



# Tree Line



New Hampshire-Vermont Christmas Tree Association

January 2006

## Special points of interest:

- ◆ **Group Buying Program:**  
The NHVTCTA has available group buying opportunities on several items, including Christmas tree boxes, chemicals and other supplies. Contact Jim Horst at (802) 447-1900 for info.
- ◆ **50th Anniversary Meeting:**  
Mark September 28-30, 2006, on your calendar. That's when we'll celebrate the 50th anniversary of the Association at The Tonry Farm, Hampton Falls, N.H.
- ◆ **Seeking Marketing Members:**  
The NHVTCTA marketing committee is in urgent need of assistance, especially in organizing the gazebo and in helping to organize fair participation. Contact chair Walt Rockwood at (802) 685-2282.
- ◆ **Scholarship Available:**  
The NHVTCTA is seeking applications for its \$1,000 scholarship award. Applications are due by June 1. Contact Bill Schmidt, scholarship chair, at (802) 257-0233.

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## Winter Meeting Line-Up

The NHVTCTA's winter meeting will take place Jan. 24, 2006, at the Canadian Club on Rte. 14 in Barre, Vt. As was the case last year, the meeting is being held on a TUESDAY rather than the traditional Wednesday in part to allow more members to enter trees at the Vermont Farm Show competition. Trees must be dropped off at the farm show by 9 a.m. the morning of the meeting; results will be announced before the end of the meeting.

You should have already received your meeting registration package in the mail. It's not too late to register; call Jim Horst at (802) 447-1900 to pre-register, or you can register at the meeting.

On the agenda is a marketing recap of the 2005 season by Nigel Manley, with audience participation regarding what worked, what didn't work, new trends observed and the outlook for 2006. Ron Kelly will recap last year's disease and insect problems, and offer a forecast for the coming year. Trish Hanson, director of the State of Vermont's Forest and Pest Lab, will give us a pine shoot beetle update, and provide information on a new pest: the European wood wasp.

The afternoon will include a panel discussion on the brush business, followed by an insiders' look at the Quebec Christmas Tree Industry.

## NCTA: 2005 Sales Update

The results of the 2005 Consumer Tracking Poll from Harris Interactive have started arriving.

The Real Tree Market Expansion Task Force had an opportunity to review them and wanted to share the results with you ... it was a huge year for Real Trees!

Here is a quick summary from the telephone poll of 1,001 randomly selected consumers—the results are a +/- 3.1%.

*Consumers reported purchasing more real trees...a lot more:*

- ◆ Sales were up 21.1%, with 5.7 million more real trees purchased
- ◆ \$213.3 MILLION increase in gross value to tree industry

*Increased market share trees purchased in 2005:*

- ◆ Up 2.9% to 78.0% of trees purchased

*Real Tree market share:*

- ◆ Up 4.0% to 29% of all trees displayed

*Reported purchases compared with pre-season intentions:*

- ◆ 5% higher than pre-season poll; this is the first time in six years of pre-season polls that actual reported purchases have been higher than the pre-season intentions

*Reported purchase price:*

- ◆ Down \$.70 to \$41.90

When you see the summary of the results of our individual Real Tree PR and market expansion projects, you will see that we are having a direct impact. It suggests that the dramatic increase in 2004 was not a one-hit wonder.



## President's Message

Well, another Christmas tree harvest and sales season has come and gone. I tend to view the Christmas tree harvest as one might view house guests—you are glad to see it (them) come, and you are glad to see it (them) go. I hope that everyone had a successful season.

Since I don't have my finger on the pulse of the entire Christmas tree industry, I can primarily speak from my own experience that the market for real trees was very good. The feedback I received from my wholesale customers was positive with many of them selling out and calling to see if I had any more trees (I didn't).

Hopefully, the good times with strong markets for real trees will continue. We as growers can help to insure this by producing high quality trees delivered to our customers in as fresh and clean a condition as possible. Study after study has shown that consumers are turned off by the

supposed "mess and inconvenience" that can be associated with a real tree.

