Chestnut Growers of America

The Chestnut Grower

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Chestnuts in a New York Vineyard

by Calder Cleavelin

Photo: Goose Watch Winery on Cayuga Lake

Goose Watch Winery, on the shores of Cayuga Lake in upstate New York, hosts dozens of wine trails and tasting events throughout the year. But October brings the area's wine connoisseurs something unique - an offering of the winery's own chestnuts.

The October Chestnut Festival at Goose Watch is one of the winery's biggest events, celebrating the harvest from one of the region's only chestnut groves and all the seasonal foods that come with it.

Coordinator Lindsay Case organizes the event every year:

Q: How did the winery start producing chestnuts?
A: The trees were there when we purchased the land in 1995. In the beginning, when we were still looking for a place to establish ourselves, we thought that having a chestnut orchard was just a neat, standout feature, and it's definitely continued to help us stand out.

Q: Are chestnuts a popular food item in the area?
A: They're definitely not mainstream yet, but that's because they're seasonal. I'd say they are a selective taste, but some people go crazy for them. We start selling them once they're ready, and we get quite a few customers. Some restaurants and local business also buy them as seasonal items.

Q: What makes the Chestnut Festival your biggest event?
A: We do most of our promotions around the wine tasting and music. We're all about just getting traffic to the winery, and the chestnuts are great because there's something unique and cultural about them that really helps people get excited for winter. Somehow chestnuts just add to the general festivity.

Q: How many chestnuts do you produce?
A: This year we harvested close to 18,000 pounds of chestnuts. The same people who work with our grapes also harvest the chestnuts.

Q: How do they help the winery's bottom line?
A: They're definitely not what we focus most of our efforts on, but they do add a little something toward the end of the year. We sell them "in bulk" to restaurants, but also by the 2 pound bag for $7.99 each. This year we sold out within a few weeks.

The 2013 Goose Watch Winery Chestnut Festival is scheduled for October 19 at Goose Watch Winery in Romulus, NY.

More In This Issue:

A Message From Dr. Mike Gold

President, CGA

It is late January (the 29th) as I write to all of you. Yesterday Dennis Fulbright, Mario Mandujano, Pete Ivory and Gary Zehr came through for a quick visit to the MU Horticulture and Agroforestry Research Center (HARC) to view our chestnut plantings while on their way to a trade show in Kansas City, MO. Starting out in freezing rain from Michigan, they arrived at HARC with the temperature pushing 70º here in Mid-Missouri and we all enjoyed a respite from the winter weather as we walked the orchards and "talked chestnuts". Tomorrow the high temperate in Mid-Missouri will be 35º with a low of 19º so we have to enjoy it while we can.

While Dr. Ken Hunt was establishing the extensive cultivar collection out at HARC between 1996 and 2011, he focused mainly on Chinese chestnut cultivars, but also thought it worthwhile to at least "take a look" at some of the "west coast" favorites mainly of European pedigree (e.g., 'Bouche de Betizac', 'Belle Epine', 'Precoce Migoule', etc.). His thinking (since verified) was that the "west coast" cultivars would be susceptible to chestnut blight and not all that well adapted to our Midwest climate. Over time we have indeed lost most of those cultivars to chestnut blight and have also been unimpressed by their ability to consistently produce high quality chestnuts in our part of the country. With the exception of 'Colossal' which out yields all other cultivars at the HARC farm, the "west coast" cultivars are a bust. You never know until you try, so, we tried and now we know.

In this issue we have reprinted a fascinating NNGA article on DNA fingerprinting of chestnuts. You can see from the discussion and the figure on page 10 that there is a lot of confusion among named cultivars. I also believe there was confusion as to "which cultivars were which" when the samples were collected. Regardless, once we have the DNA fingerprinting done for each individual tree, we can begin to correct any mapping errors and sort out the true identities of the cultivars in our collection.

As many of you are aware, last summer was blazing hot and exceptionally dry in the Midwest, especially in Missouri. Even with trickle irrigation at the HARC orchards (in point of fact only enough water to keep the trees alive due to our need to share water among many research projects), most of our cultivars yielded very small chestnuts, resulting in a 75% decline in our commercial crop load. Water really matters when it comes to commercial chestnut yield potential! Let's hope for a much better 2013.

