Southern Forest
Nursery Management Cooperative
Fall 2010

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Director's Report

It has been a few months since our last newsletter and I hope that your seedlings are getting ready to be lifted and outplanted and that you have another productive growing season under your belt. There have been no changes in the soil fumigant rules since the spring newsletter and, as far as I've been told, we are still on schedule for a December 2010 deadline for a partial adoption of the reregistration decisions (REDs). By mid 2011 (June?) we expect the complete adoption of the rules to come into play with respect to soil fumigation. The timeline for these new rules was published in the *Spring 2010 Newsletter* and they will affect spring and fall soil fumigation for the 2011 season.

Membership

Tom and I have been approached by a couple of nurseries in the southern U.S. about joining the Nursery Cooperative. We have shared with them our brochure and answered a few questions concerning membership and are happy to announce that Native Forest Nursery (NFN), owned and operated by Rick Williams, will become a full member in October 2010. Native Forest Nursery is located 11 miles south of Chatsworth, GA on what was formerly the Bowater Paper Corporation Nursery. NFN is owned by Williams Forestry and Associates of Calhoun, GA, and is dedicated to producing quality hardwood and genetically improved pine seedlings for use in reforestation, wildlife, reclamation and water quality purposes. With Rick Williams and Paul Ensminger agreeing to host the 2012 Southern Forest Nursery Association meeting in Chattanooga, they look forward to being an active and contributing member of the Southern Forest Nursery Management Cooperative. Current membership within the Nursery Cooperative is 16 full members and 1 associate member.

Advisory Meeting

The Advisory Meeting is scheduled for Wednesday and Thursday, November 3 & 4, 2010 at the School of Forestry and Wildlife Sciences Building. The Nursery Cooperative staff is in the process of updating our accomplishments, the budget and next year's work plan. If you have any ideas or items that your organization would like addressed, please let me, David or Tom know. We will begin the meeting after lunch on Wednesday and adjourn around noon on Thursday. We will set up the meeting using video conferencing for those who may not want to travel to Auburn. If you would like to get access to the meeting, please call Elizabeth Bowersock at 334.844.1012 and she will let you know what you need to access the meeting. Place those days on your calendar and more information will be available shortly.

Contact Meeting

The 2010 Nursery Cooperative Contact meeting was held in conjunction with the biennial Southern Forest Nursery Association conference on July 27, 2010 in Little Rock, Arkansas and was attended by 40 Nursery Cooperative members. For those who were unable to attend, we have posted all the presentations on the Nursery Cooperative's web site for you to access. Next year's Contact Meeting will be held in Aiken, SC with Bruce Francis and his employees at Weyerhaeuser's Quail Ridge Nursery hosting/helping out with the meeting. More details will be forthcoming in the *Spring 2011 Newsletter*.

New Publication

A new Nursery Cooperative publication was inaugurated this past summer. Dubbed the *Management Alert*, the role of this publication

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Contents

is to bring to the attention of Nursery Cooperative members an issue in seedling management that either Tom, David, Paul or I believe is timelier than our current *Newsletters*, *Research Reports* or *Technical Notes*. They are also intended to be historical and could be used in future management decisions. We will keep them to less than 1-page long, distribute them by e-mail and make them accessible on the Nursery Cooperative's web site. The frequency of the *Management Alert* will depend upon what happens in the field during the growing season that we believe everyone can benefit from. If you have any questions on a particular *Management Alert*, contact the author listed. As always, please pass the *Management Alert* onto others in your organization who may benefit from this information.

Pesticide News

MBr Issues

The 2010 CUE application (for 2013 MBr use) was submitted to EPA in late August for the agency to include in their report to the State Department and subsequent request for MBr from the Parties of the Montreal Protocol. The final amount awarded to Critical Users will be determined by the Parties in November 2011. Unlike previous CUE requests, this year EPA published their intention of ceasing/stopping/discontinuing the Critical Use Exemption process for MBr in the United States, possibly as soon as 2013. Most of the other industrial nations have stopped requesting CUE, so it is not surprising that the US EPA would phase-out and end all CUE uses in the United States.

I've been told by USDA APHIS that the ending of the CUE program by EPA will not affect the availability of MBr under the Quarantine Pre-Shipment (QPS), thus those members in states with Plant Protection language should still be allowed to use MBr. However, there has been some concern from MeBTOC about the increased use of QPS, so I envision that QPS MBr will continue to be an issue in the future.

QPS

There is some concern from MBr applicators that EPA is using the new soil fumigation rules to stop the use of MBr under the QPS rules. Discussions with both APHIS and others (non rule makers) within EPA have indicated that the rules are not going to do that (do away with MBr QPS). However, this past spring I was asked again to clarify the quarantine and pre- shipment (QPS) uses of methyl bromide - specifically state-based QPS uses. Apparently other countries are claiming state quarantine permits for methyl bromide use are violating the Montreal Protocol and states are being called upon to explain. According to USDA officials, QPS usage is now outpacing "critical use" usage, and QPS usage of methyl bromide in general is coming under serious scrutiny at the upcoming negotiation sessions of the Methyl Bromide Technical Options Committee (MeBTOC). Thus, USDA asked for help to strengthen the state and local portion of the document for submission to the Parties in mid-June, and was looking for feedback from states to answer the following EPA questions:

1. What percent of the total crops on the fumigated acreage are to be moved out of state/counties/exported?
2. When growers declare need for quarantine fumigation does the state check or certify/validate the need for fumigation through their regulations?
3. What crops/propagative plant material/commodity/logs/soil plant/other considerations are under state/county/local regulations and, if available, please provide foreign country phyto-sanitary requirements?

