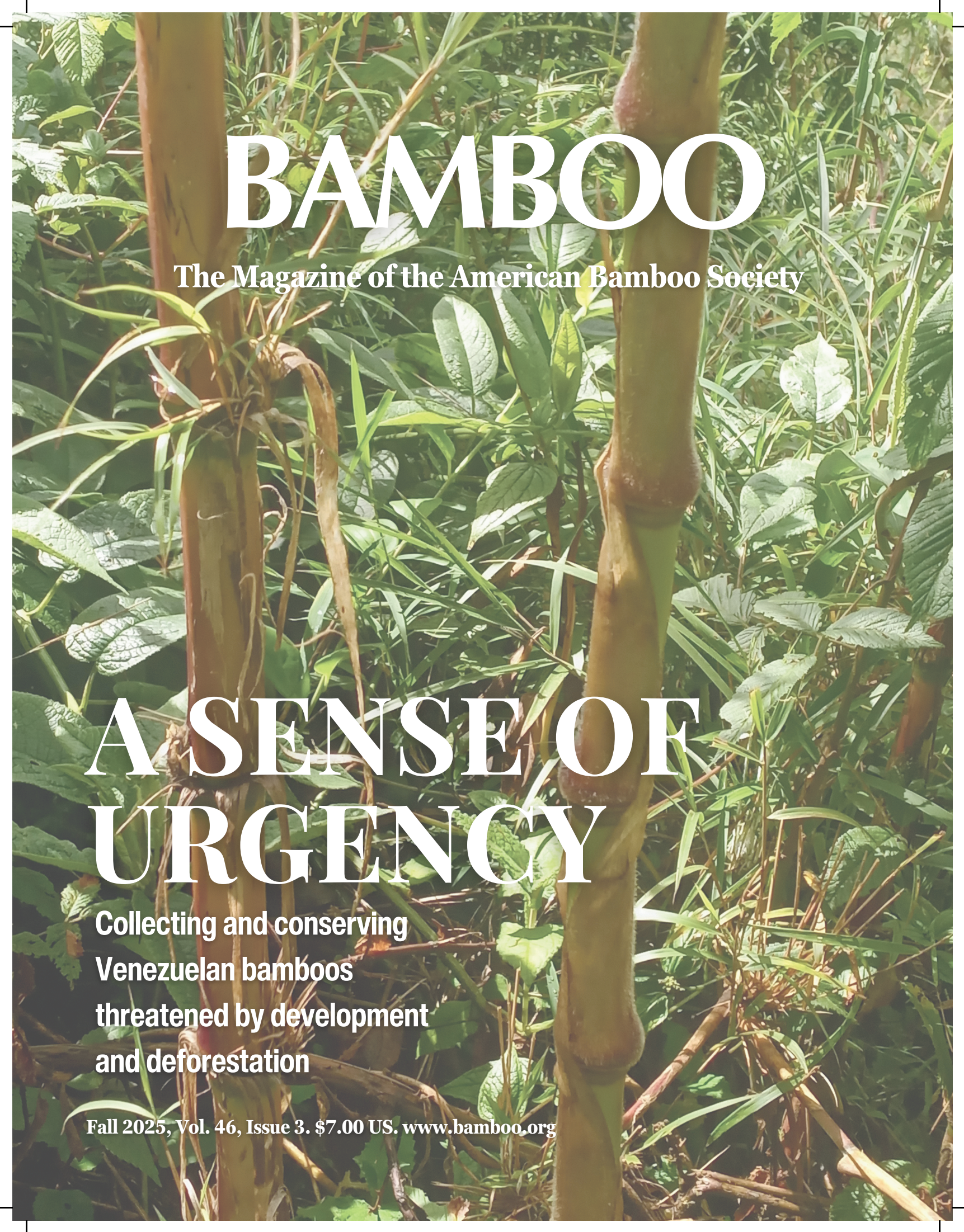




BAMBOO

The Magazine of the American Bamboo Society

A SENSE OF URGENCY

Collecting and conserving
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threatened by development
and deforestation

Fall 2025, Vol. 46, Issue 3. \$7.00 US. www.bamboo.org

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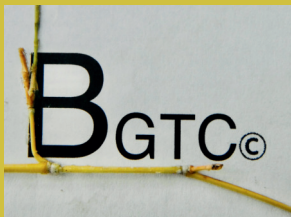
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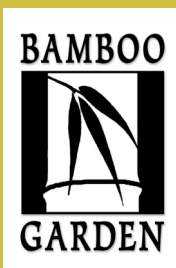
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Chusquea Spencei

Join Us

The American Bamboo Society is a volunteer-run organization devoted to providing information on bamboos via its magazine and online journal, promoting bamboo for the public and botanical gardens, increasing the number of species in the U.S., disseminating research about its uses and potential, and to support bamboo research.

*To learn more information about joining the ABS, visit
<https://www.bamboo.org/membership-information> or scan the QR code.*



ON THE COVER

*Young culms of Chusquea spencei Ernst
Credit: Francisca Ely*

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BAMBOO



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Position Open

The ABS is currently recruiting individuals for its Advertising Director position. This is a volunteer role that is essential to the organization's mission, and is instrumental in the ABS's efforts to expand the reach of the organization's priorities. Contact us at help@bamboo.org for details.

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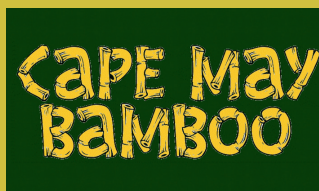
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ABS NEWS

ABS CONFERENCE 2025

Bamboo in the Carolinas: Growth, Innovation & Conservation

October 29 – November 1, 2025 • Greenville, South Carolina

The American Bamboo Society's annual conference takes place October 29–November 1 in Greenville, SC—a can't-miss event for bamboo professionals and enthusiasts. You'll explore the iconic two-acre Clemson Moso Grove, tour National Bamboo's processing plant in Shelby, NC with live demonstrations of biochar, GroZome bagging, and powder milling, and dedicate a full day at Warren Wilson College, walking riverbank groves of native *Arundinaria gigantea* paired with expert presentations on restoration and cultural history. Evenings are yours to enjoy Greenville's vibrant downtown—perfect for dinners and conversations with familiar faces and new friends over excellent meals at local favorites.