NOTICE
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The following article was reprinted with permission from the Washington Chestnut Company website

How Chestnut Trees Talk To Us

Article and photographs
by Bernie Hilgart
The Washington Chestnut Company

There are many things a chestnut tree will tell you if you know how to listen. Chestnut trees talk in simple terms like, "I am hungry", "I am thirsty", and "I am not feeling so well". With chestnut trees we do not have "Read my lips", but "Read my leaves" and reading a leaf is what we will do.

Part of the training an Emergency Medical Technician receives is how to determine if a patient is "Sick or not sick" from just a quick look. Chestnut trees can also be treated in the same way from just a few feet away determine "Sick or not sick". The good news is a chestnut tree's sudden death is defined in weeks or months not minutes or hours. So by just walking by a chestnut tree and taking a quick look at the leaves we will be able to determine "Sick or not sick".

Chestnut trees tell us a lot of how they are feeling by their leaves and their bark. Usually, when there is a serious problem with a chestnut tree the leaves will show the first signs. As the problem gets worse, the bark on the tree will have signs telling us "I am feeling real bad, like I might die". If the bark is showing signs then it may be too late to do much to save the tree. We will take a look at both healthy trees and sick trees. Ever have someone say to you, "You are not looking so good, are you feeling sick?" Well, with chestnut trees, looking good is having vigor and good looking leaves. Generally speaking, a sick chestnut tree will not produce nuts. If your chestnut tree isn't producing nuts with kernels, then it might be stressed by the growing conditions.

So let's start with what to look for in a healthy chestnut tree. During the growing season we have both leaves and bark to examine. While dormant, only bark is present for examination and can only help us determine if the chestnut tree is very sick or dead. Picture 1 is of a 'Bisalta #3' chestnut tree at bloom time (mid July). This tree is saying "I am healthy, full of energy, and look at me grow". These traits can be visually observed in the quality and size of the male flowers (catkins), the size, color, shape of the leaves. The terminal growth, that is the new growth at the end of the branches, is more than 12 inches. Not all chestnut tree cultivars look like this so the evaluation of health should be compared with a like chestnut cultivar.

Photo 1 | 'Bisalta #3' chestnut tree showing healthy leaf

Notice the bottom of the leaf is a lighter color than the top of the leaf. The amount of difference in color varies between chestnut cultivars. On some cultivars, like this one, the color difference is slight but noticable. Picture 2 is of a 'Colossal' chestnut tree. Notice the bottom of the leaf is much lighter in color than the top.

Photo 2 | 'Colossal' chestnut tree showing healthy leaf

Also, take a good look at the amount of leaf curl. The 'Colossal' chestnut leaf curls when the summer sun is intense. Other chestnut cultivars do the same leaf curl, but usually not as much as the 'Colossal' does. In other plants when the leaf curls like this, it is a possible indication of water stress, not so with chestnut trees. When the leaf curls like in these pictures it is normal and healthy.

If we kind of just look at an overall perspective of these top two photos, we see leaves that are complete without munch marks or holes in them, the color is a consistant color across the entire leaf and each leaf on the branch looks just about the same as all the others. These are examples of what you would look for when checking the health of your chestnut trees. Next, we will look at photos of chestnut trees that do have health issues.

One of the most common condition found in chestnut orchards is nitrogen deficiency. The problem with just looking at the chestnut leaf is that some other conditions can look

just about the same. Here are some examples. Picture 3 is of a 'Colossal' chestnut tree deficient in nitrogen. Notice the yellowing at the ends of the smaller leaves. Difficult to notice in this photo but the size of the leaves are about 60 percent of what a healthy 'Colossal' leaf would be.

Photo 3 | 'Colossal' chestnut tree showing nitrogen deficient leaf

This next picture shows a chestnut tree with boron damage. The orchardist applied a foliar spray of boron to the chestnut tree. The application exceeded what the chestnut tree could handle. The resulting damage looks like what this next picture illustrates. If you apply boron as a foliar spray then you may end of with your chestnut leafs looking like this:

Photo 4 | Chestnut tree showing excessive boron application

In both the pictures of the nitrogen deficiency and excessive boron the leaf edges have yellowing and even some browning. In a way it could be difficult to tell the difference if you did not know the history of what the chestnut tree was exposed to. This next picture is of a chestnut tree that is on its death bed. The tree has root problems that are showing up in the leaves. Since the roots are breaking down, the small leaves appear to be doing ok, but the large leaves are brown over 50% of the leaf area. About 3 weeks after this photograph was taken the tree was dead. The culprit, in this case was phytophthora, also known as root rot.

