

United States
Department of
Agriculture

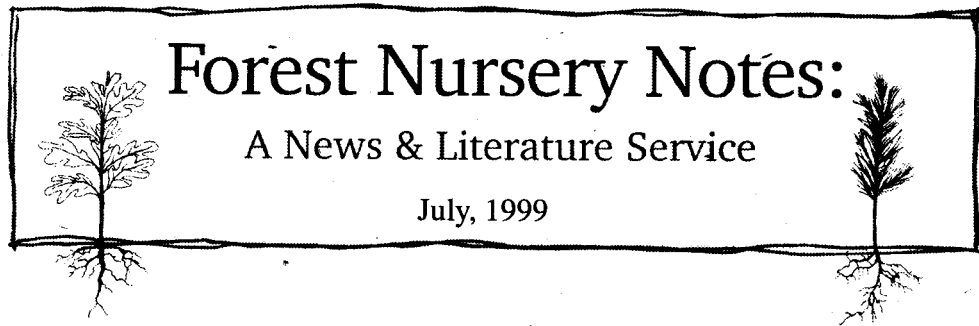
Forest Service

Pacific Northwest
Region

State and Private
Forestry

Cooperative
Programs

R6-CP-TP-03-99



Changing Format

"There is nothing permanent except change" - Heraclitus (c.480 BC)

I hope that I haven't confused you too much with the changes that have been occurring with FNN. As you know, loss in personnel and time constraints have raised havoc with most of my programs. There will continue to be two issues

of FNN per year in January and July, but the format of FNN will continue to change over the next few years. However, the goal will remain the same - providing a source of nursery news and literature.

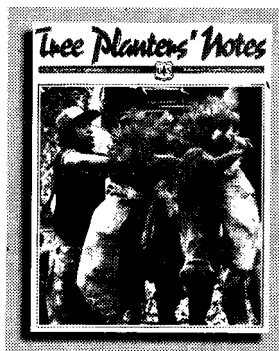
Nursery News

Forest Nursery Notes is a Technology Transfer Service of the USDA Forestry Service, State and Private Forestry:

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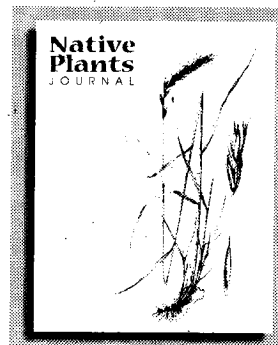
Lisa A. DeCoster- Layout

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The major format change will be the elimination of the technical sections such as Cultural Perspectives. Because FNN is an informal newsletter that is not stored in a library

retrievable format, we decided to funnel my technical articles into our journals. For example, I will continue the mineral nutrition series with an article "Micronutrients-Copper" in the next issue of Tree Planters' Notes (TPN). TPN has been around for almost 50 years and we are continually working to improve it. There will be 3 volumes per year: two containing the usual technical articles and the third will be a special issue dedicated to information and statistics on tree planting, timber stand improvement, and nursery production for the US. This information used to be a separate annual report called "Tree Planting in the United States". At only \$10 per year, TPN is a real bargain. I've included an subscription form at the back of this issue which includes a section soliciting ideas for future articles.



In the last FNN issue, I mentioned that we are starting a new periodical called the Native Plants Journal (NPJ). NPJ is a cooperative project of the USDA Forest Service, USDA Agricultural

Research Service, USDA Natural Resources Conservation Service, and the Forest Research Nursery at the University of Idaho. We decided to start this new journal because of the recent surge in interest in the propagation and use of native plants, and to balance the fact that TPN was perceived as pertaining only to trees. NPJ will be oriented to people who grow and use native plants and will have a practical, easy-to-read format consisting of both peer-reviewed and general interest articles. The first issue is scheduled for January, 2000 and it will contain a wide variety of articles on both a 'species and geographical basis. See the complete list on the order form in the back of this issue. The Forest Service will be purchasing a supply of the first issue and future ones will be only \$30 per year. So, send in the subscription form now to receive your complimentary copy. You can submit your ideas for future articles on the bottom half of the

Nursery Directories

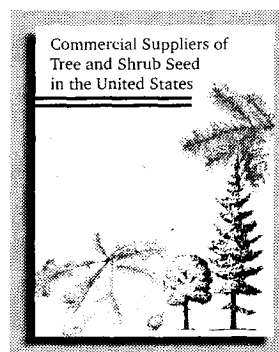
One of the functions of the federal government is to promote networking. In the past, the Forest Service has done this by publishing nursery directories such as the Directory of Forest and Conservation Nurseries in the United States (1994), the Pacific Northwest Nursery Directory and Report (1997), and Commercial Suppliers of Tree and Shrub Seed in the United States (1999). While these directories were extremely popular,

they were also a lot of work and again, due to downsizing, we just don't have the time or people to keep them current. So, for now on, we will be maintaining three directories on our home page of the WWW: << http://willow.ncfes.umn.edu/snti/pubs/dir_echp.htm >>



