

Walk-In Cooler Technology: Exploring the Options

For many of our readers, it may feel like a walk-in cooler outside, especially in the Midwestern states...which makes it a good time to consider walk-in cooler technology for storing chestnuts.

Linda and Dale Black of Rockport, Ill., emailed us to ask if we could recommend a certain type of walk-in cooler, something “that will keep the humidity up and the temperature down.”

We checked with Greg Miller of Empire Chestnut Company, Carrolton, Ohio on the issue.

Following is Greg’s response to the question of what to look for in a walk-in cooler:

“Generally, the temperature should be close to freezing (30-35° F), and the humidity as high as possible. These two conditions are not easily maintained simultaneously in a cooler. Of the two, high humidity is more important, but the most difficult to achieve. Moisture tends to condense on the evaporators, sometimes icing them over (a bad situation). The cooler should be equipped with low-velocity evaporators, the type commonly used in cut flower coolers, but also used for high-moisture produce, like lettuce.

The temperature control on the cooler needs to be adjusted by trial-and-error to keep things as cool as possible without icing over; this involves both the set point and the differential. A high differential results in longer cycle times (better defrosting), but tends to dry the (cont. pg 5)

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Lee and Lynda Williams, Moses Lake, Wash., grind chestnuts into chips (shown at left) for gluten-free chestnut beer. Bottled as “Trails End Chestnut Beer,” the product was featured at the International Gluten-Free Beer Festival in Chesterfield, England, last February.

Chestnut Chips Become Beer to Satisfy Gluten-Free Demand: A Toast to “Leftover” Chestnuts

by Rachel McCoy, Center for Agroforestry

Not sure what to do with leftover or imperfect chestnuts? Consider drinking them.

Lee and Lynda Williams of Trails End Chestnuts, Moses Lake, Wash., have found a way to use chestnuts not high enough quality for fresh sales, dried whole chestnut products or their fine-grade flour – by grinding them into material for chestnut beer. The dark colored, slightly sweet beer is gaining popularity among the gluten-free category of beers, and chestnut beers from producers like the Williams are available from a growing handful of microbreweries across the country.

Situated in the desert region of Washington state on sandy loam soil on the “basic or neutral side” says Williams, people told them chestnuts wouldn’t grow there. “We do it anyway,” says Lee.

Lee and Lynda have five acres of chestnuts with approximately 500 trees; the oldest tree in their orchard (cont. pg 3)



A Message from the President

LUCIENNE GRUNDER,
OWL CREEK RANCH
LA GRANGE, CALIF.

To all a very joyful 2007!

In France, the chestnut tree is also named "l'arbre a pain," the bread tree.

Here, before the blight, the extensive chestnut forests of the Eastern United States had certainly been a bread basket for the local populations and much of the wildlife. Lately, chestnuts are "en vogue." Villages have chestnut festivals; tourists buy a relatively expensive ticket, and are then served a great meal of roasted and otherwise prepared chestnut specialties, plus local dried meats and cheeses, all washed down with ample quantities of regional wines and spirits. But what are we doing to make chestnuts more popular?

Considering that in the United States "bigger is better," only our largest chestnuts are easily sold. We are all still exploring feasible ways of processing the smaller nuts. Some of our members are successfully turning dried, peeled chestnuts into flour and mixes for pancakes, breads or cookies - sought after by persons suffering from gluten intolerance.

Another solution is to create a market for fresh peeled, frozen chestnuts. We are all watching Dennis Fulbright at Michigan State University in East Lansing, Mich. Their large, expensive industrial peeling machine came from Italy and was funded by the USDA. Fresh frozen chestnuts are what chefs want, and I imagine that soon their customers will want to buy this convenient commodity at the supermarket. You can readily find peeled, frozen chestnuts at very reasonable prices in every European country year-round.

On a larger scale, it would be necessary to do the mechanical processing in the framework of a co-op. How many growers or expected amounts of chestnuts would be necessary to justify and maintain such an organization? How far would a member be willing to transport the crop? And are there more, and larger, chestnut orchards in our future?

On 80 acres Owl Creek Ranch here in the Central Valley, about 40 tons of chestnuts were produced in 2006; about half of them were jumbo and extra large, which sold easily by the truck loads. The balance was dried in an industrial walnut drier and could be peeled in a modified almond huller, then sold either whole or as flour. Chestnut purees are usually produced from rehydrated, dried chestnuts and are widely used, mostly in desserts and as flavoring in yogurts.

Some years ago at the Ranch, we experimented with feeding the small, unprocessed chestnuts to suckling pigs we bought. After six to eight weeks, the slaughtered piggies were stuffed with onions and rosemary and slowly roasted, a real delicacy indeed! The interest among local fine food providers was very encouraging - and so was the profit margin. I hope we can all bring more input concerning these, and many more, chestnutty subjects in this new year - and continue to grow the very best chestnuts.

To great Chestnut Adventures in 2007!

Lucienne

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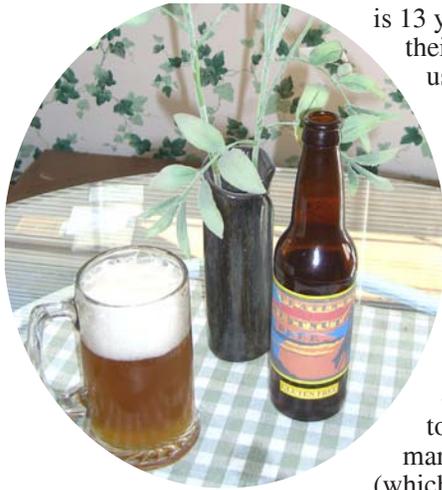
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Chestnut Chips Become Beer To Satisfy Gluten-free Demand: A Toast To “Leftover” Chestnuts (cont. from pg 1)



is 13 years old. Lee started all their chestnuts from seed, using Japanese/European crosses. There is no shortage of sunshine, but irrigation is required for production. Last year, Lee said they harvested around 5,000 pounds of chestnuts, but a heat wave in June of 2006 —followed by a rare hail storm with high winds —brought their 2006 crop to 1400 pounds of fresh market quality chestnuts (which the Williams sold out).