Photo 5 | Chestnut tree with leaf die back due to phytophthora

Next we turn our attention to the base of the chestnut tree where we find the graft on a grafted chestnut tree. Almost all plants that are propagated using grafting of a root stock and the scion wood have the potential of graft union failure. Graft union failure can show up on chestnut trees many years after the graft was formed. A failure at the graft union can have a number of different indicators such as top die back and underperforming growth observable in undersized or deformed leaves.

Picture 6 also shows that its just not the leaves we need to be observing, we also need to be looking over the entire structure of the tree such as the branches, the trunk, and the bark. The bark above the graft is one color and below the graft it is a different color. Aside from the bark color having differences, the size of the trunk is different above and below the graft. As you can see, being able to recognize potential problems starts with coming to know what a good healthy chestnut tree should look like.

Photo 6 | Chestnut tree with graft union failure

Dehydration is a problem for many living organisms, including plants, animals, and people too. Dehydration starts with a simple "I am thirsty" progressing through "Would someone just give me a drink of water", and without intervention, dehydration can result in the death of the organism. Pictured below is a chestnut tree saying, "Would someone give me some water, I feel like I might die". The reality of the situation is that the chestnut tree is suffering from water stress induced by drought during the growing season. Chestnut trees are drought resistant. The tree pictured here is a 'Colossal' that will drop all its burrs and some of its leaves because of the water stress. The tree went dormant early without producing any nuts. Rains did come before the end of the growing season providing the tree with enough water that the tree should make a full recovery next growing season.

Photo 7 | Chestnut tree stressed due to lack of water/drought

There are two important lessons presented here. The first lesson is that an orchardist needs to take time to look over the trees in the orchard, observing the leaves and looking for possible problems. The second lesson is keeping history. When a patient arrives at the doc's office, the doc asks all kinds of questions about what is happening, what happened in the recent past, and for new patients the doc asks for a complete history.

When a problem is presented to the doc, the doc will often order some lab tests. With chestnut trees our lab tests consist of leaf samples and soil samples. The results of the lab test will likely provide enough information to find a way to correct the presenting problem. If your chestnut tree orchard is facing a problem then get the lab tests done, it's worth the money and cuts out a lot of guessing.

Taking time to walk through the orchard is a great stress reducer. Take the walk often, express your thanks for at least one thing you can be thankful for and your life will be a lot happier.

Article originally published at http://washingtonchestnut.com/readingleaves.html

A letter of appreciation

From Dennis Fulbright

Professor, Michigan State University

DEAR North American Chestnut Farm Workshop Presenters, Sponsors and Supporters;

I wanted to take this opportunity to express to all of you my thanks for coming to and giving your presentations to the North American Chestnut Farm Workshop. Everyone is finally home now and I hope that when you look back on the trip to Jackson, Michigan, you will do it with fond memories. Those of you who went on to the 5th International Chestnut Symposium were treated to many more days of immersion in chestnut science and folklore. I hope the trip to West Virginia in the MSU vehicles was not too uncomfortable for the long 9-10 hour venture. In all, you left Michigan, went into Ohio, Pennsylvania, Maryland, and West Virginia--a 5 state tour. We found out that the 2nd European Chestnut meeting will be held in October of 2013 in Hungary and the 6th International Chestnut Symposium will be held in Turkey in 2016.

Our plans are to summarize your presentations, use some of the photos from your power point presentations left on my computer or handouts and get a proceedings out by early next year. You will have a chance to edit what I have written at some point in the future. You should not have to do much writing unless you feel the need to do a lot of editing.

The workshop concept seemed to be the correct format as there seemed to be a lot of questions, conversations and discussion. The proceedings from this meeting will long be used by chestnut growers, I believe.

I need to recognize the Labor Day Holiday dinner by Assistant Professor Jianjun (Jay) Hao and his wife Lihao which was spectacular especially considering they had just driven the day before from the east coast and I thank them for this and housing Ling and taking her to the airport and Umit shopping. I want to thank Umit for bringing and sharing the Turkish candy, which was very popular.

Photo: 'Kestane Sekeri', a Turkish chestnut candy

I need to thank those who helped put on the meeting because without their help I could not have done this, Betsy Braid and the CANR Conference Services, my laboratory personnel Mario and Sara Stadt, Adrian Mandujano and of course, my wife Jane.

Sue Jamieson at Camp McGregor, the Jackson Intermediate School District Science and Math Camp provided a venue where we could work, eat and socialize and we thank them for this special place.

