

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 theatrically inclined in our full NOFA community to show their talents during the fair and throughout the weekend, and responding to your ideas about how to better reflect our geographic diversity. Although we recognize this may not be feasible, we also want to reiterate that any NOFA member can be part of the Summer Conference Committee, and in so doing, can come to some or all meetings (in Massachusetts) and/or be involved in conference coordination by e-mail or phone.

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 drechris@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



The 2002 Summer Conference logo by Chris Rawlings.

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

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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 by the families 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 word as they were growing up. I owned a travel agency for

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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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Northeast Organic Farming Association

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, harvesting 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:

Full page (15" tall by 10" wide)	\$240
Half page (7 1/2" tall by 10" wide)	\$125
One-third page (7 1/2" tall by 6 1/2" wide)	\$85
One-quarter page (7 1/2" tall by 4 7/8" wide)	\$65
One-sixth page (7 1/2" tall by 3 1/8" wide), or (3 3/4" tall by 6 1/2" wide)	\$45
Business card size (1 1/2" tall by 3 1/8" wide)	\$12

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

the text, any graphics, and a sketch of how you want it to look. Include a check for the space charge plus \$10.

Frequency discounts: if you buy space in several issues you can qualify for substantial discounts off these rates. Pay for two consecutive issues and get 10% off each, pay for 3 and get 20% off, or pay for 4 and get 25% off. An ad in the NOFA Summer Conference Program Book counts as a TNF ad for purposes of this discount.

Deadlines: We need your ad copy one month before the publication date of each issue. The deadlines are:

January 31 for the Spring issue
April 30 for the Summer issue
July 31 for the Fall issue
October 31 for the Winter issue

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.

Letters (continued from page 2)

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 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

NOFA Exchange

Blow Your Own Horn

Thanksgiving Farm has **2 apprentice positions** available for 2002. The apprenticeship runs April 1st through November and includes; a \$500 a month stipend, beautiful on-farm housing, produce, wood-fired breads, and a food allowance at our natural foods co-operative market. The beautiful wilderness of the Catskills surrounds and NYC is only 2 hours away. An **assistant manager position** is also available. Those interested should have skills, dedication, and a resume detailing farm experience; competitive salary, housing, and benefits offered. For information please contact us at: Seth Kroeck, Thanksgiving Farm CSA, Box 840 Benmosche Rd., Harris, NY 12742 or 845.793.0093 or Farmer@sdtc.org

Apprentice(s) Wanted Live and learn in the beautiful Berkshire Hills. Work with Ed Stockman, an agrobiologist, with 30 years of experience as an organic vegetable and berry grower. The primary goal of the apprenticeship program at 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. For more information contact: Ed Stockman, Summit Farm, 131 Summit St., Plainfield, MA 01070 at 413-634-5024 or stockman@bcn.net.

Looking for **Assistant Farm Manager/Horticultural Therapist** - for two acre certified organic farm, which serves as a therapeutic and vocational training site for homeless men and women. Assist farm manager in all aspects of seedling and crop production, local sales, and supervision of client workers. 25 weeks position, from mid April through mid October 2002. Previous experience in agriculture needed and working with special needs populations preferred. \$500 per week salary. Send resume and cover letter to: Jean-Claude Bourrut, Long Island Shelter, P.O. Box 158, Boston, MA 02122. 617-534-2526 x304. Jcbourrut@bphc.org

For over 30 years George Hall has been certified organic. Come learn greenhouse work, CSA, farmer's market, retail deliveries, farmstand, beekeeping, and organic farming methods. We also have an extensive herb garden. We provide rustic housing, stipend, and veggies from the farm. **Five interns are wanted** for year 2002, April-October (flexible). (Don't be alarmed by ogre-like voice on the telephone.) Contact George Hall at 180 Old Farms Rd., Simsbury, CT 06070. (860) 658-9297 e mail: georgehallogre@aol.com

Landscape Designer - Knowledge of landscape graphics. Must be a people person and have own transportation. Positions starts Feb/March 2002. **Perennial Gardener** - Some experience required. Farm Production - Vegetables, Small Fruits, Nursery - Some experience required. **Landscape Laborer** - Some experience required. Full or part time available. Jobs start in April unless otherwise stated. No room or board. \$8- \$15/hr depending on experience. Benefits available. Please send resume and references (with phone numbers) to: Christine Bailey Landscape Services 192 East Main Street Norton, MA 02766 Fax 508-285-9055 Christine.Bailey7@verizon.net

For Sale **BCS tractor with attachments**, including: Acme 333VWB 4-cycle engine (327 cu. cm.), 30" rear tine tiller, 30" heavy duty mower, and 45" sickle bar mower. Well maintained, with manuals. \$1750 for the package. Call 781-259-1324 (Lincoln, MA)

The New Haven Ecology Project is seeking a 2002-season **farm intern**. We have one acre of vegetables and berries, and several animals. We are an environmental ed non-profit in New Haven, Connecticut, and we run a charter school for area high school students. The food that the gardens produce feeds students, is used in educational programs, and is sold at the downtown farmers' market. Housing and produce provide. Starting date negotiable. Small stipend also available. Please contact Leslie Chaison, NHEP (203) 777-2584, or lesliechaison@hotmail.com.

For Sale: Two Jersey bulls. Born 9/01, raised on Mom's good milk, organic oats and hay. One is naturally polled, both are friendly and handled daily. \$200 ea. or best offer. Call Jacqui at 978-874-0244.

Farm Manager Wanted: Small organic farm seeks farm manager for 2002 season and beyond. Experienced organic farmer with farm management background desired to help our non-profit environmental foundation integrate ecologically sustainable small-scale farming with 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 a letter of interest to Black Kettle Wildfarm, P.O. Box 42 Essex, New York, 12936. 518-962-4762 or email karin@willex.com.

Greenhouse Planting The greenhouses at the Natick Community Organic Farm are beginning to fill up with seedlings for spring planting. 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 NCOF on a weekday and ask for Lynda. - NCOF, 117 Eliot Street Natick 508-655-2204.

Attention Small Growers without greenhouse space. The Natick Community Organic Farm, NOFA/Mass certified, **will grow your seeds in our solar greenhouses for you** or you may purchase the varieties we grow. Contact us by April 1st to assure your quantity and selection. 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 marketing). For information contact Lynda Simkins at 508-655-2204 or stop by the Farm at 117 Eliot Street (Rt 16) Natick, MA

Non-certified organically grown **Russian Banana Fingerling Potatoes for seed or table**. 2001 harvest from certified seed stock. \$2.80 /lb + shipping Call Tim at Grateful Farm in Franklin Mass. 508-553-3022 or afrmr@aol.com "

Positions available: Phillies Bridge Farm Project. Contact Martha Cheo, 845-256-9316, PO Box 1147, New Paltz, NY 12561, mcheo@email.msn.com - **Farmer:** Grow organic produce for 80 member CSA on 5 acres. \$20,000/year, housing, benefits, option for long term tenure through leasing the facility and/or gaining equity. - **Farm Apprentice/Educator:** Work with Farmer on organic vegetable CSA production. Work with Education Director to teach programs on the farm. AmeriCorps position, April-November 2002. \$211/week, benefits, plus \$2,362.50 educational award. - **Director:** Oversee all programs, including CSA, education programs, and food sharing for low-income families. Fundraising, budgeting, organizational management and long term planning. Half-time, \$15,000/year, benefits.

Help wanted- organic herb and veg. farm, restaurants, farmer's markets. possible living quarters for barter/intern or 2 plus cash stipend. approx. may-sept. call wende@(603)679-1011 or email tomandnip@yahoo.com

Two intern positions are open at Red Fire Farm in 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 2002. Markets include CSA, farm stand, farmers market and wholesale. Interns will have the opportunity to participate in a wide range of farm activities, and also take part in the biweekly CRAFT farm training program. Housing is available in the farmhouse. Please contact Ryan for additional information at (413) 467-SOIL or redfirefarm@juno.com

Pure Vermont Maple Syrup for sale! Our sap is hand gathered on our family farm and boiled over a wood fire. We take great pride in making high quality syrup the old fashioned way! From our trees to your table. Hassle free shipping & gift shipping too All sizes & grades Free recipes & a sugaring story Sara Schlosser Sandiwood Farm Wolcott, Vt.05680 www.vtpuresyrup.com toll-free-1-888-36-syrup(79787) local-802-888-2881 email: maplesyrup@mt-mansfield.com

Masonry Oven Building Workshop With Alan Scott, Author of "The Breadbuilders" and founder of Ovenscrafters. May 10-12, Orchard Hill Farm, East Alstead, NH. Workshop will take place on a working organic farm and orchard. Come and learn a skill that could benefit most any diverse 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

Organic Greenhouse seedlings for sale. April-July. herbs, tomatoes, vegetables. Can contract grow. Catnip Acres 107 High Rd. Epping NH 03042. (603) 679-1011. email: tomandnip@yahoo.com

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 households who are working together on the many aspects of an integrated farm organism. Our family of 5 (ages 33, 29, 5, 2, and 10 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 coviles@sover.net, or 1748 Wild Branch Road Craftsbury, VT 05826

Sustainable Agriculture Program Coordinator/ Farm Manager - immediate opening for long-term core staff at nonprofit education center. Primary responsibilities include farming/logging with draft horses, livestock handling, farm/equipment maintenance, and educational programs. Also includes maple syrup, bandsaw mill, forest management, rotational grazing, pastured poultry, organic garden, C.S.A., greenhouse, training college interns, mentoring at-risk teens, workshops and field days. Requires excellent communication, planning and organizational skills, belief in peace/nonviolence, experience with kids and confident horsemanship. Salary, benefits, shared farm harvest. Housing possible. On-site interview required for final candidates. Wagbo Peace Center, 5745 North M-66, East Jordan, MI 49727, 231-536-0333, wagbo@torchlake.com

Interns/Apprentices Peacework Organic Farm, in Wayne County, New York, seeks two interns/apprentices for the 2002 growing season. We seek 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 apartment in my house, with all 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 CRAFT. Interview required. If interested, please contact Elizabeth Henderson at 315-331-9029. Evenings 8-11 best, or 7 to 8 am.. E-mail: ehendrsn@redsuspenders.com. CSA website - www.gvocsa.org.

