Summer Conference Planned for August 8 – 11
by Steve Lorenz

A history lesson was one of the orders of the day the last time the NOFA Summer Conference committee met, and it was that organically-evolving discussion which is foremost on my mind as I write this article for the wider NOFA Community. As with any yearly conference that has added and subtracted organizers from time to time, there are folks on the committee with varying NOFA conference experience, and thus a gap in understanding about how the conference has evolved over the years.

The germane fact for this context, and from which emerged one of our (in some cases, renewed) tasks, is that the Massachusetts chapter of NOFA has planned and hosted the summer event for the last 15 years. What this means is that maybe on some level this event has over the years taken on more of a Massachusetts flavor than a Northeast one, or it has been perceived that way. Although we at NOFA/Mass want to continue hosting this conference at Hampshire College, we want the event to fully reflect the contributions and unique talents of NOFA members from all seven states (and beyond). The goal is to continue to have an innovative, vital, and growing conference and that can only happen if every aspect of the conference reflects our entire geographic area.

In regard to the coming summer conference we hope to do this by using the talents of presenters from all 7 states, attracting more crafters and homesteaders to sell their wares during the Saturday afternoon Fair, having more demonstrators during the fair and throughout the weekend, giving farmers from all seven states the chance to sell their produce to us for the local-only meal, inviting the musically and dramatically inclined in our full NOFA community, and that can only happen if every aspect of the conference reflects our entire geographic area.

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Calling all organic farmers: Dre Rawlings is doing her best to put together a scrumptious “as local as we can get it” meal on Saturday evening. If you would like to sell your produce at market value to the NOFA conference for this purpose, and you’ll be able to deliver it to the conference site, please call Dre at (413) 628-0055 or email her at dre@chris@crocker.net.

Homesteaders, crafters, and others: Do you have homemade preserves, soaps, jewelry, herbal products, or other creations you’d like to sell? Sign up for a table at Saturday afternoon’s new and improved farmers’ and crafters’ market. We are also looking for people to demonstrate their craft. For more information, contact fair organizer Michael Faber at (413) 528-4387 or e-mail him at mfaber5@yahoo.com.

As you can tell, a very exciting conference is taking shape, and you’ll absolutely want to be a part of it. Those who are fans of Joel Salatin’s four books from Chelsea Green or are enticed by his pre-conference workshop series will want to return their registration forms as soon as they get them. The pre-conference, new this year, is titled “Plant/Animal Relationships in Food Production” and will immerse participants in all aspects of Salatin’s integrated systems approach to farming. The first 200 people to sign up will be treated to an 8-hour 2 part workshop on Thursday afternoon August 8th and Friday morning August 9th. It will require coming a day earlier, of course, but with the breadth of information to be covered it will be well worth it. Children’s activities will be planned for Thursday afternoon and Friday morning, standard Hampshire meals will be available for purchase, and Farmer Dan (Kaplan’s) band will entertain us Thursday evening. There will not be exhibits during the pre-conference, nor will there be a food court.

Although there has been and will continue to be considerable energy going into this inaugural pre-conference, those unable to attend the pre-conference will not be disappointed with the main event. First, as always, wonderful workshops await you. Second, Joel Salatin will be there for you, also. The author of the very popular Family Friendly Farming and other titles, he will deliver the keynote address on Friday night and conduct a marketing workshop on Saturday morning. After the lively look at...
Letters to the Editor

Dear Jack:

Your last issue was SUPERB! I especially enjoyed the article from your son in college. In fact I read every article this time around and really got caught up in the theme. I made copies of your son’s page and sent on to MY kids, who also had to work as they were growing up. I owned a travel agency for

(continued on page 3)

The Natural Farmer Needs You!

The Natural Farmer is the newspaper of the Northeast Organic Farming Association (NOFA). All members receive a subscription as part of their dues, and others may subscribe for $10 (in the US or $18 outside the US). It is published four times a year at 411 Sheldon Rd., Barre, MA 01005. The editors are Jack Kittredge and Julie Rawson, but most of the material is either written by members or summarized by us from information people send us.

Upcoming Issue Topics - We plan a year in advance so that folks who want to write on a topic can have a lot of lead time. The next 3 issues will be:

- Summer, 2002 - On-Farm Research
- Fall, 2002 - Organic Berries
- Winter, 2002-03 - Beginning Farmers

Moving or missed an issue? The Natural Farmer will not be forwarded by the post office, so you need to make sure your address is up-to-date if you move. You get your subscription to this paper in one of two ways. Direct subscribers who send us $10 are put on our data base here. These folks should send address changes to us. Most of you, however, get this paper as a NOFA member benefit for paying your chapter dues. Each quarter every NOFA chapter sends us address labels for their paid members, which we use to mail out the issue. We don’t keep copies of these, and if you moved or didn’t get the paper, your beef is with your state chapter, not us. Every issue we print an updated list of “NOFA Contacts” on the last page, for a handy reference to all the chapter names and addresses.

As a membership paper, we count on you for articles, art and graphics, news and interviews, photos on rural or organic themes, ads, letters, etc. Almost everybody has a special talent or knows someone who does. If you can’t write, find someone who can to interview you. We’d like to keep the paper lively and interesting to members, and we need your help to do it.

We appreciate a submission in any form, but are less likely to make mistakes with something typed than hand-written. To be a real gem, send it via electronic mail (JACKKITT@AOL.com) or enclose a computer disk (Macintosh or PC in Microsoft Word ideally). Also, any graphics, photos, charts, etc. you can enclose will almost certainly make your submission more readable and informative. If you have any ideas or questions, one of us is usually near the phone - (978) 355-2853, fax: (978) 355-4046

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Better Managing our Wooded Land

At the time of the first European settlement of this continent, great forests existed throughout the northeast. According to naturalist Robert Leverett, early accounts describe New England white pines towering 200 feet tall, black oaks with girths of over 30 feet, Ohio eastern sycamores 10 feet in diameter, and Appalachian Tulip Poplars rising 150 feet above the forest floor on trunks over 25 feet in circumference.

These trees were taken for ship masts and building lumber, cleared for farms, and often simply burned for charcoal and potash. The soils thus exposed were farmed and soon, without a resupply of organic matter and the complex living root zone biochemistry they were accustomed to, lost their accumulated fertility. The trees that had grown back in areas unsuited for agriculture were cut, again and again. Most NOFA farmers today have land in woodlots — often more acreage in woodlots than in crops. Traditionally these areas were used for cutting the farm’s annual cordwood supply. Many still serve this purpose. But forested areas also serve many other purposes on our farms: maintaining ecological diversity, keeping wilderness available to us for psychological and aesthetic satisfaction, using as recreational areas for hunting, fishing, hiking, etc., and harvesting sustainable crops of cordwood and lumber.

Agroforestry is the productive use of forested areas without cutting the trees. It can involve raising food or medicinal crops which grow well in understory shade, pasturing livestock in wooded areas, harvest- ing renewable products from trees (decorative cones, greens for wreaths, needles for bedding), or intercropping long-life timber with shorter-term saleable items.

In this issue of The Natural Farmer, we look at some of these ideas and people who are doing them. Since so much of our land in this region would naturally end up forested, we thought it made sense to look at uses for our land which are both compatible with this tendency and designed to return some income to the family living there and hoping to keep that land as a vital part of the farm. We hope you enjoy it and get some ideas for your own operation.

Advertise in The Natural Farmer

Advertisements not only bring in TNF revenue, which means less must come from membership dues, they also make a paper interesting and helpful to those looking for specific goods or services. We carry 2 kinds of ads:

The NOFA Exchange - this is a free bulletin board service for NOFA members and TNF subscribers. Send in up to 100 words (business or personal) and we’ll print it free in the next issue. Include a price (if selling) and an address or phone number so readers can contact you directly. If you’re not a NOFA member, you can still send in an ad - just send $5 along too! Send NOFA Exchange ads directly to The Natural Farmer, 411 Sheldon Rd., Barre, MA 01005 or (preferably) E-mail to JACKKITT@AOL.COM

Display Ads - this is for those offering products or services on a regular basis! You can get real attention with display ads. Send camera ready copy to Justine Johnson, 37 Cherry St, Easthampton, MA 01027 and enclose a check for the appropriate size. The sizes and rates are:

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Note: These prices are for camera ready copy. If you want any changes we will be glad to make them - or to type set a display ad for you - for $10 extra. Just send us

Display Ads with payment:

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Contact for Display Ads:

Contact for Display Ads: Send display ads with payment to our advertising manager, Justine Johnson at 37 Cherry St., Easthampton, MA 01027. If you have questions, or want to reserve space, contact Justine at (413) 527-1920 or johnsonlorenz@charter.net.

Disclaimer: The Natural Farmer cannot investigate the claims of advertisers and we don’t vouch for anything advertised here. Readers are expected to exercise due caution when inquiring about any product or service. Different NOFA chapters have different standards for fertilizers, for instance, and a product acceptable in one state may be prohibited in another. Please check with your chapter when in doubt. Remember, however, that advertisers are helping support the paper and, when appropriate, please support them.
twenty-five years while I was flying for TWA and my four kids ALL had a chance to ‘work the farm’ – altho it wasn’t a FARM. There was cleaning, brochure stamping, painting, minor electrical work (by my oldest, whom we have lost since to Hodgkins Disease at age 21), ticket delivery, promotions, phone answering, etc. Each of them earned quite a bit of college money over the years and each of them developed the WORK ETHIC that all your articles mention.

Nothing like a FAMILY BUSINESS to help get kids on the right track. The three of them now are all successful, married, families, and I can borrow money from any of them if need be…

Thanks again for the great bit of editing.

Jim Schmitt
Cream Ridge, NJ

Jack or Julie:
The current issue about farm families is truly outstanding! I commend you on presenting so many varied perspectives and situations. Keep up the great work!

Thank you,
Mark Hyde
Port Murray, NJ

Editor:
The Special Supplement on Farming and Families is excellent. I’m a psychic therapist part-time, activist enviro-person and parent of grown kids. That supplement should be read and studied far and wide.

Many Thanks,
Vera Cohen
Cambridge, MA

Dear Jack and Julie,
Thanks for your great efforts over the years with The Natural Farmer. You do a very impressive job. And thanks especially for your sharing in the Farm and Family section in the Winter issue. You hit a lot of notes that set up sympathetic vibrations here.

Bill Cleland,
W. Hartford, VT

Hello Jack

Your “Farming and the Family” package in the winter issue is simply fantastic! I read it cover-to-cover when it arrived just the other day. I want the rest of my family to read it, too.

Congratulations to both you and Julie, and all of your contributors.

You boldly go where few have dared to go before, with great style, compassion, humility and humanity that will serve your readers well.

Thank you!
George DeVault

Dear Jim, Mark, Vera, Bill and George,

Thanks for your kind words. Very much! Actually, though, I blush to admit that the whole thing was just an excuse to show off our family pictures!

I would like to take this opportunity, however, to admit a grievous error. In the last issue I forgot to include the name of the author of the article “The Life of an Early NOFA Pioneer”. It was, as many of you guessed, the one and only Joey Klein of Littlewood Farm in Plainfield, Vermont. Thanks, Joey and Betsy!

Jack

Dear Editor,
I love the Natural Farmer. As a second generation organic CSA farmer, I’m a loyal NOFA member. But I am perplexed by why The Natural Farmer never seems to print articles about what we can do to end farm subsidies. Every year the federal government gives approximately $17 billion (with a B) of our hard-earned taxpayer dollars to large, corporate chemical farms. The all-too-common, heart-breaking stories of struggle like those told by the small-scale organic farmers in the last issue of the Natural Farmer have their roots in farm subsidies. After all, how can organic farmers possibly compete with chemical farmers who get billions of dollars a year from our elected “representatives”?

As I write, there are thousands of organic farmers and consumers in the northeast fighting to end farm subsidies (see www.sustainableagriculture.net and www.ewg.org or call 845-744-8448) and the problem of money in politics that’s at the root of so many organic farmers’ economic woes (see www.publiccampaign.org), but you wouldn’t know it from reading The Natural Farmer. What gives?

Respectfully,
Eesha Williams
eeshaw@hotmail.com
member, NOFA-Vermont

Dear Eesha,

Thanks for writing. I haven’t really gotten much in the way of requests for dealing with farm subsidy issues. Mostly we have tried to keep the articles focused on education about organic farming methods and their practitioners. I try to run a page or two each issue about news of interest to organic farmers and their supporters. That might be an appropriate place to keep up to date with farm bill events.

But if you would like to write something explaining why farm subsidies are hurting the organic movement, I’d be glad to run it. It sounds like you have strong feelings on the issue and would do a good job explaining it!

Jack Kittredge
Thanksgiving Farm has 2 apprentice positions available for 2002. The apprenticeship runs April 1st through November and includes: $500 a month, small farm housing, stipend for produce, wood-fired breads, and a food allowance at our natural foods co-op market. The beautiful wilderness of the Catskill Mountains surrounds and NYC is only 2.5 hours away. An assistant manager position is also available. Those interested should have skills, dedication, and a resume detailing farm experience; comparable to a two-year and vocational training course. For information please contact us at: Seth Kroeck, Thanksgiving Farm CSA, Box 840 Bennema Rd., Harris, NY 12742 or 845.793.0093 or Farmers@dtc.org

Apprentice(s) Wanted Live and learn in the beautiful Berkshire Hills. Work with Ed Stockman, an agribiologist, with 30 years of experience as an organic vegetable and berry grower. The primary goal of the farm is to support Summit Farm, which is to have 1 or 2 apprentices per season personally experience every aspect from (seeding to sales) of managing a successful market garden operation. Summit farm needs 1 or 2 highly motivated and reliable persons for the 2002 growing season. Housing and an abundance of vegetables and berries are provided along with a stipend. A workweek of 40 hours which includes selling at a farmers’ market is key. Testimonial from previous apprentices are available upon request. More information contact Ed Stockman, Summit Farm, 1147 W. Main St., Plainfield, NY 10070 at 413-634-5024 or stockman@bfn.net

Looking for Assistant Farm Manager/Horticultural Therapist - for two acre certified organic farm, which is seeking an assistant farm manager. The farm is to have 1 or 2 apprentices per season personally experience every aspect (from seeding to sales) of managing a successful market garden operation. Summit Farm is to have 1 or 2 apprentices per season personally experience every aspect from (seeding to sales) of managing a successful market garden operation. Summit Farm needs 1 or 2 highly motivated and reliable persons for the 2002 growing season. Housing and an abundance of vegetables and berries are provided along with a stipend. A workweek of 40 hours which includes selling at a farmers’ market is key. Testimonial from previous apprentices are available upon request. More information contact Ed Stockman, Summit Farm, 1147 W. Main St., Plainfield, NY 10070 at 413-634-5024 or stockman@bfn.net

For over 30 years George Hall has been certified organic. The Natural Farmer Organic Farm, NOFA/MA certified, will grow your seeds in our solar greenhouses for you by the Farm at 117 Eliot Street (Rt 16) Natick, MA 01760. Non-certified organically grown Russian Banana Fingerling Potatoes for seed or table. 2001 harvest from certified seed stock. $2.80/ lb ($11.20 / 5 lb. bag) + shipping. Contact Lynda Simkins 508-655-2204 weekdays. Contact Lynda Simkins 508-655-2204 weekdays.

The Natick Community Organic Farm is seeking summer teachers to work alongside staff with our popular Summer Youth Work Program from mid June to late August. Flexible hours and a chance to work with area youth teaching the responsibilities of running an organic farm (livestock care, light carpentry, gardening and greenhouse work). For information contact Lynda Simkins at 508-655-2204 or stop by the Farm at 117 Eliot St (Rt 16) Natick, MA 01760. Non-certified organically grown Russian Banana Fingerling Potatoes for seed or table. 2001 harvest from certified seed stock. $2.80/ lb ($11.20 / 5 lb. bag) + shipping. Contact Lynda Simkins 508-655-2204 weekdays.

The New Haven Eco Project is seeking a 2002 season farm intern to learn the acre of vegetables, berries and animals. We are an environmental ed non-profit in New Haven, Connecticut, and we run a charter school for area high school students. The farm that the gardener produces feeds students, is used in educational programs, and is sold at the downtown farmers’ market. Housing and produce starting date negotiable. Stipend small also available. Please contact Leslie Chaison, NHEP (203) 277-2584, or lesliechaison@hotmail.com.

For Sale: Two Jersey bulls. Born 9/01, raised on Mom’s good grass. One is easy to handle and hay. Other is naturally polled, both are friendly and handled daily. $200 ea. or best offer. Call Jacqui at 978-874-0244.

For Sale:兼 Small organic farm seeks farm manager for 2002 season and beyond. Experienced organic farmer with farm management background, interested in helping non-profit environmental foundation integrate ecologically sustainable agricultural and education programs. Experienced in small scale greenhouse and wildlife and wilderness values in the eastern Adirondacks. Seeking individual(s)-possibly a couple-interested in helping build a human community that lives in harmony with the surrounding natural community. Assume full care and responsibility for our small, market garden/organic farm. Lease or employment arrangements considered. Please call for details or send letter of interest to Black Kettle Wilderness, P.O. Box 42 Essex, New York, 12931. 518-962-4762 or email kwilves@mct.com.

Greenhouse Planting The greenhouses at the Natick Community Organic Farm are beginning to fill up with seedlings this growing season. We are seeking interested volunteers to seed and transplant. You can learn about planting and get some sun in our cozy solar greenhouses, plus work with other local students and community members. If you are interested in volunteering to seed or transplant come by NOCF on a weekday and ask for Lynda. - NOCF, 117 Eliot Street Natick 508-655-2204.

Attention Small Growers without greenhouse space: The NOCF Community Organic Farm, NOFA/MA certified, will grow your seeds in our solar greenhouses for you. Contact us at April 1st and assure your quantity and selection. Contact Lynda Simkins 508-655-2204 weekdays.

Masonry Oven Building Workshop With Alan Scott, author of “The Brick & Mortar” and founder of Encovencasters. May 10-12, Orchard Hill Farm, East Alstead, NH. Workshop will take place on a working organic farm and orchard. And come learn as you could become farm managers or own a small farm. Cost for three day workshop: $150 Room and board options available, as well as single day participation. Contact Noah at Orchard Hill Farm for more information and registration form: (603) 835-7845 elbers@monad.net 130 old settlers East Alstead, NH 03602


We are looking for other families to help us create a diversified, multiple family farm. We’re envisioning a small (4-5 family) agrarian community of independent householders who are working together on the many aspects of an integrated farm organism. Our family of 5 (ages 33, 29, 5, and 2 months), is located in Craftsbury, Vermont on an old and beautiful 240 acre dairy farm. This season we will be raising organically certified vegetables (5+ acres), grain, hay, and a diversity of animals for meat, milk, and eggs. However, far more potential exists to develop additional farm enterprises. If you’re interested, contact Kris or Glenn at covilies@sover.net, or 1748 Wild Branch Road Craftsbury, VT 05826

Sustainable Agriculture Program Coordinator/ Farm Manager - immediate opening. Positions available: Phillies Bridge Farm Project. Contact Martha Cheo, 845-256-9316, PO Box 1147, New Paltz, NY 12561. Positions available: Phillies Bridge Farm Project. Contact Martha Cheo, 845-256-9316, PO Box 1147, New Paltz, NY 12561. mcheo@email.msn.com - For information please contact us at: Seth Kroeck, Thanksgiving Farm CSA, Box 840 Bennema Rd., Harris, NY 12742 or 845.793.0093 or Farmers@dtc.org. Thankyou for your interest. Opening for on-site interview required for final candidates. Wagbo Peace Center, 1748 Wild Branch Rd. Granby, MA for the 2002 growing season. The farm is an expanding operation that grows high quality organic vegetables, berries, flowers and bedding plants on a 70 acre land base, w/ about 18 acres of veg. in gardens, 30 acres of perennials in the fields, and 10 acres in market to farmers market and wholesale. Interns will have the opportunity to participate in a wide range of farm activities, including but not limited to composting, crop planning, bedroom management and long term planning. Half-time, $15,000/year, benefits. Please contact Ryan for additional information at (413) 467-3016 or redfirefarm@juno.com
Interns/Apprentices Peacework Organic Farm, in Warren, VT is seeking an Intern the 2002 growing season. We are seeking people willing to stay from April through November. We prefer people who want to learn the craft/art of organic vegetable production with the intention of farming. Intern work includes everything we do on the farm. Living conditions simple: small apartments, sharing all with the veggies you can eat. Weekly stipend depends on experience. We cooperate with five organic farms in Central New York on intern-training program modeled on CRFAF. Please contact: Victoria Vogt please contact Elizabeth Henderson at 315-331-9029. Evenings 8-11 best, or 7 to 8 am. E-mail: chendrisn@redsuspenders.com. CSA website – www.gvocsa.org.

Community Herbalist, Carol Joyce and Woodman/ Carpenter, Marty Vogt have moved to their new farm: Still Willin’ Organic Farm & Botanical Sanctuary 433 Richmond Road, Warwick, MA 01818. www.whitebuffaloberbs@hotmail.com Carol continues to offer her White Buffalo Herbs organic herbal & aromatic- 125 products by mail order & at Amherst Farmers Market on Saturdays. They will be offering the following: Herbal Retreat & Wilderness Education Center: 124-acres remote, open, Spouting Rock, Walks- Replanting Endangered Woodland Medicinals. For dates. Beginning Level Six Month Apprenticeship in Herbsalt & Scarlet Christmas. One week at a time starting now, 2002.

Farmhouse and ownership share in Land Cooperate for sale. Excellent opportunity for market gardeners or grass farmers. 187 acres, open, river frontage. Land has been farmed organically by Locals from Montpelier to the Pasture in Marshfield VT. Interest in cooperative living and land stewardship. Required: $99,500. (802)246-3482.

Looking for a place to build my small I am working my way through law school, and available for rent. I am in the market for a studio apartment with a small yard, in a quiet neighborhood, in the City. I am seeking a place to live that is safe, comfortable, and affordable. I am willing to move quickly if the right place becomes available.

Seeking farm collaborators here at The Benson Farmhouse and ownership share in Land Cooperate for sale. Excellent opportunity for market gardeners or grass farmers. 187 acres, open, river frontage. Land has been farmed organically by Locals from Montpelier to the Pasture in Marshfield VT. Interest in cooperative living and land stewardship. Required: $99,500. (802)246-3482.