This directory is organized by state and contains the latest addresses and production information for forest and conservation nurseries on a state-by-state basis. For those nurseries that have them, links to E-MAIL addresses and WWW home pages are also provided. Ownership category, type of nursery (container vs. bareroot), and current and potential seedling distribution are included. One

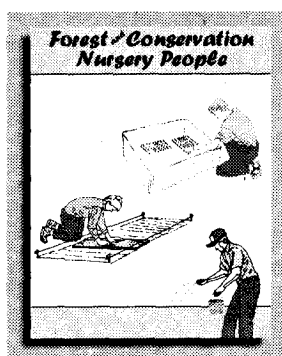
recent addition is a link to the web site for nurseries in Canada. By its very nature, directory information is constantly changing and keeping them current is a challenge. So we need your help. Telephone area codes are particularly hard to keep current because of the explosion in cellular telephones. Please send us your latest address and production information and we'll get you on-line.



This directory provides a list of vendors of tree and shrub seed for the US. The directory starts with some basic information on seed quality and other considerations and then is followed by addresses and telephone and fax numbers. Services supplied by each vendor is also included along with an alphabetical list of all the tree and shrub seed sold in the US and common plant names. Again, much of this information is

already out-of-date so please contact the National Tree Seed Laboratory if you'd like to add your name or update your listing:

National Tree Seed Laboratory
Rt 1, Box 182B
Dry Branch, Georgia 31020-9696
Telephone: 912.751.3551
Fax: 912.75.1.3554
E-MAIL.: seedlab@ix.netcom.com



We are just in the process of revising this directory. In the past, it was a hodge-podge of people and organizations but I've decided to replace it with an alphabetical listing of the FNN mailing list. It contains over 1,500 listings of people who work in the forest and conservation nursery field from around the world. I maintain the directory as a Microsoft Excel spreadsheet and constantly update it with the

information you submit on the Literature Order Form in each FNN issue. So, if you'd like to be added to the directory or just update your listing just fill out and return the Form in the back of this issue. People often ask me for copies of my mailing list, so we've arranged it so that you can download the file on our home page.

Meetings and Workshops

The **Joint Meeting of the Northeastern and Western Forest and Conservation Nursery Associations** will be held at the Gateway Conference Center in Ames, IA on **July 12-15, 1999**. Our hosts this year are the Iowa Department of Natural Resources, Cascade Forestry Nursery, and the USDA Forest Service. The meeting theme will be "Nursery Challenges for the New Millennium". Morning technical sessions will be followed by afternoon tours of the Pioneer Seed Biotechnology Labs, the Bear Creek Riparian Buffer Project area, as well as the Iowa DNR nursery.

Iowa DNR, State Forest Nursery
2404 S. Duff Avenue
Ames, IA 50010 USA
TEL: 800.865.2477 or
515.233.1161
FAX: 515.233.1131

The **IUFRO Working Party S7.03.04 - Diseases and Insects in Forest Nurseries**, will have its 4th meeting in Finland **July 25-28, 1999**. The title of the conference is "Progress in the scientific understanding of the problematic to produce healthy forest seedlings" and will include technical presentations and trips to nurseries, field stations. Our hosts are the Suonenjoki Research Station which is located in the middle part of Finland and specializes in nursery research and forest regeneration. For more information, contact Arja Lilja or visit the informative worldwide web site:

Arja Lilja
Finnish Forest Research Institute
PO. Box 18
01301 Vantaa,
FINLAND
E-MAIL: arja.lilja@metla.fi
WEB: <http://www.metla.fi/iufro/wu70304/meeting.htm>

The 18th annual **Nursery Pathology Workshop** will be held in conjunction with the joint meeting of the Western International Forest Insect and Disease Work Conferences on **Sept. 13-16, 1999** in Breckenridge, CO. This informal workshop is an excellent forum to catch-up on the latest nursery pest news, projects, and concerns. The full agenda and local information can be accessed on the following and you can register on-line. Contact Ellen Goheen if you want to register by mail:

Ellen Goheen
USDA-FS, SWORFIDSC
J. Herbert Stone Nursery
2606 Old Stage Road
Central Point, OR 97502
TEL: 541.858.6100
FAX: 541.858.6110
E-MAIL: Goheen_Ellen_M/r6pnw_rogue@fs.fed.us WEB:

www.fs.fed.us/foresthealth/technology/combine1999

The **Longleaf Pine Container Production Workshop** will be held on **Sept. 22-23, 1999** in Jesup, GA. Seed propagation in containers has been extremely successful for this important tree species and this workshop is the first attempt to share information in an informal setting. The technical sessions will cover: Getting Started, Nursery Culture, Preparation for Planting & Planting Recommendations, Panel on Problems and Successes, and Business Operations. A tour to several container nursery operations will round out the workshop. For more information, contact:

George Hernandez
Cooperative Forestry (850S)
USDA Forest Service
1720 Peachtree Rd., NW
Atlanta, GA 30367
USA
TEL: 404.347.3554
FAX: 404.347.2776
E-MAIL: gghernand/r8@fs.fed.us

The **National Society for Ecological Restoration Conference** will be held from **Sept 23-25, 1999** on the Presidio of the Golden Gate National Recreation Area (GGNRA). The meeting theme will be "Reweaving the World" and workshops will cover a wide range of restoration topics including a session on nursery practices. If you would like to have more information on the general meeting, contact:

Society for Ecological Restoration
1207 Seminole Highway, Suite B
Madison, WI 53711
USA
TEL: 608.262.9547
FAX: 608.265.8557
E-MAIL:
ser@vms2.macc.wisc.edu
WEB: www.sercal.org/ser99.htm

As part of the Conference, Betty Young is organizing a tour and hands-on training of the GGNRA Presidio Nursery as well as seed collecting hike on Saturday. If you'd like more information, you can contact Betty at:

Betty Young
Building 1064, Fort Cronkhite
Sausalito, CA 94965
TEL: 415.331.6917
FAX: 415.331.7521
E-MAIL: youngbetty@aol.com

The 19th meeting of the **Forest Nursery Association of British Columbia (FNABC)** will be held at the Coast Plaza Suite Hotel in Vancouver, BC, CANADA on **Sept 27-30, 1999**. The theme for the meeting is "The Seedling Triangle" and features technical sessions on Seed Upgrading and Use, Root Zone Ecology, Computer Climate Control, and Stocktype Performance and Micro-site Selection. These morning sessions will be enhanced by afternoon field trips to local nurseries, nursery-related industries, and local tourist attractions. Full registration packages will be mailed in early July but you might want to reserve your rooms now (TEL: 800.663.1144; FAX: 604.688.5934). For the latest information, contact David Trotter at:

Nursery Extension Services
Ministry Of Forests
14275 - 96th Avenue
Surrey, BC V3V 7Z2
CANADA
TEL: 604.930.3302
FAX: 604.775.1288
E-MAIL: dave.trotter@gems4.gov.bc.ca

On **September 28-30, 1999**, the Auburn University School of Forestry and the Southern Forest Nursery Management Cooperative are hosting a meeting of the **RIFRO Research Group 3.02.00: Operational Methods in the Establishment and Treatment of Stands**. The focus topic for this international meeting will be "The Interaction between Nursery Management and Silvicultural Operations". This meeting will provide a forum for discussing how nursery practices such as spacing, fertility, and undercutting, affect outplanting performance and how such practices affect site preparation activities. For more information, contact:

Ken McNabb, Co-Chairman
IUFRO Research Group 3.02.00
Auburn University
School of Forestry
M. White Smith Hall, Rm. 108
Auburn University, AL 36849-5418
USA
TEL: 334.844.1044
FAX: 334.844.1084
E-MAIL: mcnabb@forestry.auburn.edu
WEB: <http://sofserv.forestry.auburn.edu/sfnmc/iufro.html>

Growers are encouraged to send employees responsible for pest management to the **IR-4 nursery & floral workshop** which is being held on **Oct. 18-21, 1999** in Portland, OR. IR-4 is a cooperative government-land grant university-industry partnership that seeks pesticide registry for minor-crop production, and the purpose of this workshop is to review pest management needs and to prioritize IR-4 work for the year 2000. Growers, researchers, extension personnel and crop protection company representatives generally participate in the workshops. Contact Ray Frank for more information:

J. Ray Frank
IR-4
6916 Boyers Mill Road
New Market, MD 21774
USA
TEL: 301.898.5332
FAX: 301.898.5937

The annual international research conference on **Methyl Bromide Alternatives and Emissions Reductions** will be held on **November 1-4, 1999** at the Doubletree Mission Valley Hotel in San Diego, CA. This annual meeting, which is sponsored by the Methyl Bromide Alternatives Outreach committee, is the best way to keep up with what's new on this controversial issue. We are looking for good representation of forestry related topics, including economic consequences of the methyl bromide phase out which is now scheduled for 2005 instead of 2001. The conference objective includes sharing of information and technology transfer and is not strictly a research conference. More information and registration material can be found at their web site. If you have questions you can contact:

Stan Barras
Forest Pathology Research
USDA Forest Service (1CEN)
PO. Box 96090
Washington, DC 20090-6090
TEL: 202.205.1528 or 202.205.1561
FAX: 202.205.6207 or 202.205.2497
E-MAIL: sbarras/wo@fs.fed.us
WEB: << www.eps.gov/ozone/mbr/altmet99.html >>