Community Herbalist, Carol Joyce & Woodsman/Carpenter, Marty Vogt have moved to their new farm: Still Willin' Organic Farm & Botanical Sanctuary 433 Richmond Road, Warwick, MA 01378 (978) 544-2203 whitebuffaloherb@hotmail.com Carol continues to offer her White Buffalo Herbs **organic herbal & aromatherapy products**, by mail order & at Amherst Farmers Market on Saturdays. They will be offering the following: Herbal Retreat & Wilderness Education Center: 124 remote acres, opening Spring, 2002. Woods Walks: 2 hours, by appointment. "Plant-Ins": Replanting Endangered Woodland Medicinals. Call for dates. Beginning Level Six month Apprenticeship in Herbalism & Stewardship: One weekend a month starting Nov. 2002.

Farmhouse and ownership share in Land Cooperative for sale. Excellent opportunity for market gardeners or grass farmers. 187 acres, 40 acres open, river frontage. Land has been farmed organically. Located 12 miles from Montpelier in Marshfield VT. Interest in cooperative living and land stewardship required. \$99,500. (802)426-3482

Looking for a special place to build my long dreamed of natural, non-toxic, partially solar energy house, and mini organic homestead. I'm a single male 52, and would appreciate any leads and ideas on wonderful warm, friendly, organic minded areas, communities, for potential relocation to. Ideally there would be a CSA, and or natural food coop (good natural food store) near by. Please send any information to Mark, P.O. Box 231, New Paltz, New York 12561 or e-mail me at explorernp@msn.com Thank You!

Want to farm, but worried about hardships and risks? Don't reinvent the wheel—join us! We're an organic, direct-market family vegetable farm in Pennsylvania with a 30-year reputation for innovation and quality. We have a **professional position** which can provide a solid family income with benefits and with potential to grow. The position could lead to partnership and eventual ownership transition. Modest experience, talent and motivation are the only requirements—skills can be learned. It's a great situation for the right person or couple. Call Jim at New Morning Farm (814) 448-3904, email: moiec@hotmail.com

Seeking farm collaborators here at The Benson Place on Burnt Hill in Heath, MA. We own 38 acres of land and lease 20 more on a ridge top with great views of the Deerfield River Valley. The land is partly forested and also grows lowbush blueberries that have been commercially farmed for 35 years. Gross sales in 2001 were \$17K. We are converting to organics, and highly value our local community and wildlife. Reach us at 182 Flagg Hill Road in Heath 01346, 413-337-5340, or davegott@hotmail.com

Join a farm community, promote your spiritual growth, **exercise your work ethic**, provide produce to lots of folks. A farmer and younger farm partner hope four others – who can relate to occasional 16 hour days, dirty hands and knees, fast picking and swimming when it's too hot – will join them to farm 12 acres of vegetables and flowers. Shared housing, communal meals and some money at the end of the season if all goes well. Farm animals share the farm. TV/computer/drug free work place. Library within walking. Tanyard Farm near White River Junction, Vermont. Bill or Annette Cleland, PO Box 30, W. Hartford, VT 05084, 802-295-7827

Full-time position available April 2002 Compensation: \$22,000 salary and benefits The Morris Farm is a non-profit environmental education center and organic farm. The Farm is looking for an **Education Coordinator (EC)** to oversee educational programming, including: school field trips, after school program, winter and spring vacation camps, summer day camp, overnight camp for girls, the Wiscasset School Composting Project, and educational programs with the neighboring schools. The EC must love working with children and enjoy farm work, and have teaching and farming experience. Contact: Christine James, Executive Director, at christine_james@morrisfarm.org or (207) 882-4080. www.morrisfarm.org

Campers and Counselors Wanted for "Down on the Farm", A residential summer camp for young women ages 13-15 at The Morris Farm, an organic educational farm in Midcoast Maine. Campers and female staff will do animal chores, grow and gather their own food, and learn how to prepare their own meals. Included in each day is free time, fun activities, and time to learn crafts and skills such as making butter and cheese, canning food, spinning wool, knitting, working with draft horses, and making herbal salves. For a brochure or job description, contact: Amanda at 207-882-4080 or amanda_jamison@morrisfarm.org. Website: www.morrisfarm.org.

Apprentices Needed In Maine! MOFGA'S Farm Apprenticeship Program has over 40 participating farms offering a diverse range of experiences. Learn about organic farming, livestock care, dairy, CSA's, greenhouse mgt, marketing, homesteading skills and more. \$20 application fee. MOFGA Apprenticeship Program PO Box 170 Unity, ME 04988; 207-568-4142; www.mofga.org

Mofga's Journeyperson Program might be the right fit for you if you're an experienced, serious apprentice. This is a 2 year commitment offering farm business mgt and product marketing skills. dianes@mofga.org 207-568-4142

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 coops. Interns will gain experiences moving towards operating their own organic truck farm. 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 the fall harvest. For more information contact: Joey Klein, Littlewood Farm, Plainfield, VT 05667, 802-454-8466

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, harvest, packing and sales of organic vegetables. A great opportunity for hands-on learning, experience preferred but not required. (607) 582-6336 or bluheron@mail.empacc.net. 7.3' Lely spring tine cultivator with gauge wheels, new condition, \$1800. (607) 582-6336 or bluheron@mail.empacc.net

Opportunities at Holcomb Farm CSA. 18 Acre CT CSA serving greater Hartford households and community orgs. **1) Asst. Farm Manager:** Coordinate harvest, distribution, record keeping, assist with all production activities. **2) 2-4 month Internships, full season Apprenticeships.** Participate in all aspects of organic vegetable production, help coordinate educational activities. Contact Seth Hanauer, Hartford Food System ph (860) 296-9325, email csamanager@hartfordfood.org, www.hartfordfood.org

Land for rent to organic farmer. 110 acres, class I and II soils, 45 acres mostly class II soil. Near Meadville, PA in Crawford County. Organically certifiable. Jerome Troyer, 814-336-5150

Looking for farmer to farm 3-4 acres in Acton, MA (favorable lease terms) call: 978 263-4775.

Wow! What a great idea! Complete the circle and **offer your CSA customers one of our fresh-cut Christmas trees** and they will think of you all winter long. We are a Christmas tree, vegetable and herb farm practicing sustainable farming methods. We are looking for CSA's interested in offering a cut Balsam fir as part of their package. Call us for more information. Morze Tree Farm, Rt. 114, Box 14, Canaan, VT 05903 802-266-3512

Stonewall Farm; a non-profit community farm on 150 acres in Keene, NH, is seeking an **Executive Director**. Farm operations include: CSA, working dairy, child and adult educational programs, summer day camp, maple sugaring, hay/sleigh rides, forest management, etc. SF employs a staff of 15. The ideal candidate will have experience in fund raising, personnel management, and public relations. Send resume to Stonewall Farm Search Committee, 242 Chesterfield Rd. Keene, NH 03431. For more information contact: search@stonewallfarm.org

Organic Certification Coordinator wanted for MOFGA's new LLC. Will be responsible for day-to-day administration of the certification service. Support will be supplied, for now, through the existing MOFGA staff. Work hours and salary negotiable, but a minimum of half-time expected, with heavier load at times. The position is based in Unity, ME. Send resume and references to: Certification Coordinator Position, c/o MOFGA, PO Box 170, Unity, ME 04988, 207-568-4142, mofga@mofga.org. Work starts in March.

Farmers Assistant wanted for seasonal work, May through October. River Brook Farm is located on the Delaware River on the wild and scenic waterways. Certified organic vegetables and fruits are grown for farmers markets. The position entails all aspects of the farm, including animals, vegetables, fruits, building and markets. Modest living quarters can be provided, access to farm vegetables and a salary. River activities are available. Experience preferred, however, a position can be provided for someone inexperienced but willing to learn, energetic and available all season. Contact Neil at 845-932-7952 or write R.B.F., PO Box 2, Cocheton, NY 12726.

Permanent, year-round opportunity sought by sound, responsible, clean-living, mature male NOFA member. Very diverse knowledge, interests, relevant experience. Thoughtful, always willing to experiment and learn more. Honest, trustworthy, creative, adaptable, disciplined, hard-working, with an interest in working *with* natural systems to achieve long-range goals. Detail-oriented, highly organized, with old-fashioned values and work ethics. Looking more for a LIFE than merely a job. Friendships desired, and partnership considered with similar person(s). Please tell me about yourself, your plans, and how a collaboration might be mutually beneficial. Thanks! Gary Meli, PO Box 778209, Woodside, NY 11377-8209.

Why pay rent, or make mortgage payments, when you can **live rent-free**? The Caretaker Gazette contains property caretaking/housesitting openings, advice and information for property caretakers/housesitters. Published since 1983, subscribers receive 800+ property caretaking opportunities each year, worldwide. Many landowners request caretakers for their organic farms. Subscriptions: \$29/year. The Caretaker Gazette, PO Box 540-NF, River Falls, WI 54022, (715) 426-5500 www.caretaker.org

I am a 25-year old single woman who is interested in learning about the everyday aspects of farming. One day I would like to raise my family and open a bed and breakfast on a farm. I would be **willing to work in exchange for room and board**. I am currently working and living in Tennessee. I would like to learn about planting, 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.1, Deerlodge, TN 37726, Antbite99@hotmail.com

News Notes

compiled by Jack Kittredge

Local food purchases generate almost twice the local income. A survey by the British New Economics Foundation found that every £10 spent on local food generates £25 in local income before leaving the area. In contrast, the same £10 spent in a supermarket would generate about £14 in local income. *source: Organic Farming, Autumn, 2001*

Graphic in folder

U. S. Forest ownership: more people own smaller woodlots. Private ownership of forests has grown by more than 50% in the last generation, while forest size has decreased (particularly among middle size holdings (100 to 500 acres). *source: Tree Farmer, July/August 2001*

Potato industry implements GMO testing. The National Potato Promotion Board has invested \$600,000 to test for genetically modified seed. "We've got to make sure the spuds we grow are certified to be GMO free," said board chairman Jon Brownell. Pressure on the industry has come from GMO labeling laws to be implemented in Japan and Korea this spring, as well as increased concern from European buyers. Sales of US dehydrated potatoes in Japan have fallen 37% since last May, when snacks made with them tested positive for GMO potatoes. *source: The Vegetable Grower News, December, 2001*