The Williams also became inspired from a trip to New Zealand last year for a chestnut council meeting, where they observed a fresh peeler. They also learned about producers who send chestnuts to China for hand-peeling, but Lee chose to create his own equipment instead. A retired veterinarian for the Washington Department of Agriculture, Lee credits growing up and building things alongside his dad and enjoying working with his hands to part of their success. He applies this mechanical know-how to improving upon his processing and shelling equipment.

Whole, dried chestnuts are a good seller for the Williams, especially to Oriental markets. The Williams bulk process up to 10 gallons at a time of whole, dried chestnuts, packaging and labeling as Trails End Chestnuts. They drop ship for a large discount food business in New Hampshire, using the buyer’s label. Wholesale grocers and loyal customers are another business outlet, and the Williams have shipped from Florida to Seattle, and from Los Angeles to Maine. Their fresh chestnuts have been shipped as far as Alaska and Hawaii.

“We call our dried chestnuts ‘gourmet,’ because they’re very good quality, pellicle free and reconstitute nicely,” says Lee. “The chestnuts the pellicle adheres to are used for the beer, because the pellicle gives the dried nuts a tangy taste. But this tanginess is great for beer and it adds to the dark color also.”

“The market for coeliacs (gluten intolerant) is bigger than you might think,” says Lee, mentioning a government statistic that one out of every 133 persons in the U.S. is gluten intolerant.

Chestnut beer made in Corsica and France, such as Pietra brand, are made with 15 to 20 percent chestnuts. Lee explains that barley, which is typically used for beer production, has the same nutritional content as chestnuts – though the chemistry of chestnuts is a little different than barley.

To make chestnut chips of cracked barley size for microbrew production, Lee and Lynda start with cleaned, shelled and dried chestnuts, which are, according to Lee, “rock hard.”

They go into a pre-cracker and then a stone flour mill produces a “cracked-corn” product. The spacing of the stones in this type of flour mill determine the coarseness and size of the flour, so the Williams space the stones farther to produce the consistency needed for beer. Some of the chips are roasted on a large electric range with a circulation fan Lee made from a convection oven, to impart a richer, bolder flavor. Approximately 7 pounds of chestnut chips are needed to produce 5 gallons of the Williams “Dark Chestnut Brew.”

“We keep working on the beer and improving the recipe we offer to people for chestnut beer, though we don’t produce chestnut beer to sell ourselves. My goal is to provide the chestnut chips for home brewers,” says Lee. Home brewers and microbreweries find Trails End Chestnuts through news articles or from their web site. Web sites featuring gluten-free beers and Google articles also help achieve business. The gluten-free beer market is really starting to click, and gaining momentum now,” says Lee. “There are ten or 15 types of grains out there suitable for gluten-free beers, but the chestnuts give it a unique, delicious flavor.”

Last February, Lee and Lynda participated in the First International Gluten-Free Beer Festival at Chesterfield, England, part of a celebration of quality beer and its national heritage held in conjunction with the CAMRA (Campaign for Real Ale) Beer Festival. Samples of Trails End Chestnut Brew complimented a handful of bottled and canned gluten-free beers from across the globe. More than 1600 participants attended, with many coeliacs enjoying a gluten-free bar. The Williams have been invited to participate in the Seattle gluten-free beer festival, which is, according to Lee, part of the “microcosm of microbreweries” that exist in the Washington and Oregon region.

Carolyn Smagalski, known as the “beer fox,” a professional beer and brewing editor for Bella Online (a popular UK women’s web site) writes highly of Trails End Chestnut Brew: “Trails End Chestnut Brew is a deep chestnut brown with a tight, tawny head that slowly reduces to a Belgian veil, leaving shards of lace scattered like a web across the surface of the glass. Aromas are of coffee and sweet chocolate chip cookies – brown sugar, molasses, dough, and nuts – mixed with raisins and dates. The flavor profile is not as sweet as the aroma suggests. Tastes of roasted nuts greet your lips, blended with deep espresso notes. A satisfying bitterness touches the back of the tongue, like an imported, gourmet coffee on a cold morning.” (See www.bellaonline.com/articles/art38250.asp to read Smagalski’s complete story about Trails End.)

“If I could get all chestnut growers to understand that there’s a market for dried nuts, and for chestnut chips, then the general public might also become more aware of these products. There are growers out there with hundreds of pounds of nut chips, or nuts with pellicles adhered, wondering what to do with them,” says Lee. “Chestnut growers have to create their own markets, but the gluten-free market is big and getting bigger.”

