Chestnut Growers of America

THE CHESTNUT GROWER

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New Genetically Engineered American Chestnut Will Help Restore the Decimated, Iconic Tree

by William Powell
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Historic picture of a large American chestnut tree (Ten Eyck Dewitt barns, Paul Farm, NY)

American chestnut trees were once among the most majestic hardwood trees in the eastern deciduous forests, many reaching 80 to 120 feet in height and eight feet or more in diameter.

The "then boundless chestnut woods" Thoreau wrote about in Walden once grew throughout the Appalachian mountains. They provided habitat and a mast crop for wildlife, a nutritious nut crop for humans and a source of valuable timber. Because of their rapid growth rate and rot-resistant wood, they also have significant potential for carbon sequestration, important in these days of climate change.

The species has a sad story to tell. Of the estimated four billion American chestnut trees that once grew from Maine to Georgia, only a remnant survive today.

The species was nearly wiped out by chestnut blight, a devastating disease caused by the exotic fungal pathogen Cryphonectria parasitica. This fungus was accidentally introduced into the United States over a century ago as people began to import Asian species of chestnut. It reduced the American chestnut from the dominant canopy species in the eastern forests to little more than a rare shrub.

After battling the blight for more than a century, researchers are using the modern tools of breeding, bio-control methods that rely on a virus that inhibits the growth of the infecting fungus, and direct genetic modification to return the American chestnut to its keystone position in our forests.

See Genetically Engineered, p. 8

A ghost forest of blighted American chestnuts in Virginia. Library of Congress Prints and Photographs Division

In This Issue

PRESIDENT'S MESSAGE

As chestnut growers, we are always involved with change concerning chestnuts. As CGA members within our organization, we are constantly dealing with change. Some changes this year will include replacing two Board Members and welcoming a new Editor/Webmaster for our newsletter and website.

Current Board Members Ray Young and Bob Wallace are leaving the CGA Board this year due to changes in their lives. Ray Young has served as both a Board Member and Secretary/Treasurer for many years. He has managed the most important position of CGA with integrity, professionalism and honesty. His job has kept this organization together and grown the group to what it is today. Bob Wallace has been a Board Member for many years and has demonstrated his skills in focusing CGA to be the right group to help all of our chestnut grower members in growing quality chestnuts. CGA thanks you both for all you have done for this chestnut grower member group.

Carolyn Young will be organizing and editing her last newsletter for CGA this month. She will be stepping down from this job held by her since 1999. Carolyn has done an outstanding job keeping all the members apprized of the best knowledge available concerning growing, harvesting, marketing, and cooking with chestnuts. Once again, we thank you for all you have done for Chestnut Growers of America.

As you will read more about in this issue, CGA's Annual Meeting will be in Columbia, Missouri Friday June 10th through Sunday June 12th, 2016. Please plan to attend this very informative meeting. I understand that both Carolyn and Ray Young will be in attendance and you will have the opportunity to thank them personally for their outstanding contributions. I am not sure if Bob Wallace will be in attendance yet for our yearly meeting, but please forward thank you emails or send cards to Bob for all his work with CGA. Also you will have the opportunity to meet and welcome our new Editor/Webmaster, Rita Belair and congratulate our two new Board Members. Finally, in closing as you read this next issue, please consider inviting other non-member chestnut grower friends you might know to join and attend the Annual Meeting at Columbia, Missouri.

I hope to see you all there at our June 10th through June 12th, 2016 at the University of Missouri in Columbia, Missouri.

Roger V. Blackwell

The last month or so has seen constant discussion online about the pros and cons of GMO chestnuts. We've published here two sides of the discussion, the first by Dr. William Powell of SUNY and the second by Laurel Hopwood and Erin Riddle of TACF.

You will love the article by the DeKleine's on the way they artificially pollinated their orchard. Talk about creative, talk about thinking outside the box! Wow! You'll be impressed.

If bigger is better you'll be impressed with the 100 horse chestnut that Ray and I discovered in Sicily. It's the oldest chestnut tree in the world, and it's sitting on the slopes of Mt. Etna.

Complete info on the annual meeting is included in this issue -- even the registration form.

This will be my last issue of "The Chestnut Grower". Special thanks to those of you who have written articles or pointed me to those articles of interest that we've been able to reprint, and thanks to the boards with whom I've worked for supporting the efforts. You'll want to welcome Rita Belair who is taking over.

I'm looking forward to sitting back in October, relaxing with a glass of wine and thinking about you all.