The **Southern Forest Nursery Association** will be held the week of **June 27-30, 2000** at the Adams Mark Hotel in historical downtown Mobile, AL. The technical agenda is still being developed so, if you would like to give a presentation or have a subject that you would like to have discussed, give me a call. Besides the technical sessions, we will be touring the E.A. Hauss Nursery in Atmore and the Nielson Seed Processing Company in Evergreen, AL. A dinner party aboard the paddle boat Cotton Blossom in Mobile Bay is also planned. Sounds like a great meeting, so contact Renea Black if you would like to get on the mailing list:

Renea Black
Sales Coordinator
Alabama Forestry Commission
4165 Ross Road
Atmore, AL 36502
USA
TEL: 334.368.4854
FAX: 334.368.8624
E-MAIL: hauss@frontiemet.net

The **Western Forest and Conservation Nursery Association (WFCNA)** meeting will be held at the King Kamehameha Hotel in Kona, HI on **August 21-25, 2000**. As is our tradition, the meeting will consist of morning technical sessions followed by afternoon field trips. Please let me know if

you'd like to make a presentation as we're still working on the agenda. What better way to celebrate the new millennium than to visit Hawaii - besides all your computers will be down anyway!! Contact me for the latest information.

International Plant Propagators' Society (EPPS) meetings always cover a wide range of basic plant propagation

concepts, techniques, and technologies, and are an excellent opportunity to expand your horticultural horizons. Currently, the Society has eight regions and the IPPS home page (see following Table) contains a wealth of information on these meetings and how to join the organization. Or, you can contact me for more details.

IPPS Region	1999 Meeting Dates	Location	Web Location
Australian	May	Launceston -	http://www.accessone.com/ipps
Eastern	Sept. 15 - 18	Minneapolis, MN	http://www.accessone.com/ipps/er-usa/meeting.htm
Great Britain & Ireland	August 31 - Sept. 3	West Midland, Wales	http://www.accessone.com/ipps
Japan	October	To be Announce	http://www.accessone.com/ipps/nzreg99-.htm
New Zealand	April 29 - May 2	Invercargill, Southland	http://www.accessone.com/ipps
Scandinavia	September 23 -24	Copenhagen	http://www.acce-ssone.com/ipps
South Africa	March 25 - 26	Pretoria	http://www.accessone.com/ipps
Southern	October 2 - 6	Mobile, AL	http://www.accessone.com/ipps
Western	October 13 - 16	Wilsonville, OR	http://www.rippingale.com/wr99

EQUIPMENT, PRODUCTS, AND SERVICES

The purpose of this section is to make readers aware of new equipment, products, or services that might help them in their work. All trade names mentioned are used for the information and convenience of the reader, and so not imply endorsement or preferential treatment by the author or the USDA Forest Service.

Timing of mycorrhizal inoculation—I frequently get asked my opinion on the need for inoculating seedlings with mycorrhizal fungi. Mycorrhizae has been a popular topic in nurseries for many years and there seems to be a variety of opinions. Some "true believers" feel that mycorrhizae are essential for all phases of nursery culture as well as outplanting whereas others are more skeptical. My own position is somewhere in-between.

Most nursery managers are either unsure about whether their seedlings have mycorrhizae or have no idea of which organisms are involved. A mycorrhiza is the anatomical structure resulting from the symbiotic association between a plant root and a fungus. There are two main types that are distinguished by their morphology: ectomycorrhizae (ECM) and endomycorrhizae—which are more correctly known as vesicular-arbuscular mycorrhizae (VAM). What type is present at a nursery will depend on what species of

seedlings are being grown. ECM are the mycorrhizae that are most often noticed in forest and conservation nurseries because of their mushroom fruiting bodies or the colored sheath of fungal hyphae with surrounding mycelia can be seen with a hand lens on the short feeder roots (Figure 1).

When considering inoculation with mycorrhizal fungi, growers should think about what they hope to gain. The benefits of mycorrhizae can be separated into nursery effects and outplanting effects. The experience at many nurseries has been that high-quality crops can be grown without mycorrhizal inoculation because the nursery environment supplies all the growth requirements of a seedling. The other major nursery benefit of mycorrhizae is protection against root pathogens but, with a sterile growing medium and containers, these pests should not be much of a problem in container nurseries. In bareroot nurseries, however, mycorrhizal can protect against fungal pests. One of the most widely advertised benefits of mycorrhizae is increased survival and growth on afforestation sites. And, of course, one of the most important benefits is from a marketing standpoint because seedlings with well-developed mycorrhizae are widely considered to be high-quality nursery stock.