Hotel Details

The conference headquarters is the Embassy Suites by Hilton Greenville Downtown Riverplace (250 Riverplace, Greenville, SC). Located on the banks of the Reedy River with direct access to Falls Park on the Reedy—a 32-acre urban greenspace known for its gardens, cascading waterfalls. The hotel is within walking distance of Greenville's award-winning downtown, which boasts fantastic restaurants, lots of nightlife, public art, and local shops. Attendees are encouraged to book early, as Greenville typically fills up during the fall season.

To reserve your room at the ABS conference rate, visit the Hilton ABS Booking page <https://www.hilton.com/en/attend-my-event/american-bamboo-society-2025> or call 864-263-4800 and ask for the American Bamboo Society rate. For extended stays, contact Gracie Meitzner at g.meitzner@hospitalityamerica.com (864-412-7832). Amenities include a made-to-order breakfast, evening reception, rooftop restaurant, indoor pool, fitness center, and valet parking.

If traveling by air, Greenville–Spartanburg International Airport (GSP) is conveniently located 15 minutes from downtown, with additional flight access via Charlotte Douglas International Airport (CLT), located 101 miles away. Note that you are flying into Greenville, South Carolina. Rideshare (Uber/Lyft) permitted at GSP; no hotel shuttle. Taxi and limo service available through Eastside Transportation.

Parking: Public garages (\$7/day) downtown; RiverPlace Garage (\$7/day) or hotel valet (\$28/day).

CONFERENCE HIGHLIGHTS

Explore a mature, two-acre stand of *Phyllostachys edulis* (Moso bamboo)—one of the most impressive groves in the Southeast. Tobaris Holmes will offer an engaging talk on “The power of relocating “Moso” and other bamboos.” There will be plenty of time for wandering this impressive grove at your leisure.

ABS NEWS

ABS CONFERENCE, OCT. 29-NOV. 1 2025

Visit a 50-year-old *Phyllostachys nigra* 'Henon' grove, originally established by ABS member Robert Sutton. Take a stroll through this majestic grove that was planted via mail order from Avery Island. Carole Meckes will present a talk on "Grove Management for Usage" in Robert's *Phyllostachys aurea* grove.

Lloyd DeBois will give us a field preview of his Saturday talk: "Nigra Seedling Production" and we will be introduced to Aaron McCarty's beautiful baskets woven using Kudzoo and Bamboo to make a unique Kuboo basket. He will be demonstrating the traditional bamboo splitting techniques that he uses for his baskets. Aaron will also be offering a limited class on Sunday 11/2. To learn more about Aaron and his workshop visit <https://carolinabamboo.org>.



Moso bamboo at Clemson University

National Bamboo Facility Tour – Shelby, NC

During our tour you'll see how bamboo biomass is transformed: live demonstrations include activated biochar production for soil enrichment and carbon capture, GroZome bagging for sustainable horticulture inputs, and finely milled bamboo powder used in bioplastics, composites, and construction materials <https://nationalbamboo.com/> National Bamboo also leads in bamboo sourcing and research: they manage hundreds of acres of timber bamboo in the Southeast, collect biomass for processing, and operate the region's first commercial-scale processing facility.

Native Bamboo Conservation at Warren Wilson College – Swannanoa, NC

Walk through groves of *Arundinaria gigantea* and *Phyllostachys viridis* 'Robert Young', led by Dr. Jimmy Triplett. Presentations and Q&A by the Rivercane Restoration Alliance, Danila Sheveiko, and Jimmy Triplett will provide an integrated look at rivercane ecology, cultural ties, and regional restoration efforts. Lloyd Dubois will present his topic *Phyllostachys nigra* Seedling Production, and Kay Koppedrayner will close out our conference with her presentation: "Did the early bambuseros plan to add bamboo to American Industry", based on her Ned Jaquith Foundation funded research at the David Fairchild Archives in Florida.

SCHEDULE OF EVENTS: ABS CONFERENCE 2025

Day one: Wednesday, October 29th

9:00 am – 4:00 pm:

- American Bamboo Society Board Meeting at Embassy Suites (room to be announced)

5:00 pm – 7:00 pm:

- Meet and Greet at host hotel

Day two: Thursday, October 30th

8:00 am: Board Bus

8:30 am: Depart

9:30 am – 12 pm:

- Clemson Experimental Forest *Phyllostachys edulis* (“Moso”) Grove Ian Connor: Welcome Address. Speakers in the Grove:
 - Tobaris Holmes: Relocating “Moso”
 - Autumn Ramsay: “Bamboo Co-Ops”

12:30 pm – 1:15 pm:

- Lunch at South Carolina Botanical Gardens

2:00 pm – 5:00 pm:

- Robert and Sue Sutton’s *Phyllostachys nigra* ‘Henon’. Speakers in the Grove:
 - Robert Sutton: Introduction and history
 - Carole Meckes: *Phyllostachys aurea* (“Golden Bamboo”) grove management for usage
 - Lloyd DuBois: Gregarious flowering of “golden” and “black” bamboo
 - Aaron McCarty: Traditional splitting methods used in making bamboo baskets
 - Vinc Math “How to preserve bamboo canes”

6pm: Return to Embassy Suites

Day three: Friday, October 31st

National Bamboo Processing Facility, Shelby, NC

8:00 am: Board Bus

9:00 am – 1:30 pm:

- National Bamboo will lead a tour through their processing facility. Note: eye and ear protection required, some extras will be on hand.
- Live demonstrations:
 - Bamboo biochar production
 - Grozome product bagging
 - Bamboo powder milling (for bioplastics)
 - Hands on workshop: Biologically complete composting using plant-based materials, (including bamboo); Lunch

1:30 pm: depart

3:00 pm arrive at Furman University for self-guided tour

5:00 pm: Depart

5:20 pm: Arrival at Embassy Suites

Bamboo Co-op Program

Are you a bamboo grower, crafter, or enthusiast? Let’s connect! Our new co-op program is aimed to help you link up with local, like-minded individuals to build a powerful network or “grove”. Together, we can unlock new markets, share invaluable skills, and build a resilient community around the world’s most versatile plant. Join the discussion to find out more including how to get involved! Contact Autumn Ramsay at bammer25mashell@gmail.com for details.