Littlewood Farm seeking interns for the 2002 growing season. Help needed May to November. We grow 8 acres of vegetables and 1 acre of strawberries for sale to co ops. Interns will gain experiences moving towards operating their own organic farm truck. Training is offered in: greenhouse, bedding plants, tomatoes, peppers and cucumbers; insect scouting and biological insect controls; soil fertility management; seedbed preparation and planting; cultivation strategies and techniques; harvest and marketing. Housing is available on farm. Interns get weekly stipend, plus bonus for completing a final report of the year. For more information contact: Joe Klein, Littlewood Farm, Plainfield, VT 05667, 802-454-8466; www.mole.org

Mofga’s Journeyperson Program might be the right fit for you if you have an experienced, serious, professional position in the right fit for you if you have an experienced, serious. This is a 2 year commitment offering farm business mgmt and product marketing skills. diames@mofga.org 207-567-4142

Blue Heron Farm, an established organic produce farm in Lodi, NY, is looking for help for the 2002 growing season. Assist with greenhouse work, planting, weeding, irrigation, harvesting, packing and sales of organic vegetables. A great opportunity for hands-on learning, experience preferred but not required. (607) 695-3634 or bluheron@ mail.emmpac.net. 7.3 Lely spring tine cultivator with gauge wheels, new condition, $1800. (607) 582-0636 or bluheron@ mail.emmpac.net

Situations

WANTED: Organic Gardener for Christmas trees and they will think of you all winter long. We are a Christmas tree, vegetable and flower farm. We are looking for people who want to learn the craft/art of organic vegetable production with the intention of farming. Intern work includes everything we do on the farm. The position is located in Unity, ME. Send resume and references to: Certifying Coordinator Position, c/o MOFGA, PO Box 170, Unity, ME 04988; 207-567-4142; www.mofga.org

Stonewall Farm: A non-profit community farm on 150 acres in Kennebunk, ME is seeking an Executive Director. Farm operations include: CSA, working dairy, child and adult educational programs, summer day camp, maple syruping, farm vegetables, and management, etc. SF employs a staff of 15. The ideal candidate will have experience in fund raising, personnel management, and public relations. Send resume and references to search@stonewallfarm.org

New York   12561  or e-mail me at davegott@hotmail.com

I am a 25-year old single woman who is interested in learning about the everyday aspects of farming. I am interested in farming about 2 months of the year, harvesting small amounts of crops and about caring for livestock. I have been living in the wilderness for the last 15 months so hard work and weather is not an issue. If you have a position for me, of know of one, please contact me: Jessica Goldman, 421 Catfish Farm Rd, Deerlodge, MT 59722; jgoldman@montana.net or (406) 833-2758.
Supreme Court backs seed patents. On December 11 the US Supreme Court upheld extending the protection of utility patents to seeds. In the 1970 Plant Variety Protection Act, Congress had specifically allowed farmers to save seed for their own use and unrelated research and plant breeding programs. However, title 35, section 101 of the U.S. Code (part of the Patent Act) granted patent protection to “varieties and seed grown plants.” Critics of the ruling feel it circumvents the clear will of Congress. source: The Germinator, January, 2002

Two thirds of US farm subsidy payments go to largest 10% of producers. According to an analysis by the Environmental Working Group, 2/3 of America’s farmers get no subsidies, and among those who do, the bottom four-fifths get an average check of $1000. But some ‘farmer’ recipients include Fortune 500 companies, members of Congress and celebrities. The net result of paying such large sums to the few big farmers is that overproduction is increased, prices fall, and smaller farmers continue to sell out to the larger ones who benefit from the subsidies. source: Stewardship News, January-February, 2002 and Alternative Agriculture News, February, 2002

Monsanto and Aventis Sued. A group of Canadian farmers has sued the two companies for damages caused by genetic pollution from modified canola. The class action suit is on behalf of all of Saskatchewan’s 100,000 growers raising over one million acres of the oil seed. About 60% of the province’s canola crop is genetically modified. For details, see www.saskorgnatur.com. Alternative Agriculture News, February, 2002

GE crops contained? A biotech industry review shows that 99% of 2001 genetically engineered crop acreage was in one of 4 countries: America (68%), Argentina (22%), Canada (6%) and China (3%). Herbicide resistance was the dominant trait (77% of acreage) with Bt following (15%). A soy accounted for 63% of the acreage and corn 11%. source: Crop Biotech Net press release, January 10, 2002

Oregon Tillth excludes certified farmers from board. One of the oldest and most respected organic farming groups in the country has decided to exclude farmers it certifies from service on its board of directors in order to be in compliance with the “conflict of interest” provisions of the National Organic Program. Like the NOPAs, organic farming groups around the country have been varied in their response to these challenging provisions. Some have gotten out of certification, some have set up independent corporations to conduct their certification business, some have set up Limited Liability Corporations under the main organization for this purpose. In the case of Oregon Tillth, certified board members are resigning and recruiting to fill their seats faculty from Oregon State University’s ag department and the University of Oregon Business School, as well as environmental lawyers and organic retailers. We wish them well! source: In Good Tillth, February 15, 2002

Mail irradiation and seeds. The United States Postal Service (USPS) is using electronic beam irradiation on a limited amount of mail to kill anthrax. Batches of affected mail are irradiated mail for 3 to 5 minutes with a dosage of 55 kilo-Gray. A study was conducted of this treatment on seeds, and the Federal Seed Laboratory study reports: “The irradiated portions of the samples all had zero percent germination with zero percent abnormal seedlings and 100 percent dead seed.” Representatives of the American Seed Trade Association met with the USPS in January to discuss the normal shipment of seed in commerce. Currently, only mail that was at the Brentwood and Trenton NJ facilities at the time of the anthrax scare has been irradiated, and such mail is placed in a plastic bag with an accompanying letter advising the recipient that it has been irradiated. In order to minimize the chance of irradiation in the future, seed shippers are designing mailers that include safety seals, transparent envelopes, clear company logo with return address and name and phone and website, metered postage instead of stamps and premiums like pens or magnets which make the mailpiece lumpy. Currently private shippers use no irradiation. source: In Good Tillth, February 15, 2002

Northeast leads in direct marketing. Six of the seven NOFA states are among the top ten states in average per farm value of products sold directly for human consumption. Four NOFA states lead the list. Direct marketing is one way to maximize farm income per product. In 1999, for example, a dozen eggs sold retail for $96, but the average farm income per dozen was only 45¢. For apples the margin is even greater, 90¢ per pound versus 19¢. Farmers who can sell direct can keep the margin. source: Network 01, December, 2001

Study says organic food higher in nutrition. A study by Nutrikinetics found that organic foods were higher than conventional foods in various nutrients: magnesium (29.3% higher), vitamin C (27% higher), iron (21% higher), and phosphorus (13.6% higher). [Ed. Note: It was not clear from my source who financed the study, nor how objective Nutrikinetics is. Studies of this nature are usually conducted by partisan groups and rarely objective, in my experience.] For more info visit www.foodisyourbestmedicine.com. source: Stewardship News, January-February, 2002

Half of US grain elevators segregate GMO varieties. Giving the lie to industry claims that such measures are impossible to audit, a study by the American Corn Growers Association of 1149 elevators in 11 states reports that one half of US elevators require segregation of genetically modified varieties from non-modified varieties. Almost 20 percent of them offer premiums for non-GMO corn or soybeans. source: In Good Tillth, February 15, 2002

Limits on corporate farm ownership benefit rural communities. Counties in states protecting family farming by some measure of restriction on corporate farm ownership have fewer families in poverty, lower unemployment, and more percentage of farms realizing cash gains, according to a study by researchers from Cornell and Clarkson Universities. For more information contact Risk Welch at welshr@cornell.edu. source: Alternative Agriculture News, February, 2002

NAFTA bites owner. The North American Free Trade Agreement (NAFTA) was pressed upon the rest of the continent by the US. Like the WTO, the idea was to keep governments from imposing protectionist restrictions on imports, thus assuring free trade. So when the gasoline additive MTBE began turning up in California wells and the state ordered that the chemical be phased out, its manufacturer – a Canadian company called Methanex – sued the state seeking $970 million in compensation for loss of market share and lost future profits. The case will be decided in a closed NAFTA tribunal. California taxpayers await the decision with interest! source: Bill Moyers Reports

Demeter spins off “Stellar Certification Services.” The well established name “Demeter” on food is the mark of Biodynamic certification. But Demeter has also certified organic food, under the “Aurora” mark, produced on farms considering Biodynamics. Now the provisions of the National Organic Program, which require that the name of the organic certifier be on product labels, have forced Demeter to set up a separate certification service for organic products. Demeter and Stellar will be affiliated under the same board, and products may have one or both labels, depending on the certification earned. source: Demeter press release, February 4, 2002
“Green” forest management labels not equal. Forest owners wishing to tout their management practices may be certified under two different labels – the Sustainable Forest Initiative (SFI) of the American Forest and Paper Association, or the Forest Stewardship Council (FSC). A study by the Meridian Institute concludes, however, that the SFI fails to meet basic environmental expectations such as protecting old growth, not harming endangered species and minimizing use of toxic chemicals. The study was sponsored by both groups and is available at www.merid.org. source: Environmental News Service, October 17, 2001

Maori council opposes GE. A “hui” or community gathering of the Maori people, the indigenous New Zealanders, has declared war on genetic engineering (GE) protagonists such as the “Life Sciences Network, Multi and TransNational Chemical and Fertiliser companies, and scientists at Universities and Research Institutes experimenting with GE on Agricultural, Horticulture, Aquaculture, Flora and Fauna”. The hui continued: “These GE protagonist’s threaten our whakapapa [heritage as a people], threaten our plant whakapapa and threaten our animal whakapapa. We have a responsibility to protect the existing environment for the future of our mokopuna.” The Maori have some sharp legal teeth because they ceded sovereignty to Britain under a treaty which guarantees their “full, exclu- sive and undisturbed possession” of their “lands, forests, fisheries and other treasured possessions.” source: Maori press release, December 12, 2001

Clopyralid herbicide contaminates compost. The Dow AgroSciences herbicide Clopyralid, used to kill dandelions and thistles but toxic to vegetables such as potatoes, peppers, tomatoes and beans, has been found to survive commercial composting at rates hundreds of times that needed to kill sensitive plants. The discovery threatens the entire composting/recycling industry. “You cannot have a system that mandates recycling of green waste, and license a garden chemical that makes the waste unrecyclable,” said Gabriella Uhlar-Heffner, solid waste manager for Seattle’s public utility company. source: Los Angeles Times, December 28, 2001

Sludge safety being questioned. The inspector general of the Environmental Protection Agency has cited “gaps in the science” used to approve sludge recycling in the 1990s and the agency has asked the National Research Council to study possible health concerns related to the sludge recycling. The inspector general report comes amid growing concerns among some states, communities and federal scientists that recycling of solidified sewage - known as sludge or biosolids - may not be as safe as thought when the government approved it in the mid-1990s. A number of anecdotal reports of human health problems have been percolating up from local authorities. source: Associated Press, February 7, 2002

Brazil GE-free exports at record levels. Brazil’s net corn exports were a record 6.2 million tons compared with net imports of 1.8 million tons last year. International buyers have been looking to Brazil for corn preferentially and also have been paying a $6 to $7 dollar premium per ton over U.S. corn because Brazil’s crops are not genetically modified. Brazil is one of the last major agricultural producers in the world that forbids the sale of genetically modified foods or materials. source: Reuters, December 21, 2001

GE doesn’t pay farmers, says study. An Iowa State University economist has found that farmers who plant genetically engineered soy or corn fare no better financially for that choice than farmers who plant conventional varieties. Researcher Michael Duffy concludes that reasons other than farmer profitability are behind the increase in GE crop acreage. source: Des Moines Register, January 13, 2001

US aids Afghan farmers with GE seed. As part of US reconstruction efforts in Afghanistan, the Agency for International Development (USAID) have been giving genetically engineered seed to farmers for replanting. Agency administrator Andrew Natsios defended the use of the seed: “One of the only ways we are going to be able to feed the developing world and upgrade the agricultural system in the third world is through genetically modified material.” source: Pew Initiative on Food and Biotechnology, January 28, 2002

Corn biodiversity threatened by spread of GE. Mexican authorities became alarmed last fall at the spread of GE corn throughout the state of Oaxaca. Mexico is the original home of corn and it’s progenitor, teosinte. Over 20,000 varieties of the crop exist in Mexico and experts fear than the spread of GE corn’s pollen will contaminate these relatives and wipe out the plant’s natural biodiversity. The effect of such a disaster on humans was made clear during 1970 when 50% of the US corn crop in some areas failed because it was not resistant to a leaf blight. Only the availability of natural varieties from which resistance can be crossed into a crop will alleviate such problems. Worried Mexican officials have declared a moratorium on planting of GE corn, but are not forbidding the import of modified varieties for food. The unfortunate result is that poor peasant are diverting the cheaper, modified corn and using it for seed, not food. source: BioDemocracy News, January/February 2002
Diseases of Apple on the Organic Frontier

by Michael Phillips

Several alternative approaches to organic disease management have come about since Chelsea Green published my book, The Apple Grower, back in 1998. I briefly wanted to explore some of those options here, and by so doing, encourage readers of this article to respond back with their ideas and experiences.

Much of what follows begins with understanding the annual cycles of a given disease. A preventative approach relies foremost on orchard sanitation. Still, the use of a fungicide during the primary infection period can make all the difference when blown-in disease spores and favorable weather conditions make infection likely. Apple scab, black rot, powdery mildew, and the rust diseases take hold on the tender tissues that characteristically occur about the bud stage till about two weeks after petal fall. I use the minimum amount of sulfur I can get away with during this time—about three applications on average here in my orchard in northern New Hampshire—based upon the collective experience of many in working with spore maturity, wetting periods, and timing of major fruiting and flowering. Much of the nuance of determining when to spray is explained in The Apple Grower, as well as in regional fruit production guides.

We’d all love it if we could simply rely on the tree’s immune system to simply take care of these fungal woes. Tree tissue ideally flows from soil health. That’s the underlying principle of organic agriculture. And yet, just as the proverbial bumper sticker imparts, disease-resistant varieties achieve immunity to some extent, but never across the whole spectrum of possible diseases. Sooty blotch and flyspeck—the so-called summer diseases—can mean a sea of tissue variety like Liberty not all that pretty by harvest time. For my part, I’ve too high a regard for great-tasting fruit to rely solely on disease resistance as the foremost reason for purchasing a particular variety. Much of the tissue’s availability to spray is in the orchard. Like many of you, I’m an apple guy who loves all sorts of apples.

So I don’t object to spraying elemental sulfur with wise discretion during the primary infection period when several fungal diseases strike. I liken this to what my herbalist wife, Nancy, has taught our family to do whenever we fly. The chance of being exposed to an infectious bacterium or virus in the re-circulating air of a jet comes practically guaranteed. A vibrant immune system keeps us well. Nevertheless, in that highly charged air which so many people never really hurt to improve one’s products by taking Echinacea (an herbal tincture) before and after landing to boost one’s immune system. Sulfur works in an entirely different manner, but your sprayer and protection goes a long way when inoculum levels are high.

Another choice in this quest to keep fruit clean is a relatively new product called Oxidate. Hydrogen dioxide (the active ingredient in Oxidate) works as both a curative and a preventative against the diseases listed above for tree fruits. The oxidation that occurs on spray contact with the disease organism—and their spores—results in the denaturing of key enzymes and proteins found in these simple cells of the fungal world. Affected organisms degrade into water and oxygen, leaving no harmful residues. Here’s a product that could readily replace sulfur. And certainly would assist in clearing an orchard where past practice allowed disease to build beyond manageable levels. I’ve yet to try it. Those of you who have used hydrogen peroxide in the orchard have homegrown experience with this approach. I’d like to hear about the results of either. You can contact BioSafe Systems for more information by calling 1-888-739-3088, or check on the web at www.biosafesystems.com.

Research is underway as regards the “disease suppression advantage” of the kaolin clay product known as Surround. This barrier protection approach to insect pressure is proving invaluable for many an organic orchardist long frustrated by plum curculio. (The bugs are another discussion entirely, but for those of you seeking useful information about kaolin clay, contact the Englishland folks at 877-240-0421 and request their very informative literature packet on Surround.) The clay particle coating by itself does little or nothing to suppress fungal or bacterial disease. I suspect the clay might be useful in this regard in prolonging the viable life of individual sulfur grains on the foliage surface from ultraviolet degradation. The researchers are looking into this prospect by looking at Surround used in conjunction with both sulfur and lime sulfur. Personally, I’m leery of this idea for two reasons. More than half of our protectant disease sprays occur before petal fall, which is when clay barrier becomes vital for disease control and first-generation cooling moth. Earlier use of Surround may be warranted for many of us. The less we need to rely on any product purchased off the farm, the better. Secondly, the kaolin can negatively impact mite predators. The same goes for lime sulfur, and, to a lesser degree, sulfur. Our actions always bear upon the balance of life forces at play in the orchard system. Keeping this big picture in mind is what distinguishes an earth-savvy orchardist.

A holistic approach to disease embraces two notions I’d like to explore further. Much of this comes from my experiences with herbal medicine for people. The biological parallels between our bodies and plants, I think, are rather obvious. Firstly comes that whole idea of enhancing the immune system. Plants utilize a similar process as we do in warding off invading pathogens. Polysaccharide compounds are produced when hydrolytic enzymes first contact fungi and bacterial membranous on the foliage surface. These then activate an internal defense mechanism in the plant that scientists call phytoalexins. These consist of isoflavonoids and terpenes (varying for each unique plant species) which, when produced in sufficient abundance, can resist the invading pathogen. Plant stress, the ovule of synthetic syngenes, and climatological factors work against this natural defense mechanism process found in healthy plants.

You know how some of us use vitamin supplements or nourishing herbs (usually as teas) to enhance our diet in order to strengthen our own protection system? The same can be done for plants. A citrus extract being used in tropical fruit and vegetable production serves very much as a plant vitamin to activate the production of phytoalexins. You can read about Citrex on the web at www.citrex.com. Several of my apple friends have found immune-enhancement properties in dahlia trials using Citrex at spray rates of 6 to 12 ounces per acre for both scab and the summer diseases. The product itself is not yet registered for apples nor is it reasonably priced. I suspect a homemade garlic brew is another possibility here to vitalize plant defenses. Biodynamic growers concoct a similar brew with nettles and horseradish. This concept of plant medicines for plants has merit, the all more so when we realize the manner in which our intentions prove potent. Obviously, this is a tough angle to prove. Holistic suggestions aren’t necessarily for those hung up on isolated events. My hope here is once again to inspire experimentation and the collective sharing of admittedly anecdotal results.

A second holistic notion worth pondering is our cultural fixation on sterility. Somewhere along the line we made a generational decision to equate the lack of microorganisms as being the cutting edge approach to preventing disease. And let’s face it, so very few of us can say we’ve never taken an antibiotic or swiped our counters with an antibacterial soap. Good Lord, you can hardly avoid having to purchase antifungal-treated socks today! This underlying assumption that ridding the environment of critters much smaller than us is somehow safer misses the reality of living on earth. I almost invariably ask folks in workshops I teach to envision holding up to 2 pounds of themselves. This amount of body weight represents that portion of ourselves that isn’t “us.” Bacteria cover our skin, line our nasal passages, and make the intestines the effective digesters they’re meant to be. Our good health is predicated on the right little fellas existing within us in proper abundance.

Let’s take this understanding out to our orchards and gardens. Establishing a colonization of good microorganisms somehow ensures that the “bad guys” won’t find room at the inn. I’ve argued earlier for the discretionary use of fungicides in the primary infection period. Now I want to think outside that box. A new product called Serenade draws its worth from this deeper understanding that microorganisms can out-compete another species of microorganisms. This biofungicide from AgraQuest (call 530-750-0150 for an information packet or check on the web at www.agraquest.com) establishes a culture of Bacillus subtilis on the plant surface. This strain of bacteria, prevalent in soils worldwide, is known to release cell contents during growth to eliminate competitors in its immediate environment in order to protect its niche. Furthermore, Bacillus subtilis has also been shown to induce the plant’s natural resistance against bacterial and fungal pathogens. No doubt by the mechanism explained above. Here’s a product designed to immediately reestablish a good culture following the application of fungicides during those weeks in spring of primary infection probability.

Reaching once again for the homegrown solution suggests the use of compost teas. ATTRA has a very useful publication explaining foliar applications of such a microorganism-rich brew; call them at 1-800-346-9140 to request “Compost Teas for Disease Control” or download this write-up direct from the web at www.attra.ncat.org. We are living in a bacterial world. We can substantiate our human health is predicated on the right little fellas existing in our tissues much smaller than us is somehow safer misses the reality of living on earth. I almost invariably ask folks in workshops I teach to envision holding up to 2 pounds of themselves. This amount of body weight represents that portion of ourselves that isn’t “us.” Bacteria cover our skin, line our nasal passages, and make the intestines the effective digesters they’re meant to be. Our good health is predicated on the right little fellas existing within us in proper abundance.

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Woodland Ecosystems

by Jack Kittredge

As Bill Mollison describes so well in “Permaculture, A Designer’s Manual”, forests are unique ecosystems without which life on earth would be vastly different. A tree itself is a complex organism whose extension in space and time vastly alters its location. It has many zones with different purposes – crown, stem, leaves, roots. It functions as a huge oscillating pump, trapping the sun’s energy in the leaves and pumping it downward, absorbing water and nutrients in the roots and pumping them up into the crown. It discards large amounts of soil-creating biomass, releases oxygen and water moisture into the atmosphere, moderates ambient temperature, protects the soil from erosion and filters particulate matter from the wind.

Soil

Trees, whose roots reach deep into the underlying rock of most northeastern soils, break that rock down with both the mechanical force of root pressure and the chemical force of humic acids. They then use the resulting minerals and other nutrients into their biomass as trunk, branches, leaves, roots, etc. Eventually this material is deposited back in the forest floor as organic matter to build the soil. Over a lifetime, trees shed many times their own mass to the soil in which they grow.

Air

Some scientists estimate that forests may be producing as much as 80% of the oxygen in our atmosphere. Deforested areas such as cities no longer produce the oxygen they consume. Besides the reactive chemical services that trees provide to air, they also clean it. Windstreams confronting a forest are partially deflected (about 60%) over it, and partly enter it. Before penetrating a mile into forests, this air is slowed to a standstill, resulting in a small temperature and humidity increase. In this process fine dusts and aerosols are removed within a few hundred yards of the forest edge and negative ions produced by organisms in the forest cause positively charged dust particles to aggregate and precipitate out. This windbreak effect of forests is crucial defending against wind erosion and maintaining soil in exposed areas like islands and on hills.

Temperature

Trees moderate temperature extremes. Air coming in over a forest is forced to rise and thus to cool. When it cools, however, some of the moisture in air is condensed out as precipitation, reducing the remaining air significantly. In addition, leaves are approxi- mately 86% water and have a specific gravity estimated to be as much as 80% of the total precipitation in upland coastal areas and is a major contributor to such dense rainforests as those of Tasmania, Chile, Hawaii, the Pacific Northwest and Scandinavia. In addition to increasing precipitation, temperate forests can spread its effect around the year by delaying snow melt. Over 75% of snowfall in forested areas is held in shade and is given off slowly, to the soil, rather than melting rapidly in the spring and running off as surface water.

Fungi

Trees have evolved in combination with another complex form of life, fungi. As Paul Stamets makes clear in this issue and elsewhere, it is hard to overestimate the importance of mushrooms in forest life. Their mycelia form a complex networking of intertwined strands of cells that grow beyond the immediate tree’s root zone, extending, in extreme cases, over many acres. The mycelial content of topsoil in a Pacific Northwestern Douglas Fir forest has been estimated to be as much as 10% of biom- ass! Each mycelium gives off enzymes which unlock organic compounds in the surrounding matrix, releasing carbon, nitrogen, and other elements that are then absorbed and concentrated directly into the network.