The most recent development in the field of mycorrhizae has been how and when to inoculate. ECM fungal spores can be applied to seeds before sowing, or vegetative inoculum of ECM or VAM fungi can be incorporated into soil or growing media before the crop is sown. ECM fungal spores can also be applied in a water suspension either by hand, or through the existing irrigation system starting as soon as seedlings have enough roots

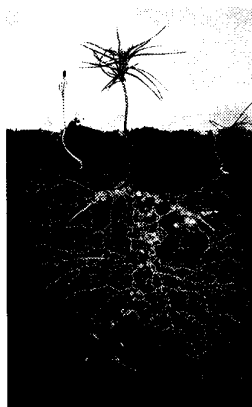


Figure 1

for successful colonization. Many nursery cultural practices, especially high fertilization rates, inhibit development of mycorrhizae and so inoculating during the hardening phase with its lower N fertilization has some merit. The drawback is that roots may already be infected with other mycorrhizal fungi, especially the ubiquitous *T. terrestris*, which thrives in the nursery environment.

If you'd like to try some inoculum in your nursery, I've prepared a listing of the current sources of mycorrhizal inoculum (Table 1). Note that they vary in what type of fungi they contain. Some products contain ECM or VAM fungi, some have a single species, and some are mixtures. Another notable difference is

the formulation. All the current products involve spores which can be in granular, tablets, liquid or packet formulations. Finally, the method and timing of application varies considerably. As previously mentioned, make sure the application timing corresponds to your reasons for inoculating in the first place. If you are primarily interested in outplanting effects, then a root dip application might make more sense than an incorporation into the soil or growing medium. As with all such listings, I'm sure that there are some products that I've missed or some of the information may have changed. Let me know and, if possible, we will upload this information onto our home page and try to keep it current.

Table 1—Commercial sources of mycorrhizal fungi for inoculating seedlings

Product	Type of Mycorrhizal Fungi ¹	Type of Inoculum	Method and timing of Application
Biogrow Tree Tabs PO Box 108 West Linn, OR 97608 TEL: 503.638.4804 FAX: 503.638.2901	Mixture of 5 species of ECM fungi + enhancers	Spores in tablet form	Apply to soil or growing media during sowing, transplanting, or outplanting
Biogrow Blend? (Same as above)	Mixture of ECM fungi + enhancers	Spores in liquid form	Apply manually or inject into irrigation system
Bio/Organics? 3200 Corte Malpaso #107 Camarillo, CA 93012 TEL: 805.388.0910	Mixture of VAM fungi	Spores in granular form	Incorporate into soil or growing media during sowing or transplanting
Mycor-Pak RTI USA 875 Airport Road, #R Monterey, CA 94940 TEL: 800.784.4769 FAX: 408.372.6753 E-MAIL: neila@redshift.com WEB: http://www.reforest.com	VAM fungus	Spore pellets in packets	Apply to soil during outplanting
MycorTree? Root Dip Plant Health Care 440 William Pitt Way Pittsburgh, PA 15238	Mixture of ECM and VAM fungi + biostimulants	Spores in granular form	Making slurry and dip roots prior to transplanting or outplanting
VAM 80 Tree of Life Nursery 33201 Omega Highway PO Box 635 San Juan Capistrano, CA 92693 TEL: 714.728.0685 FAX: 714.728.0509 E-MAIL: tjohn@cosmoaccess.net WEB: www.mycorrhiza.com	VAM fungus	Spores in granular form	Incorporate into soil or growing media during sowing or transplanting
Forest Mycorrhizal Application PO Box 1181 Grants Pass, OR 97526 TEL: 541.476.3985 FAX: 541.476.1581 E-MAIL: info@mycorrhizae.com	Site specific ECM fungi	Spores in liquid form	Apply to nursery crops in irrigation or use as a root dip before outplanting

¹ECM = Ectomycorrhizae; VAM = vesicular-arbuscular mycorrhizae

CULTURAL TIPS

Miniplug transplants -In the past decade, there has been a steady increase in the demand for larger seedlings and transplants in particular. For example, in the Coast Range of Washington and Oregon where brush competition is intense, foresters are requesting large transplant stock - from 30 to 50 cm in height (12 to 18 in.) and 5 to 10 mm in caliper (0.2 to 0.4 in.). Several things have contributed to this trend. Burning restrictions have left more slash on outplanting sites where fewer mechanical and chemical site preparation options are available. In addition, because of environmental restrictions, foresters are using less herbicides for site preparation. The most important reason, however, is the fact that larger seedlings just grow faster. New "Free-to-Grow" reforestation standards have created a demand for larger stock that not only survive but will quickly outgrow vegetative competition.

This demand for larger transplants has significantly affected nursery production. In the 1986-1987 season, the Webster Forest Nursery of the Washington Department of Natural Resources sold 90% of their stock as 2+0 seedlings and only 10% as transplants. Ten years later, the ratio had changed dramatically to over 50% transplants and that trend shows no sign of changing.