Perhaps the busiest person at the meeting was the note taker and photographer Sara Long, who uploaded the beautiful photos already and will help with the proceedings. By the way, it is her birthday this week.

Photo: FACMA chestnut harvester demonstration

I want to thank the sponsors MSU Rogers Reserve, Midwest Nut Producers Council and Chestnut Growers of America. I want to also thank the social sponsors, the various nurseries: Forrest Keeling, Nash Nurseries, Washington State Nursery, Chestnut Hill Nursery and Empire Chestnut Nursery, each who contributed to the socials.

I have decided that you all belong on the Mount Rushmore of Chestnut Farming in America.

Again, thanks for allowing us to disrupt your holiday, summer, harvest and lives to provide some of your valuable experience in your scientific discipline, vocation or avocation. I will always remember this as one of my best experiences.

Sincerely yours,

Dennis W. Fulbright
Professor
Michigan State University

The folowing was reprinted from an article that appeared in The Nutshell

First butternuts, now chestnuts; solving the identity crisis with DNA fingerprinting

Romero-Severson, J.; Coggeshall, M.V.; McCleary, T. 2012. First butternuts now chestnuts: solving the identity crisis with DNA fingerprinting. The Nutshell. 66(3):6-10.

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Chestnuts, walnuts and other nut trees provided our ancestors with a concentrated source of nutritious food already packed in easily transported containers. The transport and domestication of these trees may have played a critical role in human survival during the transition from foraging and hunting to settled societies. Humans domesticated local species of chestnuts thousands of years ago, first in China and Japan and later in Europe. The American chestnut was not domesticated in the strict sense, but the postglacial distribution of American chestnut strongly suggests that native people may have moved it into New England as the climate warmed and the ice retreated.

As the Greek, Roman and Semitic people of the ancient world knew how to layer, graft and produce rooted cuttings, they may have tried these techniques with chestnuts. Given the importance of viticulture and horticulture in the Ancient world, people who migrated would have taken their nursery stock with them, including their treasured nut trees. The most adventuresome, like Northern Nut Grower Association (NNGA) members now, may have crossed different kinds of chestnuts just to see what happened. Although the art of grafting was depicted in mosaics and described in writing, we have no records of the disappointment people must have felt when that the grafted trees or seedlings they had labored over for years did not produce as they expected. Did they blame the soil? The weather? The anger of the Gods? Or, did they darkly suspect that the person who gave or sold them the stock switched the good grafted stock or good seed with something much inferior?

Fast forwarding several thousand years to our time, the vexing problem of identity in nursery stock remains with us. As an aside at this point in the story, philosophers tell us that knowledge is better than ignorance but they make no promise that knowledge brings immediate happiness. Not all the butternut and heartnut cultivars we genotyped for the NNGA turned out to be what the contributor indicated. We found that some cultivars with the same name had different DNA fingerprints and some cultivars with different names had the same DNA fingerprints. In cultivated chestnut, the problem of identity is even more complicated in that any given cultivar could have ancestors from Chinese, Japanese, European and other chestnut species from China and America, including American chestnut. We have now finished our first chestnut cultivar genotyping study and have found what appears to be some serious confusion over identity and hybrid ancestry.

The history of chestnut growing in eastern and central North America sheds light on how the ancestry of chestnut cultivars may have become a tiny bit more muddled than is typical. Floral sensitivity to late spring frost limits the use of Japanese and European chestnuts, while the American chestnuts have severe disease problems. Chinese chestnut, on the other hand, exhibits broad adaptation and stress resistance, growing in altitudes from 50-2800 meters in all 26 Chinese provinces. Chinese chestnut tolerates the chestnut blight fungus and is used as a source of blight resistance genes in American chestnut restoration projects.

Thomas Jefferson planted European chestnut in the orchard at Monticello in 1773. Eleuthere Irenee DuPont de Nemours, who in 1799 moved to the United States from France, planted European chestnuts on the banks of the Brandywine in Delaware, imported many cultivars over the years and made many hybrids with American chestnut, one of which, 'Paragon,' was included in our study. Jefferson and DuPont were only two of many early American landowners who imported chestnuts and experimented with hybridization, establishing a tradition of amateur plant breeding that continues to this day. Although private individuals could have imported other chestnut species prior to the 19th century, existing records indicate that Japanese chestnut was introduced into America by the S. B. Parsons Company of Flushing NY in 1876 and by Luther Burbank of Santa Rose CA in 1886. Two of the Japanese chestnuts planted by Parsons in Connecticut still survive (S. L. Anagnostakis, pers. comm.). Between 1900 and 1921, United States Department of Agriculture's botanist Dr. Walter Van Fleet made thousands of interspecific crosses, first with native chinquapins, European and Japanese cultivars and later with chestnuts collected from China.