I forwarded many of the state regulations pertaining soil fumigation and forest-tree nurseries to QPS to officials in APHIS, USDA and EPA for their examination. I have followed through with the agencies as to the "results" of this information requested, but have nothing to report. So, for now, QPS appears to be available for forest-tree nurseries.

Update of Proline® Registration

Tom Starkey

Over 1 billion hardwood and conifer seedlings are produced in southern U.S. forest-tree nurseries each on approximately 2,500 acres. Despite the large number of seedlings produced, most chemical companies consider forest seedlings to be a low profit, minor crop and tend to avoid marketing products for such a small acreage. When the cost of discovery, development, and registration of a new pesticide exceeds $180 million, it is easy to understand why chemical companies focus their marketing efforts on commodities such as wheat, soybeans and peanuts that will ensure a profit from sales.

In the 1970s and 1980s, the Nursery Cooperative tested the efficacy of both registered pesticides and numbered compounds as provided and requested by chemical companies. Over time, due to the increased scrutiny by state and federal agencies, the Nursery Cooperative found the registration of numbered compounds increasingly difficult to obtain and ceased testing compounds that were not currently registered for use in the United States. Currently, only registered pesticides are tested by the Nursery Cooperative with the hope of obtaining the necessary registration for use in forest tree nurseries.

Part of the Nursery Cooperative's mission statement is to bring new pesticide chemistry to its members. One of those new chemistries was prothioconazole, the active ingredient in Proline®. In early 2009, as a result of various experiments over several years, and in cooperation with Bayer CropScience, an application was filed with the U.S. EPA in six southern U.S.

states for a Proline® 24(c) label. The intended special use label was for the control of pitch canker and *Rhizoctonia* foliar blight in loblolly and longleaf pine. Approval for its use had been received in 5 of the 6 states when, in March, 2009, U.S. EPA requested Bayer CropScience pull the approved 24(c) labels. The U.S. EPA determined that the forest-tree nursery use is a "new non-food use" that requires a separate ecological risk assessment and the existing data on file for Proline® only supports food crops. In response to U.S. EPA's request to pull the approved labels, Bayer CropScience requested the continued use under the Section 24(c) based on 1) the minor acreage involved, 2) the use pattern is only for nursery and not forestry, 3) the proposed use pattern has a similar application method and exposure as the already registered crop use, and 4) the proposed use pattern poses no greater risk (or lower risk) compared to the currently registered uses. However, in the end, the US EPA did not change their ruling and Proline® is not yet available for forest-tree nurseries. Several other labeling efforts (e.g. IR4) were explored but found not feasible with a non-food crop.

In November, 2009 after a number of conversations with both U.S. EPA and Bayer CropScience, we were informed that our registration request for Proline® in forest-tree nurseries could be considered under the Pesticide Registration Improvement Renewal Act (PRIA) of 2007 under the category of "additional use, non-food; outdoor" (PRIA code R230). Bayer CropScience agreed to allow the request to go forward if the Nursery Cooperative were to pay the PRIA fee of $22,827.

In late December 2009, the U.S. EPA acknowledged the Proline® registration package from Bayer CropScience for an additional use. The examination of Proline® by EPA for this additional "non-food, outdoor use" is expected to take about 15 months (April or May of 2011). Once this process has been completed, we anticipate a full label for Proline® to be registered for use on nursery seeds & seedlings of shortleaf, loblolly, slash, longleaf and other pines and other conifers and hardwoods. EPA must be working on the registration as we recently responded to a question from their registration division. Until this is complete, nurseries are allowed under FIFRA rules to test a pesticide on areas less than 10 acres as long as they are collecting data for future use. Therefore, small trials testing this product under the different environmental conditions that occur in nurseries are warranted (**and encouraged**) prior to becoming operational.

Research News

2010 Methyl Bromide Trials in Alabama and Georgia

Marietjie Quicke and Paul Jackson

The 2010 Methyl Bromide Alternatives trials were installed at Rayonier's Regeneration Center in Glennville, GA on October 22, 2009 and at Weyerhaeuser's Pine Hill nursery in Camden, AL on March 23, 2010. The USDA low disturbance fumigation rig was used at both sites. Prior to fumigation at Glennville, the low-disturbance rig required that the trial areas be rolled, not cultivated, and the fumigants were coulter injected rather than shank injected. The fumigants, rates, and plastics are listed in Table 1.

At Camden, soils were not rolled but were tilled/cultivated before using the USDA low-disturbance rig with HDPE plastic. The recently modified Hendrix and Dail fumigation rig that used hot glue to seal the TIF plastic and beaver tails to seal the shanks was also used. The fumigants, rates, and plastics are listed in Table 2.