Vermont towns to vote on GMOs. In 30 some town meetings in Vermont this spring, voters will be considering anti-GMO votes. In Vermont, all towns meet on the same day — March 5 this year. That has given organizers a focus for implementing a state-wide campaign around genetic engineering in agriculture. Some towns will consider outright bans on planting of GE crops, others will consider resolutions putting the town on notice seeking further safety testing, labeling, and planting moratoria. Proponents hope to create some GE-free zones in the Green Mountain state by planting time. *source: personal communications and NOFA Notes, Winter 2001-2002*

Familiar ag company names disappearing. Last September the Burpee Holding Company, publisher of the Burpee Seed catalog, filed for bankruptcy. Prior to that, in July, Foster & Gallagher, parent of Spring Hill nurseries, Breck's, Stark Brothers Nurseries and Orchards, The Vermont Wildflower Farm, Michigan Bulb, Gurney Seed, and Henry Field Company went under. Their mail order business has been picked up by Garden's Alive, an Indiana company. Also in September Garden Way, the Troy-bilt people, went out of business. Their roto-tillers will now be produced by MTD Products of Cleveland, Ohio. *source: Boston Globe, December 27, 2001*

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 limited research and plant breeding programs. However, title 35, section 101 of the U.S. Code (part of the Patent Act) granted patent protection to "seeds 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 largesse 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 Saskatchewan's 1000 organic 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.saskorganic.com. *source: 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%). Soy accounted for 63% of the acreage and corn 11%. *source: Crop Biotech Net press release, January 10, 2002*

Oregon Tilth 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 NOFAs, 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 Tilth, 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 Tilth, 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 bacteria. The equipment irradiates 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 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 Tilth, February 15, 2002*

Graphic in folder

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 impossibly difficult, a survey by the American Corn Growers Association of 1149 elevators in 11 states reports that over 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 Tilth, 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 a higher percentage of farms realizing cash gains, according to a study by researchers from Cornell and Clarkson Universities. For more information contact Risk Welsh at welshjr@clarkson.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, exclusive 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 that 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 want 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 leaf tissue and fruitlets from about the pink 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 tissue susceptibility. 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 health ideally flows from soil health. That's the underlying principle of organic agriculture. And yet, just as the proverbial bumper sticker implies, disease happens. 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 make even a scab-resistant 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 choosing a particular variety to grow 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 share, it doesn't hurt to improve one's prospects by taking Echinacea (an herbal tincture) before and after landing to boost one's immune system. Sulfur works in an entirely different manner, but you get the idea. Applied 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 organisms—and their spores—results in the denaturing of key enzymes and proteins found in these simple celled organisms. After contact, Oxidate biodegrades into water and oxygen, leaving no harmful residues. Here's a product that could readily replace sulfur. And certainly would assist in cleaning up an orchard where past practice allowed disease to build beyond unmanageable 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 about Oxidate at 1-888-273-3088, 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 Englehard folks at 1-

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 that clay barrier becomes vital for deterring curculio and first-generation codling moth. Earlier use of Surround may not 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 ecosystem. 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 membranes on the foliage surface. These in turn activate an internal defense mechanism in the plant that scientists call phytoalexins. These consist of isoflavanoids and terpenes (varying for each unique plant species) which, when produced in sufficient abundance, can resist the invading pathogen. Plant stress, the overuse of synthetic agrochemicals, 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 the body's own protection systems? 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 promise in limited 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 homegrown garlic brew is another possibility here to vitalize plant defenses. Biodynamic growers concoct a similar brew with nettles and horsetail. This concept of plant medicines for plants has merit, all the 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 1 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 somewhat 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 bacterium, 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 claim to being the most intelligent species on the planet by finally according this minute species its due. "Bacteria First" will always be a driving tenet of ecological farming.

Every orchard site remains unique when it comes to the multi-faceted challenges we each will face in growing healthy fruit. And yet by pooling together our collective understanding, we'll each get better at what we love to do. Hope to hear from you!

Michael Phillips, *Lost Nation Orchard*
RFD 1 Box 275, Groveton, NH 03582
www.HerbsAndApples.com

Special Supplement on AgroForestry

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 upward. It regularly discards large amounts of soil-creating biomass, releases oxygen and water moisture into the atmosphere, moderates the 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 take up 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, warming the remaining air significantly. In addition, leaves are approximately 86% water and have a specific gravity twice that of soil – remaining cooler than it by day and warmer by night. On the whole, plants can be as much as 25 degrees F warmer than the surrounding air.

Water

Forests have an enormous impact on local moisture. A medium size elm will evaporate 15,000 pounds of water on a clear, hot and dry day. But on the whole, trees increase local precipitation — as has been demonstrated consistently through history from the Canary Islands to the Sahara Desert. Warmer air in forests rises toward evening, drawing in cooler, moisture laden air over bodies of water. Leaves

provide a surface cooling effect that then condenses water vapor. The resulting condensation drip is 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 effects 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 forking network of interwoven 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 biomass! 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 tree 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 tree benefit from this collaboration, 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 decomposition 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 ropy 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 investigation 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-rot 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, culturing 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 homestead.

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 mulched 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 ideal player 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 suckled 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

Nevertheless, enokitake (*Flammulina velutipes*), reishi (*Ganoderma lucidum*), clustered woodlovers (*Hypholoma capnoides*), chicken of the woods (*Laetiporus sulphureus*) 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 rich manured 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 patches behave much like king stropharia and morels, travelling great distances from the place of inoculation in their search for fruiting niches.

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 perennial morel patch. Cultivators should note that morels are fickle and elusive by nature, compared to more predictable species like king stropharia, oysters, and shiitake.

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. Clearly the integration of mushrooms enhances these systems to a level which is unattainable without them. I hope readers will develop these concepts further.

Web Links

MycoWeb—Mushrooms, Fungi, Mycology has an excellent links page at <<http://www.mykoweb.com/links.html>>

Mycology Resources summarizes internet resources of interest to mycologists <<http://www.keil.ukans.edu/~fungi/>>

USDA Forest Service study on sustainable harvest and production of edible forest mushrooms in the Pacific Northwest <<http://mgd.nacse.org/fsl/pilzPoster/>>

Earth's Natural Internet by Paul Stamets <<http://www.wholeearthmag.com/ArticleBin/275.html>>

*The above was adapted from the original appearing (with photos and illustrations) as "Permaculture with a Mycological Twist" in Paul Stamets' book *Growing Gourmet and Medicinal Mushrooms,* copyright 1994 Paul Stamets. This book as well as other books, equipment, cultures, information and mycotechnology is available from Paul Stamets' company, Fungi Perfecti, P.O. Box 7634, Olympia, WA, 98507 USA <<http://www.fungi.com/info.html>>*

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Shaggy Mane

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 mycofiltration. 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.

by Zoë Gardner

Cultivation and Marketing of Woodland Medicinal Plants

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 woodlot 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 woodlot 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, baneberry, 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



photo by Zoë Gardner

A goldenseal plant

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 by underground 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-

west facing slope. Goldenseal is hardy in USDA hardiness zones four to eight.

The easiest way to propagate goldenseal is by rhizome (root) division. The rhizome should be cut into pieces a half inch in length, if possible, a live bud should be included in each piece. The fibrous rootlets should be left in tact, although if some of the rootlets fall off, initial studies suggest that the rootlets can be replanted and plants will slowly regenerate from them.

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 with pieces of strong mesh and screening secured on each end). The stratification box should be buried in a well drained area, exposed to natural rain, and left until the following spring. Burying the seed allows the plants to overcome their natural dormancy. The following spring, the seeds can be planted in nursery beds or flats, covered lightly with soil. Seedlings can take up to a year to germinate, so patience will be necessary.

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 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.

American Ginseng

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 quiquefolius*) 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

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 recent years.

The leaf stalks of black cohosh (*Cimicifuga racemosa*) emerge in mid-spring and grow to about two feet in height, the rather elegant flower stalks

begin to appear in mid-May and by mid-June reach heights up to eight feet. Stalks are full of tiny white flowers that in late summer turn into rattle-like seed capsules. Several varieties of black cohosh are sold at garden centers as ornamentals.

Black cohosh will tolerate a wide range of habitats. In warm climates, shade is necessary, but in northern regions black cohosh will grow in full sun, if enough water is available. Black cohosh is hardy from zones three to seven. In a woodland setting, black cohosh should be adaptable to any slope direction.

Root cuttings are the most reliable way to propagate black cohosh. Mature roots can be divided into three to five pieces, each piece should have at least one live bud. Propagation by seed is possible but difficult because, like 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:

Sturdivant, Lee and Tim Blakely. 1999. *Medicinal Herbs in the Garden, Field, and Marketplace*. San Juan Naturals. Friday Harbor, WA. ISBN 0-9621635-7-0.

Gladstar, Rosemary and Pamela Hirsch. 2000. *Planting the Future; Saving our Medicinal Herbs*. Healing Arts Press. Rochester, VT. ISBN 0-89281-894-8.

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Skip Keane's Forested Acres

by Jack Kittredge

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. I have friends who raise them in the city. 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



photo by Jack Kittredge

Keane stores the fresh shiitakes in plastic bags into which vents have been cut. This will enable the mushrooms to breathe and stay of high quality in his refrigerator for several days.

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 hot. 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 horizontally 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, wicking up the moisture, and the other end is up on something — another log or piece of metal a few inches above the



photo by Jack Kittredge

This oak log shows the pock-marks of drill holes into which the spawn-inoculated plugs were driven, and the resulting beautiful shiitake mushrooms.

ground. You leave them like that, on an angle. Maybe in the fall the first year you get a few mushrooms, maybe not. But the next year, in April, you take each log and slam it hard on one end. That's the Japanese method. They believe by slamming it you help stimulate the growth of the mushroom. Then you flip the log over so that the end that was up is now touching the ground. You do that to all the logs. Some people soak them in a big barrel of water before they bang them, but he just flips them.

"You get three fruitings a year," explains Keane. "You get one in April/May/June. After the Spring fruiting they shut down for three or four weeks. In July/August they come up again. Then they shut down again. The last fruiting is September/October/November, until it gets cold. When you're talking about a mushroom, actually you're talking about a strand that runs the whole length of the log. It doesn't pop out where you drill, it pops out of cracks all around the log."