In response to the chestnut blight epidemic, the Division of Forest Pathology in the United States Department of Agriculture expanded this hybridization program to develop blight resistant American chestnut timber trees. Between 1925 and 1949, this effort produced ~ 6000 hybrids, involving all 13 of the Castanea species named at the time. Subsequently, Arthur Graves at the Connecticut Agricultural Experiment Station (CAES) used some of these hybrids for his own interspecific crossing program. Hybridization was continued by R. A. Jaynes in 1962 and upon his retirement, by S. L. Anagnostakis, the most recent scientist of an unbroken line of chestnut hybridizers at CAES. Many interspecific hybrids made in the last 100 years, along with their parents and grandparents, still survive at the CAES, providing us the opportunity to genotype the entire collection, verify the ances-

try of the descendants and compare these survivors with putatively pure species. Small-scale growers and private individuals have had access to the descendants of these crosses and could have included them in their crossing designs.

Some NNGA members may have experienced the challenges of producing chestnuts as a cash crop in the United States and Canada. The reliable yields and high-quality nuts that all growers want depends on development of stress-tolerant cultivars suited to the wide range of environments in the northeastern and north central United States and the eastern Canadian provinces. Verification of identity and interspecific ancestry is necessary for the development of new cultivars with proven performance over a range of environments and high-quality, long-lasting and delicious nuts.

As the cost of DNA sequencing has fallen, micro satellite-containing EST sequences (EST-SSRs) are gaining favor over gSSR (genomic or anonymous microsatellite-containing sequences) for cultivar identification. EST-SSRs are DNA sequences close to or embedded in functional genes. The genetic code of every plant contains these types of sequences. EST-SSRs are more likely to be transferable across taxonomic boundaries than traditional gSSRs, significantly increasing their value for the identification of interspecific hybrids.

In this study, we used EST-SSR markers originally identified in Chinese chestnuts to genotype 65 chestnut cultivars. Our purpose was to detect synonymies and homonymies among cultivars and to reveal the correspondence between the species or interspecific ancestry of record and the actual degree of genetic association. In plain words, to see if the recorded pedigrees had any relationship to the actual pedigrees.

In 1996, the University of Missouri Center for Agroforestry established a chestnut clonal repository containing 69 named cultivars at the Horticulture and Agroforestry Research Center (HARC) in New Franklin, MO. An additional 27 named accessions were planted in 1998, 22 of which were already represented in the 1996 planting. Growers, hobbyists and university researchers contributed to this planting. Some of those who contributed to this collection may be reading this article right now. Each cultivar was represented by 1-11 ramets and all trees were field grafted using open pollinated 'AU Cropper' seedling rootstocks.

We genotyped all of the surviving trees (214 trees). This collection included 18 presumed interspecific hybrids of European, Chinese, American, Japanese and Ozark chinquapin chestnuts, 29 cultivars presumed to be Chinese chestnut and 18 cultivars with conflicting pedigree records, not counting hybrids in which the direction of the cross is not clear and two unknown cultivars (see Fig. 1, page 10). Of the 65 cultivars, 29 were represented by only one entry. The "identical in name" entries of the remaining 36 cultivars are presumably the result of clonal propagation and thus should be identical. Presumed ancestry was based on non-published but written records, peer reviewed literature and personal communications, mostly from NNGA members.

The details of our DNA extraction, genotyping methods and statistical analyses are in press for publication in Genetic Resources and Crop Evolution. Please contact us at the email addresses given at the end of this article if you would like these details. We will focus here on our main analysis, one generated by a computer program called STRUCTURE. STRUCTURE is an ethnic group finder. Imagine a small town of 214 people. Without knowing any of the actual ancestries, STRUCTURE can infer how many different ethnic groups these people represent and estimate the degree of ethnic admixture in each person. If two people are identical twins, they will occur in the same STRUCTURE group and have identical degrees of admixture. Scions from the same ortet are likewise expected to be in the same ethnic group and have identical admixture. As with these types of analysis in humans, our results were quite interesting but somewhat disconcerting. Our chestnut cultivars represented 18 ethnic groups (Figure 1). Many of the trees we genotyped had the same name but different DNA fingerprints. All seven entries of 'Hong Kong' differed from each other (seven homonymies) and occurred in three Structure groups. All four 'Carolina' entries differed from one another and occurred in three Structure groups. 'Ok Kwang' and 'Kohr' both had six entries and four homonymies each. The seven entries of 'Peach' had five homonymies and occurred in two Structure groups. 'Campbell NC- 8' had four homonymies occurring across two Structure groups. In total, 12 cultivars had two homonymies with the remaining 13 having 3 or more.