Carolyn

Chestnut Growers of America, Inc.

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Quarter page	$10.00
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One classified ad per member per year is free (max 6 lines, $2.50 ea add'l 6 lines). Ad space may be reserved with full payment but must meet established deadlines. If ad is cancelled, money may be refunded if space is resold. Make checks payable to Chestnut Growers of America, Inc.

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Summer deadline 6/10, mailed 7/1

The De Kleines Manage Artificial Pollination
Thinking Way Outside the Box

by Carl De Kleine, H. Arthur De Kleine, Mark De Kleine

De Kleine Orchards LLC, is a descendant fruit and nut farm from Herbert De Kleine (b. 1909 – d.2005). 'Herb', as known by friends and family, was an educator, writer, and inventor. He purchased the original 25 acres with the intention of enjoying agricultural ventures while supplementing his teacher income. De Kleine Orchards (DKO) is located in the midsection of western Michigan, 20 miles southwest of bustling Grand Rapids. When initial chestnut plantings occurred during the 1990's, De Kleine Orchards planted 100% Chinese chestnut seedlings that were grafted. Colossals and Nevadas were purchased from Fowler Nursery. Over the next 25 years (to present), we've transitioned to 100% European/Japanese grafted trees. The farm is now 48 acres consisting of sweet cherries, tart cherries, and 25 acres of chestnuts.

Generally, along the shores of Lake Michigan, 'lake effect snow' can act as a blanket of temperature protection against winter frost and freeze damage. We have relied upon this theory as our agricultural dependence for the past century. Little did we know the winters of 2014 and 2015 would test our agriculture heritage to the core.

As 'normal' spring arrives in western Michigan, west winds are cooled by Lake Michigan. This micro-climate suits plants, including fruit and nuts, from forming early buds. During the winters of 2014 and 2015 temperatures in western Michigan dropped to historic lows of -25^{o} F; -5^{o} F was noted at De Kleine Orchards. Recently, we've had to adjust our thoughts on mild lake effect climates and harsh temperatures (low) effects on our established orchards. New plantings are not immune either!

We plant using a 3 x 3 pattern with the center tree being a pollinizer, the other eight being Colossal. Each tree in the orchard is adjacent to a pollinizer – 89% nut producers and 11% pollenizers. Our orchards are planted at 20' x 20' spacing which accommodates a 40' x 40' spacing after mature thinning of the orchard (usually twelfth leaf). We have also successfully 'thinned' by transplanting 250 mature trees to vacant land. De Kleine Orchards was able to instantly expand by ten acres with producing trees.

Twelve years ago it was discovered that the Nevada pollinizer would not survive Michigan winters. Most died. DKO replanted with the Okei cultivar and in 10 years was able to pollinate 15 acres. During the winter of 2014, low temperatures damaged 100% of the Okei with 20% killed. During the winter of 2015 almost all of the remaining Okei died. DKO was faced with a challenge; nearly all of our pollinizers were gone.

We came up with a three point strategy

We came up with a three point strategy. First, we removed all but a few of the Okei showing some life. New trees were ordered but less than 25% the needed quantity was available for fall 2015 planting.

Secondly, we hired two experienced grafters to teach our 4-man crew bark grafting. Six different pollen-producing cultivars were grafted to top limbs in over 200 Colossal trees. One limb per Colossal tree was grafted with two pieces of scion wood. DKO modified a fork lift for a standing platform and a tree trimmer was used to reach the top of the trees.

In October, 2015, signs of life in the grafts were 99%, revealing only two did not live or show substantial growth. We expect the grafted wood to produce some pollen this spring and will continue with testing our grafts.

Thirdly, we attempted artificial pollination. We started with a 'trial and error' test and figured our story was compelling enough to distribute (however dull it may sound). We don't know if our pollination efforts had an effect on the yield. We didn't control conditions or make comparisons. In fact, we don't even know if the pollen collected was alive or dead. However, our ten acre block which was "artificially pollinated" had nuts covering the ground at harvest time!

How does one pollinate a block of 800 trees when pollen is not naturally available? We combed the internet but found little useful information relating to chestnuts; we asked experts from several foreign countries. We consulted with Dr. Mark De Kleine and Dr. Matt Whiting at Washington State University on techniques being tested and employed with stone fruit in Washington. We decided on a plan for making a 'farm style' pollen collector and dispenser. It is both economical and 'does the trick'.