Most of this work occurs in the rhizosphere, the area where roots and soil come into contact. About a millimeter in width, it surrounds both root hairs and mycorrhizae (the mycelia of certain mushrooms which form a symbiotic relationship with the roots of host plants). At the boundary of the root hairs, soil and mycelia, so many cells interpenetrate each other it is not so much an interface as a jelly, constantly exchanging water, carbohydrates, organic acids, vitamins and other substances. Both fungi and trees benefit from this cooperation, and ecologists believe that a healthy forest is dependent upon the presence of an abundance and variety of mycorrhizal organisms.

Another role of fungi in forest life is the decomposi- tion of wood. Trees are largely composed of lignin-cellulose tissue, which gives them the structural firmness to withstand the force of gravity. Saprophytic mushrooms have developed specific enzymes to break down lignin-cellulose into soil. Primary decomposers such as Shiitake, Oyster, and King Stropharia mushrooms grow quickly and send out rop mycelium equipped to breakdown wood into compost. Then secondary varieties such as button mushrooms take over, further reducing the mass and concentrating the nitrogen of the material. Heat, carbon dioxide and various gases are given off as by-products of this stage. Finally, soil-dwelling varieties such as the Orange Peel mushroom can finish the process where nutrients remain to sustain fungal growth.

Because of their ability to rapidly decompose complex hydrocarbons into their basic constituent elements, fungi have recently been the focus of interest in decontaminating toxic waste sites. They can be used on-site without transporting the toxic material, a significant cost advantage over other technologies. Varieties such as white rot fungi and brown rot fungi, which produce powerful lignin peroxidases and cellulases, are particularly efficient at such bioremediation. Others are under investiga- tion for use in clean-up of radioactive wastes because of a talent at sequestering heavy metals.

Plants

Many plants with unique properties are at home in a forest. Many medicinal herbs, for instance, grow wild only in woodland settings. Often the medicinal aspect of the plant is related to some survival ability (pungent taste, powerful aroma, desensitizing chemical compound, etc.) which has proven of value in that complex environment. Obviously woody products such as black locust (for no-rof fence posts), rushes for basket weaving, barks for staining and dyeing, and greens for floral displays are grown in the woods.

While harvesting of many wild plants is no longer acceptable (and in many cases is illegal) because of declining populations, cultivating such plants in a sustainable woodland setting is becoming an industry. In addition to the environmental and ecological advantages the northeastern farmer may encourage by proper attention to his or her woodlot, there are increasing opportunities to integrate that part of the farm into supporting the overall home- stead.

Special Supplement on AgroForestry
Permaculture with a Mycological Twist
by Paul Stamets

When edible and medicinal mushrooms are involved as key organisms in agriculture and forestry, the productivity of these agricultural systems can soar to extraordinary levels. Not only are mushrooms a protein-rich food source for humans but the byproducts of mushroom cultivation unlock nutrients for other members of the ecological community. The rapid return of nutrients to the ecosystem by mushrooms boosts the life cycles of plants, animals, insects (bees), and soil microflora.

What follows is a short list of some of the ways mushrooms can participate in permaculture and agroforestry systems:

1. Oyster Mushrooms

Oyster mushrooms can be grown indoors on pasteurized corn-stalks, on straw from wheat, rice, and rye, and on a wide range of other materials, including paper and pulp by-products. Soaking the bulk substrate in cold water creates a residual “tea” that is a nutritious fertilizer and potent insecticide. Submerging the bulk substrate in hot water produces a different brew of “tea” that is a naturally potent herbicide.

Oyster mushrooms can also be grown on hardwood stumps and logs. Some strains of oyster mushrooms (Pleurotus pulmonarius for example) even grow on conifer wood. Pleurotus species thrive in complex compost piles and are easy to grow outside with minimum care.

The water substrate from oyster mushroom production is useful as fodder for cows, chickens, and pigs. Since half of the mass of dry straw is liberated as gaseous carbon dioxide when it is used as substrate, pumping this CO2 from mushroom growing rooms into greenhouses to enhance plant production makes good sense. (Cultivators filter the air stream from the mushroom growing rooms so spores are eliminated.)

Furthermore, the waste straw can be mollied into soils, not only to provide structure and nutrition but to reduce the populations of nematodes which are costly to gardeners and farmers

2. King Stropharia

The king stropharia (Stropharia rugoso-annulata) is an excellent example in the recycling of complex wood debris and garden wastes and it thrives in complex environments. While it will vigorously attack wood (sawdust, chips, twigs, branches), the king stropharia also grows in wood-free substrates, particularly soils supplemented with chopped straw. I have seen this mushroom flourish in gardens devoid of wood debris, benefiting the growth of neighboring plants. Acclimated to northern latitudes, this mushroom fruits when summer temperatures range between 70-90 degrees F.

For six weeks one summer our bees attacked a king stropharia bed, exposing the mycelium to the air, and sealed from the wounds the sugar-rich cytoplasm. From morning to evening, bees continuously flew from our beehives to the mushroom patch until the bed of king stropharia literally collapsed. When a report of this phenomenon was published in Harrowsmith Magazine, beekeepers wrote me to explain that they had long been mystified by bees’ attraction to sawdust piles. Now it is clear the bees were seeking the underlying sweet mushroom mycelium.

King stropharia is an excellent edible mushroom when young, but its edibility quickly declines with maturity. Fly larvae proliferate inside the developing mushrooms. In raising silver salmon, I found that when I threw mature mushrooms into the fish-holding tank, they would float. Fly larvae soon emerged from the mushrooms, struggling for air.

Soon the fish were striking the large mushrooms to dislodge the swollen larvae into the water where they were eagerly consumed. After several days of

feeding mushrooms to the fish, I found the salmon would excitedly strike at the king stropharia as soon as they hit the water in anticipation of the succulent, squirming larvae. Inadvertently, I had discovered that king stropharia is a good base medium for generating fish food.

Growing king stropharia can have other beneficial applications in permaculture. The mushroom depends upon bacteria for growth. At our farm which included a small herd of Black Angus cows, I established two king stropharia beds at the heads of ravines which drained onto a saltwater beach where my neighbor commercially cultivates oysters and clams.

Prior to installing these mushroom beds, fecal coliform bacteria seriously threatened the water quality. Once the mycelium fully permeated the sawdust/chip beds, downstream fecal bacteria were largely eliminated. The mycelium in effect became a micro-filtration membrane.

I had discovered that by properly locating mushroom beds, greywater runoff could be cleaned of bacteria and nitrogen-rich effluent. Overall water quality improved. Massive mushrooms formed. After three to four years chunks of wood were totally reduced into a rich, peat-like soil. For nearly eight years I have continued to install king stropharia beds in depressions leading into sensitive watersheds.

Government agencies, typically slow to react to good ideas, have finally recognized the potential benefits of mycorrhization. Test plots are currently being implanted and monitored to more precisely determine the effects on water quality. If the testing is successful, I envision the widespread installation of king stropharia beds in basins leading into rivers, lakes and bodies of saltwater.

3. Shiitake/Nameko/Lion’s Manes

Outdoors, inoculated logs can be partially buried or lined up in fence-like rows. Once the logs have stopped producing, the softened wood can be broken up, sterilized and re-inoculated. Indoors, these mushrooms can be grown on sterilized substrates or on logs using the methods described in my new book (see link below).

Once the indoor substrates cease production, they can be recycled and re-inoculated with another mushroom, a process I call “species sequencing.” Later, the expired production blocks can be buried in sawdust or soil to elicit bonus crops outdoors.

4. Maitake, Reishi, and Clustered Wood-lovers

Several species can be incorporated into the management of a sustainable multistage forest. The greatest opportunities for stump culture occur in regions of the world where hardwoods predominate. Few gourmet and medicinal mushrooms can make use of coniferous woods.

Nevertheless, enokitake (Flammulina velutipes), reishi (Ganoderma lucidum), clustered woodlovers (Hypholoma capnoides), chicken of the woods (Lactarius deliciosus) and oyster mushrooms (Pleurotus spp.) are good candidates for conifer or hardwood stump decomposition.

5. Shaggy Manes

As cosmopolitan mushrooms, shaggy manes (Coprinus comatus) will grow in nutrient soils, disturbed habitats, in and around compost piles, and in grassy and gravel areas. Shaggy manes are extremely adaptive and tend to wander. Shaggy mane paches behave much like king stropharia and morels, travelling great distances from the place of inoculation in their search for nutrient riches.

6. Morels

Morels grow in a variety of habitats, from abandoned apple orchards and among diseased elms to gravelly roads and streambeds. However, the habitat that can be reproduced easily is the burn-site. Burn-sites, though increasingly restricted because of air pollution ordinances, are common out in the country where residents dispose of flammable trash.

If a burn-site is not possible, there are alternatives. The complex habitat of a garden compost pile also supports morel growth. When planting cottonwood trees you can introduce spawn around the root zones in hopes of creating a productive morel forest. Cultivators should note that morels are fickle and elusive by nature, compared to more predictable species like king stropharia, oysters, and shitake.

7. Mycorrhizal species

Mycorrhizal species can be introduced via several techniques. The age old, proven method of satellite planting is probably the simplest. By planting young seedlings around the base of trees naturally producing chanterelles, king boletes, matsutake, truffles, or other desirable species, you may establish satellite colonies by replanting the young trees elsewhere after several years of association.

These are but a few mushroom species that can be incorporated into systems which involve trees or other woody perennials. The integration of mushrooms enhances these systems to a level which is unattainable without them. I hope readers will develop these concepts further.
Goldenseal, ginseng, and black cohosh are all herbaceous perennial plants native to the hardwood forests of eastern North America. All three plants are currently quite popular as herbal remedies, but are not being cultivated on a wide scale. Instead the plants are being harvested from the wild at an unsustainable rate and are becoming threatened or endangered. Creating a sustainable cultivated supply of these plants will help to relieve stress on wild populations and at the same time provide an alternative crop to woodland owners. For these reasons, there has been increased interest in the past few years in cultivating woodland plants.

Site Selection
The major difference between cultivating woodland plants and cultivating traditional farm crops is that woodland plants need to be grown in the shade. Shade can either be created, by setting up a shade cloth or lathe covered structure, or can be utilized where already existing, such as the shade in a natural woodland. The cost of purchasing and maintaining shade cloth is prohibitively expensive for many growers, and may at times be economically unfeasible. Cultivating plants in an existing woodland is a more practical and economically viable alternative.

Site selection is probably the most important factor in the success of woodland herb cultivation. The healthiest plants will grow in areas that are most similar to the plants native habitat. The first indication as to a good site is the type of vegetation currently in a site. Ideally, your planting area will contain a mix of mature hardwood trees such as sugar maple, white ash, beech, black cherry, and red maple. A few softwood trees mixed with hardwoods is alright, but a pure softwood stand is undesirable as the evergreen nature of the trees will prevent light from reaching the forest floor in early spring when the plants need light for growth.

Good understory companion plants to look for are spring flowering herbaceous plants such as trillium, mayapple, bloodroot, wild ginger, Solomon’s seal, bayberry, and wild geraniums. Ideally, there will be some companion plants, but the area should not be overgrown.

Optimum levels of shade for each plant are currently being determined. In general, black cohosh only requires light shade (30 %) while goldenseal does best in medium to full shade, and ginseng requires full shade (70-80 %).

The soil should be rich and moist with lots of organic matter and a pH near neutral (6.5) to slightly acidic (5.2). Lime may be added to reduce the acidity of a low pH soil. Good air flow, and water drainage are important. All three plants are harvested for their roots, and the potential for root rot is something to keep in mind during site selection. Installing beds on a hillside will provide drainage and prevent root rot. For black cohosh and goldenseal the best growth occurs in tilled raised beds, for any area that is going to be tilled, a gentle slope is ideal. For ginseng, the soil will not need to be tilled, and a steep hillside can be used.

Planting a trial plot of plants in a site that is being considered is a good way to both become familiar with the woodland plants and to see if a specific site will be suitable for a particular plant.

Marketing
I believe that marketing is an important topic to consider before deciding to cultivate any plant. With any crop that you are considering growing, it is important to do some background research. With medicinal plants in particular, you’ll want to have a basic understanding of the medicinal uses of the plant, who is most likely to use the plant, and what types of companies make products with the plant. Potential customers for your crops can be local herb businesses, national companies, or bulk herb distributors. When growing and processing your herbs, you must keep in mind the fact that the highest prices will be paid for high quality organically produced herbs. Larger growers will provide competition with the amount of herbs they can grow and offer to large companies at a low price; they cater to the large manufacturers. But they can never compete with the level of quality that a small grower can provide. The best niche for the small grower is in the production of high quality plant material for small local herb companies who will appreciate the quality.

Goldenseal, ginseng, and black cohosh should all have fairly open markets, assuming that companies will be looking for sustainably grown plants, and current trends suggest that many will. Ginseng roots are said to be incredibly easy to sell, and licensed ginseng dealers, who can be found in states such as New York, Ohio, West Virginia and Wisconsin, are ready markets for your roots. Ginseng dealers may also be interested in goldenseal and black cohosh roots.

Site Preparation
Once you have your site selected, and have figured out several possible markets for your plants, you can go ahead and prepare your site for planting. Planting is best done in the fall, so that roots will have time to settle in to their new habitat during winter and will be ready to sprout in the spring. If necessary, spring planting will also work.

It is helpful to have a couple of people working on site preparation. The first step in site preparation is clearing away fallen trees and branches. A chainsaw will come in handy for cutting larger pieces of wood, and for cutting large vines. Killing large vines is important because the vines will eventually strangle the trees that provide the shade for your crops.

For black cohosh and goldenseal, you’ll need to till the soil. Plants grown in tilled soil are much larger and produce a higher yield than plants in un-tilled soil. You will need a heavy duty tiller to prepare the soil. A 14 horsepower tiller seems to be the appropriate strength for a tiller. You’ll want to make two passes with the tiller to get the soil loose and well mixed. Beds should be tilled somewhat wider than your planned bed, so there will be enough soil to create a raised bed.

Woodland tilling can be very dangerous. In the woods, there are tree roots to contend with, which can make the tiller jump unexpectedly. Common sense safety precautions are to wear steel toed boots, and have someone watching in case of an emergency.

After the beds are tilled, you’ll want to remove any large roots churned up by the tiller, and raise the beds to several inches tall. A standard hoe is the best tool for this job, a steel rake is helpful to smooth the beds out in preparation for planting.

Once your soil is tilled and your beds are raised, you’ll be ready to plant.

Goldenseal
In spite of the fact that very little scientific research has been done on the plant, goldenseal is one of the top selling herbs in health food stores, pharmacies, and discount stores in the U.S., used primarily as an “herbal antibiotic,” frequently in combination with echinacea. The medicinal properties of goldenseal are attributed to a group of compounds called alkaloids. If you sell your product to a large manufacturer, they will likely test for a minimum content of alkaloids.

Goldenseal (Hydrastis canadensis) is an herbaceous perennial that emerges from the ground mid-March to early May. Almost immediately after emergence, a rather inconspicuous single green and white flower appears, which turns into a raspberry-like red fruit in late June to early July. The mature plant is 6 to 14 inches tall with two or more stems that typically have two leaves each. The leaves are 3 to 12 inches across with 5 to 7 lobes. The plant may die down slowly after the fruit matures, or remain green until frost. Goldenseal spreads naturally under-ground rhizomes and an extensive fibrous root system, and also reproduces by seed.

The ideal level of shade for goldenseal has not yet been determined. In the southern Appalachian foothills, I saw goldenseal growing in a lawn at the edge of some woodlands and in the deep shade of cool woods, so given the right environmental conditions, goldenseal can be adaptable to a relatively wide range of habitats. Depending on the slope of your site, goldenseal can probably withstand as little as 40 percent shade, although 60 to 70 percent is probably best. Lower levels of shade will be alright for a north or east facing slope, while more shade will be necessary for a west or south-facing site.
The planting area for goldenseal should be tilled, and the beds raised. Root pieces are best planted at a depth of one to two inches with the buds facing up, at a spacing of six to eight inches between plants. Beds should be mulched with saw dust, pine bark, or chopped leaves. Several inches of mulch can be added in the winter to protect the plants. The mulch will need to be raked off in early spring to allow plants to come up.

Propagation by seed is advantageous for minimizing costs and reducing the possibility of importing plant diseases, but can be difficult and produce unpredictable results. Seed germination can vary between 0 and 90 percent, studies trying to produce better germination have not been consistent.

So far, the best results have been obtained by picking the seeds just as they ripen and turn red, mashing the seeds to loosen the pulp, and fermenting the seeds and pulp in water in order to overcome chemical germination inhibitors. Once the mixture has been allowed to ferment, the seeds are strained out and rinsed in a sieve until the water runs clear. The seed is then mixed with clean sand and put in a stratification box (easily made from a coffee can inside and the crop will be destroyed. Drying will take about two weeks.

In some years, there may be a market for goldenseal leaves, which are a less expensive and perhaps more sustainable alternative to goldenseal roots. If you do find a market for the leaves, they should be harvested in late summer when the foliage is still green.

Slugs are the primary problem with raising goldenseal and can devastate young plantings. The common remedies for slug control are all worth trying, including beer traps, diatomaceous earth, or a mix of lime and wood ash. If the slugs become intolerable, removing any mulch will likely help to reduce slug populations.

As goldenseal has become a more widely cultivated plant, an increasing number of diseases have been noticed. The diseases are fungal, and are similar to the diseases seen in ginseng populations. The best control seems to be adequate air and water flow and good sanitation. Fertilization, assumed beneficial for most crops, does not seem to be beneficial for goldenseal, and may even increase the incidence of disease in a crop.

Roots grown from division will be ready in three to five years, while those grown from seed will be ready in six to seven years. Goldenseal roots should be dug in the fall after the tops have died down. Woodland plots are probably best dug with a digging fork, the roots should have remained shallow and be easy to dig. The fibrous rootlets should be left intact. Large, healthy roots should be set aside as planting stock.

The remaining roots should be laid out on a mesh screen (an old screen door, or a frame with heavy gauge mesh) and sprayed with a hose until clean. If roots are not well cleaned, they will not pass the quality tests used by many buyers.

Roots should be dried on screens in a protected, well ventilated area out of direct sunlight. The drying area should not be more than 100 degrees, otherwise the outside of the roots will dry before the inside and the crop will be destroyed. Drying will take about two weeks.

In the U.S. ginseng is used to boost energy and mental awareness. Ginseng has been a sought-after medicinal plant for over 300 hundred years, and Asia is by far the largest consumer of American ginseng, with Hong Kong purchasing approximately 80 percent of the ginseng produced in the U.S. The Latin name, *Panax* comes from the word Panacea and ginseng has certainly been seen as a cure-all medicinal plant. In Asia, the root is used as a general tonic, an aphrodisiac, and something of a fountain of youth. In the U.S. ginseng is used to boost energy and mental awareness.

American ginseng (*Panax quinquefolius*) is a rather inconspicuous plant of the forest floor, growing to about 20 inches high. The first year, ginseng will have three tiny leaves, and look something like a wild strawberry, in following years, the plants will produce one or more prongs, each with five leaflets. Older plants produce more leaves, up to about five per plant. In early summer, plants send up a cluster of greenish white flowers that in July or August ripen into a cluster of bright red berries. Ginseng will not tolerate as much sun as goldenseal, and grows naturally on north or east facing slopes in well shaded areas in zones three through eight.

There are four different ways that ginseng can be grown, shade grown, woods cultivated, wild simulated, and wild. Shade grown plants are grown in a field under shade cloth. Woods cultivated plants are grown in cultivated beds in the woods. Wild simulated plants are grown in un-cultivated woodland areas. Wild plants are those occurring naturally in the wild. The different methods of cultivation greatly influence the external appearance of the roots. Roots produced under shade cloth or in cultivated beds are much fatter and smoother than wild simulated or wild roots.

The Asian market places the highest value on wild and wild simulated crops, believing that wild roots are much more medicinally potent than cultivated roots. The prices for the typical roots grown in the four different fashions vary widely. Shade grown roots currently sell for $10 to 12 per pound, woods cultivated roots are $80 to 100 per pound, and wild cultivated roots are $250 to $700 per pound. **American Ginseng**
simulated roots are $150 to 250 per pound. Wild simulated roots take a comparatively long time to mature, but also require the least input.

Site selection is particularly important for wild simulated ginseng. Appropriate companion plants are trillium, ferns, mayapple, bloodroot, and spike-nard. Several recent studies analyzing soils in natural stands of ginseng have found that a soil high in calcium (4,000 lbs per acre) and low in pH (5.0) produces the healthiest stands of ginseng. Soils with a low pH usually have much lower levels of calcium, finding or creating a low pH, high calcium soil will be helpful in establishing a successful planting of ginseng. To increase the amount of calcium in a site, gypsum (calcium sulphate) is the best amendment. Other forms of calcium, such as lime (calcium carbonate) will increase the pH, which is undesirable.

Planting wild simulated ginseng is very easy. Planting is best done in the fall with stratified seed. To plant, rake away the top layer of leaves in the planting area, loosen the top inch or two of soil, scatter seeds at a rate of four seeds per square foot. Rake seeds into the soil, and cover with the natural leaf layer. The roots will be ready for digging in about 10 years, but may be left in the ground longer. Ginseng roots increase in value with age, so leaving the roots in the ground for a longer period of time is not at all a problem.

**Black Cohosh**

Of the three plants, black cohosh is the most adaptable and easiest to grow. The roots of black cohosh are used medicinally in the treatment of menopause, and black cohosh is one of the primary ingredients in herbal menopause formulas. Unlike ginseng and goldenseal, commercial collection of black cohosh has only been occurring for the past 10 years or so, although the increase in demand for natural remedies for menopause has forced a lot of collection in herbal menopause formulas. Unlike ginseng and goldenseal, the seeds need to be stratified to germinate. The best germination results come from fresh seeds. The seeds need to be stratified first in a warm damp environment, then in a cold environment. To do this, fresh seeds can either be seeded in a nursery bed in the fall and left to germinate the following spring, or sown in a flat and left in an unheated greenhouse from the fall to the following spring. Plants grow rather large, and should be planted one to two feet apart at a depth of two inches in tilled raised beds. Weed control should be done early in the season, since plants will get big quickly. Beds should be mulched with sawdust, pine bark mulch, or chopped leaves.

Plants grown from cuttings should be ready for harvest in 3 to 5 years, and plants grown from seed should be ready in 6 to 7 years. Harvesting black cohosh is essentially the same as for goldenseal. Roots are dug with a digging fork and sprayed clean on mesh screening. The roots of black cohosh are relatively gnarly and may need to be cut before cleaning. Roots should be dried in a protected, well ventilated area out of direct sun. The temperature should not be over 100 degrees, drying will take approximately 5 to 10 days.

**Conclusion**

Cultivating woodland herbs can be both enjoyable and profitable for the grower who has an appropriate planting site and is willing to invest the time necessary to become familiar with woodland cultivation. In addition to satisfaction and possible profit, cultivating woodland plants will help to preserve the natural diversity of wild populations of plants that could otherwise be collected to the point of disappearing.

You should now have the basic information that you need to start cultivating woodland medicinal plants. A good deal more information is available on the internet, in books, and in other publications. A brief list of resources is given below, for a larger list of resources contact the author at the e-mail or postal address given below. United Plant Savers (see contact information below) publishes an extensive list of companies that provide live roots and seeds for the woodland herbs.