SCHEDULE OF EVENTS: ABS CONFERENCE 2025

Day four: Saturday, November 1st

Warren Wilson College Asheville, NC

8:00 am: Board Bus

9:30 am:

- Arrive and gather in Gladfelter lobby (*Unless otherwise stated, all presentations will take place in Canon Lounge located in the Gladfelter Student Center)

9:30: Silent Auction begins

10:00 am – 11:30 am:

- Walk through bamboo groves along river bank, *Arundinaria gigantea* and *Phyllostachys viridis* ‘Robert Young’ led by Jimmy Triplett

11:30 am:

- Lloyd Dubois “Black Bamboo Seedling Production”

12:00 am 1:00 pm: Lunch In Gladfelter dining hall

12:20: ABS general meeting in Canon lounge

1:00 pm – 1:30 pm:

- Danila Sheveiko "Arundinaria: The Ontological Shock of American Cane." Dr. Michael R. McKain, Ph.D. From the Field to the Lab and Back: Melding Traditional Ecological Knowledge, Genomics, and Applied Science for Canebrake Restoration

1:30 pm – 2:00 pm:

- Q & A (including Jimmy Triplett)

2:00 pm – 2:30 pm:

- Vinc Math “Chop Value”

2:30 pm – 3:45 pm:

- Vinc Math “Bamboo Construction 101” demonstration outdoors

3:00 pm: Silent auction ends

4:00 pm:

- Kay Koppedray, (Winner of Ned Jaquith Grant): Early Bamboo Industry in America

5:00 pm:

- Dinner in Canon Lounge, Gladfelter Student Center

6:30 pm: Board bus

8:00 pm: Arrive Embassy Suites

Conference Contacts

Carole Meckes – 512.906.8250

Michelle Tkach – 704.398.9247

James Clever – 206.371.1072

Ian Connor – 503.734.5735

MEMBER SPOTLIGHT

BAMBOO TEXAS

BY MARK SANDERS

Tradition looms large at Bamboo Texas, a family-owned 6-acre bamboo farm located on the outskirts of Houston. It's a multi-generational operation that's been building a loyal clientele and a reputation for quality for decades.

The story started, as so many bamboo business stories do, with a hobby that turned into an obsession. Dr. Darwin Nelson began growing bamboo at his Texas home in 1975. This was long before many noteworthy and now-collectible species were widely available, and vastly more difficult to acquire than they are today.

Around 1990, the family purchased acreage in the town of George West, Texas. Notably, Nelson's loans sat adjacent to the Nueces River, which would figure prominently in the Bamboo Texas story.

At the time, Nelson grew both running and clumping species. That was, until 2002, when the Nueces flooded and 12 feet of water topped the bamboo groves. In the aftermath, few of the runners survived. The clumping bamboos suffered less severe damage.



Dr. Darwin Nelson

MEMBER SPOTLIGHT



The disaster became an opportunity. Shifting focus from running to clumping species proved wise, as clumping bamboos grow well in this part of Texas and made for high quality natural privacy screens. No need for the complex logistics required for containing running bamboos.

The elder Nelson opened Bayside Tropical Bamboo Garden while son John focused on growing bamboo as well. With an expanding clientele came the need for more inventory, which in 2005 prompted John and wife Wendy to seek out a large property near Houston. They settled on a six-acre plot in Hockley, 30 miles outside of the metropolis, and Bamboo Texas continued to grow from a backyard hobby farm into a thriving business.

John worked full-time as a high school teacher, while Wendy became increasingly involved with the expanding operation. Momentum was building.

“That’s a big thing in Houston,” John said in a phone interview. “People want privacy, and they want the instant gratification.”

MEMBER SPOTLIGHT

Over the next few years, John and Wendy would refine their business model, shifting their focus from growing as many types of bamboo as they could acquire – 185 species at one point – to growing species that worked best for their clients.

As with any farming operation, logistics like plant selection and inventory control can make the difference between success and failure. With years of hindsight and experience, the Nelsons have developed a process that works for them. As the weather warms each year, the family concentrates on propagation. They prefer the tried-and-true method of rhizome division.

John says, “I was interested in finding out about vegetative cuttings and tissue culturing. But especially for subtropical bambusas, unless you’re in Java or in a humid sauna, the environment isn’t really suitable.” As labor-intensive as dividing rhizomes can be, it’s also the most reliable for plant viability.

They work with a combination of larger 30-gallon “mother plants” and field-grown bamboos as well for propagation. A tip from Wendy: When taking divisions from potted bamboo, she has found, there is less stress on the plants than with field divisions. As a result, she says there is no need to top (prune back) the tops of the pot-grown bamboo in order to maintain the health of the plant post-division. With a clientele that prioritizes height and seeks out the tallest plants they can acquire, this factor helps sell the product.



John and Wendy Nelson of Bamboo Texas

MEMBER SPOTLIGHT

Fertilizing and watering schedules are also top-of-mind for the Nelsons, and key components of running a successful nursery.

Wendy explains, “Right now we use Florikan 19-5-9 [a slow-release fertilizer], that I can use in the spring when we propagate, and we don’t fertilize again until the following spring. We use a cup for 15-gallon pots and a cup-and-a-half for 30-gallon pots. We use half a cup for 7-gallon pots.”

John adds, “A lot of bamboo people come up with their own fertilizer, and with our high pH and clay soils, we may end up developing our own as well. We’ve been working on that.”