I came across a forest market report from the mid-90's the other day during a "file cleaning" which described sluggish markets for real trees and a general oversupply, so things can change.

During my time with the NHVTCTA, I have been amazed and impressed by the contributions of many of our members. Russ Reay, past president and current program committee chairman, does a wonderful job in putting together the agendas for our meetings three times a year. This isn't easy and takes quite a bit of time. Walt Rockwood has given a great deal to the



Association over the years, and continues to keep on giving. He is currently working on the 50th anniversary meeting coming in fall 2006, a multi-day affair which will host growers and others involved in the real tree industry from all over the north-east. And Patrick White, our *Tree Line* editor, does a great job in putting together our newsletter. As someone who once, many years ago, was involved in the newsletter, I know that this task takes a lot of time and energy (including the unenviable task of soliciting a "President's Column").

We have a good Association with many fine members, and I will close by echoing what has been said many other times in this space that member involvement is what keeps our organization vibrant. So if you have some time—get involved!

*Dana Blais, President*



## New Hampshire-Vermont Christmas Tree Association



2006 Officers	
President	Dana Blais (603) 747-2263
Vice President	Rich Rockwood (802) 685-4343
Recording Secretary	Carolyn Page (603) 664-2934
Executive Secretary/Treasurer	Jim Horst (802) 447-1900
Past President	Russell Reay (802) 492-3323
Marketing Committee Chair	Walt Rockwood (802) 685-2282
Group Buying Chair	Bill Nichols (603) 353-4832

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(2006)	Mike Ahern	(603) 536-2334
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(2008)	Bill Nichols	(603) 353-4832
(2006)	Rich Rockwood	(802) 685-4343
(2007)	Mary Lou Schmidt	(802) 257-0233
(2006)	Susan Taylor	(603) 239-4005
(2008)*	Bob White	(802) 899-4924
(2007)	Patrick White	(802) 223-3880

Alternate Directors	
(2006)	Jay Weir (NH) (603) 237-8617
(2006)	Larry Krygier (VT) (802) 827-6123

### Contact Information

Jim Horst, Executive Secretary  
569 Pleasant Valley Road  
Bennington, VT 05201-9637  
Phone: (802) 447-1900  
E-mail: [info@nh-vtchristmastree.org](mailto:info@nh-vtchristmastree.org)  
Association Website: [www.nh-vtchristmastree.org](http://www.nh-vtchristmastree.org)

### For matters related to *Tree Line* only:

Patrick White, Editor  
NHVTCTA *Tree Line*  
18 Merritt Road  
Middlesex, VT 05602  
Phone: (802) 223-3880  
E-mail: [pwhitevt@aol.com](mailto:pwhitevt@aol.com)

### 2006 Tree Line Publication Schedule

Issue	Ad/Submission Deadline	Mailing Date
January	--	January 18
June	June 9	June 16
September	September 15	September 22


\*Denotes second consecutive term



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# Research Report: In Search of a Better Tree

*Excerpted from an article published in East, the magazine of East Carolina University, written by David Etchison.*

On a plot of land near Falkland, N.C., just west of Greenville, wannabe Christmas trees — Nordmann firs and other species — offer themselves up for science. These trees, property of East Carolina University's biology department, were planted to see how well they tolerate the hot, dry summers typical in eastern North Carolina.

But currently only one percent of the state's trees are grown in the Coastal Plains. Fraser firs, by far the most popular species with consumers, are not well suited to the local climate. So East Carolina biologists face a challenge: if they want Christmas trees to be the East's next cash crop, they must find a commercially viable species that will thrive in the region.

Or they'll have to make one.

## Looking for a Contender

In the eastern part of the state, where pine trees are pervasive, varieties like the Scotch, Virginia and white pines often stand in for the favored Fraser at Christmas time. For 30 years, Bobby Brock, president of the Eastern North Carolina Christmas Tree Growers Association, has raised Scotch pines on a 3-acre former tobacco field in what he calls "a very one-horse operation." He's become quite familiar with the limitations of the species.

