Chestnut Growers of America
Promoting Chestnuts and Connecting Chestnut Growers

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The Chestnut Grower

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Bottlenecks Limiting Eastern US Chestnuts and Priority Strategies to Overcome Them: Variety Development and Research & Development

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This article is excerpted with permission from the report Overcoming Bottlenecks in the Eastern US Chestnut Industry, *published by the Savanna Institute. The full report can be found at www.savannainstitute.org/wp-content/uploads/2021/06/2021-SI-Chestnut-report.pdf.*

In This Issue

Profitable commercial chestnut production is possible now with existing cultivars and management protocols. However, significant barriers exist to scaling up chestnut production across the region. These barriers include:

1. Scaling up the supply chain
2. Variety development
3. Research & development

This article will address barrier #2 and #3, *variety development* and *research & development*. See the article addressing barrier #1 in the Fall 2021 issue.

Variety Development

Part 1: Genomic Tools for Breeding

Key Need: *Develop a more comprehensive and practical understanding of the chestnut genome.*

Recent advances in high-throughput genotyping methodologies, as well as rapidly increasing computational resources, have dramatically expanded the potential use of genomic information in traditionally under-resourced crop species. It has become increasingly affordable to

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The Chestnut Grower

Winter 2022

About Chestnut Growers of America, Inc.

The purpose of Chestnut Growers of America is to promote chestnuts, to disseminate information to growers of chestnuts, to improve communications between growers within the industry, to support research and breeding work, and generally to further the interests and knowledge of chestnut growers. CGA advocates the delivery of only high-quality chestnuts to the marketplace.

CGA began as the Western Chestnut Growers in 1996 in Oregon where about 30 or so chestnut growers understood the need to join forces to promote chestnuts in the U.S. Eventually they realized that they needed to be a national organization and solicited memberships from every grower in the country, which took the membership to over 100. The name of the organization was changed to Chestnut Growers of America, Inc., and it was granted 501(c)(5) status. Annual meetings take place around the country in an effort to make it possible for a maximum number of people to attend. A newsletter, *The Chestnut Grower*, is published quarterly and distributed by mail and/or email. CGA maintains an extensive resource site available only to members containing information helpful in growing and marketing. Visit chestnutgrowers.org for more information.

Annual Membership Dues

Single membership, $45; Household membership, $55; Associate membership, $60. Members receive *The Chestnut Grower* quarterly. Emailed newsletters are included. Mailed newsletters are an additional $5 per year. A $10 late fee is applied to membership renewals submitted after April 1.

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Editorial Opinion

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Message from CGA President Roger Blackwell, Chestnut Grower

Hello Chestnut Growers of America Members...

Our next annual meeting will be a joint meeting with the Northern Nut Growers Association hosted by Sara Fitzsimmons of the American Chestnut Foundation in Pennsylvania and Board Member of CGA. We are planning a great joint session with the NNGA starting Sunday, August 7th through Wednesday, August 10th, 2022. The location of the meeting will be at Penn State Berks Campus, Reading, Pennsylvania. CGA will have complete details announced in the Spring newsletter.

This newsletter has great articles. More information is provided from the Savannah Institute Report. Steve Jones has a short follow-up note from Neill Allen's article from the last newsletter. Roger Smith has sent in a short story about his experiences selling chestnuts.

Please remember the purpose of CGA is to promote chestnuts, to share information among growers of chestnuts, to improve communications between growers within the industry, to support research, breeding work, and to further the interests and knowledge of chestnut growers. Thank you all for your contributions to CGA.

I hope you all had a wonderful holiday season with family and friends. See you all in Pennsylvania in August 2022 in person, and I am sure we will have a wonderful time in this joint meeting.

Best regards,

Roger R. Blackwell

Roger

A Follow-up to "The Story of the Mother Colossal"…

By Steve Jones, Selah, Washington

For the original article, see "The Original Colossal Chestnut Tree: The Story of the Mother Colossal", The Chestnut Grower Fall 2021, page 1.

Last fall, I was contacted by Neill Allen about whether we grew Colossal chestnuts. After my positive response, he sent the information and pictures you saw in the previous issue of The Chestnut Grower. I was thrilled to see these pictures and read about Mr. Allen's knowledge of this tree.