As for watering, the Nelsons use pot stakes for their large container plants, on a three- to four-times-a-day watering schedule. Shorter intervals of water tend to help root development. Notably, they increase water flow for younger, just-propagated plants.

The Nelson’s hard-earned experience and slow-and-steady approach to growing the business has allowed them to build their clientele organically over the years, building trust in the community. In addition to understanding propagation, fertilizing and watering needs, understanding customer needs is a key factor in Bamboo Texas’s success.

Asked about prospective customers’ hesitation about growing bamboo – and if you’re reading this, you likely know a bit about non-experts’ fear-of-bamboo invasiveness – Wendy says it’s just part of doing business.

“Education is such a big part of what we do,” she says. “I will have a couple show up and one will be excited while the other thinks bamboo will take over the world. When we can show them bamboo that’s been growing for 20 years, that helps.”



GETTING TO The Point

BY KAY KOPPEDRAYER

In Papua New Guinea, arrows used for hunting wild pig were tipped with good-sized heads fashioned from a local species of bamboo. Several examples of such arrows are in the Grayson Collection of archery goods housed in the Museum of Anthropology at the University of Missouri. One set of long bamboo arrows from the early twentieth century has heads made from black palmwood, monkey bone, and bamboo. Each had its purpose, to be used for hunting and warfare. As for bamboo, its size, availability, and the high silica content in its outer skin made this member of the grass family a good choice for arrowheads. The heads are typically a long, lanceolate shape, narrow and tapering at each end to a point.

This design brings out the strength of bamboo. Between its nodes, bamboo is hollow. Its outer skin is very hard, a natural protection against decay and insect damage, then just under the skin is a concentration of dense longitudinal fibers that gives bamboo its durability and strength. Here is the concentration of cellulose. Moving from the outer skin towards the pulpy inside ring of the hollow culm, the concentration lessens. Inside, the material is softer; closest to the outer skin it is the strongest due to the increased presence of the power fibers. If cut at just the right angle, the juncture where the dense power fibers meet the strong outer skin can produce a blade that is impressively sharp and strong. The key is getting the angles right—from the tip all the way down the sides—and shaping the blade to maximize its effectiveness.



Grayson Collection of archery goods housed in the Museum of Anthropology at the University of Missouri, Columbia, Missouri

Long and thin, measuring some four and a half inches in length, the two bamboo hunting arrowheads from Papua New Guinea are made from a section of bamboo with a diameter of around two inches. One face of each arrowhead retains a strip of bamboo's outer skin. This face has a convex shape, reflecting the natural cylindrical shape of bamboo. The other face, from the inside of the hollow pole, is concave. The side edges are beveled and taper down to a point that is strong and sharp, and with good penetrating power. With the natural curve of the bamboo fortifying the blade, it is not easily broken. Together, these features give the arrowhead its desired characteristics.

The natural properties of the source material—here bamboo—guided the shape of the arrowhead. In places like Papua New Guinea, its supply was endless. All a hunter needed was a good knife and the knowledge of how to work bamboo to make the most of what it had to offer. That knowledge comes from direct experience—you get a feel for the material when you work with it—and also from the collective understanding that is passed from one generation to the next.

Bamboo was also used in the Americas. Chronicles of Hernando de Soto's expeditions in search of gold and other treasures in the southeast took note of very effective arrow points made from rivercane. A Portuguese man, known only as the Gentleman from Elvas, who accompanied de Soto during his expedition in what is now Florida observed that arrows made from cane were very heavy and tough enough that the sharpened cane could pass through the Spaniards' shields. Some arrows were tipped with fish bones that were as sharp as an awl, while others were stone-tipped. According to the chronicler, those arrowheads broke off when they hit against armor. It was a different story with the cane arrow points. They could find their mark because the cane would split and enter through the chain mail. The chronicler found these points more hurtful.



Arrow from the Amazon in the author's collection



Inca Garcilaso de la Vega, in his 1605 account of de Soto's travels, offered a rather fanciful tale about the power of an arrow fitted with such heads. He wrote of the injury incurred by a Spanish horseman. It was at a place west of the Mississippi that a cane arrow fitted with a point made of the same material, cut obliquely and hardened with fire, penetrated the leg armor of the horseman. Its force was so great that the arrow went through not only the man's thigh, but also the tree and pad of his saddle, and went on to wound the horse.

For sure, Garcilaso's account of the power of native weaponry made for a good story, but whether the cane arrow had that much strength is hard to say. Garcilaso was no eyewitness to the event, not being part of the expedition himself. Only a toddler when de Soto died in 1542 on the western bank of the Mississippi, Garcilaso wrote his narrative some seventy years after it happened. His account relied on stories told and much retold. Of native descent himself—born in 1539, he was the son of a Spanish conquistador and an Inca noblewoman—Garcilaso perhaps sought to put the artifacts of native material culture in a good light. He was accurate in observing that bamboo cut and hardened in the right way could produce a fine cutting edge. Exactly how trenchant it could be is another issue altogether.

*Grayson Collection of archery goods housed in the
Museum of Anthropology at the University of Missouri,
Columbia, Missouri*

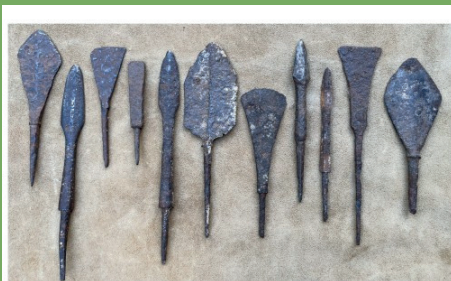
Still, accounts from other Europeans on life in the New World support Garcilaso's admiration for the properties of *Arundinaria gigantea*. In his early seventeenth-century report of life in the Jamestown colony and its surrounding environs William Strachey had high praise for the blades the local Powhatan people crafted from the native bamboo. He wrote of their using knives "of a splinter of reed [rivercane]" which they "make as sharp as a surgeon's gamotte [scalpel]." Using that knife, an Indian "will joint a deare [deer], or any beast, shape his sandalls, buskins [buckskins], mantell, etc."