"A little finger peeks out, then boom! They start popping out and in a couple of days or less they're full size. I like to let them go until they're 5 to 8 inches in diameter, and fleshy. If it gets too big, or you harvest when they're moist because of the rain, they turn to mush. That's the only bad thing about mushrooms — the moisture content. You need air circulation — that's important. I'm on a little ridge here, and there's always a little circulation here. You also have to know when you're going to pick them. Otherwise nothing bothers them. Once in a while you'll have a few snails or slugs. Squirrels don't eat them."

All mushrooms with caps, he continues, have their spores under the cap. If the cap is enclosed, the spores aren't released yet. When the cap opens fully it releases them. When the cap is exposed and you can see the veins running through it, they've been released. Skip says that in the summertime, in the June fruiting, you can go out at night and there's a magical fog around the logs. What is happening is the mushrooms are spreading their spores into the air.

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, pats 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."



photo by Jack Kittredge

Here Skip kneels by some of his ginseng plants. He seeded this area several years ago and is pleased with the result. Despite planting these himself, he needs a license from the state before he can harvest and sell the roots.

It's an endangered species, however, and I'm not allowed to sell ginseng unless I have a federal permit. Next year I'll apply for one."

Keane has three plots of ginseng, some Siberian and some American. He buys the seeds, 5000 for \$100, and finds about half of them germinate. Ginseng is harvested in the fall, after the seeds are set and the plant has lost its leaves. Once it has put as much energy as possible back into the root system, then you can harvest the root and save the seeds for replanting.

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 earth . . .”
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 form an open canopy, and if you look carefully you can see fruits swelling on many branches — pears, apples, persimmons, pecans, chestnuts. The shrubs that fill the gaps in the canopy bear raspberries, blueberries, currants, hazelnuts and other lesser known fruits, flowers and nuts at different times of the year. A diverse assemblage of native wildflowers, wild edibles, herbs, and perennial vegetables thickly covers the ground. You use many of these plants for food or medicine, while others attract beneficial insects, 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 sunnier 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 foodstuffs; the seven F's apply here: food, fuel, fiber, fodder (food for animals), fertilizer and “farmaceuticals”, 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 revert 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 successional 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

Mid-Succession Ecological Analogs: old fields usually contain diverse, highly productive species. We can mimic such ecosystems by including existing useful species and by substituting useful 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.

a source of mulch, or a combination of these functions also improves soil fertility. Some species provide food or habitat for *insectivorous* birds, or predatory and parasitic insects that devour pests, reducing and at least potentially eliminating the need for pest and disease management work. Selecting and locating plants based on their suitability for the site's soil conditions and microclimate, the amount of labor they require, their ecological roles and their ultimate size helps reduce the amount of maintenance they need and increase their yield. By mimicking the way nature does her work, we can reduce the work we do to get our sustenance to mulching, some pruning, occasional weeding, and minimal pest and disease management depending on the crops you grow. Oh, and then there's the harvesting!

Essentially, edible forest gardening is the art and science of putting plants together in woodland-like patterns that forge mutually beneficial relationships, creating a food production system that is more than the sum of its parts. The idea is that by growing fruits, nuts, vegetables, herbs, mushrooms and other useful plants and animals in a way that mimics natural forest ecosystems you can create a beautiful, diverse, high yield system that is largely self-maintained.

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. Edible forest gardening is not necessarily gardening *IN* the forest. It is gardening *LIKE* the forest.

Gardening *LIKE* the forest involves forming a deep understanding of the dynamics, patterns and principles that govern the structure and function of healthy, naturally occurring forest ecosystems. We then adapt this knowledge to mimic the structures and functions that meet our needs and help the garden ecosystem to meet its own. We use the forest as a design metaphor, a model of structure and function, while we adapt the design to focus on meeting human needs in a small space. We then participate in the evolution of an ecosystem in our back yards that can teach us about ecology and ourselves as we eat our way through it.

While you can transform an existing piece of woodland into an edible forest garden and have it work well, we don't necessarily recommend it. In

many ways it's better to start from scratch in an area currently free of trees. That way you can improve soil conditions before planting, and then create a canopy of highly productive plants where all the sun is, with additional bonus yields from the lower, shadier layers. When you use existing woods, the opportunities for high total system yields decrease unless you kill trees first or happen to be lucky enough to have persimmons, walnuts, hickories or other crop trees in the canopy already.

The most well-known aspect of mimicry in forest gardening is the creation of multiple layers of vegetation in the garden similar to the layers of vegetation in healthy forests. However, vegetation layers are only one of the five physical architectural elements we must work with to create a forest garden. We must also understand the functions, and mimic the structures, of the soil horizons and the density, patterning and diversity of forest vegetation. For example, ecological research has shown that natural ecosystems exhibiting what we call “lumpy texture” tend to have larger and more diverse bird populations and higher levels of predatory insects in the canopy.¹ When we create orchards with the trees evenly spaced, all the same size, age and species, with no shrubs, and a monotonous understory, we create smooth split pea soup texture. This reduces predator diversity and abundance, increases our work load, and pushes us towards chemical controls of one kind or another.

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 husbanding 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 elements of a healthy soil 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



photo courtesy of David Jacke

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 the soil by fixing nitrogen from the air and putting it into the soil. Alley cropping systems combine rows of nitrogen-fixing and food trees with strips of annual crops like corn and potatoes. The multi-storied "food forest" systems used in many parts of the tropics mimic the rainforest, growing such crops as coconut, oil palms, bananas, coffee, pineapples and ginger. Village and home-scale tropical forest gardens have existed in Java since at least the 10th century, and comprise 15% to 50% of village cultivated lands.² Forest gardens work in tropical climates, and have for a long time.

There is also strong evidence that similar systems were in place in cooler climates hundreds of years ago. For example, some species of temperate forest trees are able to sprout from the stump and regrow vigorously after being cut down. These stump sprouts, called *coppice* ("cop - iss"), are used as fuel, fiber, fodder or mulch, depending on the species. The coppice forestry systems of medieval Britain and other parts of Europe were the core of integrated systems of land use and building construction wherein logs, poles, saplings and brush were all used as structural materials. Coppice plots

also provided 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.³ These very stable, sustainable agroforestry systems existed for hundreds of years before declining and being almost totally lost during the industrial revolution. In addition, the more we learn 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*⁴, first published in Britain in 1991. Hart's vision of temperate climate forest gardening was the result of his work with tropical agroforestry systems⁵, 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*⁶, a solid book with a British focus. These two pieces, combined with Bill Mollison and David Holmgren's works on permaculture ("permanent culture"),⁷ 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, so the examples are fewer and farther between — but they exist. Forest gardeners 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 rural research garden to a jungle of food plants on a quarter acre lot, 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 use 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 minds' eye. We intend what follows to be suggestive rather than prescriptive or comprehensive. 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 add to 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



photo courtesy of David Jacke

Path through garden showing trellised kiwi, fruits and vegetables. Owner: Charlie Headington, Greensboro, NC.

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 ecosystem integrity, if not only native species if they will meet the design goals or the site is relatively free of exotic plants.

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 mown or cultivated area, with little or no 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".⁸ 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

undertake this strategy in an all-at-once manner. See "Nuclei 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 this situation, the aesthetic goals 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 Nuclei 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" to the breaking 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. For larger spaces, you can use a 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 strip, and planted the killed zone heavily with aggressive groundcover plants chosen for a variety of functions, but primarily to fill the ground plane with vegetation other than grass. Each year he continued this process. As the converted ground area grew, the pace of conversion could increase since more stock was available to divide. In the meantime, Martin planted his shrub crops across the 2 acres in clusters under the trees and within the already converted ground layer using the sheet mulch technique. Over a few years, this enabled Martin to convert the herbaceous understory to sun-loving and semi-shade tolerant species that improve the soil and attract beneficial insects, as well as providing useful products for consumption and sale.

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.

An Invitation to Adventure

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 grown 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, medicinals 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 more knowledge, especially 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 so much more to learn. It seems 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. The goal is to create mutually beneficial communities of multi-purpose plants for our own sustenance, and thereby to include ourselves in the natural system. We seek to recreate the Garden of Eden, and, as Bill Mollison says, "why not?"

RESOURCES: PLANTS AND MUSHROOMS

Oikos Tree Crops, PO Box 19425, Kalamazoo, MI 49019, 616-624-6233 - Many kinds of plants. Oaks!
Bear Creek Nursery, PO Box 411, Northport, WA 99157 - A good catalog of a nice variety of trees and shrubs with a permaculture flair.

Edible Landscaping, PO Box 77, Afton, VA 22920 800-524-4156 - "Containerized plants sent year round", nice variety, some not hardy here, some hard to find.

St. Lawrence Nurseries, 325 State Hwy 345, Potsdam, NY 13676, 315-265-6739 - Carries extremely cold hardy species and apple varieties, plus some "different" stuff.

Tripple Brook Farm, 37 Middle Road, Southampton, MA 01073, 413-527-4626 - A small operation with a wide variety of interesting plants-herbs to trees.

Prairie Moon Nursery, Rt 3, Box 163, Winona, MN 55987, 507-452-1362 - The other best, ecological source for wildflower seed, plants and mixes.

Garden in the Woods, 180 Hemenway Rd, Framingham, MA 01701-2699 508-877-7630 - Excellent source for native wildflower seeds and plants from the New England Wildflower Society.
Perennial Vegetable Seed Co, P.O. Box 608, Belchertown, MA 01007 www.perennialvegetable.com - THE ONE AND ONLY source specializing in perennial vegetables, from our own Eric Toensmeier.

Wild Earth Native Plant Nursery, P.O. Box 7258, Freehold, NJ 07728, 732-308-9777 - A wide variety of nursery propagated native plants.

Fungi Perfecti, P.O. Box 7634, Olympia, WA 98507. 360-426-9292 - Mushroom spawn & products for the home grower. Run by author Paul Stamets (see below).

Field & Forest Products, N 3296 Kozuzek Rd, Peshtigo, WI 54157, 715-582-4997 - More mushroom spawn and products for the home grower.

BOOKS AND OTHER INFORMATION

Edible Forest Gardens: A Delicious and Practical Ecology, Dave Jacke with Eric Toensmeier, 2001.
Designing and Maintaining Your Edible Landscape Naturally, Robert Kourik, 1986.

How to Make A Forest Garden, Patrick Whitefield, 1996.