Prior to planting our chestnut orchard in 1992, my wife, Patty and I were able to visit many orchards and nurseries across the United States that grew chestnuts. On one such visit to Alachua, Florida and Bob Wallace's Dunstan nursery, we happened to meet Dennis Fulbright. He was conducting a student field trip and allowed Patty and me to tag along. As we all know, Dennis was instrumental in establishing much of the current interest in growing chestnuts.

There are many old plantings of chestnuts on the west coast. We traveled most of Washington and much of California looking at many varieties of

chestnuts. We discovered the Tanimoto Brothers planting of Colossal Chestnuts in Gridley, CA. As I recall, this orchard was only about twelve years old. It was a fairly tight planting with trees pruned to about six feet. This experience was somewhat like buying your first home. When you saw it, you wanted it.

George Tanimoto was very helpful in guiding us to Fowler Nursery and Dave Wilson Nursery that were currently, at that time, propagating Colossal chestnut trees. Upon visiting both of those nurseries, we quickly found out about Bob Bergantz. Bob Bergantz was the primary driver of getting these two nurseries to propagate the Colossal chestnut tree. This is the same tree that Neill Allen references in his letter.

Patty and I were fortunate to track down Bob Bergantz and his wife, Mary, in Coos Bay, Oregon, where they retired. We spent a very long afternoon with Bob and learned more about chestnuts in those few hours than I have learned since. Bob came to see our orchard a year or so after it was planted. He gave us some valuable tips on what to do. Those recommendations we still use. I really believe that without Bob's persistence, we may not have the Colossal chestnut and the Nevada pollinator today.

The Colossal chestnut has been very successful for us. The Korean population in our area have been our biggest customers. We opened for business this season on Friday the 29th and in two days sold over thirty tons of chestnuts in ten-pound bags. The demand continues to out strip our supply. The yield on the Colossal chestnut is very good and the acceptance for quality has been excellent. We are a firm believer that we made a good choice in planting the Colossal chestnut.

Happy New Year!

Your 2022 membership dues are now due. You have two options:

Renew Online

Download a fillable form from the CGA website at www.chestnutgrowers.org/CGA_Membership_Application_fillable.pdf. If you receive the e-version of the newsletter, the form is also attached to that email. Complete the form and email it to Jack Kirk, CGA secretary/treasurer, at jackschestnuts@gmail.com. You can then pay your dues through the CGA website by visiting www.chestnutgrowers.org/paydues.html. Please make sure you submit both your renewal application and payment at the same time. *~OR~*

Renew by Mail

Fill out, detach, and return the membership renewal form included with this issue on page 9. Send the form with a check made payable to Chestnut Growers of America, Inc. to Jack Kirk, 2300 Bryan Park Ave., Richmond, VA 23228.

***Renew Today** - A $10 late fee is applied to renewals submitted after April 1. If you are a new member who joined after August 1, 2021, your dues are already paid for 2022, so no action is needed at this time.*

Give your marketing a boost with a paid CGA Grower Directory listing

The online Grower Directory (www.chestnutgrowers.org/growers.html) provides a way for potential customers to look up chestnut growers in their area. An option to post a paid listing helps your orchard stand out with a photo and more detailed information. From the listing, customers can link directly to your website or contact you via email. Your renewal form includes the option for you to select a paid listing (still $25.00/year) or a free listing. CGA regularly directs outside inquiries about local chestnuts to the online directory, so this is a marketing opportunity you can't afford to miss!

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genotype thousands of plants within a breeding program with high precision, developing hundreds of thousands of genetic markers that characterize diversity across the genome. Computational resources have also improved for efficiently utilizing this wealth of genetic information—both in order to determine the variable degrees of relatedness within large populations of individuals, as well as the prediction of phenotypic performance on the basis of genotypic information alone. Taken as a whole, these novel technologies now allow genomic prediction to be used within nearly any breeding program.

The efficiency gains that these tools offer are particularly significant in the context of tree breeding. Because trees have longer generation times than annual crops and often do not reach maturity until several years after becoming reproductively active, the most significant bottleneck to genetic progress within tree breeding programs is the time it takes to complete a breeding cycle. Genomic selection offers the potential to dramatically accelerate this breeding cycle, by allowing for the evaluation of plants at the seedling stage instead of waiting often more than a decade to determine performance. In addition, selection intensity can also be markedly increased, since the cost of genotyping an individual seedling requires orders of magnitude fewer resources than growing that seedling to maturity.