**Suggested on-line resources:**

United Plant Savers – P.O. Box 98, East Barre, VT 05649, www.plantsavers.org

National Center for the Preservation of Medicinal Herbs – 33560 Beech Grove Rd, Rutland, OH 45775 , www.NCPMH.org

**Suggested reading:**


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There is an area of some 50,000 forested acres in southern New England which, while within 25 minutes of a major city, is so wild that bobcats, flying squirrels and trout abound there. On their common border Connecticut and Rhode Island established state parks and forests years ago, when there were few houses in the area.

In one of them lives Skip Keane, surrounded by Rhode Island’s 19,000 acre Arcadia State Forest — in which people have gotten lost for days and through which passes the Wood River, a class A stream with the best trout fishing in the state.

Keane grew up in Attleboro and graduated from Northeastern University. Fascinated with learning and trying things out, he has a master’s degree in archeology and is getting another in elementary education. He teaches some college classes as well as subs at an elementary school, has promoted concerts, and owned both a grocery store and a restaurant. Skip was an archeologist on the Blackstone River project and knows both his local geology and Native American history.

The 8-acre place Keane bought in 1993 is on Skunk Hill Road, so he calls it Stinky Acres. In exchange for the privilege of being surrounded by miles of wilderness to explore with cross country skis and canoe, Skip is not allowed to cut trees on his own land. In the Wood River watershed, owners are limited to felling no more than 5% of their timber. As a result, Stinky Acres has specialized in raising products which do well in arboreal settings.

“I like an edible landscape,” he says. “Every year I spend maybe $500 and bring in some trees and bushes that are native to this area, or grow well here, and produce fruit or berries. I have wine grapes, rare plums, Asian pears, medlar, hardy kiwi, apricots, paw paws, elderberries, quince, persimmons, loganberries, filberts, hazelnuts, black walnut. The whole idea is to have a place where you can stroll around and eat what you find. Every year I have failures, things that don’t take. But that’s what you have to do.

“Part of the reason I got into growing mushrooms,” he continues, “was because I wanted something which could fit here. There are rivers, ponds, and miles of forest. I wanted something, which could add a little income and could be done in a forest setting.”

Keane’s mushroom business started out as an adventure. He and his friend Mike Veracka, who was also interested in edible landscapes, heard about the healthy properties of shiitake mushrooms and decided to try some logs together. Skip enjoyed raising them so much he decided to go into business and now sells them to Bread and Circus, a local food coop, some restaurants and a circle of friends.

“I wanted to sell my mushrooms as organic,” Keane relates, “so I checked into getting certified. When I first inquired about it the state sent me the application and I saw they wanted a soil test. I said, fine, I can do that. There are no chemicals used on this property. But I’m growing on logs. They didn’t understand how mushrooms are produced!”

So Skip ended up writing the regulations for organic mushroom production for the state of Rhode Island. Now he certifies that his logs are clean by getting a statement from the state about the management of the forest, and the logger about where he got the logs. He also has to certify that the place he gets plugs and spore doesn’t use anything prohibited.

“It’s not a hard process,” Keane coaxes. “Anybody can do it. Just be careful who you choose. If you love mushrooms I’d recommend getting 10 logs and putting them out under some pines. If you put them in an oak area, other mushrooms that attack oaks can contaminate your logs. But if they’re under pine, it’s safer. Mushrooms like shade and a little wind. Ventilation is the most important thing.

“You can use any hardwood for shiitake, — oak, maple, beech. Red oak is the best, from my experience. What has to happen is that the sap has to be at the right level. The logs have to be cut and used within 3 weeks — cut, drilled, plugged, and sealed within 3 weeks. You can inoculate anytime after the leaves turn brown in the fall until several weeks before leaf buds appear in the spring. But the best time to do it is late September or, even better, in February. Usually I do it in February.”

Most commercial shiitakes, says Skip, are produced in sawdust, not natural logs. It is hung in net bags, inoculated with spore, and the mushrooms pop out — although they’re typically smaller than those grown on logs. But they can be produced in greenhouses where every aspect of the environment is controlled, and can be produced by the billions.

Keane, however, prefers the natural system, and buys oak logs. Once a year the state auctions off sites in the forest they want cleared, in order to go in and plant corn or wheat as forage for the wildlife. Usually he’ll order oak logs from a friend who bids on those sites.

Log thickness is only relevant to how easily they handle - bigger logs will last a long time, but they’re harder to handle. Six inches is a good diameter for an oak log, and it doesn’t matter if you use a trunk or a limb. Last year Skip had a lot of bad winter weather and there were many downed limbs which he went around and grabbed.

Keane buys his spawn in the form of inoculated dowels from the “Mushroompeople”, PO Box 220, Summertown, TN 38483-0220, www.thefarm.org/mushroom, 800-692-6329. They have many different strains of shiitake, as well as other mushrooms, and offer a starter kit for about $20.

“You could take the spore from a mushroom, get a petri dish, sterile instruments, and inoculate your own logs, he says. “But if something else got in there, a wild strain, you’d lose all your work. So I buy the dowels. I’ve just focused on shiitakes because I like them, and they keep very well. There are lots of different shiitake varieties, however. Some do better with cold weather, some with heat. I use an all-weather variety that does best from 50 to 75 degrees F. Below or above that they shut down — they won’t grow.”

The plugs are a little less than an inch long, with the spore already in them. They run about $40 per thousand. Skip get his logs delivered after he already has his plugs, and he’ll drill 50 logs and plug them on a weekend. He just drills a hole and bangs the plug in with a hammer. He gets a cheesewax or beeswax (which also has to be certified) and paints it over the plugs. This is the Japanese method, which they’ve been doing for thousands of years.

The holes are 6 to 8 inches apart, every 2 to 3 inches all the way around the log. Some people paint the end of the log with latex or oil paint to keep them from rotting, but that’s not allowed in organic management. Keane has logs that are 6 or 7 years old, and doesn’t think you need to seal the ends.

“The hard part is drilling,” he stresses. “Two years ago I did 30,000 holes! You might put between 70 and 150 in a typical log. It’s a lot of work and you don’t really make much of money on it. I make a little, and it helps. For me, it’s more having fresh mushrooms, giving them to friends. The cost of the dowels and wax, plus the cost of the logs and the work to drill them is all it really takes. The logs will produce for four to five years.”

Once you drill your logs you stack them horizon- tally in cribs, advises Skip. You leave them that way for six months. Then you take them down and lay them so one end is on the ground, wick up the moisture, and the other end is up on something — another log or piece of metal a few inches above the
You have to be careful timing the harvest, he stresses, because mushrooms spoil quickly. You might look at them and think they’re almost ready, you’ll wait just one more day. But they can be gone the next day - maybe it rained and they got too much moisture. If you don’t harvest them, when they get to a certain size they’ll just turn brown and melt.

You can harvest in the morning, or at night. You clear a log and if it’s in the fruiting period they may keep popping out for a few weeks, necessitating picking every day. In a good fruiting, two or three mushrooms will easily amount to a pound. Then fruiting stops, even if the weather is perfect. After a rest, they’ll start fruiting again. If one batch of logs is ready, other batches will be too. Some years are good, some are bad, Keane says philosophically. He has had years when he picked 3,000 pounds, and years when he got 400. He starts new batches of logs about every 3 years.

Shiitake are very sensitive to moisture, so to keep them fresh Skip cuts vents in plastic bags to let them breathe. He keeps the bags open and put them in the refrigerator crisper, where they’ll last 2 or 3 weeks. If you close up the bag, however, the moisture in the mushroom can’t escape and it will just melt. Mushrooms don’t freeze well, he says, but they do dry well. He uses a dehydrator, then to eat them he just puts them in water to reconstitute for a half an hour. He squeezes them to get the excess moisture out, using the water in the sauce.

Keane doesn’t recommend eating shiitakes raw because he thinks they’re much better if you fry them up in a little butter and garlic. Sautéed, they have a consistency like lobster. He likes them that way, or fried a little more and added to spaghetti sauce, eggs, or sandwiches. Before cooking them he usually washes them, puts them dry, and cuts the stem off.

“Shiitakes are the healthiest mushroom in the world,” Skip asserts. “According to a report I read, they contain all 8 essential amino acids in better proportion than soybeans. They have vitamins A, C, D, and Niacin. As little as five grams of shiitake taken daily reduces serum cholesterol and blood pressure. Shiitake produce interferon and interleukin compounds which strengthen the immune system, and a fat absorbing compound that aids in weight reduction. The Japanese eat them 3 or 4 times a day just for health reasons.”

“Look at that!” he says, holding up a fresh cut sample. “How can you beat that for a mushroom? You’ve never seen a shiitake like that in your lifetime! Fresh! They’re like steak! I’m not bragging, but they’re perfect!”

Keane sells his mushrooms for about $7 a pound, fresh. On a good day they will yield a hundred pounds. He puts them on plastic trays and takes them into a store like Bread and Circus in Providence, where they are bagged and resold for $14 or $15 a pound. They sell out quickly, he says.

“If I can’t sell them for some reason,” he adds, “I’ll use them myself, give them to friends, or dry them. But usually I don’t have any trouble selling them. The first year it was hard because it was new. People wanted me to prove they wouldn’t get sick eating them. But I gave out a few samples. The next day I got calls, people wanted more.”

He finds he can’t compete with commercial growers on price, however, and market his mushrooms in a mass market chain like Stop and Shop. The things that he has going for him are the freshness of his product and that it is organic.

In addition to his edible landscaping efforts and his shiitakes, Skip uses his forest setting to grow ginseng. He feels he has almost a perfect spot for it, about 70% shade. Although there are a lot of deer in the forest, he says he has never had a problem with them — perhaps because it is a management area and hunting is allowed.

“Ginseng grows well in my woodland,” he claims. “You have to dig in the ground, turn it over, and then plant your seeds. Then just leave it. You have to wait between 5 and 7 years for a sizeable root.
Edible Forest Gardens: An Invitation to Adventure

Excerpted from the forthcoming book Edible Forest Gardens: A Delicious and Practical Ecology
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"Come among the unsown grasses bearing richly, the oaks heavy with acorns, the sweet roots in unplowed mud."
Ursula K. LeGuin, Always Coming Home

Picture yourself in a forest where almost everything around you is food. Mature and maturing fruit and nut trees at different times of the year. A diverse assemblage of native wildflowers, wild edible, herbs, and perennial vegetables thickly covers the ground. You use many of these plants for food or medicine, while others attract beneficial insect, birds and butterflies, act as soil builders or simply help keep out weeds. Here and there vines climb on trees, shrubs or arbors with fruit hanging through the foliage - hardy kiwis, grapes, and passionflower fruits. In summer glades large stands of Jerusalem artichokes grow together with groundnut vines. These plants support one another as they store energy in their roots for later harvest and winter storage, their bright yellow and deep violet flowers enjoying the radiant warmth from the sky.

What Is an Edible Forest Garden?

An edible forest garden is a perennial polyculture of multi-purpose plants — many species growing together (a polyculture), most plants re-growing every year without needing to be re-planted (perennials), each plant contributing to the success of the whole by fulfilling many functions. In other words, an edible ecosystem: a consciously designed community of mutually beneficial plants and animals intended for human food production. Edible forest gardens can provide more than just a wide variety of food and fiber, fodder (food for animals), fertilizer and "pharmaceuticals", as well as fun. A beautiful, lush environment is either a conscious focus of the garden design, or a side-benefit one enjoys.

The forest garden mimics forest ecosystems, those naturally occurring perennial polycultures originally found throughout the humid climates of the world. In much of North America, your garden would soon begin to reforest to forest if you were to stop tilling and weeding it. Annual and perennial weeds would first colonize the bare soil. In a few years, shrubs would follow the weeds as the dominant plants. Finally, the pioneer trees would move in, and a forest would be born. It can take many decades for this process, called succession, to result in a mature forest.

We humans work hard to hold back succession — mowing, weeding, plowing, spraying. If the successive process were the wind, we would be constantly motoring against it. Why not put up a sail and glide along with the land's natural tendency to become forest? Edible forest gardening is about expanding the horizons of our food gardening across the full range of the successional sequence, from field to forest, and everything in between.

Besides the direct human uses, it is critical to design the forest garden for self-renewing self-fertilizing self-maintenance. Most plants used in forest gardens are self-renewing perennials or self-sowing annuals. Continuously mulched and otherwise undisturbed soil allows a healthy and diverse soil community to develop. Including plants that can fix nitrogen, accumulate subsurface soil minerals, act as a source of mulch, or a combination of these functions also improves soil fertility. Some species provide food or habitat for insectivorous birds, predatory and parasitic insects that devour pests, reducing and at least maintaining the need for pest and disease management work.

Gardening LIKE the Forest vs. Gardening IN the Forest

There are many ways to garden IN the forest. These include the restoration of natural woodlands, ecological forestry, agroforestry, and the creation of primarily aesthetic woodland gardens. These and other forms of gardening IN the forest are not what we are talking about. Useful species with their roles and their ultimate size helps reduce the amount of maintenance they need and increase their yield.

Mid-Succession Ecological Analogs: old fields usually contain diverse, highly productive species. We can mimic such ecosystems by including existing useful species and by selecting species with similar niches in the place of less useful species. The same principle applies to every stage of succession. Survey your existing flora, find out what you can use, and figure out what you can substitute that has more direct human uses. The Ecological Analog process is one of the more direct ways to design forest gardens like the ecosystem we want to model.

In addition to physical architecture, ecosystems exhibit "social structure" and structures of change through time (AKA successional patterns). These also offer opportunities for reduced maintenance and increased yields if we pay attention and design well. Social structure includes the design and hoshandling of the food webs both above and below ground, as well as associations of plants and animals called guilds that partition resources and create webs of cooperation and interdependence. The increasingly sophisticated science of soil food webs is demonstrating exciting results such as the near elimination of the need for fertilizer in some systems, and radical reductions in diseases and pests simply by supplying the resources and conditions necessary for all the components of a healthy food web to thrive. Resource partitioning guilds in particular are essential to the design of high yield polycultures. When we understand the root patterns of different plant species, for example, we can mix and match associates that will use different parts of the soil profile. This allows us to pack individual plants closer together without increasing competition between them, while actually increasing the volume of soil resources the system as a whole uses. Such an arrangement has the highest chance of...
Plum tree with Coltsfoot (wide leaves) growing at the base and kiwi climbing the tree at Bullock brothers Farm, Orcasis, WA.

creating a polyculture that yields more per unit area than the same number of crop plants grown in monoculture.

What all of this means is that when we forest garden we design and garden not only with plants, but with insects, birds, microorganisms and all the other life forms with whom we share our home. We work and garden not as master and servants, but as co-participants in the play of life. The greater our understanding of our partners in this endeavor, the greater our ability to work consciously with them to create harmonious garden patterns. Basically, it comes down to this: don’t plant trees, plant ecologies!

The Garden of Eden: It Sounds Great, But Is It Practical?

Eric and I like to think of edible forest gardening as recreating the Garden of Eden, and from the description at the beginning of this article, it sounds as if it is. Is such an abundant, low maintenance food garden really possible?

A Few Lessons From a Little History

Though ancient in many ways, the notion of edible forest gardening is relatively new to modern western culture and especially to the modern North American continent. The people of tropical Africa, Asia, and Latin America have a long tradition of using a multi-storied agriculture integrating trees, shrubs, livestock, and herbaceous crops. They grow fodder trees in pastures that provide windbreaks, livestock forage and shade. Some of these trees also improve forage and shade. Some of these trees also improve the fertility of pastures that provide windbreaks for livestock, by planting both in the woods and in the field to create broad areas of transition with a diversity of shapes and habitats, from rural to urban, from open woods with tall trees stop immediately at the edge between significantly different habitats such as field and forest. These “edge zones” usually contain a variety of microclimates in a small space, and this typically creates highly productive and highly diverse ecosystems—a phenomenon known as the “edge effect”. We can use such edges to advantage by planting both in the woods and in the field to create broad areas of transition with a diversity of useful species.

Woods Edge Forest Garden

An abrupt line usually marks the edge between forest and field in most cultivated landscapes: woods with tall trees stop immediately at the edge of a mowed or cultivated area, with a wide or transitional vegetation. In most natural landscapes, broad areas of transition characterize the edges between significantly different habitats such as field and forest. These “edge zones” usually contain a variety of microclimates in a small space, and this typically creates highly productive and highly diverse ecosystems—a phenomenon known as the “edge effect”. We can use such edges to advantage by planting both in the woods and in the field to create broad areas of transition with a diversity of useful species.

“Instant Succession” Forest Gardens

When presented with an open field or lawn in which to plant your edible forest garden, you can design the garden as an “instant succession”. In an instant succession you design the garden at each stage of its development from perennial herbs, to shrubs and herbs, to young trees, to “climax forest”, and then plant all the species for every stage of succession at once. You must start by designing the climax stage first, and then design backwards in time step-by-step towards the present, fitting all the shorter-lived, sun-loving plants for the earlier stages around the longer-lived plants for the later stages. Such a dense planting should need minimal maintenance for many years as long as you plant enough groundcovers and sun-loving plants for the first years and put all the longer term plants at reasonable spacings. Instant successions require a large initial investment of time, money and information. They also need a lot more hands-on research to determine how they work best, but they are also quite fun and interesting. If you have a large space to convert to forest garden, then you must be ambitious to provide critical habitat for wild game mammals and birds, as well as abundant semi-wild foods and medicinal plants that formed an essential part of the Medieval diet.

Several continuously coppiced “stools”, or stumps, in Britain have been proven to be 500 to 800 years old, demonstrating that coppicing can dramatically prolong a tree’s life span. These very stable, sustainable agroforestry systems have existed for hundreds of years before declining and being almost totally lost during the industrial revolution. In addition, the more you grow about the culture and agriculture of the Indians of eastern North America, the more we understand the sophistication of their forest management strategies. Clearly, the record shows that forest garden like systems have been viable and practical in temperate climates. Isn’t it possible for us to do far better now if we put our hearts and minds to it?

A small but growing number of people in the cold climates of the world have been developing these ideas for the current era. J. Russell Smith’s seminal 1950 work Tree Crops: A Permanent Agriculture first sparked interest in the potential of agroforestry in temperate as well as tropical and sub-tropical climates throughout the world. However, tropical countries and large scale tree crop systems received most of the resulting research attention.

Robert Hart got things going for backyard folks with his inspirational book Forest Gardening, first published in Britain in 1991. Hart’s vision of temperate climate forest gardening was the result of his work with tropical agroforestry systems, his Gandhian beliefs and his backyard experiments. His forest garden in Shropshire, England is an incredibly beautiful testament to his vision, and the oldest known temperate climate forest garden in the world (started in 1981). Patrick Whitefield followed Hart’s book with his more practical How to Make a Forest Garden: a large trees with a British focus. These two pieces, combined with Bill Mollison and David Holmgren’s works on permaculture (“perma- culture”), have sparked widespread interest in and planting of forest gardens throughout Britain. These gardens all demonstrate the potential of edible forest gardens, if not the actual benefits.

Edible forest gardens have been slower to spread in North America. Few people have heard of the idea, even the examples are fewer and farther between— but they exist. Over 150 forest gardens have planted in the maritime climate of coastal Washington state, at 7,000 feet in the cold, dry Colorado Rockies, in the hot, humid city of Greensboro, North Carolina, and in chilly southern New Hampshire, all with at least some success.

Forest gardens are viable in small urban yards and large parks, on suburban lots, or in a corner of a rural farm. We have seen examples ranging from a 2 acre research garden (Bullock brothers Farm, Orcasis, WA) to a heavily planted 30 X 50 foot embankment behind an urban housing project. Smaller versions are definitely possible— though it might stretch the word “forest” rather far, the same principles and ideas still apply. Despite the name “forest garden” it is best if your site has good sun, but, of course, if your land is shady and wooded you can craft the ideas, information and plants of forest gardening.

Spanning the Gamut: Forest Gardens Examples

Forest gardens can come in a multitude of sizes, shapes and habitats, from rural to urban, from open shrubland or woodland to dense forest. Let’s explore some of the possible permutations so that you can have some pictures in your mind’s eye. We intend what follows to be suggestive rather than prescriptive or conclusive. Our book will contain many more images, patterns and examples of forest garden design.

Forest Garden in the Woods

If you already have a woodland on your property, you can inventory it, and then plan to add and subtract from the existing plant community. The results can vary from minimal change in the structure of the existing woods with the main task the underplanting of perennial vegetables and medicinals, to adding to the woody understory with shrubs and shade-tolerant trees, to making openings and planting a successional sequence that will refill the gap(s) you make with useful species from the canopy on down. Such a planting scheme will vary from wild, essentially unmanaged, higher risk plantings to semi-wild, partially managed plantings, to highly maintained gardens-in-the-woods, depending on goals, site preparation, species selection, and existing vegetation character. An understanding of the dynamics of gaps in mature forest succession will be helpful in managing some such systems. In these kinds of cases, we strongly urge the use of primarily native species to support and restore native ecosystems, if not only native species if they will meet the design goals of the site is relatively free of exotic plants.

Path through garden showing trellised kiwi, fruits and vegetables. Owner: Charlie Headington, Greensboro, NC.
undertake this strategy in an all-at-once manner. See “Native That Merge?” below for another way to fill a large space with forest garden.

The Suburban Landscape Mimic

Urban and suburban dwellers with aesthetic concerns can still create a forest garden, even in their front yard. In situation, the aesthetic garden will have more influence on the garden design than is likely in any other circumstance, so that plant selections will be made with this criterion in mind. Many edible and otherwise useful plants are quite beautiful. The forest garden can fit into a range of aesthetic styles from formal to informal, and edible plants can work as screening, groundcovers, and fit into a variety of color and texture schemes.

Micro-Forest Gardens and Nettle That Merge

Even if you have a very tiny space in which to plant, say in an urban yard or even a rooftop somewhere, you can still plant a forest garden. Though it might stretch the word “forest” beyond the break point, you can apply the same principles to a small space with as few as two or three semi-dwarf trees and associated plants that fill a 30 foot circle or a 15 by 45 foot rectangle. A larger space can use a more pattern such as this to create forest garden nuclei that quickly achieve self-maintenance and then grow outward to eventually merge. This mimics the overall development pattern of many plant communities during succession. It can be a great way to grow your own nursery stock, reduce the up-front labor and investment, and adapt over time to the realities of which plants do well, and which don’t, on your particular site.

Large Scale Forest Garden

Eric and I know of forest gardens that range in size from 30 feet by 50 feet to over 2 acres. Once you get over, say, a one-half acre size, and if you want to establish the canopy layer all at once, some broad-scale techniques may come in handy. At the Agroforestry Research Trust in Devon, England, Martin Crawford has established a model forest garden that demonstrates one of these techniques. Planting all of the trees for the canopy first and at about the same time, Martin had young trees standing in a grassy field. One year, Martin killed the grass in an 8 foot wide strip using heavy, black woven polyester sheeting as a mulch. The next year he moved the black poly to the neighboring 8 foot wide strip, and planted the killed zone heavily with aggressive groundcover plants chosen for a variety of function, but primarily to fill the ground plane and thereby to include ourselves in the natural systems with productive agricultural ecosystems. The goal is to create mutually beneficial communities of multi-purpose plants for our own sustenance, and to thereby include ourselves in the natural system. We have many lifetimes worth of creative interest and fulfilling enjoyment ahead.