(cont. pg 6)

Can We Produce Dwarf Chinese Chestnut Trees?

by Dr. Michele Warmund, MU Horticulture faculty and MU Center for Agroforestry research scientist

The trend in tree fruit and nut production for the past 20 years has been toward high density production, in which smaller trees are planted at close spacing to maximize crop yields and land efficiency. Dwarfing rootstocks not only affect production efficiency, but also influence anchorage, disease susceptibility, precocity, and soil and climatic adaptability. While dwarfing rootstocks have been used for fruit trees for many years, this is still a new idea in chestnut production. Chinese chestnut (*Castanea mollissima*) trees grown on their own seedling roots can grow to 40 to 60 ft. at maturity. The tall tree canopy makes pest control, pruning, and harvest labor expensive. Thus, a research project was initiated in 2003 to identify and evaluate sources of dwarfing that would be compatible and increase production efficiency of Chinese chestnut trees.

Fortunately, there are several *Castanea* species that have a smaller tree size than that of Chinese chestnut (Figure 1). However, there are several reports of grafting incompatibility among *Castanea* species at the time the trees are propagated. Additionally, delayed incompatibility between Chinese chestnut scions and seedling rootstocks sometimes occurs three to four years after grafting. Thus, the search for dwarfing rootstocks will be a long-term project.

Another approach to obtaining a dwarf tree is to graft an interstem between the scion and the rootstock. Interstems have been used to dwarf apple trees and to increase the adaptability of a rootstock to broader geographic regions. These trees typically take an extra year to be produced in the nursery as the interstem is grafted onto the rootstock in the first season and then the scion is grafted to the interstem the following season.

In October 2003, Dr. Sandra Anagnostakis of the Connecticut Experiment Station provided 'Little Giant' (*C. mollissima* x *C. seguinii* hybrid) seed from Connecticut for our dwarfing rootstock project. In 2004, seedlings were produced and trees were grafted in spring 2005 in the greenhouse. 'Eaton'

or 'Auburn Super' were used as scion cultivars with 'Little Giant' as the interstem with Cropper seedlings as the rootstock. Using potted trees in the greenhouse, double grafts were made and interstem trees production time was reduced by a year. At the same time, trees of the same scion cultivars without an interstem were also produced on Cropper seedling rootstock. The first trees were planted in the field at the Horticulture and Agroforestry Research Center in April 2006. Interestingly, burs were produced on all trees this first growing season except on those with the 'Little Giant' interstem. Additionally, tree height and trunk circumference were not affected by bur production. It is unknown if these results will continue throughout the life of the planting. While the lack of bur production in the first two years is desirable, cropping on the interstem trees would be desirable thereafter. In other tree crops on dwarfing rootstocks, such as apple and peach, fruit is generally removed in the first two years after planting to develop the vegetative structure of the tree and to prevent them from running out.

In October 2005, Dr. Anagnostakis provided seeds of two other *Castanea* cultivars, 'Hope' and 'King Arthur', as well as 'Little Giant' seed which will be used as understock for grafting in spring 2007. These trees will be propagated by grafting and field planted and evaluated for ten years. Our long-term goal in this project is to identify a suitable dwarfing rootstock that can be clonally propagated to ensure that trees produce a profitable crop of chestnuts annually. **CGA**

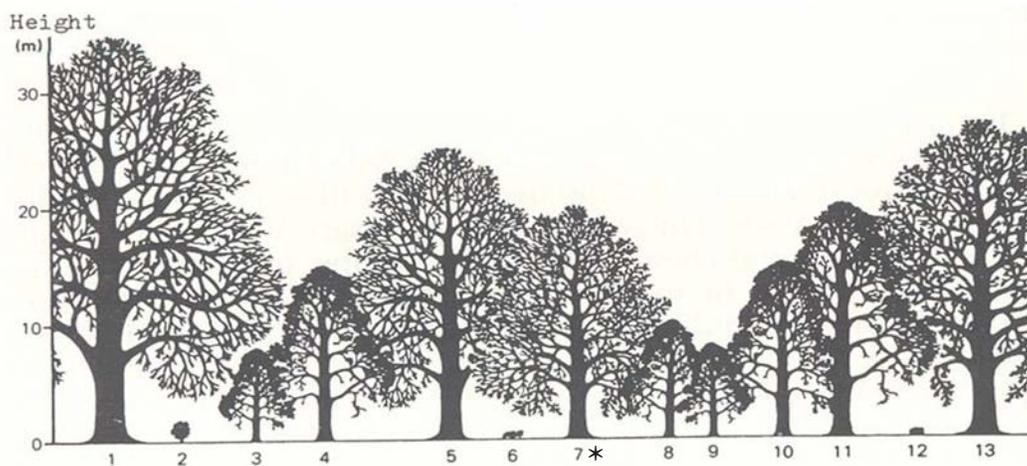


FIGURE 1. The maximum heights of various *Castanea* species. The illustrations are schematic.

- | | | |
|------------------------------|-----------------------------------|--------------------------------|
| 1. <i>C. dentata</i> , USA | 6. <i>C. alnifolia</i> , USA | 10. <i>C. pumila</i> , USA |
| 2. <i>C. davidii</i> , China | * 7. <i>C. mollissima</i> , China | 11. <i>C. ozarkensis</i> , USA |
| 3. <i>C. ashei</i> , USA | 8. <i>C. seguinii</i> , China | 12. <i>C. paucispina</i> , USA |
| 4. <i>C. crenata</i> , Japan | 9. <i>C. floridiana</i> , USA | 13. <i>C. sativa</i> , Europe |
| 5. <i>C. henryi</i> , China | | |

Fig. 1. The maximum tree heights of various *Castanea* species. (Reprinted from Bazzigher, G., K.P. Lawrenz, and F. Ritter. 1984. Propagating and growing chestnuts. NNGA 75th Annual Report 75: 119-137).