"Agroforestry News", quarterly journal of the Agroforestry Research Trust, Devon, England, available through the Permaculture Activist Magazine, Box 1209, Black Mtn., NC 28711.

Gardening with Native Wildflowers, Samuel Jones, Jr. & Leonard Foote, 1990.

Growing Gourmet and Medicinal Mushrooms, Paul Stamets, 1993.

Nut Tree Culture in North America, Richard A. Jaynes, editor, 1979. Northern Nut Growers Assoc.

Edible Wild Plants, Lee Allen Peterson, 1977.

Backyard Fruits and Berries, Miranda Smith, 1994.

Uncommon Fruits Worthy of Attention, Lee Reich.
Native Trees, Shrubs and Vines for Urban and Rural America, Gary Hightshoe, 1988.

www.soilfoodweb.com ESSENTIAL info on soil food webs & how to manage them! Good links, too.

www.tandjenterprises.com Sell BioVAM mycorrhizal fungi inoculant, good info and test results.

www.mycorrhizae.com Mycorrhizal Applications, Inc., sells VAM & ecto-mycorrhizal inoculants.

www.icserv.com/nnga/ Northern Nut Growers Association: excellent info and links!

www.nafex.org North American Fruit Explorers, excellent group doing good R & D on unusual plants.

www.agroforestry.co.uk Agroforestry Research Trust website, go there or be square!

www.agroforestry.co.uk Agroforestry Research Trust website, go there or be square!

EDIBLE FOREST GARDENS BOOK PRE-PUBLICATION SALE

The pre-publication sale of Dave and Eric's Edible Forest Gardens book continues. The manuscript will be complete shortly, and once it's finished, the price goes up. Current pre-publication price is \$25

A Sampling of Edible Forest Garden Plants

Perennial Herbs

Onions	Allium cernuum, A. tricoccum, A. cepa, etc.	Delicious greens, bulbs, pest control, some quite shade tolerant.
Wild Cabbage	Brassica oleracea	Perennial kale, tree collards, per.broccoli!
Sea Kale	Crambe maritima	Blanched shoots, delicious flower buds.
Turkish Rocket	Bunias orientalis	Mustardy leaves, shade tolerant.
Nettles	Urtica dioica	Spring greens, nutrient accumulator.
Wood Nettle	Laportea candensis	Native, spring greens, shade, also stings!
Sweet Cicely	Myrrhis odorata	Sweet, anisey foliage, flowers, seeds, shade tolerant, attracts beneficial insects.
Mountain Sorrel	Oxyria digyna	Good flavor, native, sun or shade. Buckler-leaved
Sorrel	Rumex scutatus	Tasty, good clumping groundcover.
Good King Henry	Chenopodium bonushenricus	Spinach flavor leaves, asparagus-like shoots, shade tolerant.

Vines

Hardy Kiwis	Actinidia argua, A. kolomikta	High vitamin C fruit, woody. Maypop,
Passionflower	Passiflora incarnata	Great flowers, tasty fruit, herbaceous.

Trees

Walnuts	Juglans species	Nuts, timber.
Hickories	Carya species	Nuts, timber.
Chestnuts	Castanea spp. & hybrids	Nuts, timber.
Mulberries	Morus alba, M. rubra	Fruit, coppice.
Persimmons	Diospyros virginiana, D. kaki	Fruit.
Nut Pines	Pinus edulis, P. cembra, P. pumila, P. flexilis, etc.	Nuts, windbreaks.
Pawpaw	Asimina triloba	Highly nutritious fruit, part-shade.

Shrubs

American Plum	Prunus americana	Fruit, thicket-forming.
Chickasaw Plum	Prunus angustifolia	Fruit, thicket-forming.
Saskatoon	Amelanchier alnifolia	Fruit, comm. varieties available.
Hazelnuts	Corylus species	Nuts, thicket-forming, some trees.
Currants	Ribes species	Fruit, can fruit in part-shade.

Easy to Grow Fungi

Shiitake	Lentinula edodes	Oak log dwelling, tasty, medicinal.
Kuritake	Hypholoma sublateritium	Logs, sawdust, stumps, tasty, native.
Shaggy Mane	Coprinus comatus	Hardwood chips (mulch), tasty, native.
Reishi	Ganoderma species	Stumps, logs, native, tasty, medicinal.
King Stropharia	Stropharia rugoso-annulata	Hardwood chips, straw, soil, compost, mulch, tasty, native.

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!

¹ Perry, David, 1994. Forest Ecosystems. Johns Hopkins University Press, Baltimore. Pages 202-3.
MacArthur, R.H. and J.W. MacArthur, 1961. "On bird species diversity." Ecology. Pages 594- 598.

² Reijntjes, Colin, Bertus Haver Kort, and Ann Waters-Bayer, 1992. Farming for the Future: An Introduction to Low External-Input and Sustainable Agriculture. MacMillan Press, London. Page 38.

³ Rackham, Oliver, 1993. Trees and Woodland in the British Landscape: The Complete History of Britain's Trees, Woods and Hedgerows. Weidenfield and Nicolson, London.

⁴ Hart, Robert A. de J., 1991. Forest Gardening. Green Books, Totnes, Devon, England.

⁵ Douglas, J. Sholto and Robert A. de J. Hart, 1984. Forest Farming: Towards a Solution to the Problems of World Hunger and Conservation. Intermediate Technology Publications, London.

⁶ Whitefield, Patrick, 1996. How to Make a Forest Garden. Permanent Publications, Clanfield, Hampshire, England.

⁷ *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.

⁸ Bill Mollison, Thanks.

Growing Ginseng in Your Woodlot

by Robert Beyfuss

Introduction: For the past 3,000 years or more the roots of a perennial plant called ginseng have been a very important component of traditional Chinese medicine. The roots of wild American ginseng have been harvested, dried and exported from the United States and Canada to China, since the mid 1700's. Today, American ginseng is also a very important part of traditional Chinese medicine. It is used as an "adaptogen" which is a substance that allows the body to adjust to various types of stress. It is not used as a specific cure or remedy for any particular ailment but as a component of many medicinal herbal combinations that help people deal with the aging process and related disorders.

Presently there are dozens of over the counter herbal remedies, available in any local drug store, which contain ginseng or ginseng extracts. Ginseng has become one of the most popular herbs of the 1990's as Americans and Europeans seek alternatives to prescription drugs. Unfortunately many of the ginseng products available in local stores do not contain any American ginseng. Usually they contain extracts of either Asian ginseng, which is widely cultivated in China and Korea, or so-called "Siberian ginseng" which is a related plant, but not a true species of ginseng. According to the U.S. Department of commerce, as long ago as 1858 the U.S. exported more than 350,000 pounds of dried wild ginseng roots. American ginseng has been cultivated in the U.S. since the late 1800's, primarily in the northeast, southeast and the midwest.

Types of Ginseng

American ginseng, (*Panax quinquefolium*) is a native American herb with a range that extends from Southern Quebec to Northern Georgia and from the East Coast to the Midwest. It grows as an understory plant in the dense shade provided by deciduous hardwood tree species. In the Northeast it is most often found growing under sugar maple while in the southeast it is often found under tulip 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 either wood lathe 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 untilled soil in forests for a period of nine to twelve years or even longer. The dried roots 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 in states where it occurs.

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 is highly perishable if not properly handled 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 floating the pulp off. The seeds are then mixed with moist, clean, 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 who deal with forest products have purchased woods cultivated or wild ginseng for resale to dealers who export the overwhelming majority of the crop. Most states that 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 weigh about one third of their original fresh weight. The prices received by wild ginseng harvesters or growers of woodland ginseng have always been significantly higher and in some situations may approach \$500 per pound or more. In general, the age and appearance of the root when harvested and the system of cultivation determine the 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 all of their roots in bulk. The references listed at the end of this article include sources of seed, rootlets for transplanting, ginseng buyers and consultants.

Constraints

Legal - Wild ginseng is an 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. Prospective 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 baits 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 seedlings and plants up to three years old is a good test of a 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 calcium rich forest soils 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, parts of 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. In the far north, 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. Prospec-

tive 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 rich, moist soil, high in calcium. Local foresters, 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 locations as possible within the forest 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 cultivated ginseng 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 ginseng soil usually contains at least 10% organic matter with relatively low levels of phosphorus and potassium. Soil calcium levels should be at least 1,000 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 lime 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 in before planting. If soil 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 growing site. Never add manure, 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 in the soil.

For wood's cultivated ginseng stratified seed are planted at the rate of 40 to 50 pounds per acre in prepared 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 simulated ginseng plant 20 pounds per acre. There are approximately seven thousand 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 cultivated. Many growers make four to six foot wide beds to facilitate weeding. The seed is covered with a one half to one inch layer of soil, tramped on and mulched with two to three inches of either shredded or intact leaves from the surrounding trees.

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. Rootlets 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 humus is simply raked away and seeds are pushed into the soil, tramped on and the leaf mulch is then raked back.

Maintenance

Annual maintenance of "woods cultivated" ginseng beds consists of hand weeding, removal or suppression of competing shrubbery, spraying of appropriate fungicides if needed, controlling slugs if necessary 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" Tuckasee Valley Ginseng, Box 236, Tuckasee, NC 28783

Bailey, W.G., Whitehead, C., Proctor, J.T.A., and Kyle, J.T. "The Challenges of the 21st Century, Proceedings of the International Conference-Vancouver 1994" Simon Fraser University, Burnaby, British Columbia, Canada

Beyfuss, R.L. (editor) "American Ginseng Production in the 21st Century" Proceedings from the International Ginseng Conference held in Leeds NY (Greene County) available from Cornell Cooperative Extension of Greene County for \$30 postpaid.

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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. Steeply 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 of many kinds. 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:

- * find 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 grow under difficult climatic and soil conditions, coupled with their potential for soil conservation, gives agroforestry a potential in the main types of marginal lands: semiarid, sloping and those with soil constraints. There is a demonstrated potential for reclamation of degraded land. As well as crop breeding, research programmes are under way to select or, in the longer term, breed trees tolerant of adverse soil conditions. Tree litter and prunings can substantially help to maintain soil organic matter and improve physical properties and at the same time supply nutrients. The contrast between natural and agricultural ecosystems suggests a high potential for agroforestry to lead to improved nutrient cycling and hence fertilizer use efficiency. In the case of water-use efficiency, there is a known potential, as demonstrated in studies of windbreaks and contour hedgerows, although tree-crop competition for water presents problems.