We've outlined the design and process of collection in the following:

Step 1: We used a large garbage can with a lid and a Toro leaf blower designed to both blow leaves and suck them up for bagging. The Toro blower was equipped with a 4" dia. Tube that, when attached to the fan intake, becomes a vacuum) as shown in Figure 1.

Step 2: We cut a 4" circular hole into the center of the trash can lid such that the blower sits on the middle of the lid and the vacuum tube extends three

Continued on next page

Figure 1: Toro leaf blower mounted to trash bin

Figure 2: De Kleine Orchards cyclone pollen collection system consisting of a vacuum intake and exhaust tube.

fourths of the depth of the can. Air supplying the vacuum will now come from inside the trash can. An important requirement for the incoming air flow, carrying pollen, is to swirl around the circular inside surface of the trash can; the general term is a cyclone separator. The separator allows pollen to drop out of the air stream using centrifugal force. Our exhaust was designed by inserting a 12" length of 4" diameter PVC pipe into the lid and securing it at a 45^{o} angle as shown in Figure 2.

Step 3: Next a 10' piece of flexible tube was attached to the intake PVC

***Pollination**, Cont'd from p. 3*

pipe for collecting pollen from trees as shown in Figure 3.

Pollen grows in a sack called an anther. The fuzzy surface seen on a male chestnut catkin has many anthers at the end of the filaments. When anthers split open, pollen is released, creating an unmistakable odor. After the catkins release pollen, they turn a darker brown color. We waited until the smell of pollen was evident and spent three and one half days, 12 hours, collecting pollen and anthers.

We used a gas generator on a trailer as a mobile power source for the cyclone pollen collector. We employed one high school student to operate the collection system. Six miles from our block of trees we found approximately 10 healthy, undamaged pollinizers that could be harvested. Pollen collection (yield) was increased when an operator grabbed a large hand full of catkins and stuffed them into the end of the vacuum tube while shaking the mass. We saw no destructive damage during collection.

Each day pollen collected was cleaned of debris and placed in the freezer. The total amount accumulated was no more than a pint. We used a fine powder to suspend the pollen, similar to material sold by Firman Pollen Co. of Yakima, Washington. Firman Pollen sells pollen and application equipment to fruit growers. Enough powder was purchased to provide a gallon of fine material.

Step 4: Finally we needed a pollen applicator. We used the same system used for collection but reversed the process. A small hole was drilled in the blower tube half way toward the end as shown in Figure 4. A clear flexible plastic tube was run through the drilled hole to a point approximately two inches from the end of the air outlet. This created a venturi effect where the contents of the flexible tube would be sucked into the high velocity air stream. It worked perfectly.

Figure 3: Pollen collection in a De Kleine Colossal chestnut orchard.

Figure 4: DKO pollen application device.

Figure 5. Carl (left) and Art De Kleine (right) apply chestnut pollen using the 'farm style' cyclone separation and application device.

Finally, as the story of passing along knowledge goes, Carl and Art sat in the back of a pickup truck with the electric generator, leaf blower, and quart size jars of pollen/powder mix (Figure 5). We applied pollen to every second row, pointing the blower vertically. Each time the distribution tube was dipped into the pollen mixture a visible puff of pollen shot from the end of the blower into the air.

Applying pollen is dirty work! At the conclusion of artificially pollinating 10 acres, our hats, clothes, and

Continued on next page

Figure 6: Colossal chestnuts at De Kleine Orchards under a tree that was artificially pollenated in 2015.

***Pollination**, Cont'd from p. 5*

pickup truck had a film of pollen mixture. We have no proof the pollen was alive or that the chestnut flowers were receptive. However, this block yielded 12,000 pounds of large quality nuts, in the absence of any pollinizer within the block. The pollen collection and dispersal took approximately 16 hours and less than $200 was spent on equipment. Our plan is to repeat the artificial pollination this spring using a control group as comparison. When the winters get you down, sometimes Mother Nature needs our helping hand. For more information contact Carl De Kleine: cdekleine@hotmail.com, Art De Kleine: adeklein@calpoly.edu, or Mark De Kleine dekleinemachineco@gmail.com

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Tree research and survival viable without genetic engineering

by Laurel Hopwood and Erin Riddle
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Laurel Hopwood (lhopwood@roadrunner .com) chairs the national Club's Genetic Engineering Action Team.
Erin Riddle (riddleriddle@gmail.com), is vice chair of the Atlantic Chapter

Chestnut trees, which have been bountiful along the East Coast, are being devastated by blight fungus. In the fall edition of the Sierra Atlantic, an article ("The mighty American Chestnut: New York conservationists lead epic tree restoration effort") discussed both traditional and biotechnology efforts to save these majestic trees.