Walk-in Cooler Technology: Exploring The Options (cont. from pg 1)

product more. The optimum setting ends up being a compromise that is particular to each system. I store chestnuts in mesh bags and I frequently (every day or two) spray the floor of the cooler and the chestnuts themselves with water. Water doesn't hurt the chestnuts. If everything is working properly, the chestnuts should not be losing any more than 1% of weight per week, and it's possible to keep the weight loss less than that. Just as a side note, don't store chestnuts in heavy, air-tight plastic bags (like zip-locks); they develop anaerobic respiration products that taste bad, and eventually kill the chestnuts; the same goes for controlled atmosphere or modified atmosphere storage.

Probably the best way to store chestnuts long-term is to mix them with damp sawdust or peat moss and then put them in plastic boxes or trays (not a big pile) in the cooler. Of course, this is messy and not appealing for culinary nuts, so I don't do it except for special, important seed nuts. Sometimes, when chestnuts are stored at very high humidity, surface mold grows on the shells. This looks bad, but does not hurt the kernels inside. As long as the chestnuts are firm (cannot be squished between finger and thumb), they are okay. A quick dip in a Clorox (5% or so) bath will remove the surface mold. This is easy to do if the chestnuts are packed in mesh bags.

When handling and shipping chestnuts it is more important to keep them from drying than it is to keep them cold. A week or more at temps of 40-50° F doesn't seem to cause noticeable harm, but a few days of drying causes irreversible changes (good for eating, bad for storing). Also, fresh chestnuts freeze at some point between 20 and 25° F; this is disastrous. I ship fresh culinary chestnuts in mesh bags in cardboard boxes – not air-tight, but not quickly drying either. With transit times of several days or less (i.e. ground transportation), the chestnuts seem to arrive in good condition.”

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Ray and Carolyn Young, Allen Creek Farm, Ridgefield, Wash., also shared some thoughts on cooler technology:

The Youngs have a CALM unit (Controlled Atmosphere Long Life Module), a concept used by apple and other fruit orchardists for years. However, while growers of other crops have used controlled atmosphere storage, they haven't used a unit like the Youngs that maintains a specific oxygen/carbon dioxide ratio. The unit used by the

Youngs was developed exclusively for chestnuts. The basic principle of CALM is storage under high carbon dioxide, with sufficient oxygen levels maintained. After harvest, excess moisture is removed and bins are sealed on a pallet base within a plastic sleeve. The CALM unit is then attached to the bag via an air-tight interface with an oxygen sensor and tubing going through the interface to provide adequate fresh air to the chestnuts and to maintain the ideal storage atmosphere. (<http://www.postharvest.com.au/CALM.htm>)

Here are Carolyn's comments on this year's storage:

“We opened the CALM unit up last Sunday and the nuts were gorgeous — not a bit of mildew or mold, and they were solid as a rock, as if they'd just been picked up off the ground. However, the unit did not perform as we expected. It did not get down to the oxygen levels it should have. Even if it didn't perform perfectly, it obviously made a significant difference. If it only extended our orders for two shipping days, then it more than paid for itself.

In response to the possibility that controlled or modified atmosphere storage might negatively influence the taste of chestnuts, we have not had that experience at all. This might be a possibility if oxygen levels dropped too low, but the approach for “controlled” atmosphere storage is that the oxygen doesn't get to a level that impacts food quality. (Not having a food science background, the first year we had a crop I tried putting chestnuts in vacuum sealed bags just to see what would happen. Within six weeks, it looked like I had miniature pillows. The fermentation was obvious.)

The researcher from whom we bought our unit has spent a number of years determining the proper ratio of oxygen to carbon dioxide. That ratio is different for every crop. The grower who was the beta test site in Victoria in 2005 said it allowed him to keep his nuts in excellent condition for four months. I talked with him this year after he used 15 of the units (45,000 lbs), and again, he said four months.

I thought it significant that of the 400 or so orders we shipped that had been in the unit, we did not have even one complaint about bad nuts. That's different than we've had in the past. (These 400 orders were all shipped to have arrival within 3 days.)

The first year, we sprayed the floor of the cooler to keep the humidity high — but then we bought a humidifier. It allows us to have consistent humidity of 98-99%, and we keep the refrigerator at 33 degrees so that ice doesn't form on the floor. It's just another approach.” **CGA**

Carolyn and Ray Young
Allen Creek Farm
 Ridgefield, Wash. 98642

A Toast To Chestnut Beer (cont. from pg 3)

For more information:

Trails End Chestnuts: www.chestnuttrails.com

Gluten Free Beer Festival: www.glutenfreebeerfestival.com/
Bella Online, www.bellaonline.com/articles/art38250.asp

Editor's Note: Here at the Center for Agroforestry, it's our pleasure to occasionally sample chestnut products at our weekly staff meetings. We enjoyed cracking open a bottle of Trails End Chestnut Beer at our morning meeting a few weeks ago, each of trying a small sample. We found it to be unique, distinctive and tasty; with a bolder, more robust flavor than most of our Midwestern palettes are used to, similar to a lager or stout ale. The beer has excellent color and weight, and as is common to home-brewed beers, we could detect a mild yeast flavor. One of our colleagues commented he could probably "drink a lot of this," though perhaps at a time later than 8 a.m.

Michigan State University Connects With Chestnut Beer Markets



Pietra is a Corsican chestnut beer - and one of the inspirations behind Michigan-area growers' chestnut beer efforts.

One doesn't have to travel all the way to the Gluten-Free Beer Festival in England to enjoy the unique flavors and rich color of chestnut beer.