Through a participatory breeding network organized by the University of Missouri and the University of Notre Dame, efforts are currently underway to evaluate thousands of half-sibling chestnut families planted on farms throughout the Midwest. This work will produce a robust database of the phenotypic diversity that exists currently in the region and leverage the decades of energy and resources invested by farmers in establishing mature chestnut orchards. Such a resource could provide an ideal initial multi-environment training population with which to build a set of genomic predictions for a suite of key breeding objectives in chestnut.

Additional investment will be critical to realizing this potential. Replicated trials of training populations in particular will be essential to developing accuracy predictive models. Further development of reference genomes and linkage maps, assembled specifically for key cultivars in the Midwest will improve the accuracy of marker development, and reduce the long-term costs of high-throughput genotyping. In addition, developing protocols for implementing long-read sequencing technologies in chestnut will allow for more precise haplotype estimation, and thus more precision in identifying favorable alleles. This in turn will aid in identifying and utilizing novel sources of genetic diversity identified through, for example, genome-wide association studies.

Part 2: Breeding

Key Need: *Creating professional centralized variety development programs to create modern cultivars with improved yield, nut quality, and disease resistance.*

The need for continued breeding is true for all agricultural crops but is especially important for tree crops, which require years or even decades to develop new varieties. The six- and four-fold increases in U.S. corn and soybean yields, respectively, over the last century have been accomplished through massive investments in breeding and agronomic research. Analogous investments in tree crops can also be expected to substantially improve their performance.

There is no institutional or coordinated participatory chestnut breeding program in the U.S. However, there is a growing network of chestnut farms in the Eastern U.S. that have planted more than 7,000 chestnut trees in commercial orchards. These trees are typically half-sibling seedlings of Chinese chestnuts with an unknown amount of genes from other species in the mix. With half sibling trees, the mother tree is typically known, but the pollen parent or father is usually not known. This introduces variation and potentially reduces the agronomic performance of chestnut trees. Recent grant funding from the USDA is supporting a new project at the University of Missouri Center for Agroforestry to inventory, assess, and create genetic markers for these existing chestnut trees. This work will enable future efforts to make informed crosses to create improved cultivars with known traits, and it represents an important advance in institutional engagement in chestnut breeding that can lead to broader work within universities and the USDA.

This broader engagement is a key next step in improving chestnut germplasm. USDA tree breeders are struggling to adapt popular tree fruit and nuts to our changing climate, and crops like peaches, tart cherries, and almonds have experienced stress and reduced yields due to erratic weather conditions. Mild winters combined with late spring frosts has also made breeding work more difficult and breeders are now shifting their priorities to select for later flowering trees. This same approach could be applied to chestnuts with the goal of increasing regional adaptability.

Shifting existing USDA resources to chestnuts is one scenario for creating a centralized breeding program. Investing in a new, nimble, and focused private business is another option for beginning the process of centralized breeding. The focus for a centralized breeding program should be identifying, evaluating, and developing a more comprehensive understanding of the best Chinese chestnuts cultivars and their genetics so that they can be used as a well adapted base to explore crosses with other species to improve agronomic performance. To realize the full potential of advances in breeding, the improved germplasm must be optimized for and integrated into new sophisticated forms of professional management.

Existing chestnut growers also have tremendous potential to create improved cultivars. Farmers have the ability to select trees that are ideally suited to their locations. This regional adaptation can create resilient trees that thrive under lower input management systems that lead to increased profitability. Bob Stehli in northern Ohio and Steve Lucas in eastern Oklahoma are two farmers that are taking this approach to on farm breeding. They produce seedlings and grow dense plantings of chestnuts that get thinned over time based on their assessment of the top performing trees. Seed from the best trees is then used to create the next generation of seedlings and the process is repeated to allow the trees to adapt to the specific climate, soils, and pest pressures present at a given location.

The ideal scenario for chestnut breeding would likely be to combine the best attributes of institutional breeding with the strengths of on-farm breeding to get consistent performance of the best genetics adapting to on farm conditions.

Part 3: Germplasm Repository

Key Need: *Save existing germplasm and create multiple repositories to ensure cultivars are not lost.*

The USDA maintains the National Plant Germplasm System as a collaborative effort to safeguard the genetic diversity of agriculturally important plants. This network of 18 genetic repositories spans the United States and is part of the larger international GRIN-Global Project. All commercially viable species and a selection of their wild relatives are included in this network.