A significant detail from Garcilaso's account is how the cane tip was hardened. It involved fire, not in the sense of a flaming arrow, but instead, a harnessing of the hardening properties of fire.

So how were the arrowheads attached? With glues, resins, lashings, and more. A range of natural fibers, including grass, palm strips, bark, and other vegetable fibers, were used on arrows from Africa, South America, and the South Pacific.

DISCOVER MORE

Arrowheads: The Stories they Tell is a series of chapters on the history and use patterns behind arrowhead types from over 20 different places from Native North America to Europe to Africa to Asia. It's a book about the stories different arrowhead tell. Published in 2025.



For millennia, people have been busy fashioning projectile points. Worldwide, humans have designed, crafted, and produced arrowheads in all shapes and sizes. Across cultures, people have made arrowheads from different materials in designs for every purpose imaginable. Some arrowheads were made to kill, while others were created strictly for play. Some served ceremonial intentions, while others were practical tools.

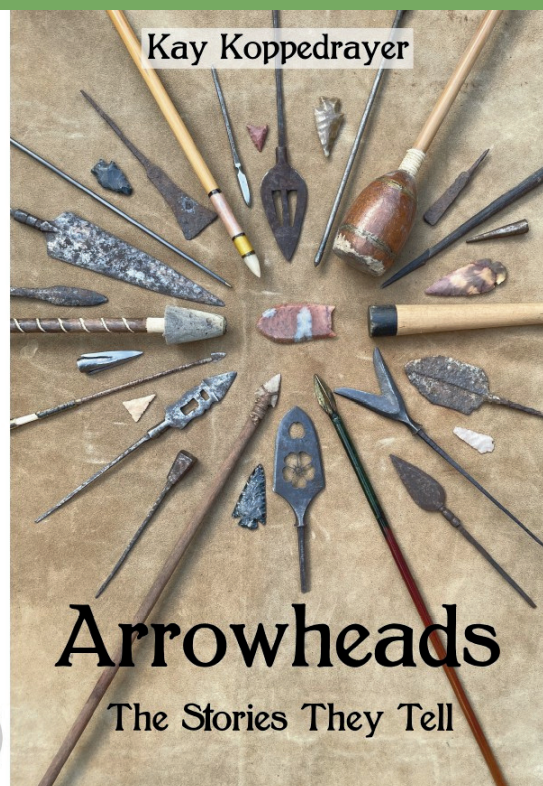
From one purpose to the next, and from one locality to another, arrowheads tell us something about the richness of human imagination. Whether from stone, metal, or bone, whether long or short, whether round or pointed, whether skinny or fat, whether sharp or blunt, each head has a story to tell. Those stories are what this work is all about.

This book takes up examples of arrowheads and traces out what their shapes and sizes tell us about their use—and more importantly about the people who made these heads. The chapters wander through the world, examining arrowheads from Africa, Europe, Asia, and the Americas. In these discussions, you'll find arrowheads that come in unexpected shapes, serving expected purposes in unusual ways.



Arrowheads

Kay Koppedraye



A SENSE OF URGENCY

CONSERVING
THREATENED
ANDEAN BAMBOOS
THROUGH LIVING
COLLECTIONS AT
THE BOTANICAL
GARDEN OF MÉRIDA,
VENEZUELA

BY FRANCISCA ELY

The Botanical Garden of Mérida (El Jardín Botánico de Mérida) belongs to the University of the Andes in Venezuela. Since its creation in 1999, it has aimed to provide the university community and the city of Mérida with a harmonious environment where locals and visitors can enjoy and learn from nature (Fig. 1A). Its connection with the university has facilitated the implementation of a wide range of environmental education activities, primarily focused on the conservation of Venezuela's biodiversity.

This botanical garden is located in the Venezuelan Andes, at an elevation of 1,840 meters above sea level. Its original vegetation was that of an Andean cloud forest. Although the exact date is unknown, it is estimated that since the late 19th century, the original vegetation was gradually eliminated—partly due to the progressive extraction of wood, mainly for fuel and, to a lesser extent, for construction. The cleared lands were later used for crops, including coffee, and as pastures for high-altitude livestock. However, these practices were eventually discontinued, and by the 1980s, when the university acquired these lands, the deforested slopes had already been colonized by a rich secondary forest.

Due to the garden's privileged location, our main goal has always been to serve as a showcase for Venezuela's biodiversity. For this reason, part of this secondary forest was enriched with growth-forms of native cloud forests species (Fig. 1B–D). Thanks to the advanced natural regeneration of this area and the establishment of live plant collections, this Botanical Garden is now an important reservoir of local biodiversity. According to a recent study, the JBM houses around 137 tree species, of which more than 60% are native (Medina et al., 2023). The proximity of the Botanical Garden of Mérida to the Milla and Albarregas rivers and the Monte Zerpa cloud forest (2.5 km) has made it an important biological corridor for local and migratory birdlife, according to the Mérida State birdwatching group (Fig. 1E, F)

Currently, the collections and thematic gardens of the Botanical Garden house both exotic and native species, selected based on their ornamental, economic, and ecological potential. In the case of native species, preference has been given to those whose conservation status is considered at risk, such as palms and woody bamboos.

The Botanical Garden as a reservoir of woody bamboos and its role in ex situ conservation of threatened native bamboos

The selection of the first woody bamboos cultivated in the Botanical Garden was based purely on landscaping criteria and included common, fast-growing exotic species: *Bambusa bambos* Druce (Fig. 2A), *B. ventricosa* McClure (Fig. 2B), *B. vulgaris* Schrad. ex J.C.Wendl. var. *vulgaris*, *B. vulgaris* var. *vittata* (Fig. 2C), *Dendrocalamus asper* (Schult. & Schult. f.) Backer (Fig. 2D), *D. strictus* (Roxb.) Nees (Fig. 2E), and *Phyllostachys aurea* (André) Rivière & C. Rivière (Fig. 2F).