Cultivars are synonymous if they have different names but the same genotype. A synonymous block containing six different cultivar names occurred in Group 8: 'AU,' Homestead,' 'Kohr,' 'Willamette,' 'Hong Kong,' 'Byron' and 'Eaton.' Group 13 contained a synonymous block of five different cultivar names: 'Mossbarger,' 'Crane,' 'Orrin,' 'AU Super' and 'Peach.' A synonymous block containing four different cultivar names occurred in Group 6: 'Campbell NC-8,' 'Gideon,' 'Miller 72-76' and 'Plot 316# 149. ' The cultivars 'Campbell NC-8,' 'Miller 72-76,' 'Plot 316#149,' 'AU Homestead,' 'AU Cropper,' 'Kohr,' 'Eaton,' 'Shing,' 'Mossbarger,' 'AU Super,' 'Peach' and 'Jersey Gem' have both synonymies and homonymies.

We anticipated possible synonymies for five sets of cultivars: 'Payne' with 'Byron 3-3,' 'Byron' with 'Lindstrom #67,' 'Lindstrom #93' with 'Perry,' 'Kintzel' with 'Gideon' and 'Meiling' with 'Crane.' Byron 3-3 is not synonymous with any version of 'Payne' in this study or with either of the "Byron' entries. 'Byron_I' and 'Lindstrom #67' are both in group 3 but they do not match. Six of the seven 'Payne' entries are also in group 3 but they do not match 'Byron_I.' 'Byron_I' and 'Lindstrom #67' could be the progeny of a group 3 'Payne' but confirmation requires additional genotyping. We found that 'Lindstrom #93' is synonymous with 'Perry' but 'Kintzel' is not synonymous with the Gideons in group 6 or the 'Gideon/Kintzel' in group 10. However, 'Kintzel' and 'GideonIKintzel' do show admixture with group 6 and so could be the progeny of a group 6 'Gideon." 'Meiling' does not match 'Meiling/Crane' and neither match 'Crane.'

The one cultivar listed as European chestnut ('Belle Epine') and all but one of the undisputed interspecific F 1 hybrids with a European parent occur in either group one, two, five or 15. Three 'Ok Kwang' entries, the only cultivar listed as Japanese chestnut, do form a distinct group (group nine) but one 'Ok Kwang' groups with the Colossals and two others in group 10, which contains an assortment of hybrids, all of which have some presumed Chinese chestnut background except for 'Ok Kwang.' The 'Ok Kwang' entry in group five has admixture with those in group 9, suggesting that 'OK Kwang_6' could be backcross to a hybrid related to 'Colossal.'

As the European and Japanese species retain considerable genetic diversity, the European and Japanese parents of different hybrid cultivars could be quite different, resulting in distinct groups of European-Japanese hybrids. The widespread impression that 'Colossal Pollinizer' is a hybrid of European and Japanese chestnut, is supported by our analysis. 'Bost,' identified as mixed, and 'Precoce Migoule,' with conflicting accounts of ancestry, are both in group 2, suggesting that the major ancestry is also derived from European and Japanese chestnut. 'Belle Epine' (group 15), listed by one source as European chestnut, groups with 'Yolo Grande' and 'Luvall's Monster,' both of which are listed as hybrids. We will be able to more accurately assess these cultivars when we have European and Japanese chestnut reference populations that represent of the genetic diversity within these two species. We anticipated some ambiguity in our results, given the degree of disagreement on pedigrees for cultivars presumably derived from these two species. What is remarkable is the placement of 'Carr' with 'Bouche de Betizac,' as 'Carr' is thought to be Chinese chestnut, according to the 1928 handwritten record of R.D. Carr, the original of which still exists at CAES.