Results and Discussion. Seedling densities at both nurseries in May/June 2010 showed no significant differences between the soil fumigation treatments. However, at seven weeks post-sowing, there were elevated levels of stunt nematodes (*Tylenchorhynchus claytoni*) in soils collected from Glennville, GA. The numbers were what we would expect at the end of a two-year fumigation cycle in nurseries with a history of nematode problems, but not at seven weeks post-sowing.

To confirm the numbers, additional soil samples were taken in early August (seven months post-fumigation). Due to the extreme heat

Table 1. Fumigants and rates for Areawide demonstration plots at Glennville, GA in 2010.

Fumigant	Rate (lbs/a)	Plastic	Components
Pic +	200	LDPE	85% Chloropicrin + 15% Solvent A
	100	VIF	
Chloropicrin	200	LDPE	100% Chloropicrin
	100	VIF	
Chlor 60	200	LDPE	60% Chloropicrin + 40% 1,3 D
	100	VIF	

LDPE = Low Density Polyethylene

VIF = Virtually Impermeable Film

Table 2. Fumigants and rates for Areawide demonstration plots at Camden, AL in 2010.

Fumigant	Rate (lbs/a)	Plastic	Components
MBr	250	TIF	80% MBr + 20% Chloropicrin
	150		
Pic +	250	TIF	85% Chloropicrin + 15% Solvent
	150		
Chloropicrin	250	TIF	100% Chloropicrin
	150		
Chlor 60	250	TIF	60% Chloropicrin + 40% 1,3-D
		HDPE	
	150	TIF	
		HDPE	

TIF = Totally Impermeable Film

HDPE = High Density Polyethylene

and dry conditions in the southeastern U.S. this summer, we were not expecting such unprecedented nematode populations in the second sample (Table 3). Significant chlorosis as a result of the nematodes was not observed at the nursery due to the aggressive fertilization program. To have such high nematode levels, we have concluded that the fumigation was not effective. Some possible reasons for the lack of efficacy include:

- The low rate of fumigant (lbs/ac) used for a nursery with a history of nematode problems.
- Fumigant was not injected deep enough by the low disturbance coulter injection rig.
- The compaction (rolling) of soil prior to fumigation may have prevented gas movement.
- Soil moisture may have been too high to allow gas (especially Chlor 60) movement through soil.

Table 3. Stunt nematode (*Tylenchorhynchus claytoni*) levels per 100 cc of soil at Glennville, GA in August 2010.

Treatment	Plastic	Rep 1	Rep 2	Rep 3	Rep 4
Chlor 60 100	VIF	534 (VH)	894 (VH)	274 (VH)	488 (VH)
Chlor 60 200	LDPE	1626 (VH)	1374 (VH)	1272 (VH)	620 (VH)
Chloropicrin 100	VIF	406 (VH)	0	260 (VH)	830 (VH)
Chloropicrin 200	LDPE	634 (VH)	8 (T)	1122 (VH)	114 (H)
Pic+ 100	VIF	1454 (VH)	720 (VH)	994 (VH)	182 (VH)
Pic + 200	LDPE	486 (VH)	142 (H)	1060 (VH)	278 (VH)

VIF = Virtually Impermeable Film, LDPE = Low Density Polyethylene

VH = Very High; H = High; M = Moderate; L = Low; T = Trace

*Soil moisture at fumigation 7.8%; Fumigated October 22, 2009

Elevated nematode levels were not found at the Camden, Al nursery, which also used the USDA low-impact rig. This nursery, however, historically has never had a nematode problem. Therefore, the use of the low-disturbance rig and/or VIF/TIF treatments need to be re-evaluated at Glennville in order to determine the reasons for the high nematode levels.

Know Weeds!

Eclipta

Eclipta (*Eclipta prostrata*) can be a problem on poorly drained seedbeds or on riser lines (especially near leaky risers). It is in the *Asteraceae* family and produces small white flowers, which leads to its common name, "false daisy." Identifying eclipta is done best by observing the leaves and stem. The leaves are oblong or lance-shaped (1-3 in) and are positioned opposite each other. Stems can be green or purplish in color and can be covered in white hairs. Eclipta plants can either stand erect or lay more prostrate, ranging in height from 1 to 3 ft. A single eclipta plant can produce as many as 17,000 seeds which have no dormancy period.

In some countries, eclipta extracts are used in medicinal hair products. The Hindu people refer to eclipta as "the king of hair." Eclipta extracts have also been mixed with honey and given to infants for the expulsion of worms. It may also provide an anti-inflammatory effect against certain insect bites and skin diseases.

Unless a market develops for some of eclipta's medicinal uses, most managers will want to know how to kill this weed. Unfortunately, once it becomes established, it is usually difficult to control with applications of Goal® or Cobra®. A report in the fall 1993 Nursery Cooperative newsletter indicated that wick applications of glyphosate were effective in killing eclipta. Recently, spot application of Stinger® wilted eclipta plants and turned it black at one nursery (but it later recovered). Herbicide trials targeting small eclipta are planned for the 2011 growing season. -- PJ

Rust Study 2010 – 3-Month Results

Tom Starkey

If you raise forest seedlings for a profession in the southern U.S., you know the importance of Bayleton® to ensure rust-free trees. At the Nursery Cooperative, we continue to test new chemistries, looking for fungicides that equal or exceed Bayleton® in its ability to control fusiform rust. Over the past several years we have found two chemicals that we feel could potentially be a replacement for Bayleton®. Both Provost® and Proline® have shown good disease control in the greenhouse and field studies on loblolly pine. We have continued to test Proline® each year since 2008 and have found it to be comparable to Bayleton® for the control of fusiform rust on loblolly pine. We have initiated a registration process with EPA and Bayer CropScience for a full label on Proline® and hope this will be completed by mid-2011 (see article on page 2).