Subsequently, given the adaptive success of these species, we continued enriching the collection of exotic bamboos through the exchange of live specimens and donations. These included species from the aforementioned genera, as well as specimens such as *Chimonobambusa marmorea* Mitford Makino (Fig. 2G), *C. quadrangularis* (Francheschi) Makino (Fig. 2H), *Fargesia fungosa* TP Yi (Fig. 2I), *Gigantochloa felix* Kurz ex Munro (Fig. 2J), *Shibatea kumasaka* Makino ex Nakai (Fig. 2K), *Sasa* Makino & Schib, *Pseudosasa* sp Makino ex Nakai (Fig. 2L), and *Pleioblastus pygmaeus* (Mik.) Nakai (Fig. 3M). As of today, our collection includes 26 exotic woody bamboo species and four varieties.

However, given that one of the main purposes of the Botanical Garden was to host and promote the cultivation of native specimens, we added fast-growing native bamboos *Guadua amplexifolia* Pressl. (Fig. 3A,B) and *G. angustifolia* Kunth (Fig. 3C,D), which soon became key landscaping attractions. Although woody bamboos are considered emblematic elements of tropical Andean landscapes (Clark & Ely, 2011), their current conservation status is cause for concern. Where there were once cloud forests and páramos (high-altitude tropical Andean grasslands), there are now crops, livestock, or abandoned pastures colonized by weeds (Ely, personal communication).

The progressive reduction of Andean landscapes motivated us to include 12 woody bamboos in the IUCN list of threatened species, later published in the Red Book of the Venezuelan Flora (Ely & Clark, 2020), and to seriously consider establishing an ex situ collection of native bamboos for conservation purposes.

Conservation and expansion of native bamboo collections

The geographical position of Mérida's Botanical Garden in the northern Venezuelan Andes was undoubtedly an advantage for assessing adaptive traits of Andean bamboos. Our primary selection was *Chusquea maculata* L.G. Clark, a climbing bamboo with a broad distribution in the Venezuelan Andes, known to occasionally grow in heavily intervened forests. The successful introduction of *C. maculata* (Fig. 3E) into the secondary forest was the incentive needed to undertake the creation of the ex situ collection of native bamboos.

During the initial phase, priority was given to more resilient forest bamboos such as *Rhipidocladum racemiflorum* (Steud.) McClure (Fig. 3F), due to its broad distribution range from Mexico to northwest Argentina. Our next goal was to collect representatives of native genera that grow in cloud forests and páramos, namely: *Arthrostylidium pubescens* Rupr. (Fig. 3G), *Aulonemia subpectinata* (Kuntze) McClure (Fig. 3H), species of the genus *Chusquea*, and *Didymogonys geminatum* (McClure) C.D. Tyrrell, L.G. Clark (Fig. 3I), whose species are either vulnerable or threatened due to habitat loss. Of these, *Chusquea* stands out as the most speciose and diverse among neotropical bamboos, with 197 species (Ruiz-Sánchez et al., 2021, 2022), and its numbers continue to rise in the tropical Andes, as many species remain undescribed (L.G. Clark, personal communication).

Our efforts to establish the native ex situ collection of threatened Andean species proved harder than expected. After 2015, public university budgets were severely cut, forcing us to discontinue field collection trips. Despite these limitations, we continued maintaining the bamboo collection using personal income and resources.

FIGURE 1



Fortunately, in December 2022, our luck changed for the better when we were awarded a grant from the Ned Jaquith Foundation, allowing us to resume field trips and collect new specimens. To date, we have successfully introduced seven new species, all of which have either vulnerable or threatened conservation status according to IUCN criteria:

Arthrostylidium pubescens, *Aulonemia subpectinata*, *Chusquea angustifolia* (Soderstr. & C. Calderón) L.G. Clark (Fig. 3J), *C. aurea* L.G. Clark & F. Ely (Fig. 3K), *C. multiramea* L.G. Clark & F. Ely (Fig. 3L), *C. purdieana* Munro (Fig. 3M) and *C. spencei* Ernst (Fig. 3N).

An additional bonus was the inclusion of three native biotypes of *Guadua angustifolia* from lowland seasonal forests in Barinas and Táchira states, which had previously been represented only by cultivars from Colombia and Ecuador. The natural habitats of *G. amplexifolia* and *G. angustifolia* have also suffered intensive deforestation over the past 50 years, making them conservation priorities.

Lessons Learned and Future Goals

Establishing this diverse collection of native bamboos – composed of species from lowland seasonal forests, cloud forests, and páramos – has taught us much about bamboo acclimatization, propagation, and planting techniques. We have learned the hard way that certain bamboos from humid or boggy páramos, such as *Chusquea mollis* L.G. Clark (formerly *Neurolepis mollis*) (Fig. 4A), do not adapt to lower elevations or drier conditions, despite our efforts to create suitable microclimates.

Another setback has been the blooming of specimens 2–3 years after transplanting, as occurred with the first group of *Chusquea multiramea* introduced in 2009 and with *Didymogonyx geminatum* (McClure) C.D. Tyrrell, L.G. Clark & Londoño in 2018.

To date, we have successfully introduced 11 native bamboo species with vulnerable or threatened conservation status into our live ex situ collection, representing the genera *Aulonemia*, *Arthrostylidium*, *Chusquea*, *Guadua*, and *Rhipidocladum*. We intend to continue introducing native endangered species to the extent that our resources permit. We have also continued promoting the conservation of native bamboos through lectures and workshops at the Botanical Garden (Fig. 4B), in schools (Fig. 4C), and within rural communities (Fig. 4D,E). These activities highlight the role of bamboos in the stability and regeneration of Andean ecosystems, as well as their potential as carbon sinks in the context of global climate change.

We also emphasize the value of native woody bamboos as a multi-purpose raw material (Fig. 4F), including Andean bamboos once widely used by settlers in rural Andean communities to build adobe houses (Fig. 4G), animal pens, and household utensils. Solid-cane species such as *Chusquea maculata*, *C. fendleri*, and *C. spencei* were traditionally used for these purposes, while hollow-cane species like *Didymogonyx geminatum* were used to weave baskets for harvesting vegetables and coffee, and for crafting cheese presses.