Having tasted several chestnut beers at festivals in Italy and Corsica, Dennis Fulbright, plant pathology professor at Michigan State University, is actively working to help Michigan chestnut growers earn market share in the chestnut chips/chestnut beer industry.

Fulbright works with and advises Chestnut Growers Inc. (CGI), a cooperative of Michigan-area chestnut growers, who process and package peeled, frozen chestnuts, chestnut chips, chestnut flour and fresh chestnuts.

CGI sells chestnut chips for beer production to local microbreweries, including Jolly Pumpkin, who last fall began producing the successful Fuego Del Otono chestnut beer, meaning "autumn fire." Chestnuts are boiled with malted barley and mixed with hot water to produce mash, and then the starches become sugars. After boiling and adding yeast, the beer matures in oak barrels, an uncommon and traditional production element used by Jolly Pumpkin.

Fulbright is excited about the possibilities chestnut chips offer to growers and is continuing to guide and enhance the process. The chipping process used by CGI is currently under study through a Michigan Department of Agriculture grant. In the past, producers have

made chestnut chips with a potato slicer, but have experienced difficulty achieving a uniform size.

For more information about Michigan State's efforts with chestnut beer, visit:

www.statenews.com/article.phtml?pk=35858.

To learn more about Chestnut Growers Inc., visit www.chestnutgrowersinc.com. **CGA**

Green Valley Marketing Efforts Help "Swamp" Ranch With Visitors

Following is a note received from Greg Dabel of Green Valley Chestnut Ranch, Sebastopol, Calif., in response to a request for growers to send photos and updates of their chestnut festivals. This is another example of the power of utilizing "free" sources of publicity - including radio interviews, press releases and existing agritourism entities.

"You wanted photos of National Chestnut Week. So did we. But we were just too busy to snap a few photos. We opened the chestnut orchard (Green Valley Chestnut Nut Ranch) to the public for the two weekends during National Chestnut Week (Oct 7/8 and 14/15). Over 500 people poured in. We offered U-pick chestnuts, free samples of chestnuts roasting on a BBQ (open fire), cookbooks, and chestnut products - and even a homemade "Chestnut Splitter." The splitters sold as fast as we could make them in the barn.

We were swamped with visitors - we did over \$6,000 in sales out the back door of the barn. The visitors came after hearing our radio interviews, seeing press releases and checking the Farm Trails maps. It took our entire family just to deal with the volumes of people. The camera literally sat on the shelf next to the Chestnut Honey. We never got a chance to photograph all the activities. Maybe next year. Thanks to the Chestnut Growers of America for the marketing ideas and for the concept of National Chestnut Week."

Greg Dabel
Green Valley Chestnut Ranch
Sebastopol, Ca
www.chestnutranch.com

Chestnut Festivals Gain Popularity, Informed Buyers

Statistical information and report by Ina Mihaela Cernusca, Research Associate, Univ. of Missouri Center for Agroforestry; with assistance from Mike Gold, Associate Director, Univ. of Missouri Center for Agroforestry

The University of Missouri Center for Agroforestry (UMCA), Columbia, organizes the annual Missouri Chestnut Roast festival, with the Oct. 14, 2006 event marking the fourth year for the popular event. The festival is dedicated to drawing consumer attention to chestnuts, walnuts and pecans and other value-added, niche locally produced agricultural products. Approximately 4,000 people attended this year's event, representing states from across the Midwest. Vendors with fresh chestnuts were Charlie NovoGradac and Debbie Milks, Lawrence, Kan., who sold fresh chestnuts and chestnut cookbooks while serving samples of braised chestnuts; and Tom Wahl and Kathy Dice, Wapello, Iowa, (representing Southeast Iowa Nutgrowers Cooperative), who sold fresh chestnuts and cured ready-to-eat chestnuts.

The Missouri Chestnut Roast has allowed the Center to perform a longitudinal study assessing consumers' familiarity with chestnuts. In 2003, 2004 and 2006, survey questionnaires were administered to festival participants. Survey results have been compared across years and a snap shot of our findings are presented.

Frequency of Consumption: The frequency of consumption has increased from 2003 to 2006. The percentage of participants that have never tasted a chestnut before decreased from 67% in 2003 to 46% in 2004, and 45% in 2006.

Familiarity with cooking chestnuts: In 2003, familiarity with cooking/preparing chestnuts was very low (74% not at all familiar). In 2004 and 2006, two questions addressed this subject: familiarity with roasting chestnuts and familiarity with cooking chestnuts using recipes. The results indicate that familiarity with any cooking is low, but people are becoming more familiar with roasting (~70% not at all familiar with cooking compared with ~60% not at all familiar with roasting).

Attributes that influence purchase decisions: Of importance to growers, wholesalers and retailers, i.e., all who are involved in the chestnut value chain, we looked at attributes that influence consumer decisions to purchase chestnuts. In 2003, quality (69% of respondents were strongly and very strongly influenced by quality in their decision to buy chestnuts), and nutrition-diet-health (55%) were the most important attributes. Price was listed as the least important attribute (26%). Similar results were obtained for 2004 data. In 2006, an increase was noted for the attribute "locally grown chestnuts". Quality remained the top attribute (72% of respondents are strongly and very strongly influenced by quality in their decision to purchase chestnuts), followed by locally grown (56%), nutrition-diet-health (54%) and price (23%) (Fig.1). We look forward to continued success at expanding the chestnut marketplace.

Essential knowledge: What respondents know about chestnuts.