This year we continued our testing of Proline® and also included two other fungicides (Table 1). TopGuard® is a new rust fungicide

for the control of soybean rust. There are several Dow AgroScience formulations of myclobutanil registered for the control of fusiform rust on loblolly pine, however, we have not been able to find research to support this claim.

Bayleton® is always included in our studies as well an untreated control. We normally look at each chemical for activity as both a seed and foliar treatment. For the last three years we have tested fungicides on both loblolly and slash pine. All of our studies are done in cooperation of the USDA Rust Screening Laboratory in Asheville, North Carolina. Seedlings are seed treated and foliar sprayed with fungicides at Auburn University and then transported to the Ashville Lab where, after a period of acclimation, they are challenged with 25,000 spores/ml of *Cronartium quercum f.sp. fusiforme* using the laboratory's inoculation protocols. Seedlings remain under the care of the rust lab for the duration of the growing season and are evaluated for "symptom response" at three and six months. After the final evaluation the seedlings are returned to Auburn University where height, RCD and seedling biomass are measured.

The results presented in Table 3 for the foliar treatment indicate that Proline® and Nova® were comparable to Bayleton® in controlling fusiform rust. This is consistent with our previous research. However, TopGuard®, with 24% rust galls on loblolly does not appear to be a suitable candidate for rust control.

We have included slash pine in our study and, for the last three years, the results presented above for the foliar application in Table 3 are typical. No fungicide, not even Bayleton® has provided an acceptable level of disease control. These results have been puzzling as we know Bayleton® provides adequate control in the field under operational conditions. In contrast, disease control on slash, when used as a seed treatment, has shown acceptable control with Bayleton®, Proline® and other fungicides (Table 2). So why the difference in rust infection between seed and foliar applications? We discussed these inconsistent results on the slash pine foliar applications with the personnel at the Rust Screening Laboratory and have put together some possible explanations:

1. The time–lag between when we apply foliar fungicides in Auburn and when they are challenged with basidiospores in Asheville has ranged from 8 to more than 14 days over the past three years. Slash pine grows faster than loblolly pine and may have new unprotected foliage at the time of testing at the Rust Laboratory.
2. Slash pine is more susceptible to fusiform rust than loblolly pine.
3. The number of *Cronartium* spores used (25,000 spores/ml) at the rust laboratory is significantly higher than found in nature and may overwhelm the seedling.
4. We generally fertilize the seedlings before taking them to Asheville, which may increase susceptibility and stimulate new seedling growth.
5. When loblolly pine is evaluated at three and six months, the presence of galls is the only indication of infection. However, with slash pine, not only are galls counted but also seedlings with no galls but purple spots on the stem are counted as a "non-gall, susceptible response." Thus, they may be "over counting" infection rate by including another variable.

Table 1. List of the fungicides we tested in 2010.

Fungicide	Manufacturer	Active Ingredient
Bayleton®	Bayer CropScience	triadimefon 50%
Proline®	Bayer CropScience	prothioconazole – 41.0%
Nova®	Dow AgroScience	myclobutanil – 40%
TopGuard®	Cheminova	flutriafol – 11.8%

Table 2. Seed treatment mean percent symptom response.

Seed Treatment	Loblolly	Slash
Fungicides	**3-Month**	**3-Month**
Check	0%	32%
Bayleton®	9%	0%
Proline®	0%	2%
Nova®	0%	0%
TopGuard®	0%**	0%**

**Replications limited due to significant reduction in treated seed germination.

Table 3. Foliar treatment rates and mean percent symptom release.

Foliar Treatment		Loblolly	Slash
Fungicides	**Foliar Rate[1]**	**3-Month**	**3-Month**
Check	N/A	16%	35%
Bayleton®	8 oz/a	5%	38%
Proline®	5 fl oz/a	5%	37%
Nova®	10 oz/a	1%	23%
TopGuard®	7 fl oz/a	24%	29%
USFS Check Seedlings		61%	81%

[1]Based upon 30 gal of water/acre

We have requested the rust laboratory provide us with a breakdown on the number of seedlings with actual galls and those with a "non-gall, susceptible response" on the six month evaluation. To confirm these explanations, this next growing season the Nursery Cooperative staff would like to put in a replicated operational study with both Bayleton® and Proline® on slash pine at a nursery. In past studies on loblolly with Bayleton® and Proline® replicated test plots were 9 beds wide by about 200 feet. If you are interested in helping answer the slash pine vs loblolly pine question, please contact Scott or Tom at Auburn.