FIGURE 2



The experiences gained through these workshops have enabled us to design a replicable educational program tailored to different age groups. We firmly believe that Mérida's Botanical Garden is the ideal space to promote the conservation of native bamboos, as it is the only public space in the region that remains open year-round and consistently supports research, as well as educational, cultural, and recreational activities.

Acknowledgments

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Figure Captions and picture credits

All of the pictures were taken by F. Ely, save pictures 1D and 1F that were taken by the birdwatcher organization Aves Endémicas of Mérida in the Botanical Garden of Mérida.

- Figure 1. The Botanical Garden of Mérida (A), Cloud Forest thematic garden (B), cloud forest understory palm (C) and tree-fern (D). Wild birds that inhabit the Botanical Garden (E, F).
- Figure 2. Exotic bamboos cultivated in the Botanical Garden. *Bambusa bambos* (A), *B. ventricosa* (B), *B. vulgaris* var. *vitatta* (C), *Dendrocalamus asper* (D), *D. strictus* (E), *Phyllostachys aurea* (F), *Chimonobambusa quadrangularis* (G), *C. marmorea* (H), *Fargesia fungosa* (I), *Gigantochloa felix* (K), *Pseudosasa* sp. (L), *Pleioblastus pygmaeus* (M).

FIGURE 3



FIGURE 4



Figure Captions and picture credits, continued

- Figure 3. Native threatened bamboos cultivated at the Botanical Garden of Mérida. *Guadua amplexifolia* (A,B), *G. angustifolia* (C,D), *Chusquea maculata* (E), *Rhipidocladum racemiflorum* (F), *Aulonemia subpectinata* (G), *Arthrostylidium pubescens* (H), *Didymogonyx geminatum* (I), *Chusquea angustifolia* (J), *C. aurea* (K), *C. multiramea* (L), *C. purdieana* (M), *Chusquea spencei* (N).
- Figure 4. *Chusquea mollis* growing in the Páramo de San José (A). Community service students receiving a workshop in bamboo propagation at the Botanical Garden of Mérida (B). Santa Rosa first grade schoolchildren participating in a bamboo workshop (C). Páramo farmers attending a workshop on propagation and cultivation of native Andean bamboos (D). Workers of the Botanical Garden of Mérida harvesting culms of *Guadua angustifolia* culms to build a bamboo gazebo (E). Solid cane of *Chusquea spencei* (F). Door of a stone shelter in the páramo Los Morritos (3,025 m) made with culms of *C. spencei* (G).

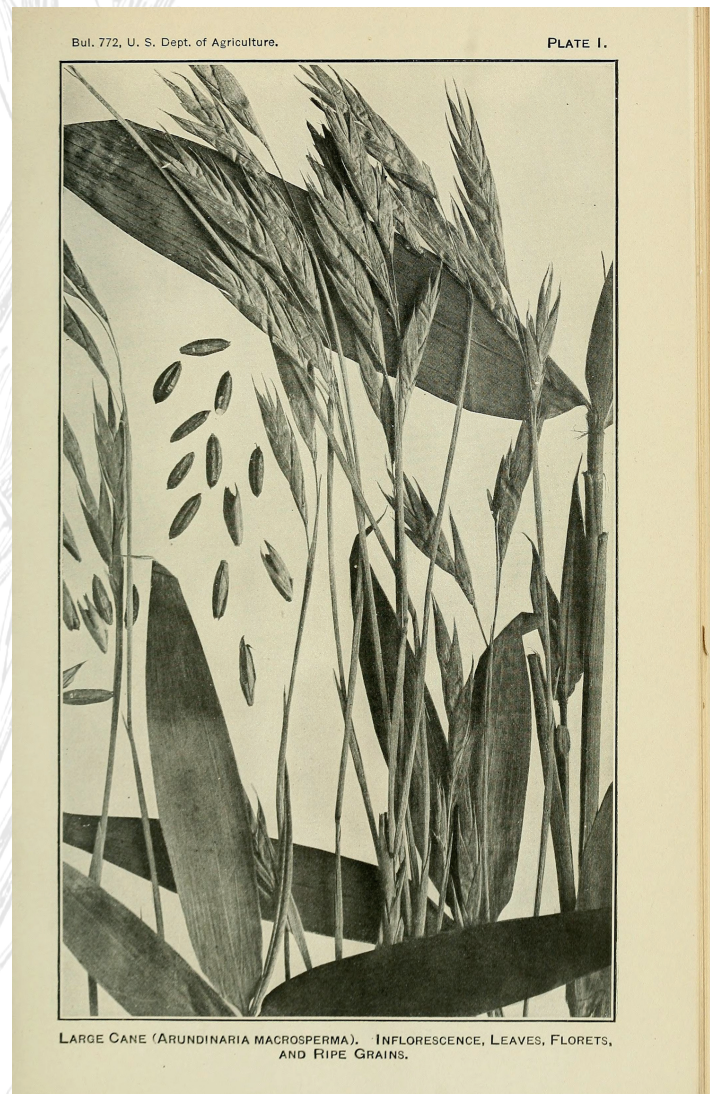
Gone to Seed

THE CURIOUS TALE OF CANEBRAKE FLOWERING IN 19TH CENTURY GEORGIA

By Kay Koppedraye

In the 1800s, a canebrake was a common sight in much of the Southeast. Back then, the native bamboo now known as rivercane (*Arundinaria gigantea*) could be found in abundance along the banks of rivers and streams and in wetlands. What was rare, however, was to see the cane flowering and setting seed. When that phenomenon happened towards the end of the nineteenth century, it caused quite a stir. It was so unusual that editors throughout the region asked their readers to report sightings of this occurrence.