To test the participants knowledge about chestnuts, two basic facts (i.e. need for refrigeration and fat content) were presented as yes/no questions in 2003. Most of respondents did not know that fresh chestnuts must always be refrigerated due to high moisture

content (72% of participants did not know this) or that chestnuts are very low in fat (63% did not know). These are two important attributes unique to chestnuts and important things for consumers (and wholesalers/retailers) to know in contrast with other nuts.

Public events like chestnut roast festivals appear to be effective tools to educate consumers about basic chestnut facts and help to distinguish chestnuts from other nuts. The Missouri Chestnut Roast provides a forum for interested people to ask questions and receive pertinent written information that the consumer can take home and read. In 2006, we were able to compare knowledge of first time visitors against repeat visitors. People who have participated in previous chestnut roasts were expected to know more about chestnuts and cross tabulation data results confirmed this expectation. Compared to first time visitors, repeat visitors demonstrated substantial gains in knowledge about three key chestnut attributes: refrigeration; fat content; and a source of gluten free flour. (Fig. 2). Essential messages about chestnuts are getting through to consumers. *CGA (Read about the Cadillac, MI, chestnut festival, pg 11).*

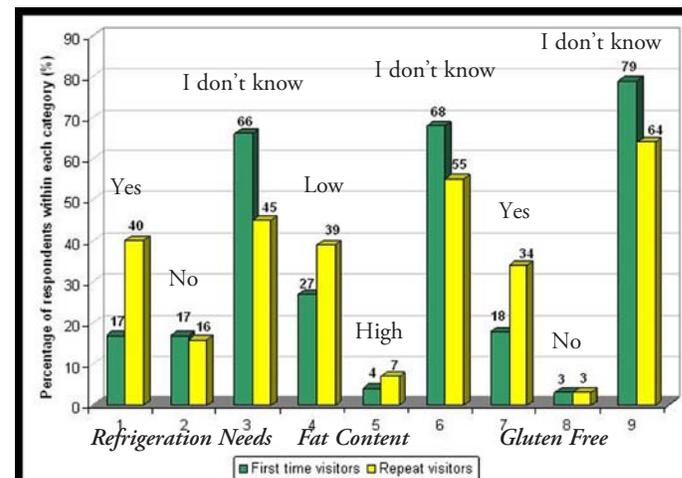
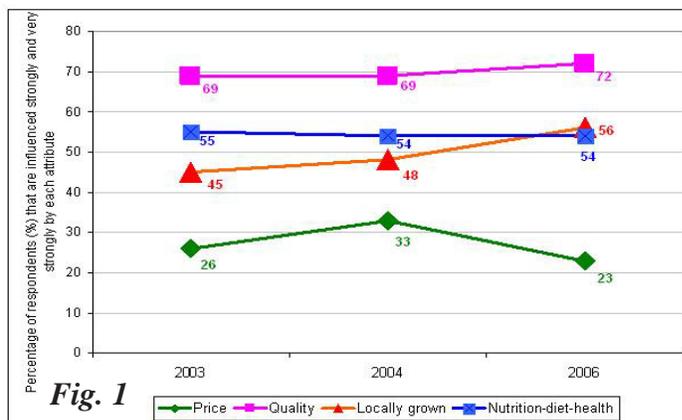


Fig. 1: (Top) Attributes that influence purchase decisions.

Fig. 2: (Bottom) Knowledge about three key chestnut attributes: Refrigeration; fat content; and source of gluten free flour.

Nut Rot Research Report: (*Phormopsis* - When does it strike?)

Written by David Ogilvy; Reprinted with permission from *The Chestnut Growers of Australia, Issue No. 3, Spring 2005*



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Introduction

About four years ago Dr. Harvey Smith contacted me regarding an article I had written for *The Australian Nutgrower* (Dec '98) entitled 'Phomopsis – when does it strike?'

My article outlined five years of record keeping and the cutting of hundreds of nuts to check for rot, with results that suggested that the organism got into the nuts at flowering only when rain fell during the blossom period.

Harvey considered this a real possibility and asked if we could work together toward resolving the problem. I naturally grasped the opportunity of collaborating with a world-renowned plant pathologist.

At the outset we decided it would be simpler if we funded the research ourselves so that we would not be restricted by the parameters and reporting of a formal project. (As well, a lot of time and energy may have been wasted trying to obtain funding).

However two years ago the Chestnut Growers of Australia Ltd, contributed approx \$600 for car hire for Harvey and I to do a tour of several NSW chestnut farms looking for the fungus. They again advanced \$1,000 during the 04/05 season to cover Harvey's airfares from New Zealand for two trips to my place, where we conducted pathogenicity testing by inoculation of flowers. I believe that Harvey also obtained some minor funding in New Zealand to do the same over there. He has, however, funded all of the laboratory work himself.

Methodology

Harvey managed to isolate and track precisely how the fungus previously called '*Phomopsis*' now called '*Gnomonia*' behaves. As this is a new, not previously described species, Harvey will be submitting a paper for publication in a scientific journal. I will therefore only outline the progress to date in layman's terms.

During the Dec 04 blossom period, Harvey once again set up the microscope in my living room and painstakingly dismembered burrs in order to isolate the fungus. We then used two inoculation methods to infect the female flowers of three varieties—Big Red (most susceptible) Di Coppi Marone (susceptibility unknown) and Red Spanish (least susceptible).

Method 1:

Enclosing burr material infected with perithecia next to female flowers inside perforated plastic bags (to produce humidity) which were then enclosed in brown paper bags (to prevent sun damage).

Method 2:

Atomising by hand ascospore suspensions (prepared under microscope) onto the styles of female flowers of each variety. After a few days the bags were removed and left off for 24 hours (weather fine/dry) to receive natural pollination. The styles were then hand pollinated before the brown paper bags only, were replaced over the inoculated flowers (female).