Pythium and Cold Storage Conclusions

Paul Jackson

For the last three years my research with the Nursery Cooperative was trying to answer two questions regarding the storability and survival of southern pine seedlings: 1) Why do bareroot

seedlings tend to store poorly from October to mid-December (low outplanting survival) and 2) Why do container-grown seedlings tend to store better than bareroot seedlings during the same period? In hindsight, my first question should have read, "Can we kill seedlings with *Pythium* and exposure to cold storage?" Before the recently completed Nursery Cooperative trials, only *Pythium dimorphum* had been associated with seedling mortality after cold storage. No other research had linked *Pythium irregulare* to seedling mortality after storage and outplanting. There are over 120 reported species of *Pythium* and, so far, only *P. dimorphum* and *P. irregulare* have been tested directly on seedling roots in cold storage. In cases where seedlings were affected by one *Pythium* species over the other, *P. irregulare* consistently showed more virulence than *P. dimorphum*. Both *P. dimorphum* and *P. irregulare* can be considered storage pathogens that can reduce the survival of bareroot longleaf pine, bareroot loblolly pine in the presence of peat moss, and root growth potential of bareroot loblolly and slash pine. In addition, *P. irregulare* can reduce the survival of bareroot slash pine and 8-week-old container-grown longleaf and shortleaf pine. These results suggest that if *P. dimorphum* and *P. irregulare* are actively present in the soil at lifting, infect seedling roots through wounds, and remain on seedling roots in cold storage that reductions in seedling root growth potential and survival are possible.

If you would like to know more about the *Pythium*/cold storage trials, please email me at paul.jackson@auburn.edu.

Other Reports

Plant Disease Clinic Results
Tom Starkey

Every year brings a new set of problems. In general, April and May are the months that we see the greatest number of requests for help in the clinic. These are the months when most newly planted seedlings begin to grow (or should begin). Our experience in the clinic is that there are almost exclusively two casual problems to seedlings not beginning growth in the spring: either freeze injury or anaerobic roots. In the 2007/2008 season, a record number of seedlings were killed or set back by deacclimation freezes which caused seedling problems after outplanting.

This year was another record season for samples in the clinic. This time, freeze injury was not the problem. We had over 20 calls this year representing over 35 different tracts from all over the southeast. It was uncanny the similarity of symptoms we saw in all the samples. Seedlings either died just before bud break or, most commonly, just after the seedling broke bud and had needle growth of ¼ to ½", thus serving as an indication of a root problem.

This past fall, record rainfalls occurred throughout the southern U.S. Rainfalls of 10" above normal were typical. In one nursery, the total amount of rainfall was 6.15" which, for one month, was not excessive. However, 5.95" of this total came within a 10-day period. Anytime rainfalls such as these occur, lenticels form on the stem and roots in response to the high soil moisture and lack of soil oxygen. Lenticels are formed by the plant in an effort to provide gas exchange for the seedling. If wet soils are not corrected and oxygen is not provided, roots begin to die. Severe examples of this are black roots in which the root cortex sloughs off. In this case, seedling RGP (root growth potential) is reduced. When these conditions happen in the nursery (or early outplanted seedlings), roots normally are able to regenerate themselves before spring growth begins since winters do not normally inhibit root growth in the south.

This past winter was a second "whammy" for seedlings. Record cold temperatures occurred throughout the southeast. There was little, if any, fluctuation in temperature as we commonly see in the southeast. The problem was not the magnitude of the cold, but rather temperatures well below average for an extended period. Montgomery, AL had nearly 14 consecutive days with temperatures lower than 25° F in January. (I know it was cold because my heating unit went out in the middle of this period!)

We feel that the cause of seedling mortality and reduced growth this year was due to the record wet fall that reduced the seedling RGP. This was followed by a record cold winter in which the seedling RGP never fully recovered. When the seedlings were outplanted in stressful conditions such as too dry or too wet, seedling mortality or reduced growth occurred.

Loblolly & Longleaf Pine Nutrient Survey
Tom Starkey

This past February we completed our nutrient survey of bareroot loblolly pine and container loblolly and longleaf pine. The results can be found on the Nursery Cooperative web site by going to the "Members Only" section and clicking on "Nutrient Survey" in the menu located on the left side of the page.

The purpose of this survey was to build a database of nutrient levels at three periods over the growing season. This data will help us evaluate specimens we receive in the Plant Disease Clinic. You can also access this data at anytime to compare your seasonal nutrient analysis with all the other nurseries that participated in the survey. Twenty bareroot and seven container nurseries participated in the survey of coastal pine families.

The figure below is a comparison of nitrogen levels over the three sampling periods for the different stock types.

Within each stock type, the range of nitrogen levels for the three sampling periods is shown. Here are some observations and comments:

- Over all three sampling periods, the median percent nitrogen

for bareroot loblolly was higher than container loblolly or longleaf pine.

- Over the growing season, the percent of nitrogen decreased as a result of carbohydrate dilution.
- The greatest range of nitrogen levels was found in container longleaf. This is probably due to the use of slow release fertilizer in the container media. Some nurseries do not use any slow-release fertilizer while other nurseries rely 100% on slow release and still others use a combination of liquid feed and slow-release fertilizer.
- During the last sampling period in January, nearly all the container longleaf nurseries had nitrogen levels below 1%. This may be due to the cessation of supplied nutrients in the fall once target seedling levels are reached. If nutrients are not replenished before shipping, nutrient starved seedlings may be shipped to customers.
- Low nitrogen levels in the spring can result in poor seedling performance when outplanted.

