crop season at the East Tennessee Nursery.

Many factors impact the effectiveness of nutrient application on seedling growth. These include when and where fertilizer is applied, nutrient availability, and uptake efficiency. Results should provide some indication of nutrient use efficiency for our three species based on fertilization, litterfall and mulch inputs, nutrient uptake, periodicity of absorption, allocation and translocation. Completion of the project should provide guidelines for hardwood seedling morphological and nutritional development, giving an indication for nursery managers where the seedlings stand in relation to other seedlings. Final results will likely be available for the 2005 Advisory Meeting in Auburn.

Table 1. Seedling Averages for September Lifting

Species	RCD (mm)	Ht. (cm)	TDW[1] (g)	FOLR[2] (no.)	Leaf Area (cm^2/seedl)	Root/shoot (g/g)
Yellow poplar	9.0	89.3	40.4	9.6	2,794	0.24
Nuttall oak	6.3	47.4	15.9	2.7	2,385	0.52
Green Ash	6.4	43.0	10.4	5.3	703	0.55

[1] Total dry weight
[2] First order lateral roots

OTHER NEWS

Officials Waging War on Cogongrass

According to a report by the Associated Press, cogongrass, a hardy invasive weed, has established a foothold in the Southeast.

Scientists have ranked cogongrass among the 10 most dangerous weeds, stating it has displaced African nomads and taken over clearings in Asian forests used for centuries to grow crops. It has the potential to be far more destructive than kudzu, a Japanese plant that has spread to 7 million acres in the southern U.S.

Reportedly, experts state the weed is also a threat to the South's multibillion-dollar forest industry. It kills pine seedlings, is expensive to control, and burns hotter than regular grasses during wildfires.

The University of Georgia, the state [Georgia] Forestry Commission, the [Georgia] Agriculture Department, and other state [Georgia] agencies are working with the federal Animal and Plant Health Inspection Service to heighten awareness and attack known infestations with herbicides.

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