There was also the same number of bags used on the same trees as a control (i.e. not inoculated with the fungus). The bags were then left on until harvest and the nuts collected and tested for rot.

The field trial confirmed previous laboratory observations and we can now say that the fungus has an endophytic presence within numerous structural tissues of the chestnut tree. It also has an airborne ascospore state which is pathogenic via the stigma, style and pollen germ tube of the female flowers. This enables it to gain direct access to the endosperm, thereby causing nut rot.

Comments, observations & possible future directions: In dual embryo nuts many of you will have observed that only one half is rotten. This is because the fungus entered through the pollen tubes of only one embryo. Observations indicated that the pellicle is a barrier to entry of the fungus.

Weather conditions (i.e. humidity (rain) and temperature combined) are necessary for the ascospore shower stages to be activated. It is also necessary for the female flower to be in its receptive period for infection to occur. Harvey Smith has duplicated some of this work in New Zealand with varieties Waikato 1003 (highly susceptible) and Waikato 1015 (least susceptible).

Discovery of this previously unknown rot-causing fungus has solved the mystery of the infection pathway of chestnut rot, and hopefully this knowledge will lead to improved methods of disease control. As it is unlikely that chemical sprays will be effective (due to tree size and timing problems), future joint Australian/New Zealand research into combating the problem may include:

-- Possible use of a predatory fungus identified during the search for the rot-causing fungus now identified as *Gnomonia* (the sexual perithecial stage) and *Discula* (the conidial vegetative stage).

- Increased attention to the removal, burning or destruction of spent burr material.

- A breeding program to produce cultivars that are resistant to the fungus.

ACKNOWLEDGEMENTS (from The Chestnut Growers of Australia) We would like to acknowledge assistance from Dr Michael Priest, Director of Plant Pathology, Orange Agricultural Institute; Professor Lester Burgess, Plant Pathology, Sydney University; along with plant pathology PhD student, Ameera Yousef, who came to complete a weeks onfarm experience and assist with the trial work. (I must also thank the long-suffering Margaret for putting up with chestnut prickles throughout the house!)

Chestnut Crop for 2006: **Sold Out!!**

Many of our members show a similar bittersweet message on their home pages -- Bitter for the customer who still wants to purchase fresh chestnuts; sweet for the seller, most of whom sold every nut they had this year. These messages are a testament to the ever-expanding demand for quality chestnuts, and the need for more growers. Here are some headlines from a few member web sites we happened to check: (We always welcome a note on the status of your fall sales!)

2006 Chestnut Crop is SOLD OUT. Thanks for all your support. We are sold out of fresh chestnuts! Contact us next September, 2007, for orders for next year--don't be late. -- Chestnut Charlie, Lawrence, Kan., www.chestnutcharlie.com/

SORRY - Sold Out for 2006 Season! Click Here to be notified of next year's crop. Delmarvelous Chestnuts had a wonderful 2006 harvest season. Our harvest was great and we enjoyed helping lots of folks have the best fall season ever! We look forward to the 2007 season. Delmarvelous Chestnuts, www.buychestnuts.com.

Fresh Chestnuts are sold out for 2006. Please get your order in early for next years harvest! We harvest in late September and early October each year depending on the weather. Please get your order in early to ensure the freshest chestnuts. Green

Valley Chestnut Ranch, Sebastopol, Calif., www.chestnutranch.com/

FRESH AMERICAN GROWN CHESTNUTS ARE SOLD OUT FOR 2006! We began shipping our Colossal variety of chestnuts in mid-September and our Italian Marroni in early October. Although we had a good crop and production has continued to increase, our customer sales has continued to increase even more rapidly. As a result, we have continued to sell out earlier each year. Correia Chestnut Farm, Isleton, Calif., www.chestnuts.us

ONLINE CATALOG SOLD OUT! Sorry, we are out of stock until fall of 2007. Chestnuts USA, Washington Grown Chestnuts, www.chestnutsusa.com/

Fresh Chestnuts - Sorry, this product has sold out. Trails End Chestnuts, Moses Lake, Wash., www.chestnuttrails.com.

Jumbo Colossal, sold out -- Ladd Hill Chestnuts, Sherwood, Ore., www.laddhillchestnuts.com

Sorry, we are sold out for the season. Please come back next year. Chestnut Ridge Ranch, Anderson Valley, Calif., <http://chestnuts-for-sale.com> **CGA**

Chestnut Chili (A first place winner!)

Recipe from Julie Rhoads, Center for Agroforestry Events Coordinator - This recipe won first place at the University of Missouri School of Natural Resources annual chili-cook off, among dozens of entries. We gave free samples of it away at the National Small Farms Trade Show in November and were met with great enthusiasm.

- 2 lbs. ground round meat
- 2 cups onion, coarsely chopped
- 2 cups green pepper, coarsely chopped
- 2 cups celery, coarsely chopped
- 2 cloves garlic, finely chopped or pressed
- 2 or more cups chestnut meat, coarsely chopped
- 2 cans diced tomatoes, undrained
- 2 cups tomato juice (or more to adjust consistency)
- 2 cans Campbell's double strength bouillon
- 2 cans Brooks Mild Chili Beans, or equivalent red, black or kidney beans
- ½ cup Worcestershire sauce
- 1 package Williams Chili Seasoning (2 lbs. meat size)
- 1 tsp. coarsely ground black pepper
- 1 tsp. salt

Wash at least 4 cups of unshelled chestnuts and score the shells with a knife. Microwave the scored chestnuts in a glass dish for about 10 minutes total on high power, or until the shells start to

open up at the cut made in the chestnut. This amount of time can vary with the size of the microwave used. Stir the chestnuts every 3 minutes during cooking.