Standard 1+1 and 2+1 bareroot transplants have been around for decades but a relatively new stocktype is being grown in forest and conservation nurseries-the miniplug transplant. "Miniplug + One" seedlings are popular with customers because a larger plant with a vigorous root system can be produced in much less time than other stocktypes (Table 2; Figure 2). Miniplug transplants combine the best of both container and bareroot propagation systems. Growing small volume miniplugs uses much less valuable bench space in greenhouses than standard-sized containers and several crops can be grown per season. Some nurseries are growing a second crop of miniplugs in addition to their normal crop. Transplanting container seedlings also optimizes space

efficiency in bareroot beds and produces the greater stem diameter and root systems of transplants (Table 2). Another benefit is that many nurseries do not have to fumigate their transplant beds, or at least not as often as seedbeds.

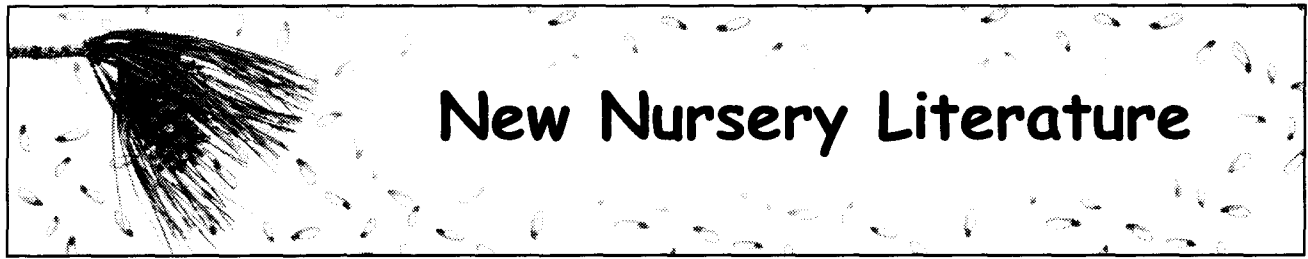
The procedure consists of sowing seeds into the miniplug containers and growing them for 2 to 4 months, depending on the propagation environment (Figure 2). Containers of around 1 in' in volume have been the most commonly-used size and both hard plastic and styrofoam containers are commercially available. A newer option is the Jiffy 18 mm peat pellet (15 cc expanded volume) which can be transplanted into a larger 50 mm pellet (250 cc expanded volume), or into a larger hard-sided container or bareroot bed. The advantage of using peat pellets is that they can be transplanted over a wider window than seedlings grown in standard containers because you don't need to wait for a firm root plug to develop.

Once the seedlings have become established in the miniplug containers, they can be extracted and transplanted into a bareroot bed or larger container. The stage of seedling development at the time of transplanting is very important because they must have a firm enough root plug to withstand handling but not so many roots that they will become deformed after transplanting. Again, the Jiffy plugs have an advantage because it is almost impossible to transplant them improperly. For bareroot transplants, the miniplugs are transplanted with standard equipment but is usually done by hand with container transplants. Growers have developed innovative tools, such as dibbles and spatulas to make the procedures easier and faster. Plug transplanting equipment has been used for flower and vegetable plugs for many years and is being modified for forest and conservation species. Beaver Plastics (TEL: 888.453.5961; FAX: 403.453.3955) has developed the Sprint Transplanter which automatically transplants miniplugs into their styroblocks.

Table 2—Miniplug transplants are large seedlings that can be produced in much less time than other stocktypes

Stocktype	Crop Cycle (yrs)	Shoot Height (cm)	Caliper (mm)
2 + 0 Seedling	2.0	37.0	5.4
1 + 1 Transplant	2.0	52.2	6.9
2 + 1 Transplant	3.0	51.9	7.4
Miniplug Transplant - Spring	1.0	20.6	4.3
Miniplug Transplant - Fall	1.5	47.0	7.6

Source: Hee and others (1988)



New Nursery Literature

This section contains a listing of all the latest published articles that I could find regarding forest and conservation nurseries. There are two basic categories of literature offered through this service: **Special Order Publications and Articles Available on the Literature Order Form.**

Special Order Publications

Special Orders (SO) are books or other publications that, because of their size or cost, require special handling. For some, the Forest Service has procured copies for free distribution, but others will have to be purchased. Prices and ordering instructions are given here, or following their listing in the New Nursery Literature section.

SO. Landis, T.D.; Tinus, R.W.; Barnett, J.P. 1999. **Seedling Propagation Vol. 6. The Container Tree Nursery Manual.** Agric. Handbk. 674. Washington, DC: U.S. Department of Agriculture, Forest Service. 165 p.

CONTENT: This softbound book contains four chapters: Crop Planning, Seed Propagation, Vegetative Propagation, and Seedling Development: The Establishment, Rapid Growth, and Hardening Phases. The previous five volumes of this series cover nursery establishment, propagation environments, equipment, and supplies and now Volume Six goes into the specifics of growing both commercial tree species as well as other native plants. Like the other volumes, the text is illustrated with numerous tables, line drawings, and color photographs.