We seek to learn from our own wetlands, fields, thickets, and forests the ways living things have adapted to our climate and land, and to mimic these systems with productive agricultural ecosystems. As the trees grow and cast deeper and deeper shade, the result is to eventually merge. This mimics the overall development pattern of many plant communities during succession. It can be a great way to grow your own nursery stock, reduce the up-front labor and investment, and adapt over time to the realities of which plants do well, and which don’t, on your particular site.

As the trees grow and cast deeper and deeper shade, Martin will convert the ground layer into more shade-tolerant edibles and ground covers. The result is a large forest garden with a dense ground layer and growing canopy and shrub layers over a few short years.

As a “new” idea, many of the practical considerations of forest gardening have yet to be worked out in complete detail, especially for North America. Only a few of the species used by British forest gardeners will adapt well to North American climates and soils. Many native North American plants have good forest gardening potential, particularly wild edibles, medicinal and beneficial insect attracting plants, but are relatively untested in such systems. There is strong positive evidence, including much farming, gardening and ecological information spread across many different references, places and people. Eric and I have seen a number of good on-the-ground examples and undertaken enough attempts to create these gardens ourselves to know that it can work, and that it can work better than anyone has yet achieved. With clear thinking and by following the principles, it is possible to gather more accessible information about the ecology of useful plants, Eric and I feel sure that the edible forest garden idea will be of interest to and within reach of many people throughout the temperate world. But there is still much to learn, and this is where you come in.

We invite you to join in a lifetime of quiet adventure. Ecological systems at their essence operate on relatively simple principles, yet have endlessly fascinating intricacies. Many delicious and useful plants stand ready for use in forest gardens, and many more exist with great potential for selection and development. We know much about the basics of edible forest garden design and management, but there is still much to learn. It seems we have many lifetimes worth of creative interest and fulfilling enjoyment ahead.

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postpaid, expected retail price is $40 (mention TNF in your note to get the $25 price until May 1, 2002). Edible Forest Gardens is the most complete and up-to-date reference manual on temperate climate forest gardening ecology and design ever to be published. Join over 130 other supporters of the Edible Forest Gardens Community Supported Authoring group. Your pre-publication purchase helps Eric and Dave keep eating while they finish the book, and you get an autographed copy mailed to your home immediately upon publication. Some members may get advance review opportunities. Send checks, mailing and shipping addresses and phone number to Dave Jacke, Native Harvest Designs, 56 High Street, Keene, NH 03431. Thanks for your continued support!

8 Permaculture One (1978) and Permaculture Two (1979), the first books on permaculture, are no longer in print, but have been succeeded by Introduction to Permaculture (1991) and Permaculture: A Designers Manual (1988), both from Tagari Publications, Tyalgum, NSW, Australia.
9 Bill Mollison, Thanks.
American ginseng, *(Panax quinquefolium)* is a native American herb with a range that extends from Southern Quebec to Northern Georgia and from East Coast to the Midwest. It grows as an understory plant in the dense shade provided by deciduous hardwood tree species. It is the Northeast it is most commonly found growing under tall sugar maple while in the southeast it is often found under tulp poplar or black walnut. In the Midwest it occurs beneath several different hardwood species including oak.

Field cultivated ginseng - is grown in raised beds in fields under artificial shade provided by a mixture of evergreen, such as sugar maple or polypropylene shade cloth for a period of three to four years. In 1999 there were approximately 8,000 acres of “Field cultivated” ginseng in production in North America.

Woods cultivated ginseng - is grown in a forested environment in tilled beds under natural shade for a period of six to nine years.

Wild simulated ginseng - is grown in untill soil in forests for a period of nine to twelve months or even longer. The success of wild-simulated ginseng closely approximate the appearance of truly wild ginseng.

Wild ginseng - is an internationally protected species. Its collection is either prohibited or strictly regulated (if you sell it).

In recent years the world market price for field cultivated ginseng has dropped to near the actual cost of production. The prices of woods cultivated and wild simulated ginseng, on the other hand, have risen to levels that can be extremely profitable for landowners with suitable forest stands.

**Seed Dormancy**

Ginseng seed has a complex dormancy requirement and germination is reduced if not properly treated. The seeds obtained from the time of harvest until it is planted. Typically the seed is extracted from the red, ripe berries in August or September by mashing the berries and filtering the water, the mixture is then mixed with moist, coarse sand at a ratio of two parts sand to one part seed. The seed/sand mixture is put in a box with screen on top and bottom and buried underground for approximately one year. The box is dug up one year later and the seed is planted in the late summer or early fall. The seeds sprout the following spring, usually in mid April. Ginseng seed that has been stored for one year under outdoor conditions is referred to as “stratified seed.”

**Markets**

Unlike many “alternative” agricultural commodities the market for ginseng is well established and easily accessed. Traditionally, fur traders, timber harvesters and other individuals involved in the field work have purchased woods cultivated or wild ginseng for resale to dealers who export the over-the-counter ginseng to Asian markets. Most states that grow ginseng have a protection plan for wild ginseng also have lists of licensed ginseng dealers. For details about your state program or a list of dealers contact your local Conservation Department.

The prices received by growers of field cultivated ginseng have been declining in recent years due to oversupply and are now in the range of approximately $12 to $20 per pound for dried root. Properly dried ginseng roots contain at least third of the ginsenoside Rb1, the original fresh weight. The prices received by wild ginseng harvesters or growers of woodland ginseng have always been significantly higher and in some situations have been as high as $100 a pound. In general, the age and appearance of the root when harvested and the system of cultivation determine the level of price received by the grower. American ginseng is sorted into at least 40 different grades based on root shape, color, taste, and age. Most growers know very little about the various grades of ginseng and simply sell their roots by bulk. The references listed at the end of this article include sources of seed, rootlets for transplanting, ginseng buyers and consultants.

**Legends**

Wild ginseng is a internationally protected plant. In order for it to be legally exported from any state it must be certified as being cultivated ginseng or, if wild plants are gathered, they must be harvested according to the rules and regulations of a state certification program, approved by the U.S. Fish and Wildlife Service. Currently, only 20 states have such a program. Other growers should contact their local Conservation Department for information regarding any local rules and regulations that might affect cultivation, including pesticide regulations.

**Pests**

Although woods cultivated ginseng is not often affected by many pest problems, occasionally they do occur. This is in stark contrast to field cultivated ginseng, which requires routine, often weekly pesticide applications. Slugs can be a major problem in woodland ginseng operations. Prospective growing areas should be surveyed for slugs by using bait made from grapefruit rinds, banana peels or some other bait. Proper site selection, cultural practices and plant spacing can reduce or eliminate the need for any pesticide applications in many cases. There are several organic pesticides that may be employed in some northeastern states if necessary. Check with your local County Cooperative Extension Agriculture Agent before applying any pesticide to ginseng.

**Costs and Returns**

Ginseng growing in a forested environment is certainly not a “get rich quick” scheme as it takes a minimum of six to eight years of growth before root harvesting can occur. Prospective growers are encouraged to start with a very small investment, perhaps a few ounces of seed plus a hundred rootlets. Expand only if preliminary results are positive. Survival of rootlets and plants up to three years old is a good test of prospective growing site. The lowest costs of production are associated with the “wild simulated” approach.

**Site Assessment**

Perhaps the most crucial aspect of forest ginseng cultivation is choosing a proper site. Ginseng thrives in cool, moist, densely shaded woodlands that have well drained soil. Wild ginseng is typically found in old growth that is heavily forested with species diversity enhanced by a healthy soil that is well supplied with organic matter. It is often found beneath mature deciduous trees and rarely grows in an exclusively coniferous forest. In the south, southeast, south-central and the northeast and mid-west, slopes that face north or northeast and of 5 to 20 percent grade seem to provide optimal orientation and facilitate both air and water drainage. For example Vermont and Maine as well as Quebec, south or southwest facing slopes are preferred. The ideal ginseng-growing site is one that has a thriving population of wild ginseng or resembles such a site in terms of tree species and ground plants. Prospective growers would be wise to investigate the ecology of wild ginseng in their region (see references) before beginning. Ginseng is often found growing among other woodland plants that indicate a high level of natural fertility. Knowledgeable soil scientists, and other resource conservationists often can be called on to identify various soil types within any given region.

**Site Preparation**

“Woods cultivated” ginseng site preparation begins with a general clearing of understory vegetation, small trees and as many rocks as possible. Test plots of less than 100 square feet should be planted in as many different locations as possible. Planting should be at least one year prior to any serious site preparation. Microclimatic conditions are often unobserved initially but may be crucial to success. For wood’s cultivation till the soil to a depth of four to six inches either with a rototiller or by hand. Raised beds are not necessary if the soil is well drained. Poorly drained areas are not suitable for ginseng. A complete soil analysis performed by your local Cooperative Extension office will be helpful to eliminate sites that are unsuitable. Good soil for wilding ginseng is rich in organic matter with relatively low levels of phosphorus and potassium. Soil calcium levels should be at least 1200 pounds per acre with magnesium to calcium ratio of close to 1 to 10.

**Planting**

Purchase only stratified high quality ginseng seed from reputable dealers. Expect to pay up to $100 per pound and more for smaller quantities. No fertilizer or manure is applied to potential ginseng beds unless the soil pH is below 4.5. If pH is 4.5 or less, 50 pounds of ground limestone per 1,000 square feet may be tilled into the bed. If calcium levels are below 2,000 pounds per acre apply 50 pounds of gypsum per 1,000 square feet. If soil calcium levels are below 1,000 pounds per acre, look for another soil site. Consider compost, phosphorus or any type of nitrogen fertilizer to a ginseng planting. A one to two inch layer of well rotted or shredded hardwood leaves (preferably sugar maple) from the forest floor may be tilled into the soil.

For wood’s cultivated ginseng stratified seed are planted at the rate of 40 to 50 pounds per acre in spaced beds (one to one and a half pounds per one thousand square feet) in late summer or fall, but before the ground begins to freeze. For wild simula- ted ginseng plant 20 pounds per acre. There are approximately 20,000 to 25,000 seeds per pound. Seeds are randomly broadcast by hand for wild simulated or tediously planted one inch apart in rows spaced six to nine inches apart for wood’s cultivation. Many growers plant wild-simulated ginseng beds to facilitate weeding. The seed is covered with a one half to one inch layer of soil, tamped on and mulched with two to three inches of either shredded or intact leaves from the surrounding vegetation. Occasionally, one, two, or three-year-old rootlets are planted horizontally (the roots are laid on their side not up and down) at a depth of one inch. These are spaced at one rootlet per square foot. Rooting and cost for transplanting cost significantly more than stratified seed but save years of time in the production cycle. One-year-old rootlets cost approximately 25 cents each, two-year-old rootlets cost 50 cents and three-year-old rootlets cost $1.00 each.

“Wild simulated” ginseng planting involves similar site preparation without tilling the soil. In most cases the ground cover of decaying leaves and deadwood mulch is enough to keep all weeds and seeds are pushed into the soil, tamped on and the leaf mulch is then raked back.

**Maintenance**

Annual maintenance of “woods cultivated” ginseng beds consists of fall mulching, removal or suppres- sion of competing shrubbery, spraying of appropri- ate fungicides if needed, controlling slugs if neces- sary and fall thinning of crowded stands to achieve a final population density of one plant per square foot. Weeding is most crucial during the first two growing seasons.
Occasionally calcium is reapplied in the form of gypsum at the rate of five pounds per 100 square feet, which is broadcast on top of the beds in early spring prior to emergence. Established ginseng beds should be tested for calcium levels every two to three years. No fertilizer should be added to woods grown ginseng at any time. “Wild simulated ginseng” is usually left to grow on its own after one or two seasons of weed control except for annual slug control if needed.

**Harvesting and Drying**

Ginseng roots growing in woodland sites are usually large enough to harvest after six or more years of growth. Harvest usually takes place in late summer or early fall. The freshly dug roots should weigh an average of at least one-quarter of an ounce each by that time. There is often great variability in the size and shape of the roots, even those growing next to each other. A “rule of thumb” is that from 100 to 300 dried ginseng roots are needed to produce a pound. A pound of freshly dug ginseng should consist of 30 to 100 roots. (dried ginseng loses 2/3 of its fresh weight) Ginseng roots are usually dug by hand, carefully, so as not to damage the root or the fibers that grow from the main taproot.

Freshly dug roots are washed with a strong stream of water from a hose, but never scrubbed. The roots are dried slowly in a well-ventilated attic or a commercial dryer that never gets warmer than 100 degrees F. They are carefully placed individually without touching each other on screens or in cardboard trays before drying. The drying process may take several weeks depending upon the prevailing weather conditions. Growers should talk to prospective buyers before attempting to dry the roots because some buyers prefer to buy fresh roots. Freshly harvested and washed ginseng roots will keep for months in a refrigerator if stored in an open plastic bag. Fresh roots are preferred for making certain types of ginseng products.

**Future Markets**

American Ginseng is gaining popularity among American and European consumers. Eventually a market for “organic” ginseng can be expected to develop, as western people become more familiar with this product. Woodland cultivation is the only possible way to grow ginseng “organically”. Currently the production of woodland ginseng is so limited that almost all that is grown is exported to Asian countries. It will most likely continue to be in great demand since the Chinese market alone is enormous. American woodland ginseng is so expensive in China that only the wealthy can afford to buy it. As Asian economies recover from their current recession, demand will increase.

Growers associations have formed in several states including NY, Maine, Illinois and Wisconsin to address the marketing issues. Commercial woodland ginseng production is still in its infancy as an industry in the U.S. It is unlikely that supply will exceed demand anytime in the next twenty to thirty years. Ginseng cultivation will always be most profitable in naturally forested areas that have suitable environmental and ecological conditions.

**Additional Information**

Beyfuss, R.L. “The Practical Guide to Growing Ginseng” available from Cornell Cooperative Extension of Greene County, 906 Greene County Office Building, Mountain Ave. Cairo, NY 12413 for $6.00 postpaid

Persons, W.S. “American Ginseng, Green Gold” Tuckasegee Valley Ginseng, Box 236, Tuckasegee, NC 28783


Robert Beyfuss is Agriculture and Natural Resources Program Leader, American Ginseng Specialist, Cornell Cooperative Extension of Greene County, 906 Greene County Office Building, Mountain Avenue, Cairo NY 12413 (518) 622-9820 email rfb14@cornell.edu
Effects of Trees on Soils

by Dr. Anthony Young

Soil Fertility and Land Degradation

Approaches to soil management, including problems of soil degradation and low soil fertility, have recently undergone major changes. The former view was to concentrate on achieving high levels of production from the more fertile areas, leaving the marginal lands for extensive use only. Deeply sloping and highly drought-prone areas were preferably not to be cultivated at all. Soil constraints were to be overcome by inputs: improved crop varieties, fertilizers, chemical control of pests and diseases, and the use of irrigation.

It had been demonstrated that crop yields could be raised by a factor of three to five times or more by the use of fertilizers, applied to the newly developed high-yielding crop varieties. This approach was successful in giving large increases in crop productivity in Western countries and Asia and moderate improvements elsewhere, but it encountered problems when fertilizers are costly in terms of energy resources to produce them, and continued high rates of use lead to environmental problems. Yield responses to fertilizers have declined, for example because of soil physical degradation or micronutrient deficiencies. Above all, large numbers of poor farmers simply cannot afford high levels of fertilizers and other purchased inputs, nor do they have the capital to take on the risk which these involve. Finally, the former solution of increasing the area under irrigation has run into severe constraints in the form of limits to available freshwater resources.

Aspects of this new approach include:
* End ways of making the use of marginal lands sustainable;
* Reclaim and restore degraded land;
* Improve germplasm to produce plant varieties which are adapted to soil constraints;
* Maintain soil organic matter and biological activity, with benefits both for soil physical conditions and balanced nutrient supplies;
* Improve nutrient cycling and nutrient use efficiency in agroecosystems;
* Use fertilizers and other external inputs at moderate levels, seeking strategic use to overcome deficiencies that cannot otherwise be remedied;
* Improve water-use efficiency.

Agroforestry can contribute to all these aspects and has a major role to play in some. The capacity of trees to maintain or improve soils is demonstrated by the high fertility status and closed nutrient cycling under natural forest, the restoration of soils.

Nitrogen fixation and a high biomass production have been widely recognized as desirable. However, many properties are specific to particular objectives of systems in which the trees are used. Even species that are shunned for their competitive effects may have a role in certain designs. An example is the way in which Eucalyptus species with a high water uptake, which adversely affects yields in adjacent crops, have been employed to lower the water table and so reduce salinization.

The properties which are likely to make a good perennial suitable for soil fertility maintenance or improvement are:
1. A high rate of production of leafy biomass.
2. A dense network of fine roots, with a capacity for abundant mycorrhizal association.
3. The existence of deep roots.
4. A high rate of nutrient fixation.
5. A high and balanced nutrient content in the foliage; litter of high quality (high in nitrogen, low in lignin and polyphenols).
6. An appreciable nutrient content in the root system.
7. Either rapid litter decay, where nutrient release is desired, or a moderate rate of litter decay, where maintenance of a soil cover is required.
8. Absence of toxic substances in the litter or root residues.
9. For soil reclamation, a capacity to grow on poor soils.
10. Absence of severe competitive effects with crops, particularly for water.
11. Low invasiveness.
12. Productive functions, or service functions other than soil improvement.

Not all of these properties are compatible: for example, litter of high quality is not likely to have a moderate rate of decay. The last property, the existence of productive functions, is not directly concerned with soils but is of the highest importance if the tree is to be effective in fertility maintenance. A species needs to be acceptable and desirable in agroforestry systems from other points of view, especially production. A tree might have all the desirable properties above, but, if it is not planted and cared for, it will not be effective in improving soil fertility.

Summary of Effects of Trees on Soils

The capacity of trees to maintain or improve soils is shown by the high fertility status and closed nutrient cycling under natural forest, the restoration of fertility under forest fallow in shifting cultivation, and the experience of reclamation forestry and agroforestry.

Soil transacts frequently show higher organic matter and better soil physical properties under trees. Some species, most notably Faidherbia albituba, regularly give higher crop yields beneath the tree canopy. Trees improve soil fertility by processes which:
* check runoff and soil erosion;
* maintain soil organic matter and physical properties;
* increase nutrient inputs, through nitrogen fixation and uptake from deep soil horizons;
* promote more closed nutrient cycling.

Trees may also adversely affect associated crops. The effects of allelopathy (inhibition effects) have probably been exaggerated by mistaking them for, or confounding them with, other processes. Competition for water is a serious but not insuperable problem in all agroecosystems, whereas competition for nutrients has rarely been demonstrated.

Where the net effect of tree—crop interactions is positive, the length of the tree—crop interface, or extent of the ecological fields, should be maximized. If the net effect is negative, the aim of agroforestry system design should be to reduce the length of the interface.

A range of properties have been identified which make tree species suited to soil improvement. For many purposes, high biomass production, nitrogen fixation, a combination of fine feeder roots with tap roots and litter with a high nutrient content are suitable. Tolerance to initially poor soil conditions is clearly needed for reclamation. About 100 species have been identified which are known to fulfill soil-improving functions, but there is much scope to increase this range.

The following are the principal trees and shrubs that have been employed for soil improvement (from Webb et. al., 1984; von Carlowitz, 1986; von Carlowitz et al., 1991; MacDicken, 1994; Young, 1999, p. 159). Names in parentheses are synonyms formerly in use. Species marked with an *userisk were not listed in the Original Source, but have been added on the basis of recent research.

- Acacia auriculiformis
- Acacia cyanophylla
- Acacia mangium
- Acacia mearnsii
- Acacia nilotica
- Acacia senegal
- Acacia seyal
- Acacia tortilis
- Albizia lebbek
- Albizia saman (Samanea saman)
- Anacardium occidentale
- Anis acuminate
- Anis nepalensis
- Antidesma spp.
- Ariplex spp.
- Azadirachta indica
- Bacaris gasipaes
- Cajanus cajan
- Calliandra calothyrsus
- Casuarina cunninghamiana
- Casuarina equisetfolia
- Casuarina glauca
- Centrosema pubescens
- Cordia alliodora
- *Crotalaria spp.
- Dalbergia sissou
- Dactyladenia barteri (Acioa barteri)
- Erythrina crista-galli
- Erythrina confusa
- Erythrina poepiggiana
- Faidherbia albida (Acacia albida)
- Flemingia congesta (Flemingia macrophylla)
- Gliricidia sepium
- Grevillea robusta
- Inga edulis
- Inga jinicuil
- Leucaena lebbeck
- Leucaena leucocephala
- Melia azedarach
- Musanga cecropioides
- Paraserianthes falcataria (Albizia falcataria)
- Parake nigra (Parika africana)
- Paulownia elongata
- Peltophorum dasyrrhachis

How Do We Know That Trees Improve Soils?

Underlying all aspects of the role of agroforestry in maintenance of soil fertility is the fundamental proposition that trees improve soils. How do we know that this is true?
<table>
<thead>
<tr>
<th>Species</th>
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<tbody>
<tr>
<td>Populus deltoides</td>
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<tr>
<td>Prosopis chilensis</td>
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<tr>
<td>Prosopis glandulosa</td>
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<tr>
<td>Prosopis juliflora</td>
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<tr>
<td>Prosopis tamarugo</td>
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<tr>
<td>Schinus molle</td>
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<td>Senna reticulata</td>
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<tr>
<td>Senna siamea (Cassia siamea)</td>
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<td>Senna spectabilis (Cassia spectabilis)</td>
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<td>Sesbania bispinosa</td>
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<td>Sesbania graniflora</td>
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<tr>
<td>Sesbania rostrata</td>
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<tr>
<td>Sesbania sesban</td>
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<tr>
<td>Tamarix aphylla</td>
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<tr>
<td>Tephrosia candida</td>
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<tr>
<td>*Tephrosia vogelii</td>
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<tr>
<td>*Tithonia diversifolia</td>
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<tr>
<td>Ziziphus mauritiana</td>
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<tr>
<td>Ziziphus nummularia</td>
</tr>
<tr>
<td>Zizyphus spina-christi</td>
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</tbody>
</table>

**Recent Study**

The soil-improving capacities of trees, and how these can be applied in practical agroforestry systems, continues to be a major focus of agroforestry. In a recent overview of agroforestry research (Nair and Latt, 1997), six out of ten review articles were concerned wholly or in substantial part with soil fertility aspects. One important recent change of emphasis is that less attention is being given to hedgerow intercropping (alley cropping), in view of the observed reluctance of farmers to adopt this system, whilst more emphasis is now placed on systems of managed tree fallows (Buresh and Cooper, 1999). An account of using trees to lower the water table, referred to above, is given by Burgess et al. (1998). Recent successful projects in soil fertility improvement by trees are described by Rao et al. (1998) and Niang et al. (1999).

**References**


The above excerpts are adapted from Chapter 2 of Agroforestry for Soil Management 2nd Edition with permission of the author and publisher. Details of the processes involved are discussed in detail in the original text. Agroforestry For Soil Management 2nd Edition presents a synthesis of evidence from agriculture, forestry and soil science, drawing on over 700 published sources dating largely from the 1990s. These include both results of field trials of agroforestry systems, and research into the plant-soil processes which take place within them. It is a valuable resource for research scientists, or for practical scientists, agronomists and foresters. The book can be purchased through many resellers including www.amazon.com, www.amazon.co.uk, and www.bookshop.co.uk as well as through the publisher CAB International at: <http://www.cabi.org/bookshop/index.asp>.