"Some trees, like the Virginia pine, really don't want to be a Christmas tree," he said. "They have 'bad' genes. They grow crooked and have bare spots. It takes a lot of work to get a good tree."

Dr. Ronald Newton, a plant physiologist and chair of ECU's biology department, hopes to provide eastern North Carolina growers with another option. For

nearly 25 years he has studied trees and their ability to cope with environmental stresses such as heat, disease and drought. When he came to East Carolina five years ago, the department was just starting to look at Christmas trees as a potential replacement crop for tobacco farmers.

"We're interested in bringing in Christmas tree species that are adaptable to this area," Newton said. "The tree that is revered by consumers is the Fraser fir, but it doesn't do well here, which is understandable when you think about where Fraser firs come from."

Frasers, which account for 96 percent of the Christmas trees raised in N.C., grow almost exclusively in the mountains. So scientists must either create a tougher Fraser through genetic engineering or find an alternative. They're working on both.

*continued on page 10*



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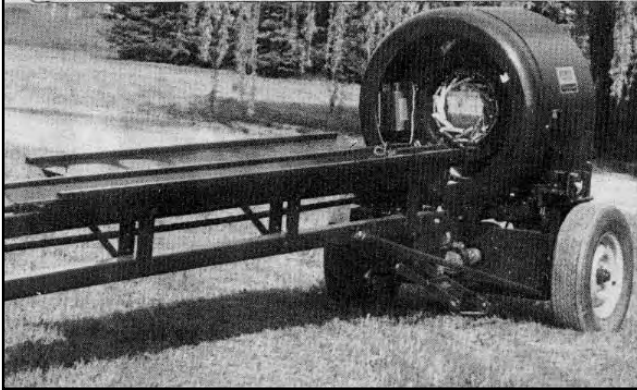
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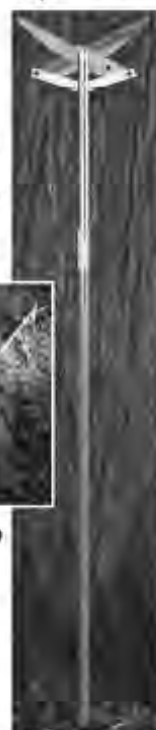
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## Trees in the News...

Not surprisingly, Christmas trees were in the news quite a bit late last year. Some of the news was good, some was bad—some was just amusing. Here's a recap of some of the news reports.

### From the Associated Press out of Rhode Island:

It's a Charlie Brown Christmas for Rhode Island's official Christmas tree.

The 18-foot Colorado blue spruce lost its needles and died after Statehouse workers dried it with commercial fans and sprayed it with a fire-retardant chemical. The workers were following the stringent new fire code enacted after a nightclub blaze in Rhode Island nearly three years ago killed 100 people.

The pathetic-looking tree was hustled out of the building Wednesday night.

Gov. Donald Carcieri sheepishly explained the tree's demise and suggested the state might get an artificial replacement next year.

"With the new fire code, we're supposed to spray it," he told WPRO-AM. "And apparently the spray killed it."

Rhode Island law designates Christmas trees as "flammable vegetation" and regulates their display in public buildings. Until recently, Christmas trees in public buildings had to be doused with fire retardant, said Tom Coffey, executive director of the Fire Safety Code Board of Appeal and Review.

The state lifted that requirement on Dec. 6, Coffey said, but that was too late for the Statehouse tree, which was put up Nov. 25.

Lawmakers overhauled the fire code after the February 2003 blaze at a West Warwick nightclub. At first, the code banned Christmas trees in public buildings, but tree farmers fought earlier this year to have that section removed in exchange for safeguards that include posting the tree's watering schedule nearby.

A properly watered tree is not a fire hazard, said Al Bettencourt, executive director of Rhode Island's Farm Bureau, who once tried proving the point on cable TV.

"First we tried to light it with matches - couldn't do it," he said. "Then we took out a 50,000-

BTU blowtorch and we turned that onto the tree."

The pine crackled, he said, but never caught fire.

Bettencourt and a team of farmers rushed Thursday to get a replacement tree. The task proved complicated because the law also requires a fire marshal to be on hand when a tree destined for public display is cut down, to ensure freshness.