Unfortunately, the article could have given the impression that the Sierra Club approves the release of genetically engineered organisms into the environment. According to Sierra Club's policy, "Based on the precautionary principle, the Sierra Club calls for a ban on the propagation and release of all genetically engineered organisms, including field crops, orchard and forest trees."

Genetic engineering (GE) is a new technology that, unlike traditional breeding methods, allows the transfer of genetic material from one organism into a host organism of an unrelated species, thus bypassing the natural reproductive barriers between species. The genetic manipulation resulting from genes inserted by genetic engineering cannot be recalled and the altered characteristics will be passed on to future generations and continue to be reproduced in the environment.

A May 30, 2015 article in the New Scientist reveals that the first GE chestnut was planted in 2006, and there are now over 1,000 GE chestnut trees growing at various test plots in New York. Charles Maynard, of the State University of New York, stated, "We hope to obtain regulatory approval for trees to be grown outside permitted plots within three to five years."

In the documentary A Silent Forest: The Growing Threat, Genetically Engineered Trees, award-winning geneticist Dr. David Suzuki discussed how GE trees may adversely impact ecological systems. As Dr. Suzuki explains, the problem with genetic engineering has to do with the fact that GE plants and animals are created using horizontal gene transfer, as contrasted with vertical gene transfer, which is the mechanism in natural reproduction. Vertical gene transfer is the transmission of genes from the parent generation to offspring via sexual or asexual reproduction. By contrast, horizontal gene transfer involves injecting a gene from one species into a completely different species, which yields unexpected results. According to Dr. Suzuki, the assumption that the principles of vertical inheritance can be applied to horizontal inheritance is flawed and is "just lousy science."

"Forests are already under tremendous pressure from climate change and human interaction," says Dr. Ricarda Steinbrecher, who has a PhD in molecular genetics. "Compared to crops that have been cultivated for thousands of years, trees are wild. If a GE trait enters a forest species, the implications could be absolutely horrendous. We could see the ecological system weaken and collapse."

According to Dr. Steinbrecher, "You cannot design a biological system that's 100 percent foolproof." Data backs her up. According to the United Nations Food and Agriculture Organization, even at a 95 percent success rate, it is nearly impossible to control gene flow through pollen and seed dispersal.

The good news is that the American chestnut still exists throughout the forests of the Eastern U.S. Many of the trees that were killed off by the blight resprouted from the stumps. Many of these have survived to the point where they are producing chestnuts that are being harvested by people and feeding wildlife. There is also active work being undertaken to identify and breed naturally resistant wild American chestnut trees. The Sierra Club approves and encourages these non-GE methods being used to bring back the chestnut.

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The 100 Horse Chestnut

by Maria Mazzaro
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A few kilometers from the town of Sant'Alfio, on the lower slopes of Mount Etna, is the Hundred Horse Chestnut Tree ("Castagno dei Cento Cavalli"), believed to be the oldest tree in Sicily and perhaps the oldest of Europe.

Not every part of it is that old. Parts of the trunk have been burned and at one point a house was built into the giant tree. Yet it survives. Until recently, few local residents appreciated the tree's legacy, but it has been dated scientifically.

One would not think that the question of a tree's antiquity could engender adamant rivalry but, as in the cases of many "world records," eclectic opinions abound, colored by the motivation of "locals" to promote "their" tree as a source of local pride while perhaps generating tourism profits.

In the manner of an international athletic competition with participants fiercely vying for first place, the claim to Europe's oldest surviving tree is made by several towns, with olive trees leading the list. The age of these trees cannot be dated very reliably beyond two thousand years, but among those usually mentioned are the Fortingall Yew in Perthshire (Scotland), the Pedras del Rei olive in Portugal and the Pano Vouves olive in Greece. All are thought to be slightly over two thousand years old.

While it is not likely that any of these trees are much over two thousand years old, their histories are fascinating, with the chestnut's being the longest and perhaps most accurate. Conifers lead the list of the world's oldest trees, with a conifer root system in Sweden dated to the end of the last ice age and several American trees estimated to be almost five millennia old.

In this land of legend combined with the occasional fact, the name "Hundred Horses" owes its name to the traditional story that during a sudden rainstorm the young Joan (Giovanna) of Aragon, Queen of Naples, travelling with a mounted suite of around a hundred retainers and knights, sought shelter under the huge tree.