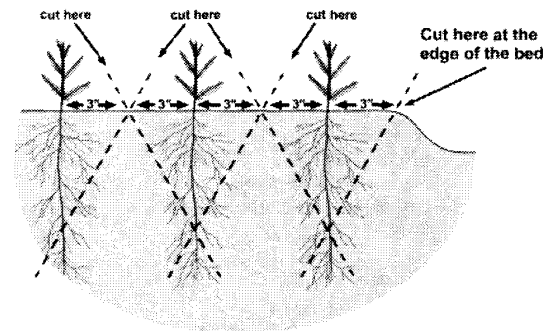
COST: One free copy to each person, while supplies last. Additional copies can be ordered from the US Government Bookstore for an as yet to be determined price - probably around \$30.

TO ORDER: Write #A on the Literature Order Form, or you can also order through the On-Line Publications section of our Reforestation, Nurseries, and Genetic Resources (RNCR) home page: << <http://willow.ncfes.umn.edu/snti/snti.htm> >>.

SO. Dumroese, R.K.; Landis, T.D.; Wenny, D.L. 1998. **Raising Forest Tree Seedlings at Home: Simple Methods for Growing Conifers of the Pacific Northwest From Seeds.** Moscow, ID: University of Idaho, Idaho Forest, Wildlife, and Range Experiment Station Contribution 860. 55p.

CONTENT: This publication, affectionately called The Beginners Nursery Manual, is a cooperative effort of the USDA Forest Service Cooperative Forestry Program and the University of Idaho. The manual provides basic, practical information for folks who wish to grow forest tree seedlings at home on a hobby level. Although focusing on conifers of the Pacific Northwest, the techniques presented will work with a variety of woody trees and shrubs. This would also be an invaluable aid for people thinking about starting their own nursery. The easy-to-read text is supplemented with plenty of figures (Fig. 3), and appendices provide more detailed and advanced information.

Figure 3—Directions for undercutting bareroot seedlings.



COST: Free, while supplies last.

TO ORDER: Write #B on the Literature Order Form, or you can also order through the On-Line Publications section of our Reforestation, Nurseries, and Genetic Resources (RNCR) home page: << <http://willow.ncfes.umn.edu/snti/snti.htm> >>.

SO. **National Proceedings: Forest and Conservation Nursery Associations -1998** Landis, T.D.; Barnett, J.P. tech. coord. 1999. General Technical Report. SRS-25. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station, 192 p.

CONTENT: This proceedings is a compilation of 43 papers that were presented at the three regional nursery meetings in 1998. The Southern Forest Nursery Association Conference was held in Lafayette, LA, on July 13-16; the Northeastern Forest Nursery Association Conference was held in Annapolis, MD, on July 27-30; and the Combined Forest Nursery Association of British Columbia/Western Forest and Conservation Nursery Association meeting was held on August 10-13 in Victoria, BC, Canada. The subject matter ranges from seed collection and processing, through nursery cultural practices, to harvesting, storage and outplanting.

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SO. Rose, R.; Haase, D.L. 1998. **Native Plants: Propagating and Planting**. Proceedings of Dec. 9-10 conference. Corvallis, OR: Oregon State University, Nursery Technology Cooperative. 182 p.

CONTENT: Proceedings includes 35 papers from speaker presentations and posters. Topics cover seed propagation, vegetative propagation, and native plant projects.

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The Northeast Regional Agricultural Engineering Service (NRAES) offers many useful publications that have application to forest and conservation nurseries. I have featured three that caught my eye but you might want to check their website for others:

SO. Bartok, J.W Jr. 1994. **Fertilizer and Manure Application Equipment**. Pub. No. NRAES-57. Ithaca, NY: Northeast Regional Agricultural Engineering Service. 23 p.

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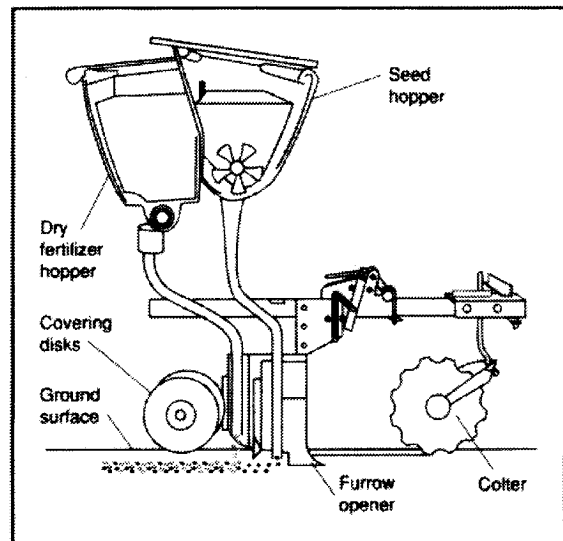
SO. Derksen, R.C. 1994. **Hydraulic Nozzles for Boom Sprayers**. Pub. No. FS-38. Ithaca, NY: Northeast Regional Agricultural Engineering Service. 6 p.