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 we know that this is true?

1. The soil that develops under natural forest and woodland is fertile. It is well structured, has a good water-holding capacity and has a store of nutrients bound up in the organic matter. Farmers know they will get a good crop by planting on cleared natural forest.
2. The cycles of carbon and nutrients under natural forest ecosystems are relatively closed, with much

recycling and low inputs and outputs.

3. The practice of shifting cultivation demonstrated the power of trees to restore fertility lost during cropping.

4. Experience of reclamation forestry has demonstrated the power of trees to build up fertility on degraded land.

What Makes a Good Soil-Improving Tree?

It would be useful to have guidelines on which properties of a tree or shrub species make it desirable for the point of view of soil fertility. This would help in identifying naturally occurring species and selecting trees for systems which have soil improvement as a specific objective.

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 woody 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 nitrogen 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 transects frequently show higher organic matter and better soil physical properties under trees. Some species, most notably *Faidherbia albida*, regularly give higher crop yields beneath the tree canopy. Trees improve soil fertility by processes which:

- * increase additions to the soil;
- * reduce losses from the soil;
- * improve soil physical, chemical and biological conditions.

The most important sets of processes are those by which trees:

- * 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 dry environments, 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 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 fulfil 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, 1989a, p. 159). Names in parentheses are synonyms formerly in use. Species marked with an *asterisk 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 lebbbeck
Albizia saman (*Samanea saman*)
Anacardium occidentale
Alnus acuminata
Alnus nepalensis
Alnus spp.
Atriplex spp.
Azadirachta indica
Bactris gasipaes
 Bamboo genera
Cajanus cajan
Calliandra calothyrsus
Casuarina cunninghamiana
Casuarina equisetifolia
Casuarina glauca
 **Centrosema pubescens*
Cordia alliodora
 **Crotalaria* spp.
Dalbergia sissoo
Dactyladenia barteri (*Acioa barteri*)
Dendrocalamus spp.
Erythrina caffra
Erythrina orientalis
Erythrina poeppigiana
Faidherbia albida (*Acacia albida*)
Flemingia congesta (*Flemingia macrophylla*)
Gliricidia sepium
Grevillea robusta
Inga edulis
Inga jinicuil
Leucaena diversifolia
Leucaena leucocephala
Melaleuca leucadendron
Melia azedarach
Musanga cecropioides
Paraserianthes falcataria (*Albizia falcataria*)
Parkia biglobosa (*Parkia africana*)
Paulownia elongata
Peltophorum dasyrrachis

Populus deltoides
 Prosopis chilensis
 Prosopis cineraria
 Prosopis glandulosa
 Prosopis juliflora
 Prosopis tamarugo
 Schinus molle
 Senna reticulata
 Senna siamea (Cassia siamea)
 Senna spectabilis (Cassia spectabilis)
 Sesbania bispinosa
 Sesbania grandiflora
 Sesbania rostrata
 Sesbania sesban
 Tamarix aphylla
 Tephrosia candida
 *Tephrosia vogelii
 *Tithonia diversifolia
 Ziziphus mauritiana
 Ziziphus nummularia
 Zizyphus spina-christi

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).

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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 agronomy 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>.

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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 watching a compost pile cook down to fine, 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 fungi.

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 interweave 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 readily 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 mushrooms to be used to regenerate clearcut forests, since the trees grow so much better.



photo courtesy Eric Hoffner

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 antiviral 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/noppolicies.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 holes and how many holes should be drilled 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 contaminating spores of other mushrooms and keep moisture in.

Another method is to cut logs into two or three one-foot sections, placing a 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.

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 if soaked once a week 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 supply companies. Recording 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 a 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 for 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 is longer than that for log culture, 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.

It is important that stumps be fairly fresh, so that the grower can be mostly certain that what is growing is what was 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 sapwood. 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.



photo courtesy Eric Hoffner

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 between garden beds. 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 farm's hive. The bees burrowed into the sawdust and devoured the sugar-rich mycelium for weeks.

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-\$400/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 symbionts 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 northeast 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



photo courtesy Eric Hoffner

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

Ways to grow mushrooms outdoors

Log Culture One can grow many kinds of mushrooms on the types of hardwood tree 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). For this reason, birch is not highly recommended for log culture, while oak is considered the best, and maple, hickory, ash, beech, poplar, ironwood, cottonwood, aspen, willow, and elm will all support vigorous mushroom growth. The logs also need to be small in diameter, from 3 to 10 inches, and two to four feet in length. For this reason, growing mushrooms on the small hardwood trees thinned from a woodlot makes good sense.

Logs should be alive when cut. Unless spawn is introduced to a log before it is two months old, it is likely that another mushroom strain will colonize it first. The best time of year to harvest logs is winter or early spring when all of the tree's sap is still in the trunk of the tree. This sap is crucial to the proper nutrition of the fungi. A log from a tree that is fully leafed out will support mushrooms, but not as well as a log cut from a dormant tree. (This type of project can really put a person's tree ID skill to the test. If you find it difficult to identify dormant trees, borrow a knowledgeable friend, or get a field guide and mark the suitable specimens while they still have leaves). Once the logs are sawn to the proper length, be careful to leave the bark intact, as exposed wood leads to contamination and dessication, and be sure to keep logs clear of the ground until inoculation.

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 For those who are interested in mushroom culture but want 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 Gourmet and Medicinal Mushrooms, by Paul Stamets. Best all around book that describes natural outdoor culture and indoor techniques of many mushroom varieties in depth. \$45 new.

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 300 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 gigante* (commonly known as giant bamboo, canebreak, or rivercane) and *Arundinaria tect* (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 Genera Distinguished by Growing Type:
Clumper or Runner

Clumper	Runner
<i>Arundinaria</i>	<i>Chimonobambusa</i>
<i>Bambusa</i>	<i>Indocalamus</i>
<i>Chusquea</i>	<i>Phyllostachys</i>
<i>Dendrocalamus</i>	<i>Pleioblastus</i>
<i>Drepanostachyum</i>	<i>Pseudosasa</i>
<i>Fargesia</i>	<i>Sasa</i>
<i>Himalayacalamus</i>	<i>Semiarundinaria</i>
<i>Oatea</i>	<i>Shibatea</i>
<i>Thamocalamus</i>	<i>Sinobambusa</i>

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 construction, food, and the arts (e.g., concrete reinforcement, fishing poles, furniture, crafts, edible bamboo shoots, musical instruments); and [3] ornamental, landscape, and conservation uses (e.g., specimen plants, screens, hedges, riparian buffer zone).

Bamboo canes intended for strength and durability — furniture, flutes, crafts, fencing — should be harvested at three to five years of age. Prior to the end of the third year, cane tissue is still filled with sap and comparatively soft. Thus, marking and selecting canes is a regular part of grove management. Of course, bamboo canes serve many utilitarian purposes around the farm—bean poles, pecan nut tree limb shakers, vegetable trellises and stakes—and these latter uses can be made of any canes that are available.

Products made from U.S.-grown bamboo include fishing poles, flutes, furniture, and crafts. Much of this bamboo is harvested from stands in southern Mississippi, Louisiana, Florida, and the West Coast. Most Americans are probably more familiar with bamboo as an ornamental specimen plant or living screen, and opportunities exist for bamboo as a niche nursery plant.

Though bamboo acreage has historically been limited in the United States, there is renewed interest in bamboo as a commercial crop with many uses. The *Temperate Bamboo Quarterly*, published

since 1993, features useful bamboo species and developments, and bamboo has been explored as an agroforestry crop through several conferences and workshops in the Pacific Northwest.

There are five steps in developing a successful bamboo venture:

- identification and selection of varieties most suitable for desired end uses
- grove management procedures (planting, maintenance, and harvesting)
- materials processing (grading, cleaning, and drying)
- product manufacturing (equipment, materials, tools, jigs, dyes, paints, varnishes)
- marketing (customer identification, distribution, advertising)

Potential Bamboo Markets

Potential markets and bamboo products in the United States are summarized below. In most circumstances, bamboo should be viewed as a complementary crop that fills a niche market or serves a purpose on the farm, rather than a primary cash crop.

- Plant Material: Landscape nursery plant material; zoos; botanical gardens
- Food: Fresh bamboo shoots
- Construction Material: Concrete reinforcement; bamboo fencing; housing
- Musical Instruments: Flutes; wind chimes; pan pipes; xylophones
- Tools: Bamboo leaf rakes
- Furniture & Crafts: Toys; wood working inlay; trim work; paneling; basketry weaving; frames; jewelry; fishing poles; floral stakes; garden stakes; trellis poles
- Conservation: Living screens; agroforestry; riparian filter strips; constructed wetlands; wildlife habitat

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 — Value-Added
• Intercropping	• Timber
• Riparian vegetation filter	• Craftwood
• Constructed wetlands	• Fiber crop
• Living screens	• Livestock forage
• Permaculture	• Bamboo shoots

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. nuda*, 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

imparting 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 demand for fresh, locally grown produce through niche marketing. Local markets for bamboo shoots include Asian restaurants, farmers’ markets, and health food stores, especially in towns with ethnic populations 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 into production in 3 to 4 years and 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 plants varieties that originated in Southwestern 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 Turtle, co-editor of *Temperate Bamboo Quarterly*, explained that bamboo shoots should be harvested as soon as you 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 are 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 become a common 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. In this respect, 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 patroonship 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 where 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 — like a bathroom door. I don't want to take out a big loan, and I don't want to get that big. I don't want to be a business, with employees. I'm a nature guy."

Born in Orange, New Jersey, Michael moved as a child a few miles out to what was then rural country, where he explored a lot in woods and nature. He became a welder, but after being disabled was attracted to this part of New York by the low price of land. He bought 110 acres, mostly wooded, and began raising the things he liked: vegetables, chickens, flowers, mushrooms, ginseng, herbs.



photo by Jack Kittredge

NOFA/NY certified farmer Michael Hoffman stands in his woods where he raises shiitake mushrooms on oak logs. After being inoculated for a year and a half, the logs are soaked in the stock tank behind Hoffman to bring on a flush of fruiting

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 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

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



photo by Jack Kittredge

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.

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 shangers. I've found mice and voles really like ginseng, too. I was going to raise it in the field — put an arbor up, put kiwi over it and ginseng under it since it likes shade. That way I could protect it. But the rabbits killed the kiwi before it got going. It doesn't grow as fast as the catalogs say."