The oldest chestnut tree in the world a few kilometers from the town of Sant’Alfio on the lower slopes of Mt. Etna.

Joan of Aragon (1454 Barcelona - 1517 Naples), daughter of King John II of Aragon (1397-1479), was the second wife of King Ferdinand I ("Ferrante") of Naples and Sicily (1423-1494), who she wed in 1476. The royal dynasty of Aragon had ruled Sicily since the War of the Vespers in 1282, and by now the "Italian" branch also ruled (from Naples) the southern third of the Italian peninsula. King Ferrante's reign was characterised by, among other things, high taxes. In addition to descendants by his two wives, Ferrante had a number of surviving children by two mistresses.

As chestnut trees, conifers and olive trees normally grow to be several centuries old, their occasionally exceptional longevity shouldn't surprise us. They are nature's testaments to history.

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The 100 Horse Chestnut Tree Today

The 100 Horse Chestnut tree seen in March, 2016 with your editor and hubby.

Today the tree is seen in its Spring attire. What you see behind the fence is one single chestnut tree. Botanists have verified that it has only one root system and only disagree on its age, with some claiming it is 2000 years old and at least one other saying 4000 years of age. In any case it is amazing to see.

What we found even more unusual is that while wild chestnuts are scattered around the area there are no commercial orchards in existence here, nor did we see any anywhere else in Sicily where we visited. Farmers are growing wine grapes and olive trees nearby, but no chestnuts. One would think that when you have a tree like this that’s still producing with no apparent signs of blight, phytophthora, gall wasp, chestnut weevil or shothole borer this would be an ideal area for an orchard, but apparently such is not the case. And add to that the fact that it has escaped the many eruptions of Mt. Etna where it lives on its lower slopes and you wonder if it has “special powers”.

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***Genetically Engineered**, cont'd from p. 1*

Chestnut blight canker. William Powell, CC BY-ND

To restore this beloved tree, we will need every tool available. It's taken 26 years of research involving a team of more than 100 university scientists and students here at the not-for-profit American Chestnut Research and Restoration Project, but we've finally developed a nonpatented, blight-resistant American chestnut tree.

One genetic tweak

My research partner, Dr. Chuck Maynard, and I work with a team at the SUNY College of Environmental Science and Forestry (ESF) that includes high school students, undergraduate and graduate students, postdoctoral fellows, colleagues from other institutions and volunteers. Our efforts focus on direct genetic modification, or genetic engineering, as a way to bring back the American chestnut.

Thirty days after infection with chestnut blight, the wild-type American chestnuts on the left are wilted, while the 'Darling 54' transgenic trees are doing well. Andy Newhouse, CC BY-ND

Thirty days after infection with chestnut blight, the wild-type American chestnuts on the left are wilted, while the 'Darling 54' transgenic trees are doing well. Andy Newhouse, CC BY-ND

We've tested more than 30 genes from different plant species that could potentially enhance blight resistance. To date, a gene from bread wheat has proven most effective at protecting the tree from the fungus-caused blight.

This wheat gene produces an enzyme called oxalate oxidase (OxO), which detoxifies the oxalate that the fungus uses to form deadly cankers on the stems. This common defense enzyme is found in all grain crops as well as in bananas, strawberries, peanuts and other familiar foods consumed daily by billions of humans and animals, and it's unrelated to gluten proteins.

We've added the OxO gene (and a marker gene to help us ensure the resistance-enhancing gene is present) to the chestnut genome, which contains around 40,000 other genes. This is a minuscule alteration compared to the products of many traditional breeding methods. Consider the techniques of species hybridization, in which tens of thousands of genes are added, and mutational breeding, in which unknown mutations are induced. Genetic engineering allows us to produce a blight-resistant American chestnut that's genetically over 99.999 percent identical to wild-type American chestnuts.

Time release video of seedling exposed to chestnut blight can be seen at https://www.youtube.com/watch?feature=player_embedded&v=Ty9b1vml5IQ .

Gene transfers happen all the time

For some, this raises a question: isn't moving genes between species unnatural? In short: no. Such movement has been essential to the evolution of all species. Researchers are discovering that horizontal (between-species) gene transfer happens in nature and even in our own bodies. In fact, the same organism (Agrobacterium) that we use to move blight-resistance genes into chestnuts has also permanently modified other plants in the wild. For example, all the sweet potato varieties on the market today were genetically engineered by this bacterium around 8,000 years ago.

There is another logical question: what about unintended consequences? Of course undefined questions are impossible to answer, but logically the method producing the smallest changes to the plant should have the fewest unintended consequences.