Mushrooms in Agroforestry

by Eric Hoffner

As one of the premier nutrient recycling organisms in the world, fungi are naturally an important component of any farm or garden. Along with organisms such as bacteria and yeasts, fungi are responsible for the activity in compost—just watch composting and you’ll see crumbly soil is proof of their power. Fungi can aid in the decomposition of straw, corn cobs, woodchips, or sawdust, as well as hard-to-handle forestry waste products like tree stumps and logs from small diameter trees. Their ability to break down such materials is important because this makes nutrients available for a farm or garden’s plants and animals.

Many mushrooms are well adapted to growing under forest cover, so growing them can be a good fit for anyone considering ways to incorporate a stand of trees on their property into their overall farm or garden plan. Fungi are cold tolerant and are easy to grow organically throughout the Northeast. Also, since they don’t have to be replanted each year, most of the work is done in the first season. Mushrooms need little daily care, add a superb accent to a fresh dinner from the garden, and can be an eye-catching addition to a grower’s stand at the market.

Mushroom Biology

A mushroom, the part of the fungus we see, is just the fruiting body of a large, intricate network of filaments called mycelia. Fungal mycelia live in the soil and in organic matter, especially wood, in every ecosystem of the world. These fine filaments intertwine and connect in an intricate network that carries nutrients, water, and minerals to nourish the fungus.

When neighboring mycelia of the same species come into contact, and the pH, temperature, and humidity are right, the mycelia may join and form a mushroom. A single mushroom is capable of producing invisible clouds of spores which colonize new substrates and grow into new mycelial networks. Picking a mushroom has been likened to plucking fruit from a tree—it’s unlikely that the mushroom we see is the only fruit the mycelium will produce, at least until it exhausts its food source.

There are two kinds of mushrooms that a cultivator can grow—the decomposers and the symbionts. The first kind, the decomposing fungi, are also called saprophytes, and they are the main type of mushroom considered for gourmet cultivation. Their mycelial nets intertwave throughout and between the cells in dead plant matter, secreting powerful enzymes and acids that act to reduce complex molecules into their basic components that are easily available for uptake by the fungus itself as well as other plants and organisms.

Saprophytic mushrooms colonize dead plant matter, or substrate, and work vigorously to extract all of the readily available nutrients. These mushrooms include the oyster, lion’s mane, hen-of-the-woods, and shiitake mushrooms. Our most familiar mushrooms are also in this group: portobello, crimini, and button mushrooms, all of the same genus, Agaricus.

The second kind of fungi is symbiotic with plants, and like the nitrogen producing bacteria present in the roots of garden peas and clover, they cooperate with trees, shrubs, or other plants. They are a common and important component of forest ecosystems. Their mycelial nets, being much finer than plant roots, are able to gather large amounts of water and trace minerals from the soil, which are shared with plant rootlets. For its part, the plant shares the some sugar it produces photosynthetically with the mycelium, and so both organisms benefit. Trees have been shown to grow much more vigorously in the presence of these symbiotic, or mycorrhizal fungi. Some nurseries have even specialized in inoculating tree seedlings with mycorrhizal mushroom mycelia to be used to regenerate clearcut forests, since the trees grow so much better.

Eric holds an oyster mushroom growing on a poplar log inoculated with plug spawn.

What Kind to Grow? Choosing which varieties to cultivate may well be the toughest aspect of growing mushrooms. Most folks are familiar with the rich and robust shiitake, but the other wood-loving varieties also have a lot to offer. Chicken-of-the-woods mushrooms are very meaty and absorb cooking flavors well, and the hen-of-the-woods, or maitake as it is known in Japan, has a pleasing mild flavor. Wood ear mushrooms are excellent in soups, lion’s manes grow like a white pom-pom and resemble lobster in taste and texture, and oyster mushrooms are heavy yielding, sweet tasting mushrooms that are excellent in a stir fry. Other mushrooms that can readily be grown include morels, which make the best cream of mushroom soup, and the amazingly vigorous King stropharia. All of these mushrooms are indigenous to the Northeastern US, except the shiitake and wood ear.

Visit www.fungiperfecti.com to see photographs and descriptions of these commonly grown mushrooms.

All edible mushrooms contain substantial amounts of protein and trace minerals, and many also have medicinal properties. These medicinal effects are probably the result of complex molecules present in the mushroom and mycelia called polysaccharides that the fungi produce to inhibit the growth of molds and bacteria in a mushroom. Practitioners of eastern medicine have been using mushrooms for a long time and researchers in China and Japan have conducted many studies that prove their healing properties. Such studies are beginning in the U.S. now, too, which should lead to more widespread acceptance of mushrooms as agents of healing.

Anti-viral, anti-bacterial, anti-tumor, and immune system enhancing properties are exhibited by the maitake, reishi, shiitake, and nearly all of the shelf mushrooms. New drugs to fight cancer, herpes, and influenza A are being developed from these and other mushrooms, and some of their unique anti-viral compounds have even shown the ability to inhibit the replication of the virus that causes AIDS.

Shiitake mushrooms also effectively lower cholesterol levels in the body—a single cap sautéed in a whole pat of butter will still help to lower a person’s blood serum cholesterol. One can gain all of the medicinal benefits of mushrooms by simply consuming them, either in a scrumptious dish in the case of shiitake, oyster, lion’s mane, or maitake, or powdered in tea in the case of the woody reishi or shelf mushrooms.

Mushrooms and Organic Standards

There are currently no rules for mushroom production under the new standards issued by the USDA. According to the National Organic Program (NOP), until those rules are in place, certified growers may produce and label mushrooms as organic as long as at least a portion of that production is certified by a USDA-accredited agent. Also, the mushrooms can’t carry the USDA seal, but must display the certifying agent’s seal or other identifying mark. See http://www.ams.usda.gov/nop/nopolicies.htm for more information. That said, growing mushrooms organically outdoors is easy. They require little but occasional watering after their initial inoculation into a substrate. Any farm that is already organically certified for vegetable crops ought to have no problem selling outdoor-grown mushrooms as organic.
Tools needed for log culturing include a hammer or mallet, natural fiber paintbrush, cheese wax, and a drill. To introduce spawn to a log, drill holes one inch deep (a drill stop is useful, as holes that are too deep inhibit rapid colonization by the mushroom, and shallow holes will leave dowels exposed) and fill them with plug or sawdust spawn. Spawn suppliers will furnish advice on the width of the hole and how many dowels or plugs are needed per log—more dowels should be inserted to produce more rapid blooms. A good rule of thumb is 30 to 50 plugs per log, tapped into evenly spaced holes 4 to 6 inches apart in a diamond pattern. Melted cheese wax (also available from spawn suppliers) applied to the ends of the logs and the heads of the dowels will keep out contamination spores of other mushrooms and keep moisture in.

Another method is to cut logs into two or three-foot sections, provide one layer of sawdust spawn between the ends, and then nailing the pieces back together. Alternatively, some growers cut a V shaped wedge out of the log, fill the cut with sawdust spawn, and then nail the wedge back on. Those who want to avoid cutting or drilling can simply pack sawdust spawn onto the log ends and make an aluminum foil “swimming cap” to hold the spawn in, but since the foil is liable to tear, contamination by unwanted fungi becomes more likely.

Inoculated logs stacked in the woods.

Mushroom Patches Oyster mushrooms and the King stropharia mushroom can be grown on fresh sawdust and wood chip piles, on fresh chopped straw dug into soil under trees, or on wood chips in an open garden. Paul Stamets, in his excellent reference Growing Gourmet and Medicinal Mushrooms, notes that crops growing near fungi do very well. Benefiting perhaps from the mushrooms’ ability to make micronutrients available in the soil. Stamets’ company, Fungi Perfecti, sells kits to grow Shaggy Mane, King stropharia, and oyster mushroom patches in garden aisles between crops and under trees. Even bees love mushroom patches—Stamets’ book notes an instance where a King stropharia patch was ferociously fed upon by that small insect.

Other varieties of mushrooms that can be grown in patches include some of the more valuable ones, like morels—many companies now offer their spawn. The even more delicious chanterelle should become available in coming years. Patches often require special amendments or treatments, such as areas of burned ground in the case of morels, in order to flourish. The supplier of the spawn can advise best how to achieve success. It’s also best to have a source of water nearby to ensure the harvest.

Inoculated Trees One emerging industry is the growing of truffles, the most sought-after of all mushrooms. The black perigord truffle, as the European variety is known, goes for as much as $250-$300/lb wholesale and $750-$900 retail—not bad for a crop that requires little effort. Other attractive aspects of growing these “black diamonds” is that they can produce for as many years as the tree is alive, and harvest is mid November to mid March, precisely the time that other sources of on-farm revenue may lag.

Since truffles are symbions with trees, one must purchase trees whose roots have been inoculated with truffle mycelium. Since truffles don’t grow well in acidic environments, the typically sour northeastern soils would have to be amended with lime prior to planting any trees. Potentially, rows of truffle trees could be planted and crops grown in between, so that the crops gain the advantage of shade during hot summer months and are protected from the damaging/drying effects of the wind. Another possible use could be planting the trees out in pasture and allowing grazers to enjoy their shade as well, so long as they don’t nibble the trees too much.

The catch is that it takes years before the first harvest—digging is not encouraged for several years to allow proper establishment of the colony—and so truffle growing must be viewed as a longer-term investment. At $17-$20 per tree, the cost can be prohibitive if one is to grow as many as 500 trees per acre, as some commercial farms do. One also

**Basic hand tools needed for inoculating with dowels: drill, hammer, natural fiber paintbrush, cheese wax, logs.**

**Ways to grow mushrooms outdoors**

**Log Culture** One can grow many kinds of mushroom species common in the northeast. Shiitake, chicken-of-the-woods, maitake, wood ear, lion’s mane, oyster, and reishi mushrooms are a few good candidates. On average, each log will cost $1-$3 to inoculate, depending on the type of spawn ordered and how much is introduced into each log—the cost is around $20 to inoculate 20 logs.

Mushroom spawn is actively growing fungal mycelium and is available either as plugs (“1” wood dowels) or in sawdust. Successful introduction, or inoculation, of this spawn onto a new substrate will produce mushrooms for years. When selecting a variety for cultivation, one should consider flavor, vigor, edibility vs. medicinal properties, marketability, and time until harvest. Companies that sell spawn offer a great deal of information on these topics (see resource list). Proper log selection is crucial to the success of the project. Hardwood logs can produce mushrooms for up to six years. Softer woods like aspen or poplar will yield mushrooms sooner, but will not produce as long as the denser woods. Conifer and fruit tree woods are notoriously bad for growing mushrooms and should be avoided. Tree species with thicker bark retain more moisture and protect mushrooms from drying out (a dry mushroom is a dead mushroom). Logs should to be alive when cut. Unless spawn is thinned from a woodlot makes good sense.

Fungi will usually fruit only after the whole available substrate has been completely colonized. The clear advantage of this method is that the mycelium benefits from the stump’s natural function of transporting water from below ground to the surface. When the mushrooms appear, they can be in huge clusters.

It is important that stumps be fairly fresh, so that the grower can be certain that what is growing is what is intended. Even so, it is helpful to know what other kinds of mushrooms may grow on wood in the neighborhood. Stumps are best located under tree cover, to prevent drying out.

When inoculating stumps, space the holes for dowels or sawdust spawn 4 to 6 inches apart in rows or rings in the sawdust. Sealing the holes with wax is recommended to keep out other mushroom species. Oyster, maitake, and reishi are particularly good for growing on stumps, and may produce mushrooms for a dozen years or more.

**Locate a spot for the newly inoculated logs near a water source and under existing tree cover to ensure success. Logs need watering or soaking in a pond or tank during dry times, and will produce best the year soaked once a month until their first fruiting. It is best to allow the bark to dry between soakings to deter the growth of unwanted fungi species. Logs should be lain in the shade in flat stacks called ricks, or if they are far from a water source, they can be buried 1/3 of their length in the soil, standing upright, so that moisture will be drawn into the wood naturally.**

A final important task is to mark each log with a durable label, such as the aluminum tags offered by some companies. For example, the date of inoculation and the type and strain of mushroom on these tags will help the cultivator determine how well various types of mushrooms perform in the region.

Although all wood loving mushrooms can be grown on sawdust or other substrates indoors all year long, this is much more technical operation and requires substantial investment. Mushrooms grown on logs outdoors are firmer and more robust, bring better prices, and seem to be more flavorful. While yields from outdoor mushroom operations are seasonal and not great enough to be profitable, they do supply a fine supplemental income to many cultivators. The website www.mushroompeople.com has a table that can help determine the income potential of a mushroom growing operation.

Stumps Mushrooms can also be effectively grown on the stumps of freshly felled trees. The length of time until first harvest varies from that for logiculture given the sheer size of the substrate, as fungi will usually fruit only after the whole available substrate has been completely colonized. The clear advantage of this method is that the mycelium benefits from the stump’s natural function of transporting water from below ground to the surface. When the mushrooms appear, they can be in huge clusters.

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needs to train a dog to find them, as the traditional pig will devour too many freshly found truffles.

In just five years, though, each tree can produce up to 2 pounds of truffles each. Yields vary, and this is an unproven industry in North America as yet. Growers in Oregon are having success growing the black truffle and the indigenous white truffle, too. Contact mushroom supply houses to find companies that can supply trees and information, but be sure that they are selling the real thing. Some unscrupulous dealers are selling trees inoculated with “false truffles.” They look like the real thing but are of little value.

**Kits** Any person who is interested in mushroom culture but wants to start out slowly, many spawn sources offer easy-to-grow organic mushroom kits, which are usually compacted sawdust blocks pre-inoculated with the mushroom of your choice. Just add water and watch them grow! These also make great science projects for kids. Nearly all mushroom supply companies offer kits for around $20.

**Harvesting Mushrooms** When harvesting mushrooms, the grower ought to use a knife and cleanly slice through the stalk at its base, leaving as little mushroom attached to the substrate or log as possible. This will prevent contamination problems posed by molds that may land on ragged mushroom stumps. Shiitakes require a very sharp knife, as they have stout stalks which are tough to cut through. Reishi mushrooms, though, are brittle and one can snap them off fairly cleanly with ease.

Mushrooms can be an integral part of any farm or garden, both for their valuable ecological functions and their nutritional and medicinal properties. Experiment with methods that produce desired varieties and consult some of the excellent references on growing mushrooms outdoors to boost yields. Growing mushrooms outdoors is truly an art that anyone can master and enjoy, so why not give it a try this year?

**Resources**

**Mushroom Cultivation Books**

- *Growing Shiitake in a Continental Climate*, by M.E. Kozak and J. Krawczyk. Excellent resource for log culture of mushrooms, applicable to most species. $15 new.

**Mushroom Identification Guides**

- *The Audubon Field Guide to North American Mushrooms* by Gary Lincoff is an excellent resource, packed with photographs, and covers 700+ species. $18.95 new.
- *Mushrooms of Northeastern North America* by Allen Bessette, Arlene Bessette and David Fischer. The most comprehensive guide for the northeast, with great photos—the keys to identifying the species are more advanced than the Audubon guide, and more difficult to follow. $45 new.

**Mushroom Supply Houses**

There are many companies offering spawn and a simple online search can locate a number of them. Two of the best are:

- **Fungi Perfecti** of Olympia, WA offers the greatest diversity of mushroom spawn and cultivation tools for the organic grower. One can see photographs and descriptions of most of the mushrooms mentioned above. Free home gardener catalog available, commercial catalog $3.00 plus $1.50 S/H. Also offers seminars on mushroom culture. www.fungi.com 1.800.780.9126 mycomedia@aol.com
- **Mushroompeople** in Tennessee sells shiitake, reishi, maitake, lion’s mane, and oyster mushroom spawn. They have a how-to-video available, which can be rented for $12 per week, and their Spawn Starter Kit includes 500 plugs, 1 pound of cheese wax, and 10 aluminum tags, good for ten 40” logs for just $19. Their site also has a handy tutorial on log cultivation, lists companies who buy fresh mushrooms, and gives figures on expected returns from shiitake production per cord of wood. www.mushroompeople.com 1.800.692.6329 mushroom@thefarm.org
Bamboo: A Multipurpose Agriforestry Crop

by Steve Diver, ATTRA Program Specialist

The bamboos are gaining increased attention as an alternative crop with multiple uses and benefits. These long-lived, woody-stemmed perennial grasses are usually evergreen in climates to which they are adapted; those of temperate regions grow a complete set of new leaves each spring, the old ones falling away as the new ones develop. Worldwide, approximately 87 genera and over 1,500 species of bamboo exist, with roughly 100 species comprising those of economical importance.

Two species of bamboo are native to the United States — Arundinaria gigantea (commonly known as giant bamboo, canebrake, or rivercane) and Arundinaria text (switch cane) — but most of the commercial and ornamental bamboos grown in the U.S. have been introduced from China and Japan.

Bamboo consists of two general types: clumping and running. The clumping types are typically of tropical or subtropical origin and therefore have limited geographical suitability in the United States since they cannot withstand freezing temperatures. An important exception among the clumping types is the Panda bamboo from the Himalayas, Fargesia spp., which is cold hardy to -25°F.

Running bamboo, which includes the most important genus of temperate climate species, Phyllostachys, can withstand occasional low winter temperatures between -10° and +15°F. The running types are typically top-hardy in sections of the Lower South, Southwest, and Pacific Coast (1), and root-hardy in northern climates (i.e., plants regrow from roots even if the exposed canes are winter-killed). Cold hardiness is an important characteristic of temperate bamboo species, along with height of cane, diameter of cane, and intended use.

Bamboo Groom Distinguished by Growing Type: Clumper or Runner

Clumper
Arundinaria
Bambusa
Chusquea
Dendrocalamus
Drepanostachyum
Fargesia
Himatanalyca
Otatea
Thamnochloa
Bamboo has three principal uses: [1] domestic use around the farm (e.g., vegetable-stakes, trellis poles, shade laths); [2] commercial production for use in agricultural and other enterprises such as crop or livestock production to derive both economic and ecological benefits, two key goals of sustainable agriculture. Bamboo as a woody grass plant is uniquely suited to agroforestry. Some of the many uses of bamboo in agroforestry are summarized below.

Bamboo Agroforestry
Agroforestry is the integration of woody plants with other agricultural enterprises such as crop or livestock production to derive both economic and ecological benefits, two key goals of sustainable agriculture. Bamboo as a woody grass plant is uniquely suited to agroforestry. Some of the many uses of bamboo in agroforestry are summarized below.

Agroforestry Function
Primary Use
Agroforestry Products

Intercropping
Riparian vegetation filter
Constructions
Living screens

Value-Added
Timber
Craftwood
Fiber crop

Bamboo Shoots as a Commercial Food Crop
Each spring, ATTRA gets phone calls on cultivation of bamboo shoots as a specialty food crop. Bamboo shoots are a popular item in Asian stir fry and as a pickled condiment. The most important genus for bamboo shoot production in the temperate U.S. is Phyllostachys, which consists of about 60 species, all of which are edible. Important food species include P. dulcis, P. edulis, P. bambusoides, P. pubescens, P. muda, and P. viridis.

An early USDA bamboo researcher recommended boiling fresh bamboo shoots prior to use for about 18–20 minutes. Bamboo shoots from species

importing a bitter taste should get a change of water after the first 8–10 minutes of cooking.

Daphne Lewis, author of “Bamboo on the Farm”, notes that the United States imports 30,000 tons of canned bamboo shoots each year from Taiwan, Thailand, and China. Small-scale growers are remarkably successful in creating and growing fresh, locally grown produce through niche marketing. Local markets for bamboo shoots include Asian restaurants, farmers’ markets, and health food stores, especially in Louisiana. Floral arrangements and arrangements that relish bamboo shoots. Harvesting shoots is also a convenient method of controlling the spread of running-type bamboos.

According to Tim Ogden of the Oregon Bamboo Co. (in Myrtle Creek, OR, 97457 541-863-6834) “...bamboo comes in, reaches maximum productivity in 7 to 8 years, producing 2 to 10 tons of bamboo shoots per acre. We sell everything we can produce off our mature 3-acre grove and we’ll be able to sell all the production from our second 3-acre grove, too, when it comes into production.” Ogden said distributors pay up to $2 per pound for his bamboo shoots, which retail for about $6 per pound.

Ogden grows varieties that originated in Southeastern China. The plants are spaced every 10 ft. in rows spaced 20 ft. apart. Oregon Bamboo Co. sells an informational packet titled American Bamboo Agriculture, which includes a 35-minute video and a hardbound book, for $22. Sue Tucker, co-editor of Temperate Bamboo Quarterly, explained that bamboo shoots should be harvested as soon as they can feel the tip of the bamboo shoot in the ground with the bottom of your feet. “Once the shoots emerge from the ground, they quickly become tough and bitter.” In the following excerpt from the Spring-Summer 1995 issue of Temperate Bamboo Quarterly, she notes:

Studies in China on the changes in nutrient content of bamboo shoots of different ages show there is a definite advantage to harvesting the shoots while they are still underground with sheaths just appearing above ground. Tests were done, using Phyllostachys pubescens, by harvesting at three different stages: underground, 5 days above ground, and 10 days above ground. It was found that protein and amino acid content is highest when shoots are still underground. In fact the author stated that protein content of a bamboo shoot (P. pubescens) underground is higher than any other vegetable.

Bamboo shoot production in perspective:
• It does not seem likely that large-scale bamboo shoot production will ever become a major agricultural enterprise in the United States. Countries that export this product have decided advantages over American farmers with respect to climate, labor, and processing costs.
• This should not deter market farmers from exploring bamboo cultivars, growing methods, and harvesting techniques to sell fresh bamboo shoots to niche markets, but it does give pause to great expectations that bamboo shoots are an easy cash crop or even the primary reason to raise bamboo.

Bamboo Plant Material
A list of bamboo species and their characteristics (e.g., growth habit, cold hardiness, size) and uses (e.g., bamboo crafts or conservation purposes) is certainly one of the first things potential bamboo growers need information on. The following is a partial list of prior issues of Temperate Bamboo Quarterly and The Journal of the American Bamboo Society are invaluable (see below). Since bamboos are vegetatively propagated, nurseries ship live plants. Consequently, some plant material may be available only during certain months of the year.

A complete listing of bamboo species and suppliers in the U.S. is available in print through the American Bamboo Society (www.bamboo.org/abs/). Categories include Species Descriptions, Bamboo Plant and Product Suppliers List; and Index of Cold Hardy Species.
The Woods at Honey Hollow Farm

by Jack Kittredge

The Schoharie River Valley area southwest of Albany contains some of the best farmland in New York. Back when the Taconic range was as high as the Himalayas, geologists say, there was a delta in the Catskills and the Schoharie Valley was a sea bed. Alluvial deposits over countless ages left what is now a topsoil many feet thick, in which fossils are often found.