There are federal funds allocated to supporting a USDA-housed chestnut germplasm repository, and that program is currently housed in the pecan breeding program in the Southern Plains Agricultural Research Center in College Station, Texas. However, this location focuses on pecans, and they have not worked with chestnuts. These funds could be reallocated to support a dedicated chestnut repository in the center of the growing region for chestnuts in the U.S. The Center for Agroforestry at the University of Missouri is interested in housing this program. Their location in plant hardiness zone 6 and past experience with chestnuts makes them an ideal candidate to establish a germplasm repository.

In addition to establishing a federally supported chestnut germplasm repository, it is also important to preserve existing chestnut orchards and university breeding programs. Both of these sources of chestnut genetics have a tenuous existence and they are susceptible to changes in funding, pests and disease pressure, and urban development. These factors result in orchards being damaged or lost to development and other land uses. In some cases, this results in the loss of potentially valuable cultivars. Given the current restrictions on importing new germplasm into the U.S., it is important to save existing cultivars so we retain a broad base of genetics to work with in breeding programs.

Another approach to preserving chestnut genetic diversity is to work with existing chestnut growers to identify and assess existing genetics that are being grown on farms and to ensure multiple trees of each valuable cultivar are being grown on farms across the eastern U.S. Recent grant funding is supporting this work and efforts are underway to characterize existing germplasm on farms and to better understand the chestnut genome. This work will document the existing distributed network of chestnut trees that can serve as an additional source of valuable genetics and serve as a safety net for an official germplasm repository.

Research & Development

Part 4: Agronomic Research

Key Need: *Research-based best practices for Eastern U.S. chestnut growers.*

An extensive network of institutions, researchers, and farmers around the world have generated a large knowledge base for best practices and management guidelines for chestnut orchards. China, in particular, is relevant for the Eastern U.S. As the world's largest chestnut producer and the center of origin for Chinese chestnuts they have the most comprehensive understanding of the Chinese chestnut best management practices. Consequently, translation of Chinese research and cooperation between the U.S. and China can fast track the development of the Eastern U.S. chestnut industry.

Nevertheless, new and ongoing research on chestnut agronomy specific to the Eastern U.S. will be critical, especially in the following areas:

- Fertility management both during orchard establishment and at maturity
- Appropriate timing, intensity, and mechanization of pruning
- Weed control requirements and approaches during orchard establishment under both conventional and organic management
- Evaluation of ideal plant spacing during establishment and at maturity, both in terms of plant health and yield maximization
- Investigation of intercropping approaches (e.g., asparagus, rhubarb, vegetables) and livestock integration in silvopasture
- Evaluation of strategies for pest and disease management, as well as scouting for the emergence of novel pests and diseases as the size and number of hazelnut orchards in the region increases
- Resilience to biotic and abiotic pressures introduced by climate change

Strategic investments that leverage and coordinate existing research and institutions can position chestnuts as a viable staple crop worthy of broader engagement from mainstream institutions like the USDA and the U.S. Forest Service. When these institutions engage in significant chestnut research and development, chestnuts will make even more rapid gains in agronomic performance.

Key U.S. institutions currently conducting research on chestnuts include: Michigan State University, University of Missouri Center for Agroforestry, State University of New York (SUNY), University of Illinois at Urbana-Champaign, Route 9 Cooperative, Wintergreen Farm, The American Chestnut Foundation, The Chinquapin Chestnut Foundation, Chestnut Growers of America, Northern Nut Growers Association, the Savanna Institute, and various grower-led research projects associated with individual farms.

There is also tremendous potential to cooperate with researchers in China, Europe and other chestnut producing regions to learn from their work. A researcher exchange program would advance our understanding of chestnuts and successful management practices. These programs are already in place at major universities and funding chestnut research could tie into these existing avenues for cooperation.

Part 5: Clonal Propagation

Key Need: *Develop efficient protocols to produce affordable grafted and tissue cultured trees.*

While grafted European chestnuts are widely planted in commercial orchards in Europe and other parts of the world, Chinese chestnuts have proven more difficult to graft. The few grafted Chinese chestnut trees that are available in the U.S. are only commercially viable in select locations with ideal climate, soils, and management conditions. More research and development is needed to better understand the factors limiting the viability of grafted Chinese chestnut trees.