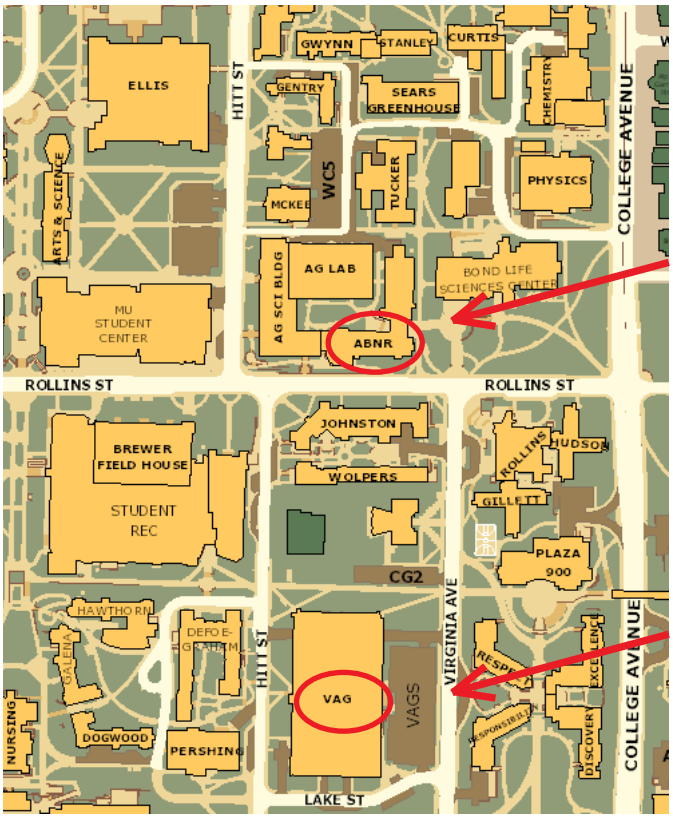
See Genetically Engineered, p. 10

Annual Meeting Promises to be a Rousing Success

Friday	6:00 - 10:00	**Welcome party on MU campus** Room 123 Anheuser-Busch Natural Resources (ABNR) Bldg Snacks/beverages available all evening
Saturday	8:00	**Annual Meeting on MU Campus**
	8:00	Room 123 Anheuser-Busch Natural Resources (ABNR) Bldg. Registration in ABNR Lobby (east entrance)
	8:30	Annual Meeting
	9:00-12:00	Presentations Miller/Fulbright/FACMA/NovoGradec/Annual Mkt Survey
	12:00-1:00	Catered lunch
	1:00-3:30	Travel to MU Horticulture and Agroforestry Research Center (HARC), New Franklin, MO Tour orchards, discuss cultivars, orchard management, Future Breeding Programs, FACMA Harvester
	3:30-4:30	Travel to Stouffer Farms, Napton, MO
	4:30-5:30	Visit Stouffer chestnut orchards, fertigation system
	5:30-6:45	Return to Columbia, MO
	7:00	No-host dinner, Dinner location TBD
Sunday	9:00	Going west, leave for Chestnut Charlie's 1840 E. 1450 Road, Lawrence, KS 66044 (785) 841-8505
	9:00	Going east, leave for Forrest Keeling Nursery 88 Forrest Keeling Ln, Elsberry, MO 63343 (573) 898-5571
	9:00	Going NE, leave for Redfern Farm, Wapello, IA 13882 I Ave., Wapello, IA 52653 (319) 729-5905

Questions?

Email CGA@ChestnutsOnLine.com
Email: ToddCS@missouri.edu
Email: GoldM@missouri.edu



Friday reception and Saturday meeting will be in ABNR, Anheuser Busch Natural Resource building.

Parking available in VAG, Virginia Ave. garage, first three floors.