Remove the partially cooked chestnuts from the microwave and let cool for 10 minutes. Peel the shell from the chestnut meat and discard the shells. Coarsely chop the chestnut meat. Microwave the chopped chestnut meats an additional amount of time until they are slightly crunchy.

Wash and chop the onion, garlic, green pepper. Keep the chopped vegetables separate from each other.

Using a large skillet, cook the ground round on medium high heat until no longer pink. Remove the skillet from the heat and drain the fat. Return the skillet to the stovetop and brown the cooked meat on high heat. When the meat is browned, turn the heat down to medium and add the chopped onion and garlic to the skillet. Mix thoroughly. Cook the meat mixture on medium heat until the onion and garlic are soft. Transfer the mixture to a large pot.

Microwave the chopped celery in a glass dish until slightly crunchy and do the same with the chopped green pepper. Add the celery, green pepper, and the chestnut meat to the meat mixture.

Add all of the other ingredients to the meat and vegetable mixture and bring to a boil. Lower the heat to low and simmer for at least 30 minutes, or until the celery, green pepper and chestnut are thoroughly cooked. The chili will be more flavorful if it can be chilled 24 hours before serving. This recipe makes about 6 quarts of chili and can easily be cut in half. **CGA**

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Chestnut Festivals (cont. from pg 7)

Cadillac Chestnut Festival Offers Variety Of Chestnut Products

By Dennis Fulbright, Michigan State University

Instead of the thousands of visitors coming to the Cadillac in 2006, only hundreds came, but this was satisfying since we changed the venue from the outdoor city park to the cafeteria of the Cadillac Junior High School. Even with fewer people, we made almost the same amount of money. This is might be due to the fact that there were fewer chestnut “tourists,” and more people coming to buy chestnuts, or due to the fact that we had so much more to sell in terms of products. The Cherry chestnut salsa, for example, sold out.

With more varied chestnut products to sell than any other year, the public enjoyed free tastes of roasted chestnuts and chestnut soup. Products including chestnut pancakes, chestnut salsa, chestnut spread, chestnut flour, chestnut chips and breading, plus fresh chestnuts, were all for sale in the school cafeteria. Chestnut seedlings were popular, as were the educational talks. This year, city sponsorships helped fund the event, allowing more opportunity for additions (including musical performers and clowns), and the pancake breakfast helped sell 50 pounds of chestnut flour. *CGA*



The 2006 Cadillac festival was held indoors and offered more chestnut food products than any other year. Here we wait the opening of the school doors.



Education is still a major part of the festival. Bill Nash and Roger Blackwell use a computer program to tell the chestnut story in Michigan.

Chestnuts in the Media

These are just a few media listings we collected; there are many more, as chestnuts continue to gain popularity -- and our members continue to enhance their marketing efforts. Please email us at mccoyr@missouri.edu if you are featured in a media outlet so we can continue spreading the good word about chestnuts.

Springfield, Mo. *News-Leader*, Dec. 6, 2006: “**Growers find riches in chestnuts,**” featuring the Southeast Iowa Nut Growers, Wapello, Iowa.

Capper's magazine, Topeka, Kan., Dec. 2006, “**Nutty about chestnuts,**” featuring Charlie NovoGradac and Debbie Milks, Lawrence, Kan. And the University of Missouri Center for Agroforestry, New Franklin, Mo.

MSU Today (Michigan State University), Nov. 20, 2006 “**Michigan Chestnuts Usher in the holiday season.**”

Des Moines Register, Nov. 26, 2006. “**Iowans crack nut market.**”

San Francisco Chronicle, Nov. 22, 2006. “**Chestnuts usher in festivities,**” featuring information about the annual chestnut festival held at the Gianoli Ranch in Mendocinio County, hosted by family friends and descendants to celebrate early Italian settlers and their culture.

Kansas City Star, “**Enjoy these before the holiday,**” Nov. 15, 2006

Mid-Missouri Mature Living, arranged feature story on chestnut art/Missouri Chestnut Roast, October 2006 issue.

Missouri Alternatives Center, *Ag Opportunities* newsletter, “**Quality is the Key Determinant for Chestnut Sales: Demand Exceeds Supply,**” October 2006.

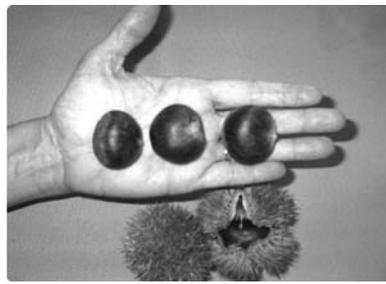
KELO FM 92.5, Sioux Falls, S.D., *Christmas Memories* program, interview with Mike Gold, Center for Agroforestry, about chestnuts. Dec. 2006.

89.5 FM, KOPN, *Farm and Fiddle* radio interview, Oct. 4, 2006, featuring agroforestry and chestnuts.

Food Finds, a hit TV show on the Food Network, visited Delmarvelous Farms Nov. 25, 2006 at 4:00 p.m., ET/PT; Nov. 26, 2006 at 7 p.m. ET/PT. The popular show featured chestnuts--from harvest to dinner table. Last year *Food Finds* filmed the Delmarvelous harvest, a chestnut roast and a seven course chestnut feast. www.buychestnuts.com/



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