However, tissue culture, another method of clonal propagation, could sidestep the

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graft issue altogether if successfully applied to chestnuts. Faculty at the SUNY College of Environmental Science and Forestry in Syracuse, New York have developed some of the first promising protocols for tissue culture of chestnuts, though the process has proven to be very time consuming and complex. Each species and variety of chestnut requires its own protocol with varying levels of hormones, time, temperature, and other variables dialed in through detailed experimentation and testing.

The work at SUNY focuses on American chestnuts, but they have also developed the ability to produce tissue cultured trees for Colossal, a European x Japanese chestnut variety, and they have the potential to produce Chinese chestnuts given adequate time and funding. Z's Nutty Ridge Nursery in New York is currently offering tissue cultured Colossal chestnuts for sale, and they have plans to offer more cultivars in the future. Investing in tissue culture-based clonal propagation could build upon the work that has been done to date and greatly accelerate progress towards scaling up production and expanding the availability of more diverse germplasm.

Part 6: Autonomous Robotic Harvesters

Key Need: *Autonomous robotic harvesters that facilitate (1) efficient commercial harvesting for strong economies of scale as well as (2) capture high-resolution yield data to support variety development.*

The primary harvesters in use on small to medium sized chestnut orchards are homemade vacuum-based harvesters that are typically pulled behind a tractor. These harvesters pick up chestnuts, burs, and debris that get sorted out post-harvest with a variety of other cleaning and sorting equipment. Some larger scale chestnut orchards use European chestnut harvesters. These machines function like a small combine and they harvest and separate nuts from debris while harvesting. Typically, some level of debris remains after harvest and additional cleaning and sorting is required. These machines are expensive and are cost prohibitive on orchards under ten acres in size.

Orchard management needs to be optimized for a given type of harvester to realize the full benefits of mechanical harvest. Optimum orchard management varies with soil types, climate, cultivars, and intensity of management. In some cases, multiple machines may be used to prepare an orchard for harvest. For example, DeKleine Orchards in Michigan uses a modified black walnut harvester as a first pass to pick up debris and unpollinated burs from the orchard floor prior to actual harvest. This increases the efficiency of their operation by reducing the volume of burs that they need to handle during harvest. While these increases in efficiency are important, further advances are needed to increase the scale of the chestnut industry.

Professionally managed commercial chestnut production requires mechanical harvesters that are optimized for the scale and type of farm. Dan Guyer at Michigan State University has done testing, evaluation, and research into developing a new type of chestnut harvester for U.S. growers. He has determined that there is a niche for a U.S. made harvester for farms with 2 to 9 acres of chestnuts. Below two acres hand harvesting is economical and above 9 acres European made harvesters like FACMA can be justified (see Figure 1). Many questions remain regarding the best harvester option for different orchard sizes and types of management.

Autonomous robotic harvesters represent the next frontier for chestnut harvesting technology and this approach has the potential for large gains in efficiency as well as improved data collection that can inform management decisions. A "swarm" of robotic harvesters can collect data as they harvest and communicate with each other to focus effort on the most productive areas of the orchard while minimizing time in areas with little to no chestnuts on the ground. The data collected by these harvesters will identify the most productive trees, determine nut sizes, and the harvest window each season (see Figure 2).

One potential partner in this work is the University of Illinois and the technology company EarthSense (earthsense.co). EarthSense is developing robots for various applications in row crops, and much of the technology can be applied to chestnuts. EarthSense estimates that they can leverage their existing technology to create a prototype robotic chestnut harvester in two years.

Part 7: Food Processing for Novel Markets

Key Need: *Research and development to match chestnut kernel characteristics with industry specifications for starch and livestock feed markets.*

Compared to existing chestnut markets, there are massive potential novel market opportunities for chestnuts to replace corn as an industrial starch or livestock feed. Critical to accessing these markets, however, is meeting their biochemical and nutritional requirements. Researchers in Europe and China have evaluated chestnut starch for its suitability for use in industrial and processed food applications. Their research has demonstrated that chestnut flour can be used in gluten free processed foods and as a component of baked goods, including sourdough bread.

For industrial applications, chestnut starch can be processed and modified through heat and enzymatic treatment as well as through fermentation. This produces a starch that is intermediate between cassava and corn starch, and, once treated, chestnut starch can replace corn starch in a variety of uses where lower processing temperatures are used.

While initial work has already occurred on chestnut starch, substantial further work is necessary. In particular, further research is needed to quantify starch properties for top Midwestern chestnut selections. Furthermore, as continued breeding occurs, there is potential to

Figure 1. FACMA harvester.