Suggested Motel Options for CGA Meeting

There will be no headquarters hotel this year but there are many places available. Because the Missouri Special Olympics are taking place this weekend you are advised to book **EARLY!**

- http://www.tripadvisor.com/Smart-Deals-g44257-Columbia_Missouri-Hotel-Deals.html
- Hampton Inn & Suites Columbia (at the University of Missouri) closest to our side of campus, breakfast included with price. 1225 Fellow's Place Blvd. Columbia, MO 65201, 573-214-2222 http://hamptoninn3.hilton.com/en/hotels/missouri/hampton-inn-and-suites-columbia-at-the-university-of-missouri-COUUMHX/index.html
- Stoney Creek Hotel second closet to campus, breakfast may be included with price, 2601 S. Providence Rd., Columbia, MO 65203, 573-442-6400
- http://www.stoneycreekhotels.com/hotel/travel/columbia/home.do
- Courtyard by Marriott, located on Highway 63 at Grindstone Parkway, northeast corner of inter-section, 3301 Lemone Industrial Blvd., Columbia, MO 65201, 573-443-8000
- http://www.marriott.com/hotels/travel/coucy-courtyard-columbia/,
- The Broadway Hotel, a Doubletree by Hilton, located downtown, very close (walking distance) but pricey, 1111 E. Broadway, Columbia, MO 65201, 573-875-7000
- http://doubletree3.hilton.com/en/hotels/missouri/the-broadway-columbia-a-doubletree-by-hilton-hotel-COUTB-DT/index.html
- The Tiger Hotel, located downtown, very close (walking distance) but seems pricey, 23 S. 8th Street, Columbia, MO 65201, 573-875-8888, http://www.thetigerhotel.com/
- There is no Days Inn in Columbia although it shows up on google on Interstate 70 Dr. SW
- Lots of choices along I-70 Highway from Exits #124 - #128
    1. Comfort Suites
    2. Drury Inn
    3. Holiday Inn
    4. La Quinta
    5. Motel 6
    6. Ramada Inn
    7. Red Roof Inn
    8. Super 8

***Genetically Engineered**, cont'd from p. 5*

We have not observed nontarget transgene effects – that is, changes that we didn't intend – on our trees or on other organisms that interact with our trees, for example with beneficial fungi. And at any rate, unintended consequences aren't constrained to the genetics lab. Chestnut growers have seen unintended consequences resulting from their hybrid breeding of chestnuts. One example is the internal kernel breakdown (IKB) seen in chestnut hybridization, caused by crossing a male sterile European/Japanese hybrid ("Colossal") with Chinese chestnut. By mixing tens of thousands of genes with unknown interactions through traditional breeding, occasionally you get incompatible combinations or induced mutations that can lead to unintended outcomes like IKB or male sterility.

Butterfly on male flowers of an American chestnut. Andy Newhouse, CC BY-ND

One of the key advantages of genetic engineering is that it's far less disruptive to the original chestnut genome – and thus to its ecologically important characteristics. The trees remain more true to form with less chance of unforeseen and unwanted side effects. Once these genes are inserted, they become a normal part of the tree's genome and are inherited just like any other gene. They have no more chance of moving to other species than do any of the approximately 40,000 genes already in chestnut.

Next steps for the blight-resistant American chestnut

One of the challenges of genetic engineering that is not faced by any other methods of genetic modification also serves as a safeguard. We must shepherd these trees through federal regulatory review by the U.S. Department of Agriculture, the Environmental Protection Agency and the Food and Drug Administration. Our plan is to submit these applications as we finish collecting the necessary data; we expect the process to take three to five years. Once we receive (anticipated) approval, we will quickly make the trees available to the public.

This project is unique because it is the first to seek approval of a transgenic plant to help save a species and restore a forest's ecology. Our forests face many challenges today from exotic pests and pathogens such as Emerald Ash Borer, Hemlock Wooly Adelgid, Sudden Oak Death, Dutch Elm Disease, and many more. The American chestnut can serve as a model system for protecting our forest's health.

Direct genetic modification will likely not be used in isolation. Integration might improve the outcomes of both the conventional hybrid/backcross breeding program of the American Chestnut Foundation and our genetic engineering program. Allowing crosses between the best trees from both programs will allow gene stacking – having multiple and diverse resistance genes in a single tree – with each working in a different way to stop the blight. This would significantly decrease the chances that the blight could ever overcome the resistance. The two programs working together would also allow the addition of resistance genes for other important pests, such as Phytophthora, which causes a serious root rot in the southern part of the chestnut range. And combining methods increases the chances that the resistance will be long-lasting and reliable, which is very important for a tree that in good health can live for centuries.

A unique aspect of the genetically engineered American chestnut trees is their ability to rescue the genetic diversity in the small surviving population of American chestnut trees. When we cross our blight-resistant transgenic trees to these surviving "mother" trees, directly in the wild or from nuts gathered from them and grown in orchards, we're helping preserve the remaining wild genes.