Some entries of 'Campbell NC-8,' presumed to be Chinese chestnut x European chestnut, are synonymous with 'Gideon,' presumed to be Chinese chestnut. Group 8 includes three of the cultivars with presumed American chestnut ancestry ('Carolina,' 'Dunstan Hybrid' and 'Willamette'), but also cultivars presumed to be Chinese chestnut only and others with European chestnut ancestry. 'Paragon,' one of the oldest cultivars in our study and three other cultivars in group 15 either have presumed American chestnut ancestry or could have such ancestry. 'Belle Epine,' on the other hand, is a French cultivar identified as European chestnut in many studies. 'Sleeping Giant' and 'Eaton' (Group 15) reportedly have similar complex pedigrees, with some authors identifying 'Eaton' as a seed of 'Sleeping Giant.' However, the Eatons in our collection are synonymous with 'Sleeping Giant' and thus the presumption that 'Eaton' is a seed of 'Sleeping Giant' is inconsistent with the genetic data. Finally, the unknown entries X_I (group 3) and X _ 2 (group 10) were different from each other and from all other entries.

Homonymies and synonymies are expected when DNA markers are first used on a clonally propagated set of cultivars. Bud sports could account for some of the synonymy but we have found no written evidence that supports this possibility in the set of cultivars we genotyped. If any of the NNGA members know that a cultivar on our list might be bud sport, please let us know. Accurate determination of interspecific ancestries in existing chestnut cultivars and breeding stock will require reference sets for each the five species most likely to be ancestral: European (*Castanea. sativa*), Japanese (*C. crenata*), Chinese (*C. mollissima*), American (*C. dentata*) and the American chinquapins (*C. pumila*), aka the Allegheny and Ozark chinquapins. In collaboration with Dennis Fulbright at Michigan State, we hope to develop species-specific genetic tests, as we did with butternut and heartnut, but we can't do this without you. STRUCTURE can find the number of ethnic groups (species in our case) but cannot tell us which species these are. To know with confidence that a given cultivar is a cross between a Japanese x European parent and Chinese parent, for example, we need to have a set of known Japanese, European and Chinese chestnuts.

We need American chestnut, Ozark chinquapin and Allegheny chinquapin of known provenance (you collected the scion or seed or know the person who did). We also need more European chestnut cultivars. Cultivars or local varieties from France, Italy, Greece, Turkey or Georgia would be especially welcome but any contribution is appreciated. Any Japanese or Chinese chestnuts not listed in Figure 1 would also be welcome. Please send an email to Tim McCleary for instructions.

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Jeanne Romero @ jromeros@nd.edu
Mark Coggeshall @ coggeshallm@missouri.edu

Figure legend:

Fig. 1 (shown on next page)

STRUCTURE graphic showing 18 ethnic groups for 214 trees (see Fig. 1, page 10) representing cultivars of Chinese, Japanese, European and possibly chinquapin chestnut descent. The authors are happy to email a pdf of the original color figure to anyone who requests it.