If you have questions on the web site results or would like a comparative listing of your nursery as compared to an anonymous listing of others in the survey, let me know.

Longleaf Pine Mortality –Rhizoctonia Blight
Observed in Three Year Old Longleaf

The following article was from a "2010 Pest Alert – Georgia Forestry Commission" contact Chip Bates cbates@gfc.state.ga.us, Forest Health Specialist for further information

Introduction

In October of 2009, a Georgia Forestry Commission forester observed three year old longleaf pine seedlings with discolored, soft and wilting needles, dead terminal buds, and near total mortality in a portion of a field heavily overgrown with partridge pea. Partridge pea is planted with native warm season grasses (NWSG) under guidelines of the Conservation Reserve Program. The partridge pea was well over four feet tall in most areas and had overtopped the desired longleaf seedlings possibly creating a microclimate conducive to the growth of unwanted fungi. Significant mortality was observed over about ten acres of this fifty acre plantation and this correlated directly with the overgrown portions of the field.

In December 2009, symptomatic pine samples were collected from the Bulloch County, Georgia site and sent to Michelle Cram, Plant Pathologist with the USDA Forest Service in Athens, Georgia. The samples came back positive for *Rhizoctonia*. In the meantime similar symptoms appeared in longleaf stands in Jones and Wheeler Counties which also came back positive for Rhizoctonia. Rhizoctonia blight is typically published as a fungal disease pathogen causing blight or mortality in seedling stock of pine nursery beds. The terms "Longleaf Seedling Blight" or "Damping Off" are often used as common names for this disease.

Symptoms

Field symptoms appear to be consistent for a tentative identification of *Rhizoctonia* blight. The symptoms appear as a progression of mortality from grass stage seedlings to seedlings producing growth candles up to three feet high. The following describes some of the symptoms observed in the field:

Puzzle This!

See if you can figure out this puzzler…

Two foresters met one day when they came to the nursery to pick up some seedlings. One got a bill for $150 (for 3,000 bareroot slash pine) and the other got a bill for $350 (2,000 container-grown longleaf pine plus 1,000 bareroot slash pine). Both foresters were going to plant 545 trees per acre on old-field sites but one landowner wanted to establish a mixed longleaf pine/slash pine stand with every third row planted with slash pine. Turns out both foresters were using the same contractor to machine plant the seedlings and to apply the same herbicide treatment (in a 6-foot band).

A few months later, the two foresters were having breakfast. The forester who planted only slash whipped out his calculator and figured that his costs per acre amounted to $160. He then figured his friend's costs amounted to $196 per acre. No the friend replied; your wrong, in fact my costs were less than $155 per acre. What? I don't believe you! How could it cost you less when we both planted the same number of seedlings, we used the same contractor, and you paid $36 more for container-grown stock?

[Answer to be given in the spring newsletter!]

1. Needles do not stand erect and are wilted with a fine or soft feel to the touch. Normally longleaf needles are coarse to the touch, similar to a horse's mane.
2. Terminal buds show signs of dieback and are similar to damage caused by pine tip moth. There is a distinct line of necrosis in the terminal bud and in some samples we found what appears to be large hollow pith down the terminal bud indicating limited insect damage.
3. There appears to be a progression of mortality from wilting needles to dieback of the terminal bud to complete mortality of seedlings. Normally a three year old longleaf seedling will not abruptly die.

To date, *Rhizoctonia* has been confirmed in three year old longleaf pine stands in Bulloch, Wheeler, and Jones Counties in Georgia. In each stand infected with *Rhizoctonia* blight, we found localized areas of partridge pea re-seeding so prolifically that it became a dense mat competing for water and nutrients and overtopping the longleaf seedlings, shading the forest floor, restricting available sunlight, and possibly creating a microclimate conducive to the growth of unwanted fungus.

Management Recommendations

1. Use very low rates or eliminate partridge pea in your native warm season grass planting mix.
2. When localized competition becomes an issue, rotary mow the "worst" portions of these fields in late spring or early summer before the partridge pea has time to cover the newly established seedling.
3. When replanting after a loss from Rhizoctonia blight, scalp along the existing rows, establish new longleaf seedlings prior to February 15th, and rotary mow between the rows during late spring to early summer to control overtopping and to inhibit reseeding.

Nursery 101

Nursery 101 - Nutrient Mobility in Seedlings
Tom Starkey

Nutrient mobility is the translocation of nutrients within the seedling vascular system. Nutrient mobility is important since it determines where deficiencies and toxicities may occur in the seedling. Nutrients differ significantly in their mobility in the seedling. The table below provides a relative comparison of the mobility of various nutrients.

When nutrients are limited in the soil or growing media, elements must be mobilized within the seedling to support new growth. Nutrients such as nitrogen, phosphorus, potassium and magnesium are capable of moving within the vascular system to support the growth of new tissue. If the supply of nutrients is not replaced in the soil or growing media so that they can be taken up by the seedling, the older needles or leaves will begin to show deficiency symptoms as the highly mobile nutrients move out of the older tissue to support new growth. In the case of nitrogen, deficiencies first appear as chlorosis in the older needles/leaves.