"This one will not be sprayed," promised Steve Kass, a spokesman for the governor.

### From the Associated Press out of California (note that it's not until the second paragraph that it's revealed the tree was *artificial*):

A 35-foot Christmas tree caught fire early Wednesday in the lobby of the Disneyland Grand Californian Hotel, forcing the evacuation of more than 2,000 guests, officials said. No one was injured except for a guest who complained of a strained back and another with symptoms of stress, officials said.

The sprinkler system kept the 3 a.m. blaze in the artificial tree in check, and firefighters were able to quickly put it out, said Maria Sabol, a spokeswoman for the Anaheim Fire Department. She called the fire "electrical in nature," saying it started after employees changed some lightbulbs on the tree and turned the lights back on.

### From the Associated Press out of New Hampshire:

Taller Christmas trees are in demand this holiday season, but some buyers' eyes are bigger than their living rooms.

While some families are looking for larger trees to fill cavernous, cathedral-ceilinged "great rooms" in their upscale homes, others simply want the biggest and best product, even if that means the tree trimming starts with chopping a foot or more off the trunk when they discover it won't fit in their home.

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"When you're outdoors, a tree certainly has a different look than it does in a living room," said David Murray of Murray Farms Greenhouse in Concord, who sells trees up to 13 feet tall.

Murray advertises that his trees are "extra thick, extra tall, for that extra big room!" But he and others in the industry say that for every customer with a large room to fill, there's another with unrealistic visions dancing in their heads.

"It's like people buying an enormous roast of beef and only eating half of it and then feeding the rest to the dog," said Steve Taylor, New Hampshire's agriculture commissioner. "It's a function of our affluent society."

Irwin Loiterstein, a Christmas tree wholesaler in St. Louis who works with growers nationwide, said tall trees are in demand, but so are tiny ones suited to apartments and condominiums.

"There's been big surge in smaller and taller trees," said Loiterstein, who serves on the board of directors of the National Christmas Tree Association. "I had a bunch of them last week and got rid of them, and all of sudden I'm getting calls all over the place."

**From the Associated Press out of, well, where else?**

San Francisco Renting Out Christmas Trees

It might just take a Christmas miracle to deck out these spindly branches, and at \$90 a tree they're anything but cheap. But like Charlie Brown's sad sapling, it's the thought behind them that shines through.

The city is renting 100 young potted trees, from fruitless olives to Brisbane boxes, to homes for the holidays. Instead letting them get tossed to the curb when holiday is over, the city will pick them up in January and plant them in a neighborhood in need of greenery.

"We call it the guilt-free option," said Mark Westlund, spokesman for the San Francisco


Department of the Environment, which introduced the unusual tree rental program this year as an environmentally friendly alternative to harvested firs and artificial trees.

"You don't have to worry about cutting down a living tree and you don't have to worry about buying a tree with petroleum materials," he said.

The trees, typically 6- to 12-foot high, are far from the full-bodied evergreens most

Christmas revelers are accustomed to. But that's fine with Stacy Collins Johnson, who rented a live primrose to help her children, ages 4 and 6, learn the importance of giving back to the environment.





"I wasn't really sure how this would play out, having a nontraditional Christmas tree in our house," said Johnson, 43. "I thought they'd be upset, and they love it. They named the tree Charlie Green."





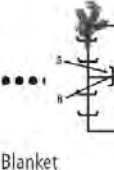

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## Education Offerings

### New England

The 2006 New England Christmas Tree Pest Management course has been scheduled for Thursday, March 16 and Friday March 17, 2006, at Keene State College in Keene, N.H. The course is an intensive 2-day series of lectures and laboratories providing hands-on learning about conifer tree health, insects and diseases, weed identification and control.

Sponsored by UNH Cooperative Extension, the course brings together insect and disease experts from throughout the Northeast as instructors. Pesticide recertification credits for all the New England states and forestry continuing education credits are available.