For the next decade and a half, newspaper articles began to buzz with accounts of rivercane setting seed. Some described the seed as resembling wheat. Others compared it to oats. All made mention of its abundance, with more than a few wondering if there were any means of getting an annual yield from the cane. The earliest accounts begin in the 1880s, and they continue up through the first years of the 1900s. As to the species – whether *Arundinaria gigantea* or *tecta* or both – was seeding in this time span, that cannot be determined. All accounts simply refer to the plants in the canebrakes as cane or cane reeds.





In 1881, the Columbus Daily Enquirer picked up a piece from Stewart County about an editor having been shown “a common reed cane” that had gone to seed. The piece went on to praise the seed as “excellent food for cattle and hogs,” adding that “in some portions of the county the canebrakes are heading out nicely, and the cattle and stock will reap a rich harvest.” Some months later Georgia’s Weekly Telegraph reprinted a notice from the Eatonton Messenger. There Mr. W. S. Griffin showed the news room “a common reed, or cane blade, upon the top of which were well developed seed resembling in size and appearance grains of wheat.” Griffin relayed that an entire canebrake on his property showed “the growth of these seed.” He reckoned it was something of a curiosity.

An 1886 piece from Wrightsboro, near Augusta, Georgia, carried similar reports from local readers. One reader brought in stalks of the cane loaded with grain described as looking like wheat, only much larger. People who came to the newsroom were puzzled over the grain until an older resident identified it as “old-fashioned cane gone to seed.” Another person reported seeing several acres of the cane seeding, some of which was “bent to the ground with the weight of the heads.” He thought the yield could amount to as much as 100 bushels to the acre, adding that stock, cattle, and poultry were very fond of it. That bounty led the news editor to wonder about the possibility of propagating “this seed-bearing cane,” believing “it would be a wonderful benefit to the people.” This article was of such interest that it was reprinted in other regional newspapers, including the Savannah Morning News.

The interest was more than passing. Nearly ten years later, an 1895 front page notice from Savannah’s Morning News had the editor asking his readers, “As this is a thing of rare occurrence, it is fraught with much interest. Have any of our readers noticed the occurrence in their own localities, and do they recollect it having occurred before?” The headline, “And Here Too,” of a May 1895 article published in a newspaper from a small town outside of Athens, Georgia, said it all.

That locality was also seeing canebrakes in its vicinity in seed, enough and in excellent quality for one farmer to foresee using it as feedstuff for his stock for several months. Overall, that article praised the appearance of the seed, especially in the current year when the oat crop was so short. It got hopes up. In the words of the writer,

What a blessing it will be if this should prove to be an annual occurrence. There are enough canebrakes or land suited for nothing else but canebrakes in the county to produce grain sufficient to feed the stock of the county the year round. How valuable these brakes will be if this freak of the canes should become yearly.

Another Savannah newspaper, the Weekly News, ran its own front page article that same year recounting what was happening in Alabama, across the state line from Columbus, Georgia. A druggist from the area showed up at a convention with the tops of some cane reeds, some three feet in length, filled with “little heads of grain” over a hundred on each stalk. The grains yielded a white starchy interior, comparable in taste and appearance to oats.

With mile after mile of canebrakes in the area, the reporter observed that the thousands of bushels of seed, some even saying millions of bushels, were there for the gathering. Local farmers had already realized its value and were gathering it by the hundreds of bushels. Stock relished it, and with it being pleasant to the taste, that reporter found no reason why it would not make good food for humans.

He goes on to speak of its wonders as a new foodstuff. Though a professor of botany cautioned against any hope of it becoming an annual crop, having identified it *Arundinaria macrosperma* (an earlier botanical name of rivercane), citing its long cycle of flowering and seeding, the reporter held on to a vision of miraculous bounty:



Fig. 77: *Arundinaria gigantea*: flowering shoot, X $\frac{1}{2}$; summit of culm sheath, and inner face, showing auricles and ligule, and two views of floret, X 2. (From H. C. Chase).

There are millions of acres in the south covered with reed canes, and if some means should be discovered as bringing it into bearing it would prove one of the greatest blessings that Providence even conferred upon this section. Half of Chatham county could be planted in it, including the abandoned rice plantations. It seems that the attention of the department of agriculture at Washington should certainly be called to this phenomenon and a thorough investigation requested.

Despite the hopes many of the articles expressed about harnessing the food-producing potential of the canebrakes, an annual yield was not in the cards. In fact, by the mid-twentieth century, virtually all the canebrakes were gone, having yielded their habitat to agriculture or cattle grazing. And, as for any foodstuff that came from the cane's flowering and seeding, the wait for bounty was long. The interval between seeding cycles was explained by one old timer who went by the name Old John. In a 1901 letter to the editor of the Albany Weekly Herald, he described what he had witnessed, saying he was sorry to dispel false hopes. A veteran of the Civil War, he wrote of seeing an extensive canebrake by the Flint River go to seed in 1853. When it died and burned, the explosions from the dead cane sounded much like he had heard during the war. He saw the same in another canebrake that went to seed in 1857. Then, some forty years later, he learned of a large canebrake in Calhoun, Florida, where the reeds all had seeded and were dying. By his estimates, the cane seeded in forty-year cycles.

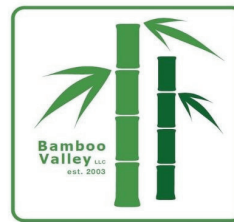
Still, when the canebrakes went to seed, it was a feast for human and beast alike. A memoir published in the 1850s remarked upon the effect so much foodstuff had, with all animals and fowl getting rolling fat from eating the seed. He continued, "The squirrels were so fat that their kidneys were covered [in fat]. This food [the seed] imparted a delicious flavor to the flesh and we feasted that summer and fall." The enjoyment did not last, however. By winter, all the canes were dead and gone, carried off by high water or rotted on the ground. This writer likely witnessed the following seeding cycle, but for far too many who spoke in awe of the productivity of the swamp cane at the end of the nineteenth century, the next cycle never came. By then, the canebrakes were gone.



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Chusquea bamboos in their native habitat. Credit: Francisca Ely