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CONTENT: These softbound pamphlets contains information on equipment selection and methods of application for dry chemicals, liquid fertilizers and pesticides, and manure. They have many excellent illustrations (Figure 4) and should be a useful addition to the nursery library.

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Figure 4—Fertilizer application at seeding. Source: *Fertilizer and Manure Application Equipment*.



SO. Baskin, C.C.; Baskin, J.M. 1998. **Seeds: ecology, biogeography, and evolution of dormancy and germination.** New York: Academic Press. 666 p.

CONTENT: This hardbound book discusses two of the most interesting aspects of seed biology: germination and dormancy. Relevant topics include types of dormancy, timing of germination, and the environmental factors that control germination in plant communities from the tropics to the arctic. Although it does not specifically cover nursery propagation, much of the information can be applied in forest and conservation nurseries especially those growing native plants.

COST: \$99.95

TO ORDER: From your local bookstore or one of the web sites.

The International Centre for Research in Agroforestry (ICRAF) has just published two volumes of a nursery manual series, entitled Good Tree Nursery Practices. Both manuals are written in plain English with background information as to why specific techniques are recommended. Illustrations and practical examples help reinforce the themes.

SO. **Practical Guidelines for Research Nurseries,** by Hannah Jaenicke, 93 pages.

CONTENT: This manual is targeted at scientists, nursery managers and managers of tree planting programs. Despite the central role of trees in agroforestry research, seedling quality is often neglected. However, without sufficient attention to

seedling quality, experiments may be canceled and long-term results may be confounded. Moderate investments in the improvement of nursery infrastructure can in most cases increase the scientific value of agroforestry experiments. The book covers seedling quality, containers, substrates, fertilizers, nursery and plant hygiene, nursery environment and facilities, and management and planning.

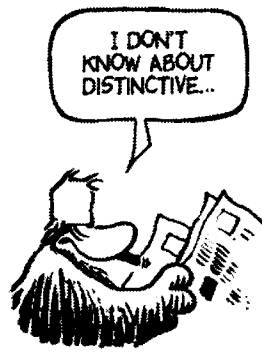
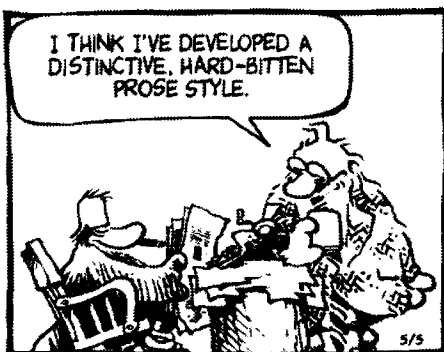
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CONTENT: This manual is targeted at extension staff, managers of tree planting projects, and leaders of community and group nurseries. While community tree planting programs are common, more attention is given to seedling quantity, rather than seedling quality. In order for these programs to succeed in the long term, the emphasis must change to quality. In this book the author does not spell out the A-Z on how to run a nursery, rather she focuses on how to adjust nutrients, light, and watering to achieve optimal plant development. Chapters on follow-up after planting, how to carry out simple nursery experiments, and natural pesticide recipes are included.

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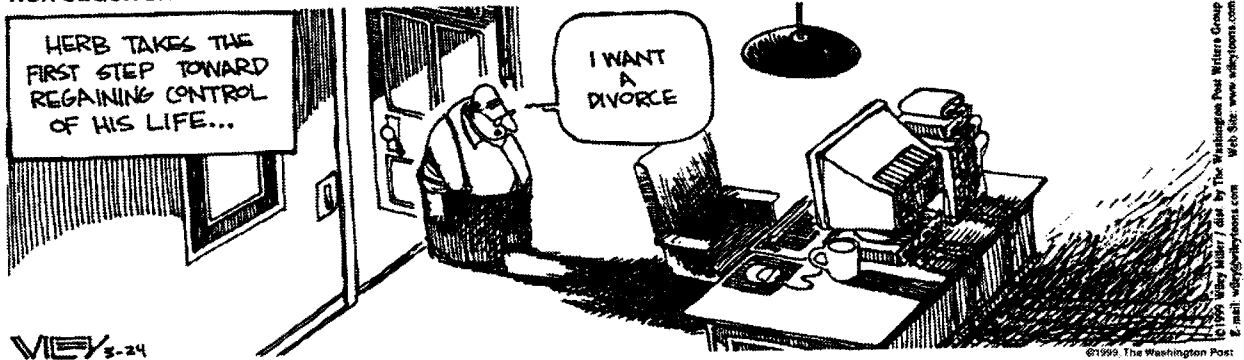
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