Figure 2: Existing EarthSense crop management robots that could be adapted into autonomous robotic chestnut harvesters.

match selection requirements with the biochemical and nutritional requirements of novel markets.

In addition to chestnut chemical composition, research is needed to determine how a large-scale chestnut industry could leverage the existing network of corn storage, transportation, and processing infrastructure. Utilizing this existing infrastructure will make scaling the chestnut industry much more effective and efficient but will require specific modifications to account for the perishable nature of chestnuts. Large corn processing companies, such as Archer Daniels Midland and Cargill, could serve as key collaborators in this research.

Priority Strategies to Overcome Bottlenecks Related to Variety Development and Research & Development

The bottlenecks presented above each play a sizable role in holding back the Eastern U.S. chestnut industry. This section provides an objective ranking to prioritize strategies to overcome the bottlenecks based on capital needs, relative urgency, expected timeframe, and dependency on prerequisite activities.

Strategy 1: *Permanent Industry Leadership*

Critical to the long-term success of the U.S. chestnut industry is a high functioning team of rotating researchers, scholars, and technical service providers that can guide the development of the industry. Significant chestnut expertise exists within Europe and China in particular and creating this team would provide an avenue for integrating this knowledge into the U.S. A chestnut team housed at the Center for Agroforestry, University of Illinois and/or the Savanna Institute could provide comprehensive support to the industry based on the model exemplified by the Chestnut Research and Development Center in Piemonte, Italy. This chestnut leadership team could recruit employees from China and Europe as a way to leverage their expertise and help build relationships with researchers and experts around the world.

Strategy 2: *Centralized Variety Development*

A broad coalition of universities has increased our understanding of chestnuts in the Eastern U.S. over the last few decades. However, variety development, in particular, remains slow, as none of these institutions have yet dedicated the necessary long-term resources or personnel to the work. Centralized variety development spearheaded by a public institution to leverage university resources is critical to the development of improved chestnut cultivars in the eastern U.S.

Based on conversations with senior faculty at several universities, there are three general tiers of investment that could support chestnut breeding:

Tier 1

A fully endowed breeder would likely cost ~$2 million to hire at the Assistant Professor level, or ~$6 million to recruit an established mid-career Full Professor. This would provide both for salary dollars, some ongoing research costs, and partially offset start-up costs. Such a position could be tailored to be 100% research and focus at least a large percentage of their time on chestnuts in particular. Right-of-first refusal agreements could likely be obtained from the university to provide exclusive access by the funder to any germplasm developed through such a breeding program.

Tier 2

In lieu of fully endowing a new position, $500,000- $1,500,000 could be leveraged to help shape the focus of a new hire that a university is already pursuing. For instance, $75,000 per year for 10 years could offset ~50% of a new breeding hire, and therefore be used to shape the focus of this hire on chestnuts.

In both of these cases, the substantial cost of funding a tenured professor would be offset by the significant resources such a professor could in turn leverage. Through grant-writing activities, access to university services such as greenhouses, labs, biotechnology centers, as well as the support of undergraduates, graduate students, and scientific staff, a professor-level position could form the stable basis necessary to drive the long-term improvement of chestnut germplasm.

Tier 3

Absent such a substantial investment, significant benefits could still be obtained by accessing academic research capacities of universities. Discrete grants on the order of $100,000-$500,000 to existing research labs would provide support for specific research projects that still mobilize the substantial resources of the university system.

Strategy 3: *Genomic Tools for Breeding*

Researchers at the University of Missouri and Notre Dame University are poised to develop an ancestry informative marker set (AIMS) from mapped simple sequence repeats within expressed sequence tags (EST-SSR's) in *Castanea*. This will be used to determine the genetic makeup of existing cultivars. It can also be used as a "fingerprinting" tool to characterize and validate chestnut clones (cultivars). This will help accelerate progress toward creating improved cultivars.

Strategy 4: *Robotic Harvester Development*

EarthSense has deployed 100 robots for rowcrop applications since 2018. They

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have 13 full time employees that focus on AI engineering and robotics. They want to leverage their technology to develop robots for agroforestry. This includes robotic chestnut harvesters that would use machine vision and learning to collect data in the field and turn it into valuable information that can be used to inform management and breeding. We are in discussion with EarthSense to lay out a long term plan for developing robotic chestnut harvesters.