The biennial course has been well received by past attendees from New England and Canada. Christmas Tree farmers, foresters and landscapers can all benefit by attending. Space is limited and advance registration will be required. For more information contact Marshall Patmos, UNH Cooperative Extension at (603) 352-4550 or via e-mail at [marshall.patmos@unh.edu](mailto:marshall.patmos@unh.edu)

### New York

The 2006 Northeast Regional Christmas Tree and Wreath Convention hosted by the New York Christmas Tree Farmers Association of New York is scheduled to be held January 27-29 at the Turning Stone Convention Center in Verona, N.Y.

Contact Bob Norris, Executive Director, at (315) 754-8132 for more information or visit [www.christmastreesny.org](http://www.christmastreesny.org)

### Pennsylvania

Penn State's 2006 Christmas Tree Management Short Course will be held at the Ramada Inn and Conference Center in State College, Wednesday February 15 and Thursday February 16. Sponsored by the College of Agricultural Sciences and the Department of Horticulture, the course attracts growers from over 12 states and Canada.

The course is designed to help growers adopt the latest pest control, production and business management practices. This year's program represents a broad range of topics and highlights conifer pest management. Some speakers/topics include:

Rayanne Lehman – Insect pests of pine  
 Larry Kuhns – Containerized conifer production  
 Eric Lorenz – Pesticide safety  
 Sandy Gardosik – Mites & white pine weevil  
 Jon Johnson – Controlling Tree-of-Heaven  
 Joe Neal – Low rate Roundup technology  
 Brett Crosby – Risk management & farm analysis  
 Jim Rockis – What you need to know about plugs  
 Tracey Olson – Spruce rust & diseases of pine  
 Rick Bates – Swiss & Rhabdocline needlecasts  
 George Perry/Bob Pollock/Paul Shealer – Back-to-Basics workshop

A registration fee of \$185 includes all educational sessions, instructional materials, breaks and lunches for Feb 15 and 16. Registration deadline is Friday, Feb. 10, 2006. If you do not receive a registration form or need additional information, please call the Christmas Tree Management Short Course office at (814) 863-0918 or e-mail Rick Bates at [rmb30@psu.edu](mailto:rmb30@psu.edu)

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## SEEDLINGS & TRANSPLANTS

Fall 2005 - Spring 2006 (Partial Listing)

SPRUCE VARIETIES	Age	Size	Per 100	Per 1000
<b>Colorado Blue Spruce (picea pungens glauca)</b> Zones 2-7				
3 yr. seedlings	3-0	8-16"	48.00	240.00
4 yr. seedlings	4-0	14-22"	56.00	280.00
• 5 yr. transplants*	2-3	10-18"	160.00	800.00
6 yr. transplants*	3-3	16-24"	200.00	1,000.00
<b>Norway Spruce (picea abies)</b> Zones 2-7				
3 yr. seedlings	3-0	10-18"	50.00	250.00
4 yr. transplants	2-2	10-18"	170.00	850.00
• 5 yr. transplants*	2-3	14-24"	195.00	975.00
<b>Black Hills Spruce (picea glauca var. densata)</b> Zones 2-6				
3 yr. seedlings	3-0	5-10"	55.00	275.00
4 yr. transplants	2-2	6-12"	140.00	700.00
<b>Engelmann Spruce (picea engelmannii)</b> Zones 2-7				
3 yr. seedlings	3-0	6-12"	50.00	250.00
<b>Serbian Spruce (picea omorika)</b> Zones 4-7				
3 yr. seedlings	3-0	7-14"	70.00	350.00
4 yr. seedlings	4-0	8-16"	85.00	425.00
5 yr. transplants*	3-2	12-20"	190.00	950.00
<b>Meyer Spruce (picea meyeri)</b> Zones 2-7				
3 yr. seedlings	3-0	5-10"	75.00	375.00
4 yr. transplants	2-2	5-10"	160.00	800.00
<b>White Spruce (picea glauca)</b> Zones 4-7				
3 yr. seedlings	3-0	8-16"	50.00	250.00
• 4 yr. transplants	2-2	8-16"	140.00	700.00
FIR VARIETIES	Age	Size	Per 100	Per 1000
<b>Fraser Fir (abies fraseri)</b> Zones 4-7				
3 yr. seedlings	3-0	5-10"	60.00	300.00
• 4 yr. transplants	2-2	7-14"	170.00	850.00
5 yr. transplants*	2-3	8-16"	180.00	900.00
<b>Fraser Fir (Ayers Seed Orchard)</b> Zones 4-7				
3 yr. seedlings	3-0	5-10"	65.00	325.00
• 4 yr. transplants	2-2	8-15"	180.00	900.00
<b>Balsam Fir (abies balsamea)</b> Zones 3-6				
3 yr. seedlings	3-0	4-9"	40.00	200.00
<b>Concolor Fir (abies concolor)</b> Zones 3-7				
3 yr. seedlings	3-0	8-16"	70.00	350.00
4 yr. seedlings	4-0	12-20"	80.00	400.00
4 yr. transplants	2-2	5-10"	175.00	875.00
<b>Canaan Fir (abies balsamea phanerolepis)</b> Zones 4-7				
3 yr. seedlings	3-0	5-10"	70.00	350.00
4 yr. transplants	2-2	7-14"	170.00	850.00
• 5 yr. transplants*	2-3	10-18"	190.00	950.00
<b>Douglas Fir (Lincoln N.F. New Mexico)</b> Zones 4-6				
2 yr. seedlings	2-0	10-15"	50.00	250.00
4 yr. transplants	2-2	8-16"	165.00	825.00
5 yr. transplants*	2-3	20-30"	210.00	1,050.00
<b>Douglas Fir (Clearwater N.F. Idaho)</b> Zones 4-6				
3 yr. seedlings	3-0	10-18"	70.00	350.00