Another idea he tried to protect the ginseng was to grow in within a circle of logs. Since he was cutting and plugging large numbers of oak logs for shiitake 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 can grow pretty big — like turnips. In Wisconsin, it's a big business. They bring in 2000 pounds per acre. They fumigate the soil — kill 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 shiitakes, but he also cultures morels, chanterrels, mitakes and adankos. The shiitake 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 it 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. 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 flush of fruiting bodies, and after a week or so they are ready to harvest. He says you can get maybe 5 pounds of mushrooms from a flush. Then you rest the log. How often a log will fruit depends on the strain of mushroom. Some fruit only once a year, some 4 or 5 times a year. If they fruit more often, they won't last as many years — eventually all varieties use up the nutrients in the log. Over the lifetime of a log you might get 40 or more pounds.

Bugs are a big problem with commercial mushrooms, and so most growers spray a lot. Hoffman shakes bugs out of his, but also relies on the fact that in the wild there are lots of natural predators, so the bugs population doesn't go wild like in a commercial monocropping situation.

He also collects wild mushrooms, just for the spores. "Most mushrooms grow only on specific trees or specific soil profiles," he explains. "If I see one I like, I take it and soak it in water with some



photo by Jack Kittredge

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. Then I'll spread it back wherever I want to inoculate. If it's a good area for them, you'll get more than. 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 adanko don't require soaking. They seem to do better with spring rains, growing in the cold, with low humidity. They're much meatier and more flavorful. I've inoculated some beds of chanterrel — 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. He had to have a plan for the whole process — the dowels, the wax.

Michael has also 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 new fern fronds, from them in the spring. Hoffman harvests a number in May and takes them to the Green Market as one of his first offerings each year.

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 witch hazel, which flowers in the fall and sets seed in the next year. The lotion 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.

Hoffman would like to get into growing more herbs, and would also like to grow and sell orchids. He gets excited about those plants: "Ninety percent of orchids grow in trees. They get most of the nutrition they need right on the surface of the tree. Whatever washes out of the cracks and the bark. Life is amazing. It's a miracle. All life is intelligence. Take orchids, now. Plants don't have eyes but there is an orchid that imitates, both visually and with odors, pheromones, a female wasp. It gets a male wasp to mate with it and it picks up pollen. The next time the wasp mates with an orchid it pollinates that one. Is that just trial and error? The orchid just came out looking and smelling like a female wasp? There's an intelligence there. Things and how they react are so complex. We have no idea what's going on. Our five senses only detect a little bit of what is going on.

"I'd like to grow lady's slippers, too," he continues. "They're expensive if you look in the catalogs, but they're gorgeous. They grow them in sterile lab conditions in flasks on agar. I've seen some beds of yellow ones in the wild, and then gone back later and they were all gone. I have a feeling somebody is supplying the catalog houses that way! Yellows are easy to grow, but the pink ones are virtually impossible! You have to have a very specific ecology. Orchids are great. They all propagate with microscopic dust."

Hoffman thinks he could sell herbs or orchids by mail order. But he is worried that there may be too much competition to be successful. "It takes a while to sell these items," he cautions. "You have to develop a clientele that knows what you have. If you are interested in how to grow these plants, you'll pick it up! You read things, talk to people. You learn by trying it out. I've always enjoyed the challenge."

Nontimber Forest Products

by Deborah Hill

Nontimber forest products (NTFPs), 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.) Lion’s Mane (*Heridium erinaceus*), King Stropharia (*Stropharia rugosoannulma*) 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 fungi 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 my 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 reinoculated 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 (*Caulophyllum thalictroides*), as well as bark from such trees and shrubs as witch hazel (*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 several 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 medicinals 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 marketable leaves, seeds, and fruits, bear annually. Harvesting roots may take longer. Goldenseal, from which both root and leaves are marketable (and seed for that matter), takes two or three years to develop a large enough root mass to market. Ginseng commands a high market price because it takes five to ten years to develop the kind of root that brings top dollar.

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 probably kill the whole plant. Slippery elm, which can grow into a large tree, can either be managed—like the witch hazel—by coppice when young, or could bear some vertical strips of bark being removed 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 (*Mimosa triloba*), hazelnuts (*Corylus* 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 areas like the Pacific Northwest. Although many of the forest resources for crafts may be obtained by collection or “wild crafting,” some of the most desirable species can be “farmed” by intentionally altering the habitat to increase their production.

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 mean a lot of leaves, and a lot of leaves means high syrup production.

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 harvesting 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 treatment, 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 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 one 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 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

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

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 riparian buffer strips. One or more 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.

Further Reading

“American Ginseng - Green Gold.” by Scott W. Persons. 1994. Bright Mountain Books, Asheville NC, 203 p.

“Forest Farming: Revitalizing and Expanding Crop-Yielding and Forest Based Enterprises.” by Deborah B. Hill and Louise Buck 1998. Chapter 8 In: Agroforestry - An Integrated Science and Practice. W.J. Rietveld, H.E. Garrett, and R.F. Fisher (eds.). American Society of Agronomy Special Publication.

“Income Opportunities in Special Forest Products.” by M.G. Thomas and R. Schermann. 1993. USDA Agricultural Information Bulletin 666, 206 p.

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/>>

Conservation International’s Directory of Information Resources for Non-Timber Forest Products lists many useful publications: <<http://www.conservation.org/library/books/ntfp.htm>>

This article was originally published in The Permaculture Activist, No. 40. For subscription information write to, Subscriptions, P.O. Box 1209, Black Mountain, NC 28711 USA. Tel: 828-298-2812, Fax: 828-298-6441, E-mail: <pcactiv@metalab.unc.edu>, Web: <<http://www.permacultureactivist.net/>>

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(continued from page 1)

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.

Book Reviews

The Overstory Book: Cultivating Connections with Trees

edited by Craig R. Elevitch and Kim W. Wilkinson
Permanent Agriculture Resources, Hawaii, June, 2001
PO Box 428, Holaloa, HI 96725
808-324-4427, overstory@agroforestry.net

430 pages \$39.95 + \$6.50 shipping, ISBN 0-9702544-1-5

also available on searchable CD for \$16.95 post-paid,

or both for \$49.95 plus \$6.50 shipping

reviewed by Jack Kittredge

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]).

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 in on agroforestry, planting trees, designing with nature, income from agroforestry, human connections, 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.

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 connections of many living communities with trees – the connections with other life forms are essential.)

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

canopy shape

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 than 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, incorrect planting procedures have caused a multitude of tree problems worldwide.)

If you like trees and enjoy learning about them, I have no doubt that you will enjoy this book. It has numerous illustrations (although they are much larger and more effective on the CD than in the book). It makes ideal bedtime reading for those long summer days when a few pages at a time is all you can manage!

The New American Farmer: Profiles of Agricultural Innovation

Editor: Valerie Berton (no real author, different authors wrote different profiles)

Publisher: USDA's Sustainable Agriculture Research and Education program, Sustainable Agriculture Publications, 210 Hills Building, University of Vermont, VT 05405-0082

Paperback, 159 pages, \$10, Published in 2001
Book available for free at www.sare.org, or CD-ROM available for \$5.

Reviewed by Don Franczyk

USDA's SARE (Sustainable Agriculture Research and Education) Program has published a collection of profiles detailing sustainable agriculture practices on forty-eight farms across the United States. The book goes beyond simply profiling the practices of these farmers to discuss the effect that the sustainable practices have on broader financial, community, and environmental goals. SARE's aim in publishing the book is to show representative samples of what they call the "New American Farmer", farmers who are farming using sustainable practices and making it work.

The book is organized into four regional sections: the North Central, the Northeast, the Southern, and the Western. There are 11-14 profiles for each region with a total of 48 profiles in all. A pool of

windbreak

writers wrote the profiles but the profiles themselves were written to a standard template. Each farm profile addresses a standard topic list which includes: Problems Addressed, Background, Focal Point of Operation, Economics and Profitability, Environmental Benefits, Community and Quality of Life Benefits, Transition Advice, and The Future. At the end of each profile is the address and contact information for the farmer(s) profiled.

There is an impressive diversity of operations profiled in this book. Operations range in size from a 3 acre nursery in Massachusetts to a 3300 acre sugar cane operation in Louisiana. There is a healthy mix of livestock, rowcrop, and specialty crop growers profiled. Crops profiled include vegetables, cotton, grain, bananas, and citrus. Some of the growers profiled are organic, and some are not. Management practices that are repeated throughout the book include cover cropping, rotational grazing, pastured poultry, and elimination or reduction in the use of pesticides and herbicides.

Marketing of products grown on the farm is represented strongly in the profiles. The farms profiled use a variety of marketing techniques but for the most part are direct marketing their products. The profiles show a healthy mix of Community Supported Agriculture, Grower Cooperatives, and creation of value added products.

The strength and weakness of the book lies in the profiles. The quality of the profiles is uneven. At times reading a profile puts you right on the farm and you get a feeling that you know and understand the operation. Other profiles keep you at a distance and you never feel any familiarity with the operation. The selection process for the operations may have overemphasized diversity and variety to the point that it is debatable whether all of the forty eight operations are sustainable. Some of the larger operations especially seem to have been included in order to demonstrate that sustainability is achievable no matter what the scale, yet in reading the large operation's profiles I was not convinced that they were truly sustainable. Also, because there is such a range in the size of operations, only a fraction of the profiles are of use to any particular grower. Reading about sustainable banana growing practices was interesting, but nothing in that profile spoke to me as a small vegetable and livestock producer.

Regardless of their geographical region, the profiles of the small and mid size farmers seemed most useful to Northeast growers. Even with climate and crop production differences, the problems of small farmers anywhere in the United States seemed most translatable to the problems faced by farmers in the Northeast. Many of the small grower profiles sparked ideas of practices I want to implement and change on my own farm. The small grower profiles showed that small farmers could compete in the marketplace, and that sustainable agriculture practices and financial sustainability were not mutually exclusive. Because of the large number of operations profiled, and their overall diversity, there will be something of value in this book for just about any grower, there just might not be as much of it as he/she would like.

SARE has chosen to make the book available for free on its website in PDF format. Searches can be conducted on topics of interest in the profiles on the SARE website, and the whole book or individual profiles can be downloaded and printed out. Hardcopies of the book and CD-ROM copies of the book are also available for \$10 and \$5 respectively.