Nutrients that have low mobility within the seedling cannot be redistributed to meet the needs of developing tissue. In the case of iron, zinc and manganese for example, if the seedling cannot take up the required nutrients from the soil or media, iron, zinc and manganese cannot move to newly expanding tissue, therefore deficiency signs become evident in the form of chlorosis in the young tissue.

Toxicity symptoms can occur when excessive amounts of nutrients are absorbed by the older tissue of the seedling. As this accumulation continues over time, toxicity symptoms first appear on the older tissue.

When nutrient disorders are observed, note whether the deficiency or toxicity problems are primarily affecting the older or younger tissue. Determining the specific cause and corrective course of action may not be simple since many nutrient disorders have similar appearance and several nutrients may be involved.

High Mobility	Moderately Mobility	Low Mobility	
Nitrogen	Sulfur	Boron	Manganese
Phosphorus	Molybdenum	Calcium	Zinc
Potassium		Iron	Copper
Magnesium			

David's Den

German Top-Pruning Equipment
David South

Several Nursery Cooperative members attended the "Target Seedling Symposium" in Portland, Oregon in August. It was good to see old friends and listen to some of the presentations. Diane Haase did a great job organizing the meeting. The field trip involved a visit to the IFA Nursery at Canby, and the PTR Nursery at Hubbard, Oregon. After the meeting, Tom Starkey and I went to the "FarWest" trade show for horticultural nurseries and garden centers. While there, we saw lots of new products and equipment. One booth that caught my eye was selling top-pruning equipment.

I have been to horticultural shows before, but this is the first time I have seen top-pruning equipment for sale (but they use the word "trimming" instead). Apparently, "trimming" has become a popular practice in the production of some ornamentals. The cost of one machine was about $15,000 and they said they have sold over 160 to nurseries throughout the U.S. (www.agrinomix.com). Having been a fan of top-pruning of both pines and hardwoods, it was good to see

such a rapid adoption by the horticultural industry.

The equipment is made in Germany [Lanz-GmbH]. They have been making and designing trimmers for four years. Some are hand-held sickle bar mowers (they have both one- and two-person types that can be used in bareroot seedbeds). One pruner has a cutting blade 10 feet long. Examples and videos of the equipment are at www.trimming-machines.com.

On a related note, I am still amazed when I hear professors pontificate about the practice of top-pruning (while ignoring the literature, not considering economics, and not following the scientific method). I have often wondered how one can ever determine a "target" seedling height for a hardwood or conifer without outplanting seedlings from top-pruning trials? For example, I know of one study (that was not outplanted) where the researchers concluded that nursery managers were excessively top-pruning trees. In one example, they showed that top-pruning greatly decreased the production of cull seedlings (due to excessive height). Even so, they somehow concluded that seedling weight was more important to crop production than controlling stem height. In contrast, I am sure that most nursery managers (who know the economic advantages of higher seed efficiency, greater seedling uniformity, lower shipping costs, and increased survival when soil moisture is limiting) understand the reasons why they control seedling height with "proper" top-pruning. I applaud the managers who ignore the "experts" who pontificate but fail to follow the scientific method when making nursery management recommendations.

20 Years Ago...

In the fall of1990, Dr. Walt Kelly was director of the Nursery Cooperative. Ken McNabb, David South, Bill Carey and Tommy Hill, among others, were listed on the directory.

The "Plant Diagnosis Service" for Nursery Cooperative members was started by Bill Carey.

Research topics and interesting articles included: The use of plant growth regulators; Root stripping reduces RGP; Are well formed buds needed?; Seed efficiency for container and bareroot nurseries.

News from member nurseries included: All southern and western International Paper nurseries were combined under one organization headed by Dr. Ken Munson; North Carolina hired Sharon Booker for their Clayton container nursery; South Carolina shut down the Coastal Nursery in St. George (Hurricane Hugo was instrumental in this decision); Indian Mound, Texas nursery hired Tony Simms as manager to replace Al Stauder; JB Jarratt retired from Garland Gray in Virginia; and finally, the Westvaco SC nursery had a 7-row Whitfield seeder for sale.

Heavy Rainfall Increases Manganese (Mn) and Induces a Calcium (Ca) Deficiency
David South

As many managers know, the fall of 2009 was wet, with some states receiving 10 inches above normal for the months of October -December. For the month of October, record amounts of rainfall fell in AR, LA and MS. One nursery recorded 16.8 inches in December. We know that frequent rainfall can flood seedbeds and prolonged anaerobic soil can adversely affect root growth and seedling survival, especially when trees are lifted just after a period of low oxygen in the soil.

What we did not realize until recently is that the low redox potential of soils due to flooding can increase the amount of available Manganese (Mn) in the soil. In fact, on some soils, water-logging increased Mn availability by as much as 5 tons per acre in the top 8 inches of soil with a pH of 4.8. (No, the soil did not increase in weight, just the amount of available Mn.) Soil samples from one nursery indicate that available Mn increased in one year by 240 lbs per acre. Mn availability is also higher in acidic soils and therefore the combination of low pH and low oxygen can cause some nursery soils to exceed 1,200 lbs/acre of Mn. When both soil calcium and soil pH are low, high Mn can induce a calcium deficiency. For example, high concentrations of Mn in hydroponics can decrease the root content of Ca in Norway spruce. On some soils with 20-25% clay (i.e. sandy clay loam), a Ca deficiency (i.e. stunting, chlorosis, resin exudation at terminal) might occur for loblolly pine seedlings (in July-August) when the Ca/Mn ratio in the soil drops below 0.35 (with a soil pH below 5.0). Typically, chlorosis at pH 4.8 is rare at most sandy nurseries but with fine-textured nurseries, chlorosis has occurred as far back as 1959 (when pH drops below 5.0). A simple solution to this problem is to apply dolomitic lime prior to sowing (which will increase the Ca/Mn ratio and raise the soil pH).