Acknowledgement

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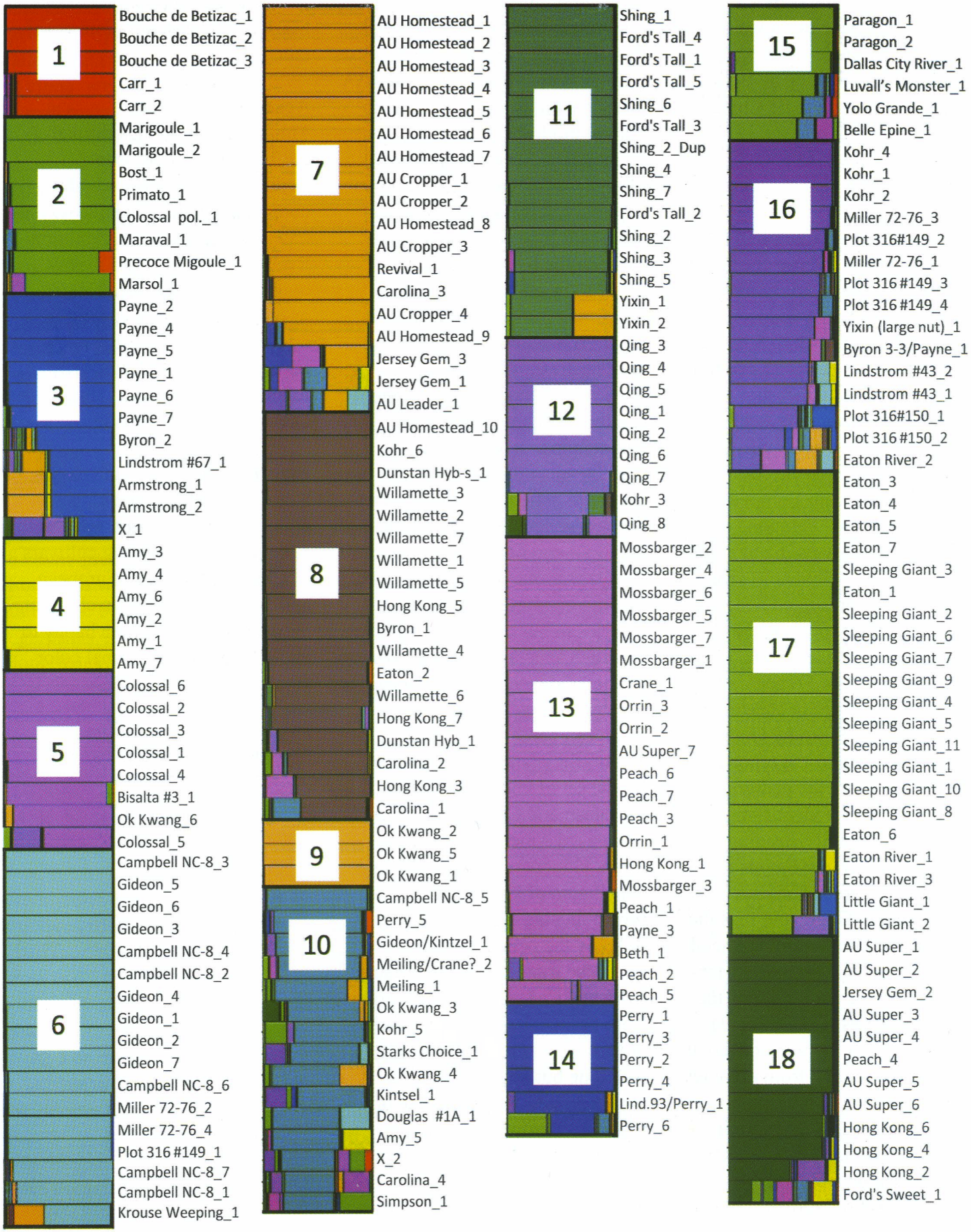
Figure 1, "First Butternuts, now chestnuts;" continued from page 9



Crop Insurance Options for Specialty, Diversified and Organic Farmers

ATTRA publication explores AGR-Lite wholefarm insurance, other options

Generally, the greater the diversity or specialization of the crops and livestock farmers grow, the more difficult it can be for them to obtain insurance that fully covers the value and risks of their production.

A new ATTRA publication by National Center for Appropriate Technology (NCAT) agricultural economist Jeff Schahczenski gives several examples of using alternative crop-insurance policies that can offer some degree of protection from significant market-price changes and the multiple perils of farming that can impact yield.

NCAT developed and manages ATTRA, also known as the National Sustainable Agriculture Information Service, through a cooperative agreement with the USDA rural Business-Cooperative Service.

The publication, "Crop Insurance Options for Specialty, Diversified, and Organic Farmers," focuses on understanding whole-farm revenue insurance options, which may be of particular interest to growers of diverse specialty and organic crops and livestock.

It expands on webinars funded by the USDA Risk Management Agency that Schahczenski recently gave on the topic.

In particular, the publication goes into depth concerning Adjusted Gross Revenue Lite (AGR-Lite)— a unique, federally subsidized crop-insurance product that holds great promise to serve the needs of smaller, diverse, specialty crop, organic, and direct-market farmers.

While most insurance products are tied to a specific crop or commodity, AGR-Lite is based on whole-farm revenue and allows farmers who grow several specialty crops, or diverse crops and livestock products, to insure their production based on their historic revenue.

The publication also explains the AGR-Lite Wizard assessment software tool. This tool assists farmers and agricultural professionals in evaluating the usefulness of whole-farm revenue insurance. Schahczenski was instrumental in developing AGR-Lite Wizard as part of a four-year program also funded by the RMA.

"Crop Insurance Options for Specialty, Diversified, and Organic Farmers" is available to download for free or as a hard-copy publication for a small handling fee from the ATTRA website www.attra.ncat.org. Schahczenski's webinars, along with numerous others, also are available at the site along with more than 400 sustainable-agriculture publications, databases, information about ATTRA's free sustainable-agriculture hotlines and "Ask an Ag Expert" service, as well as many other features.

About the Author:

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Jeff has expertise in organic and sustainable agriculture public policy, marketing and economics, transgenics in agriculture, organic horticulture, energy use in agriculture, cooperative development, sustainable building, intercultural communications and beekeeping.

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