This productive valley land supported early Dutch planters with their manor houses and large plantations. A system of tenant farming, derived from Europe, supplied the necessary labor. It lasted until the middle of the 19th century, when several small depressions squeezed a generation of farmers into the locally famous rent wars. Bands of armed farmers, unable to pay their rent, would rally to prevent the sheriff from carrying out evictions when the alarm was raised by the call of tin horns. Finally the patronship system of land-holding was abolished in favor of free-holds, and history turned its attention elsewhere.

The hills which frame the river valley climb steeply up. On their flanks is no alluvial topsoil, but glacial till. At 1400 feet, on Michael Hoffman’s farm, a seasonal stream has turned up so many cobblestones they call it Cobblekill. Also on his farm is a hollow on which one of the first commercial honeybee operations in the country existed. Thus the name, Honey Hollow Farm.

The farm is Michael and Linda’s livelihood, except for a disability payment he receives. During the winter they work on the post and beam house they have been building for five years. Surrounding the house are patios and walkways of field stone that have taken hundreds of hours to haul from the garden and lay in place in beds of sand.

Michael admits it’s slow going, but points out the one advantage of this pace: “We’ve done this without going into debt! We don’t have a mortgage. We figure each month if we can afford something — without going into debt! We don’t have a mortgage. We maybe have a couple of acres so far. This was all hayfield and I think I’m working on the stock tank behind Hoffman to bring on a flush of fruiting

Ginseng, which once proliferated throughout these hills, practically disappeared by the 1890s because of over-harvesting. Hoffman’s multi-year efforts to reestablish the species in his woods have paid off with the appearance of hundreds of plants like these. Although young, they appear to be thriving. The one in the center of this picture is at least three years old and has several seeds visible growing on a spike in the center of the three compound leaves.

The pair sell their produce at the Green Market in Union Square every Monday. They leave at 3 in the morning and get back late at night. It is an excellent market, Hoffman says, and well worth maintaining. Growers can get into other Green Markets pretty easily, but Union Square has a waiting list. Being certified organic helps them significantly, especially when some big grower brings in tons of tomatoes long before they are ripe in the hill country. Sometimes, Hoffman says, he is lucky to get tomatoes before the frost hits.

During spring the land stays wet and cold, then in the summer there is often drought. The soil is a clay humus with a PH of about 5 or 6 on which Michael battles to keep up with liming. While there is no bedrock on the farm, he says with a sigh that there are plenty of pieces of ledge and boulders he spends half a day digging around to get a chain in place to pull.

“I’ve been trying to increase the area under production,” he says. “We maybe have a couple of acres so far. This was all hayfield and I think I’m working on seeds that have been here since the ice age. You have to smother quack grass for years. I put black plastic down to kill the sod, but the quack grass comes up. It has to smother quack grass for years. I put black plastic down to kill the sod, but the quack grass keeps coming back! I love leaves — we use tons of leaves from the town. We’ll put down leaves a couple of feet deep, trying to kill the quack grass. It finally makes it through, though. That’s one thing I know how to grow!”

Weeds, however, are not the worst of Hoffman’s problems. Living surrounded by thousands of acres of forest, the returning deer population is a constant challenge. He has put a high fence around his entire garden and keeps purebred dogs there to chase away invaders. While that is pretty effective for the does when they have fawns with them, at other times the deer seem to get in and out before the dogs can reach them. Michael is also concerned about what the deer are doing to the oaks, ginseng, wasabi and other plantings he has made in his extensive woods.

Hoffman has been planting Ginseng in his woods for the past 10 years or so. It used to grow wild throughout the area, but its value as an ingredient in oriental medicine became so high that in the 1890s the wild ginseng beds were obliterated. Whole towns would turn out to dig the plants up.

Michael has been helping it come back in by seeding likely areas. Unfortunately, most of his woods are pine and ginseng prefers hardwood. So he has also been liming his woods to raise the pH, putting down lots of oak leaves, and occasionally bringing in trace elements. The soil has a sandy base, however, which means it drains well — a necessity for ginseng to thrive.

Ginseng seed generally has to be stratified for a year and a half — go through two winters — before it will germinate. Hoffman used to buy stratified seed, but now just collects seed from his plants and spreads it around. It stratifies in the soil and then comes up.

“Seeds have their little strategies too,” he says. “Some will come up the next year, some will wait 5 or 6 years. They’ll stagger their timing, just in case.”

The plant will start out with just a single leaf the first year, the second it will have two leaves, and the third, three. The leaf is compound, with five sections which look as if they were each separate ones. When a plant is at least three years old, about June it will form a flower in the center of the plant. This becomes a red berry in the fall, with seeds in it. If you harvest it, you are supposed to wait until the seeds are ripe and then replant them.

Too much sunlight will burn ginseng — it will fade. You can’t really tell how old ginseng is from looking at it. Even a 50-year-old plant wouldn’t be much bigger than a 5 or 6 year old one — perhaps a...
couple of feet tall as opposed to 12 to 18 inches. The only real way to tell the plant’s age is to carefully expose a portion of the root and count the bud scars which are formed each year by new growth.

Michael’s steady work at seeding his land is showing fruit, with many young ginseng plants in beds throughout his woods, despite strong predation by deer. But it has not been easy.

“This was a lot of work, planting all this,” he asserts. “I figure I’m up against deer, I’m up against shrews, I’m up against groundhogs and voles and mice and even bats really like ginseng. I just went to raise it in the field — put an arbor up, put kiwi over it and ginseng under it so it isn’t shaded. That way I could protect it. But the rabbits killed the kiwi before it went going. It doesn’t grow as fast as the catalogs say.”

Another idea he tried to protect the ginseng was to grow it in within a circle of logs. Since he was cutting and plugging large numbers of oak logs for shitake production, Hoffman stacked them and made them into deer fencing. That has helped somewhat, with ginseng plants and young oaks (also favored by deer) making their comeback a little within the fencing.

The market for ginseng has been flooded with field-grown product recently. Since it is grown as a monoculture it has lots of problems with fungi and is thus heavily doused with fungicides. Field-grown ginseng used to command a hundred dollars a pound. Now it’s more like $20, Michael reports.

“You figure it has to grow at least 4 years,” he says, “and that’s not that much money. But in the field the roots are grown very large I think — I see them in Wisconsin, it’s a big business. They bring in 2000 pounds per acre. They put the soil — every everything in it. So I take my own ginseng! With the wild plant you can get $200 to $2000 a pound for the roots. But I just sell ginseng to individuals.”

Hoffman has a large mushroom operation in his woods as well. Most of the work goes into shitakes, but he also cultures morels, chanterels, mitakes and adankos. The shitake and mitake varieties grow naturally on trees. To grow them for production, however, oak logs are cut to about 4 feet in length, then drilled with about 50 holes per log. Into these holes are inserted dowels which have had the appropriate fungus grown through them in sterile labs.

To create these dowels in the lab, he says, they cut a piece of mushroom, put it in a sterile flask full of agar, and grow it out. Then they break that up and put in jars of boiled rye. Once the fungus has grown through the rye, they take jars of sterilized dowels, put the rye in them, and grow the mycelium through the dowels. Michael has tried to inoculate his own dowels, but has had only about a 10% success rate — he gets contamination from molds, penicillin, all kinds of other organisms.

Once he hammers dowels into the log, Hoffman seals the hole with wax. Then it takes about a year and a half for the fungus to colonize the log. When it’s ready he soaks the log for about a day to get a seal the hole with wax. It then takes about a year and a half for the fungus to colonize the log. When it’s ready he soaks the log for about a day to get a

Ostrich ferns, which bud forth early each spring as fiddleheads, also do well for Hoffman. He harvests a few from each plant for aficionados to enjoy sautéed in oil.

Sugar ferns. Then I’ll spread it back wherever I want to inoculate. If it’s a good area for them, you’ll get more then. They have even inoculated soil in California with spores of truffles from Tuscany. They’re hoping to develop a truffle industry there.

“I’ve never really studied mushrooms,” he continues, “but I’ve observed them over the years. The morel is the favorite of a lot of people they grow in dirt. The mitake have to have one end of the log buried in the ground to season — to get moisture. They fruit in September. The adanoko don’t require soaking. They seem to do better in the spring rain, growing in the cold, with low humidity. They’re much meater and more flavorful. I’ve inoculated some beds of chanterel — a little yellow mushroom. A lot of country people are suspicious of many mushrooms, but they’ll eat puffballs because they’re identifiable. That’s the one that looks like a soccer ball, then turns brown and explodes into spores.”

The economics of mushroom production and marketing, however, aren’t good, he says. He does better with vegetables. Hoffman sells his mushrooms fresh, at the Green Market. Bacteria can break them down quickly, but if they are refrigerated they’ll keep well. He had to write up his own certification plan for NOFA-NY. Just being an organic grower wasn’t good enough.

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He has put in a few wasabi plants in his woods. It’s in the mustard family. It grows in shade and from the root is made a hot sauce, sort of like horseradish, which is very popular in Japanese cooking. At the moment this is just an experiment to see if it will grow well on his farm. But he has a number of ethnic buyers at the Green Market, including a number of Japanese.

Ostrich ferns grow very well in these woods, and one can harvest fiddleheads, which are the budding shoots of horsetail, which is very popular in Japanese cooking. At the moment this is just an experiment to see if it will grow well on his farm. But he has a number of ethnic buyers at the Green Market, including a number of Japanese.

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A tour through his woods with Michael is fascinating as he points out other plants he is watching. He established watercress in a streambed and is seeing if it will thrive (it seems to be surviving, but it will take longer to see). He planted black locust for fence posts and rails. When it’s green, he says, it is great to work with. But you can bend a lot of nails trying to drive them into seasoned black locust!

He points out wild ramps, similar to garlic, and white truffle, which flowers in the fall and sets fruit in the next year. The fruit is made from its twigs. I sampled the root of toothwort, which has a mildly numbing effect of one’s gums and is recommended in cases of toothache.
Nontimber Forest Products

by Deborah Hill

Nontimber forest products (NFPFs), also known as “nonwood,” “minor,” “secondary,” and “special” or “specialty” forest products, involve an existing forest or woodland, and intentionally cropping something other than trees. The practice may or may not involve cultivation—the intention is to manage the forest for nontimber crops. This kind of cropping can be done in any kind of forest and has been traditional in many parts of the world. With careful planning, forest farming can be done in conjunction with other agroforestry practices.

Forest farmed products include mushrooms, botanicals of medicinal or culinary value, fruits and nuts, craft materials, maple and other syrups, and baled pine straw. Other, more traditional wood products such as fenceposts and fuelwood are also possibilities, while the raising of honeybees (apiculture) is yet another option.

Exotic Mushrooms

Wild mushrooms that can be found in temperate woods include morels (Morchella spp.), chanterelles (Cantharellus spp.), boletes (Boletaceae) and honey mushrooms (Armillaria mellea) along with several other edible species. Most of these are only seasonally available, and one must be VERY sure that the mushrooms in question are the edible ones—not look-alikes that may be poisonous!

High quality mushrooms may be forest-farmed, on the other hand. These include culinary mushrooms such as shiitake (Lentinula edodes), maitake (Hen-of-the-woods, Grifola frondosa), oyster mushrooms (Pleurotus sp.) and Lion’s Mane (Hericium erinaceus), King Stropharia (Stropharia rugosoannulata) as well as a primarily medicinal mushroom, reishi (Ganoderma lucidum). The majority of these mushrooms grow in wood fiber and can be inoculated into small diameter (7-12 cm (3-5 inch)) logs.

The underside of a shiitake mushroom fruiting body is a lovely thing.

Production of these mushrooms can return enough economic benefit to justify thinning and culling forest stands to upgrade the quality and improve the health of the remaining trees. Because small logs are preferred for mushroom production, large branches can be used as well as small diameter trees.

Shiitake and oyster mushrooms are probably the most familiar of the exotic mushrooms. These, along with Lion’s Mane, reishi, and maitake can be inoculated into drilled holes in logs harvested during the dormant season (November-February in the central U.S.A.). The objective is to inject the active mycelium or “root” of these fungi into the wood that they will ultimately consume at a time when it contains the maximum amount of sugars. This season begins when the tree is shutting down for the winter—having shed its leaves—and runs through the time it gears up again in the spring, preparing for the new year’s growth.

Trees used for this purpose must be alive at the time of cutting. Even though the fungus feed on dead wood, it is important to get the desirable mycelium into the wood before some other bacterium or fungus begins the decay process. Log lengths vary, but most people cut lengths they find easy to handle. All experimental work has been done with logs one meter (39 inches) long, but other people have worked with logs both longer and shorter. Cutting logs shorter than 70 cm (24 inches) could create problems with the mushroom spawn drying out.

My own experiments, as well as those of people in Ohio, Oklahoma, Minnesota, and Wisconsin, show that shiitake will grow on almost any species of hardwood tree, although oaks, especially the white oaks, are favored. It is possible to grow these mushrooms on conifers, but this has not been very successful.

Once the logs have been inoculated and sealed, they need to be placed in a relatively cool, moist environment for the fungi to grow (run) through the entire log. Ideally this would be a wooded site with some mixture of conifers (so that there is some shade year round), and near a water source. Monitoring the moisture content of the logs is important; supplemental watering may be necessary in hot, dry weather. Production usually begins 6 to 18 months after inoculation and continues seasonally with the right combination of moisture and temperature. The logs usually produce about 10% of their original weight in mushrooms over their productive life. Shiitake logs can be sterilized and re inoculated with oyster mushrooms when the shiitake production declines.

Markets are available and increasing in many parts of the country. If you expect to sell mushrooms, however, it is important to locate your own markets before inoculating any logs. The fungi that do not grow on logs—stropharia and morels—grow on the forest floor. Stropharia can be “seeded” into wood chip beds in the forest and watered like a garden until they begin to produce mushrooms. Even though these mushrooms can grow to remarkable sizes (big enough for a child to sit on!), they are marketed when relatively small—roughly the size of large commercial button mushrooms.

Morels are a little trickier to grow—their life cycle is known, but it is still difficult to produce them at will. Kits are available, and at least two companies are producing morels commercially under controlled indoor conditions. They too require a prepared bed on the forest floor and need to be kept moist until they produce. Under outside conditions they will only produce in season, which is late spring to early summer.

Botanicals and Medicinals

Every culture has had people in it who knew which plants to collect in the forest and how to use their different parts to remedy various ills. Botanicals such as echinacea (purple coneflower) and St. John’s wort are now available in outlets from your local pharmacy to Wal-Mart. Some of the forest-based botanicals include herbs such as goldenseal (Hydrastis canadensis), black cohosh (Cimicifuga racemosa), bloodroot (Sanguinaria canadensis), and blue cohosh (Caoutchoucal thalictrides), as well as bark from most eastern trees (Hamamelis virginiana), slippery elm (Ulmus rubra) and sassafras (Sassafras albidum).

Probably the best known and certainly most valuable botanical is American ginseng (Panax quinquefolium). Ginseng grown under forest conditions, so-called woods-grown, woods-cultivated, or wild-simulated, has maintained a stable price of close to $300 per pound for some time.

Most of the herbaceous and shrubby botanicals are marketable for pennies to dollars per pound, and there are many national herb companies that will buy dried material from producers. Several of these herbs can be encouraged to grow in larger patches than occur naturally, by techniques that disturb the forest soil very little. Both herbaceous medicinal and exotic mushrooms prefer a forest canopy—usually with fairly dense (75-85%) shade, so minimal alteration of the overstory is needed. As with most plant cultivation, the problems are competition for water and nutrients, so some weeding may be necessary.

Most of these herbaceous plants, especially those with medicinal uses, require slightly more management—harvesting rootlets, so small roots can also be marketed for transplanting.

Ginseng plants usually begin to produce seed in their third year and the seed can be a product in itself. The planting market demands both seed and 1st- or 2nd-year rootlets, so small roots can also be marketed for transplanting.

The greatest challenge in growing ginseng to fruition is keeping it until it’s big enough to sell. In the central U.S.—and the Appalachian and Ozark Mountains in particular—theft of nearly-grown ginseng is widespread. Ginseng is considered by the federal government to be a threatened plant, and its harvesting is restricted to certain months of the year and to certain ages of root, but there is considerable disregard for those laws, and little enforcement by local officials.

Trees and shrubs from which roots (sassafras) and bark (witch hazel, slippery elm) are taken for their medicinal use, require a different kind of management. Witch hazel is best managed by cutting the stems fairly close to the ground, then stripping the bark off. Cutting the stems encourages resprouting Ginseng roots of marketable size and quality take five to ten years to develop.
while taking the bark off the standing stems would provide light posts, while small diameter elm, which can grow into a large tree, can either be managed—like the witch hazel—by coppice when young, or could be some vertical strips of bark being re-
moved from a mature tree, as long as most of the bark is left around the trunk to keep its circulation functioning. Some of the roots of sassafras may be removed without killing the whole tree; alternately, only the smaller shoots may be harvested, roots and all.

Fruits and Nuts

Native fruits and nuts are other options for forest farming, and can include such species as persimmon (Diospyros virginiana), pawpaw (Mimina triloba), hazelnuts (Corylsh spp.), pine nuts (Pinus spp.), and walnuts (Juglans spp.). Unfortunately, one of the greatest nut trees of all time, the American chestnut (Castanea dentata), no longer grows big enough to produce nuts. It occupied some 20% of the eastern deciduous forest and was effectively wiped out by an exotic disease in the 1920s.

As with apiculture and maple syrup production, farming of fruiting species requires adjustment of the forest canopy (more water, nutrients, sunlight) to allow for better growth of the crop trees. This usually means removing the surrounding trees whose crowns touch the crowns of the crop trees (you can then use some of the harvested wood for mushroom production, fenceposts, or firewood for boiling maple syrup!).

Crafts Materials

Working crafts materials as part of forest farming ranges from collecting pine cones and gilding them for decorations, or waxing them for fire starters, to selecting odd-shaped branches or burls on trees for carving. There are many plant species at all levels, from herbs to shrubs to vines to canopy trees, that may produce something harvestable for crafts. Grape vines are collected for fashioning into decorative wreaths, while small diameter (less than 25 cm (10 inches)) white oak saplings are the ideal size for making splints for white oak baskets. People have even made (beautiful) baskets from kudzu vines, so opportunities live greatly in the eyes of the beholder. One enterprising company injected dyes into very young pine saplings (less than 5 cm (2 in) in diameter) and then cuts the stems and branches into disks that were made into jewelry—the color already in them.

Crafts from wood are the dominant types produced in Kentucky and probably in most of the mountain regions of the central United States; they are also the most economically valuable. Greens and grasses used in the floral trades may be more valuable in the floral trades than in crafts, for example; beech leaves, and a lot of leaves means high syrup produc-
tion.

Maple syrup and other tree saps

Maple Syrup, and syrup or “beers” made from other tree saps, have been produced for centuries in North America. Native Americans figured out how to get this sweet material long before Europeans came to this continent. A “sugar bush” is simply a forest where the owner has selected for maple trees, specifically sugar maple (Acer saccharum). Maple syrup can be made from the sap of any maple tree species but the sugar content of sugar maple sap is higher than that of the other maples, and it therefore takes fewer gallons of sap to make a gallon of syrup (with sugar maple the ratio is about 40 to 1, so it’s a lot more work to get the syrup from the others).

Management of the sugar bush requires spacing the trees far enough apart that they form large crowns (when the trees are all crowded together in a normal forested situation, the crown of any individual tree is not particularly large). Large crowns means a lot of leaves, and a lot of leaves means high syrup produc-
tion.

The expense of maple syrup production lies in the fairly substantial capital investment required for the tapping (buckets or plastic tubing), boiling, and bottling equipment and materials. People who do this every year build a “sugar shack”—a building that houses the boiling pans, with lots of roof ventilation for the steam to escape, and a long, deep fire pit for heating the sap. Scrap wood from other forest management operations can be used to fuel the sugaring process. Labor is intensive during the production process, but the season of work is short, lasting usually four- to six-weeks in the spring—when days are beginning to warm but nights are still cool, and before bud break. The result is a very high value-added product.

Pine straw

Pine straw is the annual needle drop of pine trees. Commercially, it is baled from under long-needled pines in the Deep South, specifically loblolly (Pinus taeda) and longleaf pines (P. palustris). This material makes excellent mulch, especially for landscaping. There have even been experiments to color the pine needles for interior landscaping so that they can match the decor of the room! Even though harvest-
ing removes organic material from the forest floor, and thereby reduces the amount of nutrient cycling available to the stand of trees, people have found that it is possible to rake and bale the pine straw from the same location every other year or every third year without markedly affecting the nutrient balance. Pines with long needles are preferred, because these take longer to break down. The pine straw is baled much like hay, and can return a significant short-term economic benefit while owners are waiting the 20-30 years required for the timber crop to mature. Managing for pine straw production means planting the trees in widely-
spaced rows to accommodate the movement of the straw harvesting machinery.

Fenceposts

The most desirable tree species for fenceposts in the eastern United States are black locust (Robinia pseudoacacia) and Eastern red cedar (Juniperus virginiana). In the west, it is probably redwood (Sequoia sempervirens). These species are desirable because of their natural resistance to decay—locust posts may last for decades without chemical treat-
ment, whereas other species, even with treatment, may not last as long. Management consists of favoring the growth of these species over others and providing access to maximum water, light, and nutrients in the system where they are growing. Fenceposts are also an option as an intermediate product in the crop tree rows of an alley cropping system. Black locust, for example, can grow large enough to be harvested for fenceposts in 12-15 years, while black walnut may take three times longer than that to reach a size that would be considered marketable.

Fuelwood

Fuelwood, or firewood, is more of a byproduct of other management for forest farming than perhaps a specific activity, unless the forest is managed to encourage the the growth of trees that are known to be excellent fuelwood, such as black locust or some of the less commercially desirable oaks (post oak, Quercus stellaria, or blackjack oak, Q. marilandica). Exhausted mushroom logs can be used for firewood also, although they maybe punky enough that they are better ground up and used for mulch.

Apiculture

If agroforestry is “the intentional integration of agronomic crops with tree crops or livestock with tree crops,” then with apiculture in forest farming, the “livestock” are very tiny! It has been estimated that in every three bites of food we eat is dependent on active pollination of plants. The insect world, specifically bees and wasps, are the major operators in this case. The European honeybee (Apis mellifera) is the best-known of these insects, although it is not a native species. It has a couple of characteristics which make it particularly valuable. One is that honeybees show species fidelity, which means that they will use the same source of nectar to make honey until that source is exhausted. This enables them to make “specialty” honeys from crops such as buckwheat,
tupelo, and sourwood. Another is that they collect pollen, along with nectar, and use both to raise their young, but also collect it in sufficient volume that it can be harvested without compromising the health of the hive.

Managing honeybees is not difficult, and getting setup with bees and hives is neither particularly expensive nor complicated. Extracting honey from the combs is an expensive proposition (extractors are costly), but it is possible to get good equipment second-hand.

Forests can be managed to favor trees that honeybees particularly like, such as basswood (Tilia americana) and black gum (Nyssa sylvatica), providing extra light, water, and nutrients for those trees, as well as exposing the crowns to maximize surface area for flower production.

Average production for a hive is 23 kg (50 lbs.) of honey per year. It is also possible for a hive to produce 23 kg (50 lbs.) of pollen in a year. Products from the hive include: royal jelly (the super-rich food fed in tiny amounts to all honeybee larvae, but the exclusive diet of the queens) popular in both the health food and cosmetic markets; propolis, another product used in food supplements; and beeswax, used for candle-making and other crafts. Pollination itself is another saleable service, as hives can be transported from place to place to pollinate crops. And some alternative health practitioners use honeybees for their venom, which anecdotally is said to be extremely helpful to people suffering pain from rheumatoid arthritis, or other joint problems.