Leadership 101

The MacArthur Tenets
Tom Starkey

History will confirm that one of the greatest military generals and leader was General Douglas MacArthur (1880 – 1964). Born into a military family in Little Rock, Arkansas, MacArthur was best known for his command of the American armed forces in the Philippines during World War II. He was a brilliant strategist and a farsighted administrator with a flamboyant personality.

As a result of observing MacArthur's life, William Ganoe and

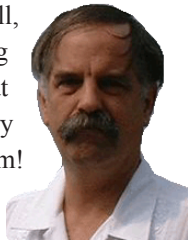
General Jacob Devers created a list of questions that reflect MacArthur's principles of people management – The MacArthur Tenets. I have modified and combined the original tenets:

- Do I heckle those I work with or strengthen and encourage them?
- Do I use moral courage in firing a worker who has proven themselves beyond doubt to be unfit?
- Have I done all in my power to encourage, motivate and stimulate the weak and prone to make mistakes?
- Am I thoroughly familiar with the technique, necessities, objectives and administration of my job?
- Do I lose my temper at individuals?
- Do I act in such a way as to make those I work with WANT to follow me?
- Do I delegate tasks that should be mine?
- Do I keep everything to myself and delegate nothing?
- Do I develop those I work with by placing on each one as much responsibility as he can stand?
- Am I interested in the personal welfare of each of those with whom I work, as if he were a member of my family? Do I know them intimately?
- Have I the calmness of voice and manner to inspire confidence, or am I inclined to show anger, frustration or excitability?
- Am I a constant example to my subordinates in character, dress, manner and courtesy?
- Am I inclined to be nice to my superiors and act differently to those with whom I work?
- Is my door open to those with whom I work?
- Do I think more of POSITION than JOB?
- Do I correct a worker in the presence of others?

So Long & Thank You!

David South-Retirement

After 35 years working with the various research Cooperatives (Genetics, Silviculture and Nursery) at Auburn University, David South has made it official and will retire from the School of Forestry and Wildlife Sciences on December 31, 2010. His work on seedling quality and outplanting survival and his research on selective herbicides for conifers and hardwoods has significantly increased seed efficiency and transformed seedling production in forest-tree nurseries in the southern United States. Over the past few years David has built a home in South Carolina where he plans to semi-retire if he can find a place to store all of his "stuff," as he calls it. However, for those that know David well, he carries an enormous amount of nursery seedling information in his brain and we all confident that the staff at Auburn and the members of the Nursery Cooperative have not seen or heard the last of him! Thank you, David, for all of your hard work and contributions to the Nursery Cooperative. You will be missed!



Ken Woody-Retirement

After graduating from the University of Georgia's Forestry School, Ken Woody began his exemplary forest nursery career on June 29, 1970 when he went to work for the State of South Carolina Forestry Division at the Coastal Nursery. In 1977 Ken took over management of the State of SC Tillman Nursery near Sumter, SC. In 1978 Ken was hired by International Paper and relocated his family to Arkansas where he constructed the International Paper Supertree #1 Nursery near Bluff City, Arkansas. Ken managed this nursery until 1982 when he moved to South Carolina to construct the International Paper Supertree #3 Nursery near Blenheim, SC. He managed this nursery until 1995 when he moved to Georgia to build the International Paper Georgia Supertree Nursery near Shellman, GA.

Ken began his career with Plum Creek Timber Company in 1997. Ken built the Pearl River Nursery near Hazlehurst, Mississippi and planted the first seedling crop there in 1998. In 2005 Ken accepted the Nursery Manager position at the Plum Creek Jesup Georgia Nursery.

Ken has constructed four state of the art nurseries in his 41 years of forest nursery work. He has had an outstanding career and has been instrumental in the development of many of the nursery management practices that are used today. Ken is well respected and loved by his peers, employees, and customers.

Ken plans on retiring on June 29, 2011 and moving with his wife Eloise to their home on the Santee Cooper Lake in South Carolina.

Steve Cantrell-Retirement

Steve Cantrell retired from the SC Forestry Commission in July 2010. Steve began with the SC Forestry Commission as Nursery Manger at Piedmont Nursery near Salem, SC. However, most of this 33 years of service were spent as Nursery Manager at Taylor Nursery in Trenton, SC. He takes with him many years of experience and a wealth of knowledge that can't be replaced. Steve will be sorely missed.

Have Some Interesting News to Share?

If you have any interesting news or research results you would like to share, please contact one of the Nursery Cooperative staff members, and we will be glad to post the information on our web site. Please send pictures as well. The "Manager Reports" can be found at the following web page: https://www.nurserycoop.auburn.edu/membersonly/managerreports.html