Strategy 5: *Research and Development Funding Pool*

The agronomic and commercial viability of any crop is built up over time via continuous research and development. Chestnuts in the U.S. are at an early stage of development, equivalent to corn in the 1930's. Chestnuts are poised to make rapid gains in productivity with basic research and development applied to them. Achieving a doubling of yield is feasible with chestnuts.

A dedicated, industry-led research and development funding pool would allow continuous funding of the most pressing issues as the industry grows, maximizing the likelihood of industry success and profitability of investments across the supply chain. These issues include many of those in the core bottlenecks identified in this report.

A $20,000,000 endowed funding pool would generate over $1,000,000 in interest each year that could be used to fund a competitive grant apparatus. This program could be administered by a newly formed Chestnut Development Council consisting of industry stakeholders. The program would function similarly to the USDA's Sustainable Agriculture Research and Education Program and create a very effective and adaptable resource to ensure that the industry is able to quickly address challenges as they arise.

Membership and financial summaries prepared by Jack Kirk, CGA Treasurer / Secretary

Membership Report, 2019-2021

Members	2021	2020	2019
Household	63	57	55
Individual	52	48	42
Associate	1	1	5
Honorary	0	0	0
Complimentary	1	1	2
Total	**117**	**107**	**104**

Mark Your Calendars!

For the 2022 Annual Meeting, a joint meeting with the Northern Nut Growers Association (NNGA).

August 7-10, 2022

Penn State Berks Campus, Reading, Pennsylvania

Chestnut Growers of America End-of year Financial Report, 2019-2021

		2021	2020	2019
Income	Annual Mtg Registrations	--	--	14,428.58
	Annual Mtg Silent Auction	--	--	234.00
	Membership Dues	5940.44	5,245.00	3,978.38
	Online Grower Directory	300.00	350.00	140.00
	Interest Income	34.24	155.72	64.82
	Newsletter Advertising	275.00	135.00	140.00
Total Income		**6,549.68**	**5,885.72**	**18,985.78**
Expenses	Annual Meeting	--	--	(14,329.27)
	Insurance	(1,122.00)	(1,027.25)	(1,037.25)
	Newsletter	(856.23)	(740.50)	(872.89)
	Communications Director	(2468.75)	(2,025.00)	(3,201.31)
	Organizational Expenses	(50.00)	(50.00)	(50.00)
	Website	(227.95)	(243.94)	(195.99)
Total Expenses		**(4,724.93)**	**(4,086.69)**	**(19,686.71)**
Net Income		***1,824.75***	***1,799.03***	***(700.93)***
Cash, beginning of year		***24,052.39***	***22,253.36***	***22,954.29***
Cash, end of year		***25,877.14***	***24,052.39***	***22,253.36***

Membership Application/Renewal Form

Chestnut Growers of America, Inc.

Please complete application and **EITHER** mail to:

Chestnut Growers of America, Inc., Attn: Jack Kirk, 2300 Bryan Park Avenue, Richmond, VA 23228

OR email (scanned copy or fillable PDF, available for download at www.chestnutgrowers.org/resources.html) to: jackschestnuts@gmail.com.

Instruction for completing PDF application: Download fillable PDF and save it to your computer. Open the PDF with Adobe Acrobat or Reader (not a web browser). Fill out the form by clicking in the purple text bars. Go to File > Save As, and then save the PDF with your name (for example, "CGA 2020 Membership Application - Smith). Before emailing your application, close Adobe Reader, and then re-open your application and make sure the information you filled in still appears in the document. Then attach your application to your email to Jack.

For dues payment, **EITHER** mail check to Jack Kirk at Richmond address; **OR** submit your dues online via PayPal at www.chestnutgrowers.org/paydues.html. ***Please ensure that you have submitted both your application and dues.***

A Farm/Business/Organization Name:

B

First Name	Last Name	First Name	Last Name
(Individual/First Household Member)		*(Second Household Member)*	

_____**New Member Application** *(please complete sections C-K below)*

_____**Renewal** *(please complete sections I-K below)*

_____No updates to lines C-H below. Please use info from last year.

_____My information has changed. I have provided updates below.

C Address

D

City	State/Province	Zip/Postal Code	Country

E

Phone	Fax
( )	( )

F

Email	Website

G

Acreage in Chestnuts	# of Trees	Year First Planted	Previous Year's Production (lbs)

H Cultivars Grown

I Please send newsletters in the following format (*$5.00/year for print to cover cost of printing and postage):*