<b>Douglas Fir (Shuswap Lake Region, B.C.)</b> Zones 4-6				
3 yr. seedlings	3-0	10-18"	70.00	350.00
SCOTCH PINE (HYBRIDS)	Age	Size	Per 100	Per 1000
<b>Scotch Pine (Lake Superior Blue II®)</b> Zones 5-8				
2 yr. seedlings	2-0	5-10"	50.00	250.00
3 yr. seedlings	3-0	12-20"	70.00	350.00
OTHER SCOTCH PINE VARIETIES	Age	Size	Per 100	Per 1000
<b>Scotch Pine (East Anglia)-New!</b> Zones 2-8				
2 yr. seedlings	2-0	5-10"	45.00	225.00
<b>Scotch Pine (Belgium)</b> Zones 2-8				
2 yr. seedlings	2-0	6-12"	45.00	225.00
<b>Scotch Pine (French Highland)</b> Zones 2-8				
2 yr. seedlings	2-0	3-7"	40.00	200.00
3 yr. seedlings	3-0	12-20"	65.00	325.00
<b>Scotch Pine (Spanish Guadarrama)</b> Zones 5-8				
3 yr. seedlings	3-0	12-20"	65.00	325.00
PINE VARIETIES	Age	Size	Per 100	Per 1000
<b>Eastern White Pine (Northern Seed Source)</b> Zones 3-8				
3 yr. seedlings	3-0	5-10"	60.00	300.00
• 4 yr. transplants	2-2	8-15"	155.00	775.00
5 yr. transplants*	2-3	14-28"	180.00	900.00
<b>Eastern White Pine (Southern Seed Source)</b> Zones 3-8				
3 yr. seedlings	3-0	5-10"	62.00	310.00
• 4 yr. transplants	2-2	8-16"	165.00	825.00
<b>American Red Pine (pinus resinosa)</b> Zones 2-6				
3 yr. seedlings	3-0	8-16"	70.00	350.00
5 yr. transplants*	2-3	14-24"	190.00	950.00
<b>Austrian Pine (pinus nigra)</b> Zones 4-8				
3 yr. seedlings	3-0	10-18"	60.00	300.00
<b>Austrian Pine (Pal Select)</b> Zones 4-8				
2 yr. seedlings	2-0	4-7"	45.00	225.00
OTHER VARIETIES	Age	Size	Per 100	Per 1000
<b>American Arborvitae (thuja occidentalis)</b> Zones 4-6				
3 yr. seedlings	3-0	6-12"	70.00	350.00
<b>Canadian Hemlock (tsuga canadensis)</b> Zones 3-7				
3 yr. seedlings	3-0	6-12"	70.00	350.00
4 yr. seedlings	4-0	14-22"	90.00	450.00
• 5 yr. transplants*	2-3	14-24"	190.00	950.00
6 yr. transplants*	3-3	20-30"	240.00	1,200.00