Weedless Gardening

by Lee Reich

Workman Publishing, NY

708 Broadway, NY, NY 10003

200 pages \$8.95 ISBN 0-7611-1696-6

reviewed by Michael O'Bannon

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.

watering can

In **Weedless Gardening**, Reich takes his gardening methods directly from nature, forgoing 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 smothers 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. This 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.

sun & rain

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. Out of control weedy sections may require starting over with the newspaper and mulch, though.

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. This 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

Organic matter best does its job of protecting the soil from pelting rain and hot sun if left on the surface.

Gaia's Garden,
by Toby Hemenway,
Chelsea Green Press, 2001
\$24.95, paperback, 222 pages

Gaia's Garden: A Guide to Home-Scale Permaculture, is about turning a conventional, resource-intensive, tightly-controlled yard and garden with a few isolated species, into a productive, beautiful, self-supporting, ecologically dynamic blend of plants and animals.

Although this is definitely a book about organic gardening, what sets it apart from many other books about organic gardening is that Hemenway is educated in and committed to permaculture, a far-reaching approach to the design of human communities. In terms of gardening, permaculture suggests a heavy reliance on perennial plants, and a focus on the interactions between various plants and animals and their environment. The gardens that Hemenway describes include tree, shrub and herb layers, produce food, flowers, and wildlife habitat, are pleasant and welcoming places to spend time, and require little in the way of outside inputs. They also tend to alter the surrounding climate in whatever way the particular location requires - more heat, less heat, more water retention, better drainage, or less wind - and even create varying microclimates for different plants.

Hemenway's basic method is to emulate and work with nature. In nature, diversity creates stability; massive population outbreaks of any one species are generally prevented by preexisting predators and competitors. Similarly, in the gardens described in Hemenway's book, a carefully chosen diversity of plants creates complex miniature ecosystems that hold possible pests in check. In nature, fertility sufficient for growth generally comes from within the community. Similarly, Hemenway's "ecological gardens" rely on plants that fix nitrogen, draw minerals from the subsoil, or drop a heavy leaf litter to create fertility.

In a conventional garden, there are times and places where a lot of sunlight is not captured, and weeds tend to spring up to take advantage of the excess. In an ecological garden, multiple layers of perennial plants capture more sunlight and thus reduce weed problems. In this situation, nature's tendency to fill in space and capture all available sunlight becomes a benefit.

In permaculture, plants are selected partly on the basis of their interactions with other species. Hemenway advocates planting not one species, like an apple tree, but a miniature community of plants that help and serve each other at the same time that they help and serve humans. An apple tree can be planted with daffodils, comfrey, artichokes, yarrow, nasturtiums, dill, fennel, dandelions, chicory, clover, and fava beans. These other plants provide food and flowers, attract beneficial insects and birds, keep out invasive grasses, create mulch, and accumulate

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 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 reason for doing that I'll 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 soil and water depleted in any one area, fewer pesticides needed to protect huge monocrops or preserve food in extended transit, and less fuel used to transport food."

nutrients. In permaculture, this group is called a "guild."

Each plant in a guild performs multiple functions, and each function is fulfilled by multiple plants. In the apple guild, for instance, clover fixes nitrogen, attracts pollinators, and creates mulch.

After giving a couple of examples of guilds, Hemenway provides a guide to creating your own guilds on your own land. There can be no recipes for guilds, because every piece of land and every person is different. The goal is to find out what guilds grow naturally in your area, and adapt them to fit your needs.

In recognition of our affection for certain annual vegetables, Hemenway also describes annual herbaceous polycultures that take advantage of interactions between plants in the same way the tree-centered guilds do. Again, these are not recipes but examples, and Hemenway follows the examples with principles for creating your own polyculture.

Also included in the book is a discussion of soil fertility, tips for catching and conserving water (which might not have seemed relevant to New England before the endless drought which began last spring), and an introduction to greywater recycling systems.

Hemenway grows lyrical at times in his admiration for natural ecosystems and for gardens that are based on natural ecosystems. He also tends to anthropomorphize. Soil organisms, he says, eat humus "grudgingly," and turning a compost pile involves "murdering millions" of microbes, "smashing their homes" and "bludgeoning them and their children."

I will immediately add that Hemenway himself sometimes turns compost piles, and he is generally a practical and forgiving writer who offers his readers lots of encouragement.

My only criticism of this intriguing book is that Hemenway's explanation of ecological principles is sometimes simplistic. In particular, his explanation of the edge effect does not take into account that some species (most famously the northern spotted owl) require large tracts of a single type of vegetation. Hemenway does not seem to recognize that a single-minded attempt to maximize edge will mean the disappearance of some species.

At the very end, Hemenway makes an intriguing reference to a garden "popping," which is the moment, after a few years of designing, planting, and tending the garden, when it suddenly begins to thrive. The necessary climatic modifications have begun and the interactions between plants are established, and the garden becomes 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.

fert analysis

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. Following 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.

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 production on a subsistence scale. We also felt impatient and discouraged relative to the massive social/political/economic overhaul that both friends and experts (some of whom overlapped) were suggesting as required to effect a long-term local food system. Of course, they are more than likely correct. But we were desperate for a taste of the Promised Land, a tangible talisman, and a test of its first person worth in light of the work that will ultimately be required by many to realize the larger goal.

Our first year of experiment was mostly preoccupied with gaining access to and developing recipes for the variety of foods necessary to sustain health and morale through a complete cycle of seasons. Our major work since then has involved education about the underlying issues and increasing avenues of access so that the scope of the project could extend beyond a couple of fanatics such as ourselves. A few



photo courtesy Becky May

Pickup includes the potatoes, onions, garlic and apples we see here.

highlights include speaking on a local radio and television talk shows, teaching an after school course, and catering a few communal functions from family holiday meals to receptions at our synagogue. This article will focus on another project, a *winter* CSA, that I hope will catch the fancy of a few readers and generate a few seedlings of its own.

It began with a friend, farmer, and fellow NOFA member, Wayne Young of High Hill Orchard in Meriden, CT, sharing the difficulty of making ends meet in the agriculturally challenging economic climate of Connecticut where homes are more profitable to grow in our rocky soil than vegetables. I countered with my woes as a consumer facing another season end and the prospect of a winter's worth of withdrawal from local produce.

"Why don't you do a winter CSA?" I said brazenly throwing down a garden glove size gauntlet. (I was afraid to even broach the subject with my summer CSA Farmers as most seem desperate for their well deserved break, at least from the demands of distribution, by first frost.)

"Why don't you organize it for me?" he countered, pitchfork poised defensively by his side. (Well I can't swear to there being an actual pitchfork but it sounded too good to resist)

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 goody, stubbornness or perhaps foolish pride may well be as much the mother of invention as necessity.

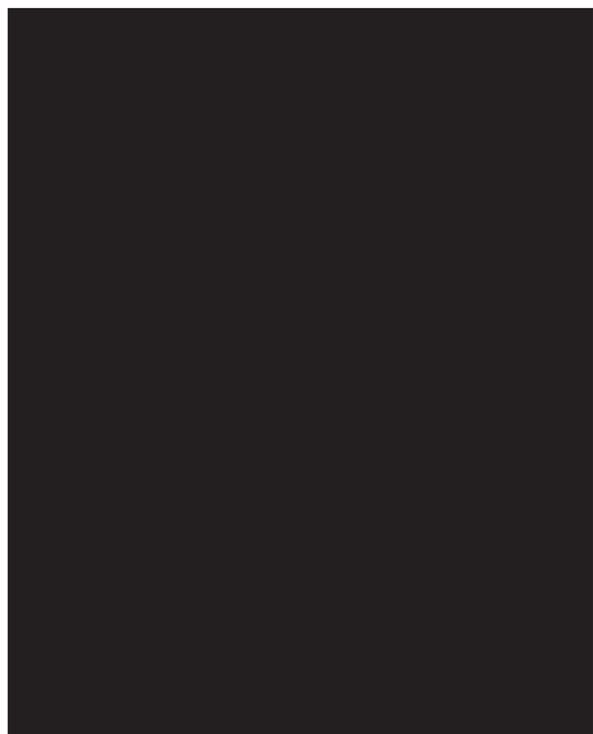


photo courtesy Becky May

A happy couple picks up.

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 pickups 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 home/driveway closer to where many members lived. I also found it more convenient to have the use of my own facilities between customers and had more flexibility for late-pickups, family responsibilities etc. purposes.

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/year 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 posters, 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 turkey promotions. We also experimented with supplementing some all season CT products such as eggs, cheese, beeswax candles, mushrooms, honey, jam, pickles, greenhouse products on a individually ordered basis. This we found to be a little more tricky because of the decentralized sourcing, accounting implications and diverse handling regulations. 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-fiving, 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 Sundays 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 menacing green, squiggly line my grammar check program has inserted to threaten me!)

Now I am trying to make good on my premise/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 not all on the shoulders of our front line farmers. Or perhaps I'll pursue that most elusive of prospects – *the spring CSA!* Any takers? I can be reached at (203)-624-2798.

High Hill Orchard Quick Reference Sheet

Quantity	Anticipated Share Items	Nov	Dec	Jan	Feb
4	Winter Squash	*	*		
1-2 heads	Cabbage/Brussel Sprouts	*	*		
3 lbs	Pears	*	*		
3-5 lbs	Apples	3lbs	3lbs	5lbs	5lbs
10 lbs	Potatoes	*	*	*	*
3-5 lbs	Beets	*	or	*	*
3-5 lbs	Turnips		*		*
3 lbs	Onions	*	*	*	*
2 heads	Garlic	*	*	*	*
1 gallon	Cider	*	*	*	*
1 bunch	Cooking Greens	*			
1 bunch	Carrots	*			

NOFA Contact People

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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, stonewallfarm@monad.net

Friday, May 3 & Saturday, May 4: Organic Beekeeping Workshop, The Pfeiffer Center, Chestnut Ridge, NY for more info: 845-352-5020 ext. 20, info@pfeiffercenter.org

Saturday, May 11 - Sunday, May 12: NH Sheep & Wool Festival, Contoocook, New Hampshire. for more info: (603) 635-8553 or daowens@erols.com

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

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

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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.

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photo by Jack Kittredge

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

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