Summary

Farming the forest provides many options for annual (maple syrup, crafts, some botanicals, mushrooms) and longer-term (fuelwood, fenceposts, ginseng) commodities, along with the possibility of timber crops. Production of these commodities may involve altering the forest canopy (shade for mushrooms and botanicals, crown spread for apiculture and maple syrup) or making changes in the forest floor (sowing medicinals such as ginseng and goldenseal, inoculating for morels or stropharia). Many of these options could also be implemented in the tree rows of alley crop plantations, as well as in the selection of species for windbreaks and maple syrup. Implementing several of these options can provide annual cash flow and can be managed by various members of a family. Implementing several of them will bring greater biodiversity to the existing forest, thereby enhance its health, while supplementing annual income from the land.

In well managed agroforestry, high value crops are cultivated under the protection of a canopy that has been modified to provide the correct conditions.

Further Reading


Web Links

The National Agroforestry Center’s page on forest farming, with a link to species tables: <http://www.libfind.unl.edu/nac/pubs/afnotes/ff-1/>

NAC’s fact sheet on forest farming with mushrooms, including resource information, by Deborah Hill: <http://www.libfind.unl.edu/nac/pubs/afnotes/ff-2/>

The FAO Forest Products Division’s Non-Wood Forest Products web site has extensive information including organizational database and a broad range of publications in electronic form in English, French and Spanish: <http://www.fao.org/forestry/FOP/FOPW/NWFP/nwfp-e.stm>

The Special Forest Products Web Site focuses on the use and markets for special forest products: <http://www.sfp.forprod.vt.edu/special_fp.htm>

Institute for Culture and Ecology’s Non Timber Forest Products in the United States has extensive reference information: <http://www.ifcae.org/ntfp/>


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Families and Farming in the last issue of The Natural Farmer, it will be nice to glean some good advice and inspiration from Salatin in the flesh.

On the topic of families, the children’s conference and teen conference staff have also been busy securing some new, exciting workshops. Watch for those in the next issue or consult your registration form when it arrives. Also, as a kickoff for the Saturday afternoon fair, we are planning a Grand Parade complete with puppets, masks, and streamers and whatever else we dream up. Children’s conference participants will spend part of Saturday morning and afternoon decorating and planning for the parade, and then we’ll bring the pomp and circumstance to everyone at the conference. If you have any ideas or would like to be a part of the parade planning, contact Justine Johnson or Steve Lorenz at (413) 527-1920 or johnsonlorenz@charter.net.

The parade will be a raucous beginning to what we hope to be a great fair. Festive is what we are looking for, and in order to achieve that we believe we need to have music and dancing. We are in the process of trying to book some musicians for during the fair, but we also would love to have some impromptu playing and jamming. So if you play the fiddle but never told anyone or you’ve let your mandolin gather dust in the corner for too long now, or if nothing makes you smile like when you play your ukulele or tuba or drum, please bring your instruments! Also, if you and some others have a barn band or you know of another group which would fit in well with the fair crowd, please call Michael Faber and let him know what you’re thinking (413) 528-4387.

As always food will be a centerpiece of the conference whether you’re partaking of the meals in the Hampshire College dining hall or you’re breezing by the food court under the main tents. Most people truly loved Dre Rawlings’ menu last year, and at present she is planning some equally delectable items. As for the food court, Bernard Kirchner is looking to diversify the selections a bit and would love if someone gave him a heads up about a great restaurant or small food business who could benefit from the exposure of being at the conference and make simple, wholesome meals (and a bit of money). You can call Bernard at (413) 229-3306.

Fine people of NOFA, you can tell we’re definitely looking for improvement, innovation and growth at this year’s Summer Conference, but we know we must also butter our bread well, too. For example, we spent a good portion of time at the last committee meeting debating the merits of debating and what the topic of this year’s debate should be. Any ideas? Call Jack Kittredge (978) 355-2853 or Email him at jackkitt@aol.com. The conference will be better for such discussions, we think. Richard “The Entertainer” Murphy has dotted I’s and crossed T’s to make sure the conference will be fun as well as informative: A contradance, a zydeco band, a family storyteller, good food, wine, and beer all await you. But, if you can think of any films you think he should get a hold of, please call him at (508) 867-5735. Also, if you can help in any of the areas mentioned above or have any other ideas for the conference, please let us know. Otherwise, just mark your calendars for August 8-11.
Craig Elevitch and Kim Wilkinson are tireless advocates for understanding the importance of trees on our globe. Craig is an engineer with experience in tropical agroforestry and forest management. Kim is a permaculture consultant and ecologist who manages a tree nursery. Together they have collected from others and co-written themselves a number of short articles on various aspects of agroforestry. These have been published on the internet in a free Email journal at www.overstory.org. Many of these have been republished in this book (although not all – I note that a very thoughtful piece by Bill Mollison, Permaculture’s founder, is not in the print version although it is on the internet [#92]).

The book is organized by concept areas concerning trees. Each area contains short articles on various aspects of agroforestry. These have been published on the internet in a free Email journal at www.overstory.org. Many of these have been republished in this book (although not all – I note that a very thoughtful piece by Bill Mollison, Permaculture’s founder, is not in the print version although it is on the internet [#92]).

A particular favorite of mine was the chapter by Alex Shigo entitled “Twelve Tree Myths”. The myths, and my parenthetical summaries of Shigo’s much longer explanation, are:

Myth 1: Forests are groups of trees. (No, they are highly ordered arrangements of living, dying and dead cells. There are more living cells in sapwood than dead cells.)

Myth 2: Nature is balanced. (No, it vibrates in a continuing state of dynamic equilibrium.)

Myth 3: Wood is dead. (No, wood is a highly ordered arrangement of living, dying and dead cells. There are more living cells in sapwood than dead cells.)

Myth 4: Photosynthesis is most active during bright, hot days over 100°F. (No, Photosynthesis decreases rapidly as temperatures begin to exceed 100°F.)

Myth 5: Water causes rot. (No, microorganisms cause rot. Too much or too little water will stop rot.)

Myth 6: Roots are the most important part of a tree. (No, there is a continuing dynamic equilibrium between roots and crown.)

Myth 7: Ants speed up the decay process. (No, ants actually slow the decay process. Ants live in the tree and eat elsewhere.)

Myth 8: All insects and fungi that live on, in, and about trees are harmful. (No, less then one percent of the insects and fungi live on, in, and about trees are harmful.)

Myth 9: A healthy tree is a tree free of infections. (No, a tree can be very healthy and still have thousands of walled off or compartmentalized infections.)

Myth 10: All wood-product problems start after the tree is cut. (No, the patterns of decay in products usually follow the patterns set in the living tree.)

Myth 11: Fertilizer is tree food. (No, fertilizers provide elements essential for growth, but trees are able to trap the sun for the energy they need.)

Myth 12: Anybody can plant a tree correctly! (No, there is a continuing dynamic equilibrium.)

Diverse forests

The book is organized by concept areas concerning trees. Each area contains several short pieces as chapters. Areas cover traditional knowledge, microorganisms, animal connections, protecting land, saving water and soil, restoring land, growing trees, non-timber forest products, useful species, starting businesses, planting trees, designing with trees, saving water and soil, restoring land, growing trees, and resources for more information. Each piece has a relatively short expository section of 3 to 8 pages, then gives credits and further references both in print and on the web.

One problem with this book for NOFA readers is that many of the pieces are more relevant to tropical or arid regions. A number are general purpose and of relevance anywhere, and a few relate specifically to temperate regions, but over a third are specific to regions where our conditions of moisture and temperature just do not exist.

The quality of the chapters is somewhat uneven. Some, like that of P. K. Ramachandran Nair on Tropical Homegardens, Alex Shigo on The Rhizosphere, or Michael Pease on Vegetative Erosion Barriers are fairly technical and detailed. Others, like the USDA pieces on Buffers and Silvopasture, are quite general. In virtually all, however, there are some good insights to better management of woodland areas.
In Weedless Gardening, Reich takes his gardening methods directly from nature, forgetting that annual drudgery of rototilling or forking the entire garden. His method for this is simply 1. Minimize soil disruption; soil turning actually increases weed seed germination by bringing buried dormant seeds to the surface. 2. Protect the soil surface; a covered surface smoothes weed seedlings and protects soil from the suns drying rays and wind/rain erosion. 3. Avoid soil compaction through permanently designating walkways and growing areas. 4. Use drip irrigation; This method of watering supplies water in the amount that the plants actually need it and in the place they need it, not wasted on the paths. The benefits of this Weedless Gardening method are it is better for the soil, the plants and the gardener’s back. Reich is familiar with the other writers that advocate a less labor-intensive manner of gardening. He briefly describes and dismisses such heroes of gardening/farming as Ruth Stout, with her No-work Garden Book; Masanobu Fukoka’s One Straw Revolution; and Patricia Lanza, of Lasagna Gardening fame.

Reich describes in Chapter 2 the method he recommends for creating a new garden from lawn. His method entails nothing more elaborate than smothering the lawn (new garden site) with newspaper/cardboard, and then a thick application of organic mulch. This will kill the existing sod and begin the process for a healthy soil. Personal experience with this method convinced me long ago that this is by far the easiest way to start a new bed. Next we are told his methods for amending soils out of balance for the specific crops that will be grown, as well as how to detect and cure overly wet soils. This section includes a brief outlining of drainage tile installation.

Chapter 3’s opening sentence states “Regular maintenance goes a long way in getting the Weedless Garden to almost care for itself”. His own vegetable garden contains 2000 sq. ft. and requires less than 5 minutes per week to maintain its weed free status. Other maintenance tips include when plants no longer are productive, i.e. beans no longer produce beans, do not just yank the plant out. Cut it out carefully, in order not to disrupt the soil. By not disrupting the soil he states that the next crop can immediately be sown or transplanted.

“Nature abhors uncovered ground and so should you” Reich states as he describes the benefits of mulching. Those are protecting the soil from erosion as well as feeding the soil as the mulch decomposes.

Next in this chapter he describes how cover crops can be used in the garden. One that interests me is a description of how June-bearing strawberries can be interplanted with a cover crop of oats. This crop will shade out weeds during the growing season; then it will flop over dead providing the mulch necessary for the strawberry to survive the winter. A short description on personal techniques for weeding as well as useful tools for the task follows.

Chapter 4 deals with requirements for fertilizing. Reich advocates applying nitrogen in the form of soybean meal anywhere heavy feeding plants grow, or in naturally poor soil. He applies for all plants that he recommends applying once a year before laying out mulch of any kind.

Easy to read charts outline the NPK percentage of various organic fertilizers as well as common nutrient deficiency symptoms. The benefits of compost is discussed along with the secrets to buying good quality compost, or how to make ones own backyard compost pile.

In the next section Reich explains the basics of drip irrigation that is pinpointing the water to the exact spot the plants need it. He dispels the myth that “watering deeply and infrequently promotes deep rooting”. He advocates “shallow watering and frequently” as the best way for plants to effectively use the water in the soil pores. This section was a

Weedless Gardening
by Lee Reich
Workman Publishing, NY
708 Broadway, NY, NY 10003

Lee Reich Ph.D. is a garden writer and an avid gardener. He writes for Associated Press, his articles regularly appearing in the NY Times as well as Fine Gardening, Organic Gardening, and Horticulture magazines. He has worked in soil and plant research for the USDA and Cornell University.
bit too technical i.e. complicated for the beginning gardener, which is the audience I think this book is written for. An extensive description about pressure regulators, # of emitters, discharge rate per emitter worksheets for calculating minutes of watering per session, was just too much.

Chapter 5 talks about his views on garden layout, specifically bed width and how much space is wasted according to the amount of space dedicated to paths. Growing in wide beds allows for more plants, because more of the ground is devoted to plants, not pathways.

Again he writes of the need to leave the soil as intact as possible, even when harvesting root crops. Another aspect of garden layout described here is that of intercropping different plants together, both as a way of reducing insect pressure on the plants, and maximizing space. Next is a description of how trellising is a method in which a gardener can grow more plants in a small space. Most gardeners think only of summer crops, that is peppers and tomatoes. However, succession planting is advocated as the way to spread out your garden harvest, i.e., planting spinach in the space before the tomatoes go in. The bounty of a spring and fall harvest are not to be missed, Reich writes.Lengthen your growing season through methods such as using cloches, wall o water, and row covers.

The rest of the chapter is about Reich’s growing techniques for 40 of the most common vegetables along with a seed sowing chart. Throughout the book are lists of sources for various garden devices, seeds, and fertilizers.

There is a brief description about flower gardening and ground cover crops in meadows along with the joys of mowing with a scythe. Follow that is a chapter on trees, shrubs, vines and fruit plants. Location is elaborated as the most important factor in predicting whether a plant will be productive or not. Then come details about the planting hole, depth, to amend or not amend the soil. Tips and techniques for planting trees debunks some of the persistent myths about tree planting that have been around for decades. Watering tips and mulching options are explained.

Throughout the book, Reich maintains that the closer we as gardener mimic the methods that nature uses, the less we will fight her. By minimizing soil disruption and compaction, by keeping the ground covered with mulch, and with precision watering via drip irrigation, we will have less work in fighting weeds.

Eating in Connecticut

by Becky May

As I write, I am listening to George Winston’s CD, Winter into Spring, reflecting on the season past, the one at hand, the one to come. It has been almost 6 years since my husband and I did a year’s experiment in buying only locally grown foods for our home (see Natural Farmer - Winter, 1994-95). This article is about the steps we’ve taken since that first year and some of the possibilities for the near future.

By way of a little background, our reason for experimenting with exclusively Connecticut based grocery shopping was to take the pulse of our state’s agricultural health. Our motivation for doing that is excerpt from the original article: “In a nutshell, local agriculture helps preserve and promote open space, land/people balance, and smaller scale farming. This means less land being devoted to one area, fewer pesticides needed to protect huge monocrops or protect food in extended transit, and less fuel used to transport food.”

We had a number of friends who approached this through self-sufficient farming but we are otherwise employed city dwellers who share the goals but not the means of local food systems. We also felt impatient and discouraged relative to the massive social/political/economic overhaul that we feel ultimately be required by many to realize the larger goal.

At the very end, Hemenway makes an intriguing reference to a garden “popving,” which is the moment, after a few years of designing, planting, and tending the garden, when it suddenly begins to produce, that we have begun and the interactions between plants are established, and the garden becomes a far more productive and requires far less labor than it did in the early years. It is this persuasive promise that makes the whole attempt seem worthwhile.
So, it went like this.

Wayne is primarily an orchard grower so he had the right kind of fruit and facilities for cool weather harvest and storage. He knew a few wholesale farmers with some surplus fall/winter crops like potatoes and onions to supplement the stock he grew for his seasonal farm stand. He purchased the last gleanable greens from the summer CSA farmers for whom he supplies fruit. I coordinated advertising, registration and share days (10 am-1pm) in exchange for a free share. We solicited help from members in making reminder phone calls and unloading truck/clean-up on share days on a purely volunteer basis. Without requiring any requirement of labor contribution we always had plenty of offers for help.

We figured on four monthly share outs because that’s the longest we could reasonably keep the produce in saleable condition in the informal environment of his walk-in cooler. Monthly pick-ups were possible because the products were not dependent on being freshly harvested for either quality or crop rotation. Monthly pick-ups also allowed for less person power on both the administrative end and the driving demands of members. Wayne’s farm constituted one obvious share site but was a little remote to appeal to the majority of members, especially with the likely prospect of encountering at least some winter driving conditions. We set up a satellite site at first in a generous community center (Thanks Never Ending Bookstore/Rainbow Recyclers!) and later in my urban community center (Thanks Never Ending Bookstore/Rainbow Recyclers!)

Never mind that I’d just had my first baby just weeks before. Never mind that he hadn’t planted anything with this in mind. Well, to misquote an oldie but goodie, stubbornness or perhaps foolish pride may well be as much the mother of invention as necessity.

We priced the produce against local markets and arrived at a starting fee of $120.00 for a season ranging from mid-November to mid-February. Since that time we have increased membership by a $5/month which seems to work for both Wayne and members. I think an updated analysis is probably in order. A goal of 50 shares was determined to be the best compromise of manageability and profitability. We reached that number easily the first year but have struggled a little in subsequent years mostly through attrition of empty nesters, matriculating graduate students, and a few who eventually gave up on anything involving turnips!

The two local summer CSA’s in our area agreed to let us use their mailing lists, (Thanks Mill River Valley Gardens and Mad Mares!) We also used postcards, NOFA Newsletter-Conference and word of mouth. We offer full shares, fruit only shares, half shares, and organized a swap for members who wanted to tailor their share. We also experimented with specialty shares like a Thanksgiving fixin’s package that brought in some folks who just wanted to try it without the full 4 month commitment. This also served as outreach to a wider audience by advertising through some small local grocers for whom a one time thing was non-competitive with their regular sales, didn’t violate their distributor contracts and enhanced their own seasonal turkeys promotions. We also experimented with supplementing some all season CT products such as eggs, cheese, beeswax candles, mushrooms, honey, jam, pickles, greenhouse products on an individually ordered basis. This we found to be a little more tricky because of the decentralized sourcing, accounting implications and word of mouth. Nevertheless, it was fairly popular and I believe is worthy developing further.

Selling the shares is only half the job. Supporting our members is the other, and in some ways, more critical half. We are still learning how to inform and build confidence about the storage, rationing and preparation of the sometimes unfamiliar or less favorite species that are the realistic bulk of a New England fall harvest (turnips, for example). These efforts range from recipe sheets to various share day antics that include much back patting and high-flying, member to member testimonials and last resort displays of vegetative machismo.

By nature I am an initiator not a maintainer. After four years and various attempts to pass the baton by bribe and begging, my successor, Kathleen Rooney stepped to the plate this season. Despite my vigorous efforts to lose my own job, I can remember few more satisfying days in my life than those that began on those chilly Saturdays mornings, moving masses of produce with the help of some hearty souls to appreciative and enthusiastic eaters, knowing the cycle of growth and consumption was complete in my small, winter-quieted corner of the world. (And you know what? I’m not going to fix that sentence no matter what mangling green, squiggly line my grammar check program has inserted to threaten me!)

Now I am trying to make good on my promise/ promise that leaving the role of coordinator would free me up to encourage the spread of this peculiar but dear-to-me creation – the exclusively winter CSA. I would be happy to share our templates and advise anyone interested in putting a group together. I especially encourage non-growers to consider giving it a go so it’s all not on the shoulders of our front line farmers. Or perhaps I’ll pursue that the elusive of prospects – the growing CSA! Any takers? I can be reached at (203)-624-2798.

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### High Hill Orchard Quick Reference Sheet

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<td>1-2 heads</td>
<td>Cabbage/Brussel Sprouts</td>
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<td>Potatoes</td>
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<td>Beets</td>
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<td>3-5 lbs</td>
<td>Turnips</td>
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<td>Onions</td>
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<td>Cooking Greens</td>
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<td>1 bunch</td>
<td>Carrots</td>
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Mail to: The Natural Farmer, 411 Sheldon Rd., Barre, MA 01005

Calendar

Thursday, March 14: Second annual New England Farm Direct Marketing Conference & Trade Show, Boxborough, MA for more info: 413-529-9232

Friday, March 22 - Sunday, March 24: NOFA Interstate Council Retreat, Deerfield, MA for more info: 978-355-2853

Saturday, March 23: Maple Sugaring and Sap Gathering Contest, Stonewall Farm, Keene, NH for more info: 603-357-7278, stonestawllfarm@monad.net

Friday, May 3 & Saturday, May 4: Organic Beekeeping Workshop, The Pfeiffer Center, Chestnut Ridge, NY for more info: 845-332-3020 ext. 20, info@pfeiffercenter.org

Saturday, May 11 – Sunday, May 12: NH Sheep & Wool Festival, Contoocook, New Hampshire. for more info: (603) 625-8553 or dlawton@dem.state.ri.us

Saturday, June 1: HerbFest 2002, Coventry, CT for more info: 860-742-8239 or herbfes@hotmail.com

Thursday, August 8 – Friday, August 9: Joel Salatin’s training session on Plant/Animal Relationships in Food Production, Amherst, MA for more info: 978-355-2853 or jackkitt@alcom

Friday, August 9 – Sunday, August 11: NOFA Summer Conference, Amherst, MA for more info: 978-355-2853 or jackkitt@alcom

NOFA Membership

You may join NOFA by joining one of the seven state chapters. Contact the person listed below for your state. Dues, which help pay for the important work of the organization, vary from chapter to chapter. Unless noted, membership includes a subscription to The Natural Farmer.

Give a NOFA Membership! Send dues for a friend or relative to his or her state chapter and give a membership in one of the most active grassroots organizations in the state.

Connecticut: Individual or Household: $35, Business/Institution: $50, Supporting: $100, Student (full time, supply name of institution) $20

Judy Rothenberg, 53 Lanes Pond Rd., Northford, CT 06472-1125, voice: (203) 484-9570, Email: Northfordy@aol.com

Massachusetts: Individual: $30, Family: $40, Low income: $20, Supporting: $100

Elaine Peterson, 411 Sheldon Road, Barre, MA 01005, (978) 355-2853, jackkitt@alcom


Elaine Peterson, 4 Park St., Suite 208, Concord, NH 03301, (603) 224-4469, info@nofavt.org

New Jersey: Individual: $35, family/organization: $50, Business/organization: $100, Low Income: $15* does not include a subscription to The Natural Farmer

Mayra Richter, NOFA-NY, P O Box 880, Chester, 10918, (914) 734-5495, Email: MayraR@nyip.org

New York: Individual: $35, family/organization: $50, Business/organization: $100, Low Income: $15* does not include a subscription to The Natural Farmer

Richard S. T Этne, 329-9232, info@pfeiffercenter.org

Rhode Island: Individual: $20, Student: $10

Virginia: Individual: $30, Farm/Family: $40, Business: $50, Sponsor: $100, Sustainer: $250, Lifetime: $1000, Basic: $15-25* does not include a subscription to The Natural Farmer

Kirsten Novak Bower, NOFA-VA, PO Box 97, Richmond, VA 23221-97, info@nofavt.org

* indicates co-chair

Bill Hill, 51 John Read Road, West Redding, CT 06896 (203) 938-9403

Fred Sideman*, MOFGA, PO Box 170, Unity, ME 04988 (207) 568-4142

Judy Gillan, P O Box 31, Belchertown, MA 01007 (413) 323-4531

Ed McGlew, 140 Chestnut St, West Hatfield, MA 01088 (413) 247-9264

Vickie Smith*, NHDA, Bureau of Markets, CallBox 2042, Concord, NH 03301 (603) 271-3685

Rick Estes, 145 Mountain Rd., Concord, NH 03301, (603) 224-4469

Erich V. Bremer, PO Box 886, Pennington, NJ 08534, (609) 737-6848

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Rhode Island farmer Skip Keane cradles one of his forest-grown crops, a fresh-cut shiitake mushroom.

News, features, and articles about organic growing in the Northeast, plus a Special Supplement on

AgroForestry