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## Research Report

*continued from page 4*

"Our goal is to have a Christmas tree species that has all the attributes consumers like and that can be produced in this part of the state," Newton said. "We're using two different approaches to accomplish the same thing. With Fraser fir, we are interested in providing resistance to drought and phytophthora, a root-rot disease, and we're interested in bringing in some new species that might tolerate the environment and increase North Carolina's share of the national market."

Those species so far have included the Nordmann fir, Turkish fir, Momi fir, Canaan fir and balsam fir.

"We're excited because there are some possibilities with those species, particularly the Nordmann, because the Nordmann has characteristics similar to the Fraser fir," Newton said. Those characteristics include soft needles, a pleasing A shape, strong branches and good needle and moisture retention. "Nordmann is one of the primary Christmas tree species in Europe, particularly in Denmark and the Netherlands," Newton said.

So far, the Nordmann has proven most resistant to heat and dry conditions. Tests are under way to figure out just what it

would need to prosper in this region. Considerations such as the amount of water and fertilizer required are important in determining if the trees can be grown profitably.

### Developing a Winner

While researchers look for alternative trees, they have not given up on the Fraser. Genetic engineering might be the key to developing a fir that can take the heat and fight disease.

"If you're very selective, you can bring in genes to provide resistance to environmental stress or disease," Newton said. "We have isolated genes from other trees that are induced by drought. We can tell that these genes are very effective when the tree is experiencing drought stress."

The Aleppo pine of Israel, for example, is a drought-tolerant species that could provide a gene to boost the Fraser's resistance to hot, dry weather. The Fraser has other enemies, such as fungi and insects, that could also be fought with genetic engineering. That would be a great help to the industry, according to Linda Gragg, executive director of the N. C. Christmas Tree Association, which is based in the western part of the state, where large areas of native trees have

been devastated by the phytophthora fungus.

"Just a deer walking across where phytophthora is will spread it from one field to another," Gragg said. "It is that easy to transfer."

Genetically modifying plants is not new. Researchers at Cornell University created a variety of papaya tree that resists a virus that threatened to destroy the industry in Hawaii. Cotton and other crops are made to resist a herbicide that kills off the weeds around them. Newton hopes to accomplish similar transformations with the Fraser fir, but the research still has a way to go.

"There are genes out there that would be effective against insects and drought," Newton said. "We've isolated the genes so we actually have the DNA, but we're not sure exactly how those genes work. Pine trees can have thousands of genes. We don't really know all their functions."

### The Clone Wars

Getting the right tree is only half the battle. Scientists must also consider effective propagation techniques to produce enough baby trees for research and to start an industry.