Half the resulting offspring will be fully blight-resistant, while also containing half the genes from the mother tree. By making these crosses, the restoration trees will be ecologically adapted to the diverse environments in which they'll grow. These trees could also be used to boost the genetic diversity of the hybrid/backcross breeding program, or used directly for restoration and left to fend for themselves, allowing natural selection to make the final determination of the effectiveness of our efforts.

The American chestnut was one of the most important hardwood tree species in the eastern forests of North America, and it can be again. This tiny change in the genome will hopefully be a huge step toward putting the American chestnut on a path to recovery.

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Transgenic American chestnut 'Darling 54.' Linda McGuigan CC BY-ND

Chestnut Growers of America
Annual Meeting and Conference

Friday, June 10- Sunday, June 12, 2016

University of Missouri

Columbia, MO

SCHEDULE

Friday	6:00-10:00	Welcome party on MU Campus. Room 123 Anheuser-Busch Resources (ABNR Bldg. Snacks/beverages available all evening.
Saturday	8:00	Registration,Room 123 ABNR Bldg lobby (east entrance)
	8:30	Annual Meeting
	9:00 - 12:00	Presentations Miller/Fulbright/FACMA/NovoGradac/Annual Market Survey
	12:00 - 1:00	Catered Lunch
	1:00 - 2:00	Travel to MU Horticulture and Agroforestry Research Center (HARC), New Franklin, MO
	2:00 - 3:30	Tour orchards, discuss cultivars, orchard management, future breeding programs, FACMA harvester
	3:30 - 4:30	Travel to Stouffer Farms, Napton, MO
	4:30 - 5:30	Visit Stouffer chestnut orchards, fertigation system
	5:30 - 6:45	Return to Columbia, MO
	7:00	No-host dinner, Broadway Brewery 816 E. Broadway, Columbia, MO - one flight of stairs down from street level
Sunday	7:30	Board of Directors Meeting
		Visits to any or all of the following:
		Charlie NovoGradac, Lawrence, KS
		Forrest Keeling Nursery, 88 Forrest Keeling Ln, Elsberry, MO
		Tom Wahl's, 13882 I Ave., Wapello, IA

Questions?

Email CGA@ChestnutsOnLine.com
ToddCS@missouri.edu
GoldM@missouri.edu

DO-IT-YOURSELF LODGING

Since all activities will be at the univeristy or orchards there is no headquarters hotel this year. The Missouri Special Olympics will be held in Columbia this same weekend so it's imperative that you make your reservations early.

The following hotels are suggested:

Hampton Inn & Suites -- closest to campus
1225 Fellow's Place Blvd.
Columbia 877-595-9070

Stoney Creek Inn -- second closest
2601 S Providence Rd.
Columbia 573-442-6400

Courtyard by Marriort
Hwy 63 at Grindstone Pkwy
Columbia 573-443-8000

Broadway Hotel (close to campus)
1111 E. Broadway
Columbia 573-875-7000

The Tiger Hotel
23 S. 8th St.
Columbia 573-875-8888

There are many others in town. Check them out at www.hotels-rates.com/Columbia/MO/usa/

Cut here and return this form with your check made payable to Chestnut Growers of America, Inc.

On time registration fee includes Friday evening welcome party, Saturday coffee, lunch, conference attendance, and Sunday orchard tour. Registrations need to be received by **Tuesday, May 31**. Make checks payable to Chestnut Growers of America, Inc. and mail to Ray Young, Secretary/Treasurer, PO Box 841, Ridgefield, WA 98642.

Name_____ _____Member _____Non-Member
Name_____ _____Member _____Non-Member
Name_____ _____Member _____Non-Member

_____Number of members @ $45.00 each = $_____
_____Number of non-members @ $55.00 each = $_____
TOTAL ENCLOSED $_____

I am planning on donating something for the silent auction to be held on Saturday. _____ YES _____ NO

Address:_____ City:_____ State:_____Zip:_____

Phone:_____ Email:_____

I am planning on a Sunday visit to _____Chestnut Charlie's _____Forrest Keeling Nursery _____the Wahl's

CGA Nominating Committee Presents Slate of Officers

Headed by chairman David English, the nominating committe also included Bill Nash, and Mike Gold. The slate is as follows:

President: David English
Vice President: Roger Blackwell
Sec/Tres: Jack Kirk
Director: Sandy Bole
Director: Tom Wahl
Director: Derek Waltchak
Director: Lee Williams

According to the bylaws the nominating committee's slate shall be considered to have been elected unanimously if no written petitions are received by Mar. 1. Since that is the case, no balloting shall be necessary. These directors and officers will take over at the conclusion of the annual meeting.

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