_____Email Only _____Print Only _____Both Email and Print

J Listing on the CGA website grower directory (chestnutgrowers.org/growers; *see reverse for more info*):

_____Free Listing _____Paid Listing _____Please do not list my information on the website.

Continued on reverse ➔

_____**New Member** or **Renewal** ***before*** **April 1**

K	Membership Dues	
	_____Household Membership	$55.00
	_____Individual Membership	$45.00
	_____Associate Membership	$60.00
	_____Print Format Newsletters (see **I** above)	$5.00
	_____Paid Listing on CGA Website (see **J** above)	$25.00
	Total dues for this year:	_____

Renew Today!

A $10 late fee is applied after April 1; after that date dues increase to $65 for a household membership and $55 for an individual membership.

_____**Renewal** ***after*** **April 1**

K	Membership Dues	
	_____Household Membership	$65.00
	_____Individual Membership	$55.00
	_____Associate Membership	$70.00
	_____Print Format Newsletters (see **I** above)	$5.00
	_____Paid Listing on CGA Website (see **J** above)	$25.00
	Total dues for this year:	_____

Today's Date:

_____

Listings on chestnutgrowers.org Grower Directory

Paid listings include a photo of you taken in your orchard/farm, your orchard name, address, phone number, email, website link, and a description of your orchard. This is a great way to make your information stand out to potential customers! Free listings include the orchard name, address, and phone number.

If purchasing a paid listing, send a high-quality photo and your written description (150-200 words) to the webmaster at chestnutgrowersofamerica@gmail.com.

Paid Listing Example

Allen Creek Farm

PO Box 841, Ridgefield, WA 98642
(Website) (Email) Phone: 360-887-3669

Planted in 1999, Allen C
customers throughout
flour and a delicious pa
are inspected annually
certificate that allows tl
WSDA is done of the co

The Youngs practice su
population and a foliar
nutrient needs of the tr
and is not a potential s

Nuts are refrigerated within 24 hours of harvest at 33° I

Curious about just how things are done? Visit our websi
trees to you. (2016)

Free Listing Examples

Chestnut Ridge of Pike County
18483 US Hwy 54
Rockport, IL 62370
217-437-4281

Thistle Creek Orchard
35 Shady Ln.
Avon, IL 61415
309-678-7216

Green Glades Chestnuts
10396 E. 1000th St.
Macomb, IL 61455
309-255-6189

Twinsholler Chestnut Orchards
1514 190th Ave.
Cameron, IL 61423
309-221-2955

Atlas Nuts
18521 US Hwy 54, Rockport, IL 62370
516-641-4513

Chestnut Stories from the Field

You never know what's around the corner…

I was in Chicago this past fall selling chestnuts out of the back of a 19-foot Ford van. I had 5,000 lbs in my van, and all the chestnuts were pre-sold. At a Walgreens parking lot on my 3rd stop I pulled 300 lbs out of the side door of the van to give to a Korean gentleman who operates a health food store in the northern suburbs. After paying me in cash he observed the chestnuts still in my van. He gets into the back of my van and with body language conveys he wants to buy the rest of the chestnuts (1,200 lbs). He doesn't speak English, so I try to politely tell him they are already sold. We go through this five times with me shaking my head. Finally, he pulls out his billfold and shows me several $100 bills. Again, I shake my head. I pull out my phone and call my contact in Iowa City, IA that knows him and gave me the lead. I explain to her what is going on and ask her to call him and tell him he can't have the chestnuts because they are already sold. She calls him and he finally leaves my van. I shake his hand, and with a big smile he thanks me for the chestnuts. The next day I call my Iowa City contact and tell her I have 1,000 lbs of small chestnuts he can have the following week when I return to Chicago. He agrees to the price, and I deliver them to his business in the northern suburbs of Chicago. This time he looks in my van and just shakes his head and asks me if he can order more. I brought him up another 625 lbs the following week. The interesting thing here is not only the passion he has for the chestnut, but that the first 300 lbs he bought were the extra-large chestnuts, and all the rest were the small size. You just never know what is around the corner!

-Roger Smith, Prairie Grove Chestnut Growers, Iowa

Have a real-life chestnut story to share? Send your story to the editor at chestnutgrowersofamerica@gmail.com.

Chestnut Growers of America
8 Hanson Street A
Dover, NH 03820

The Chestnut Grower

Winter 2022