"It takes trees a long time to produce cones and seed, three to

*continued on page 12*



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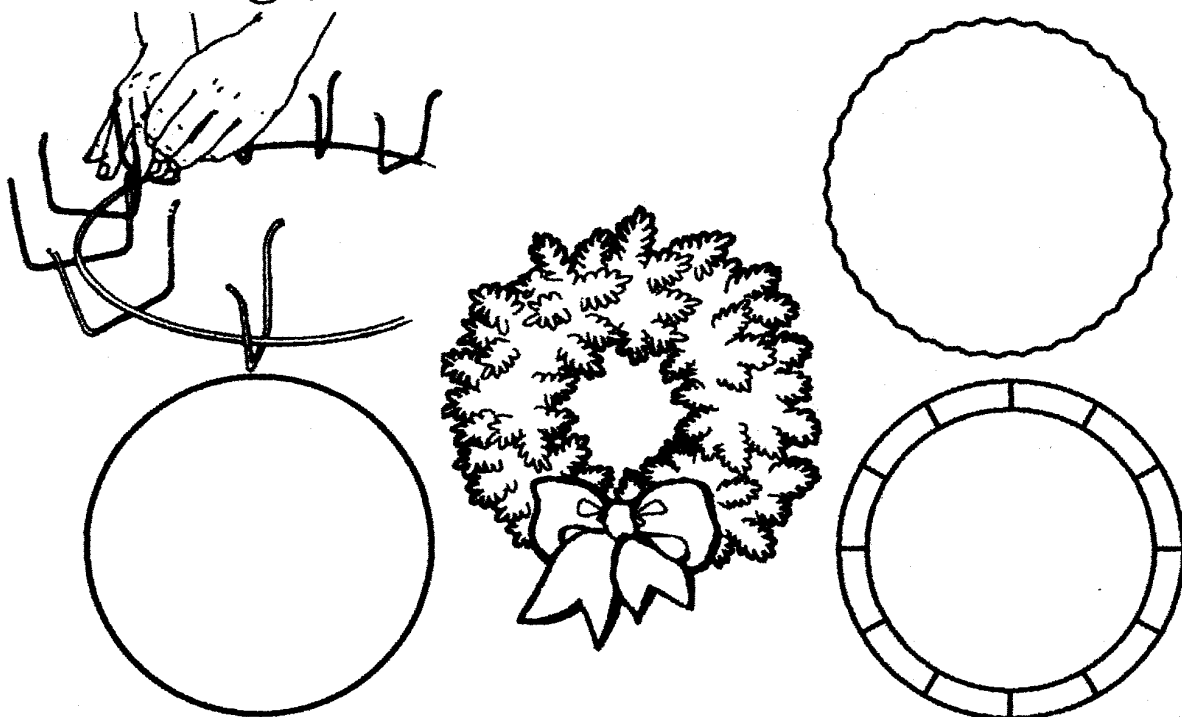
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## Research Report

*continued from page 10*

five years in most cases. That's a long time to wait," said Newton, who points to cloning as a much faster way of creating a supply of plants for the lab or the field. Once a technique for clonal propagation is developed for each species, commercial labs can create thousands of trees from the genetic material of one.

But it hasn't been easy; fir trees have proven terribly difficult to clone. "We've been working on it for four summers," Newton said. "We're tenacious — and perhaps stupid — but we're going to continue to do it. Fraser fir in particular has been very tough to work with, but we feel like we've cracked the problem with Fraser. But with Nordmann, contamination still seems to be a problem for us."

The contamination comes from microbes on the seeds scientists are working with. They are cloning the trees by embryogene-

sis, a process by which a callus (a mass of undifferentiated cells) is formed from the embryonic tissues in the seeds. Tiny but complete plants form on the surface of the callus where they can be harvested and nurtured into what most people would recognize as seedlings but are called plantlets because they don't come from seeds. During this process, the microbes gain access to plant tissue they normally wouldn't in the wild, and they usually kill the plant. Faculty and students are trying dozens of techniques to sterilize the seeds.

"It's been very frustrating, almost embarrassing," Newton said. "We thought we could make some real progress, but we've spent a lot of time trying to get rid of microorganisms."

### Frankentrees?

Newton is well aware that cloning and genetic engineering

are technologies that can make people nervous.

"Consumers are going to accept a tree that is based on traditional genetics, where you take the pollen of one tree and place it on another. But some consumers may not like the idea of your taking a gene from bacteria and putting it into a Christmas tree," he said.

Newton is just as concerned, but more optimistic about the promise of genetically engineered trees.

"Is it going to happen? Yeah, it's going to happen," he said. "It's the kind of research that we have to do. We have a gene now that we could use to make trees more efficient users of nitrogen. If we can do that, we can perhaps enhance growth. It can take 10, 11, 12 years to produce a 6-foot Fraser fir. If we can cut off a couple of years, that's money in the pocket of the grower.

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