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The Gesha Legacy

Augmenting Arabica's Genetic Pool

By Dan Bolton

Photo by Willem Boot

Editors note: Gesha is an Ethiopian village and place name like Harrar or Yirgacheffe. Geisha is a coffee varietal.



Gesha beans with pulp removed



Pouring coffee from a clay jebena

Photos by Rachel Samuels

GESHA, Ethiopia

Coffee's reproductive biology limits its ability to improve its lot in life.

"It mostly reproduces by self-fertilization which occurs in about 90% of the flowers," according to Dr. Sarada Krishnan, a coffee plant expert and director of horticulture at the Denver Botanic Gardens in the U.S.

The result is countless varieties in its native Ethiopia – and a very, very small gene pool among arabica grown elsewhere.

Dr. Aaron Davis, leader of coffee research at the Royal Botanic Gardens, Kew, U.K., reports that only 0.03% of the genetic diversity available in coffee can be found in commercial farms worldwide. This is one reason why coffee is highly susceptible to pests and diseases such as coffee leaf rust (CLR).

"Enlarging the genetic base and improvement of arabica cultivars have become high priorities for researchers," writes Krishnan.

"In Ethiopia we have the opportunity to save the world's most astounding coffee cultivar, geisha, by reproducing the mother trees of this variety to preserve this unique genotype for many future generations," adds Dutch coffee consultant Willem Boot.

Enhancing coffee vigor is why in 1931 the British government tasked its consul in Ethiopia, R.C.R. Whalley, with obtaining coffee samples to plant in Kenya and Tanzania (the former German East Africa which gave way to British rule after World War I). It was the practice then for coffee farmers to plant many species. As the birthplace of arabica, Ethiopia offers the greatest genetic diversity of all.

Samples, named for the nearest location where they grew, were sent to agricultural research stations for evaluation. One variety the diplomat chose by happenstance proved robust, disease resistant, and intensely flavorful (although that trait would not be revealed for decades). The seeds are believed to have been sourced in the western highlands near Maji and Goldija. The coffee was labeled with some variant of Gesha, one of three like-sounding places (Gesha, Geiscia, and Gescia) in Pueblos Unidos, Ethiopia. At the time it was just another seed in the sack.



The Quest

Willem Boot during his first expedition into the wild coffee forest near the town of Gesha.

CHURCHILL, Manitoba

Willem Boot is watching for polar bears, sipping his superb La Mula Geisha and explaining that no one really knows how many coffee cultivars exist in Ethiopia – certainly thousands upon thousands.

It's November on the edge of Hudson Bay. The Tundra Buggy in which we are riding has plenty of hot water that would quickly freeze if spilled outside the cab. Boot makes geisha pour overs wherever he travels because when Boot says he fell for Geisha – it was head over heels.

This is the story of adventure, mishaps and serendipity during the decade Boot devoted to finding the mother of Panama Geisha – and how Dr. Sarada Krishnan proved he was right.

Botanical treasure

Boot first experienced the rapture of high grown geisha in 2004 as a professional cupper during the now famous “Best of Panama” competition. Price Peterson, who owns Hacienda La Esmeralda in Boquete, in the highlands of Chiriqui, submitted a little known varietal that year that professional cupper Don Holly called “God in a Cup.”

Boot scored the coffee at 98 on the 100-point Specialty Coffee Association of America (SCAA) cup quality scale – his top award ever – and amazingly 14 of the 15 judges gave it “super high” scores as well. No one in the group had tasted anything as memorable as the floral Esmeralda Special (Geisha), recalls Boot. Geisha varietals went on to win the Best of Panama competition for the next decade. Esmeralda won in 2005, 2006, 2007, 2009, and 2010 and received top recognition at several consecutive SCAA convention cuppings.

Media coverage was extensive and effusive. *New York Times* reporter Michael Weissman even wrote a 2008 book titled “*God in a Cup*.” The exposure drove auction prices higher with every season. At a time when coffee was selling for 48 cents a pound the Esmeralda was auctioned for an unheard of price of \$21 per pound. By 2006 the price had more than doubled and would peak at \$350 per pound in years to come.

In 2006 Boot established Finca La Mula on the side of the Baru Volcano, eventually planting 6,000 Geisha trees on steep wooded slopes at 1,700 to 1,800 feet. Last year geishas again won every top award. This time La Mula came out on top. In recent years La Mula has lived up to its name*, earning \$107 per pound. It retails for \$37.50 for 150 grams.

Esmeralda's first lot was small, only 3,000 pounds of coffee harvested from several areas on the farm. These would later become distinct brands: Esmeralda Special, Canas Verdes, Jaramillo, and Boquete. Once word got out of riches to be made several Boquete growers located mature geisha trees on their property and quickly planted more.

In a few years they were grossing \$5,000 to \$25,000 for 150- to 250-pound lots marketed as Elida Estate Geisha, Los Lajones Bambu Geisha, Las Brujas Kotowa, Ironman Geisha, Altieri Geisha, Carmen Geisha, Mama Cata Geisha and Geisha Rojas. Panama's annual geisha crop is now estimated at more than 150,000 kilos.

*Moola or moolah are slang terms for money (pronounced moo'la)





Coffee growing in Ethiopia sprouts in the nursery before it is transplanted.



Harvesting indigenous gesha seeds from the forest near Gesha, Ethiopia



Rachel Samuel, partner at Gesha Village Estate, is a professional photographer and documentary film maker. After 20 years of living in the U.S. she, her husband, and brother Yohannes moved back to their native Ethiopia to start a coffee farm.

When planted at 1,400 meters and below the elliptical cherry from the tall and gangly, low-yielding plants revealed little promise in the cup. Fortunately researchers in Tanganyika discovered that the big oval leaf trees showed some resistance to disease – especially fungus. This is why the varietal was sent in July 1953 to Costa Rica's coffee research center, the Coffee Institute Inter of Agricultural Sciences (IICA) and later to the Tropical Agricultural Research and Higher Education Center (CATIE).

In 1963 the coffee made its way to Panama where seeds obtained by Don Pachi Serracin were planted in the mountains near Boquete, an ideal high-mountain terroir at 3,900 feet and up. Trees from Gesha also found their way to Jamaica, Brazil and Colombia where researchers sought fungus-resistant varieties but in Panama the cherry from these trees literally blew past the competition.

No one knows exactly why, but in time the New World plants came to be

known as gesha, a varietal that today is judged to produce some of the finest coffee in the world. Retailers have bid as high as \$350 per pound since 2004. Lots generally sell for at least \$50 per pound in a specialty market that buys every pound offered.

That is why 80 years after gesha left Ethiopia Boot found himself mired in mud looking for a needle of a tree in 425,000 square mile haystack of undeveloped country.

Boot, 54, is a grower, consultant and professional coffee taster who roasted his first batch of coffee at the age of 14. He speaks six languages and has a master's degree in business economics from the University of Amsterdam. The Dutch native splits his time between Panama, where he owns Finca La Mula and co-owns Finca Sophia, farms with a total of 35,000 gesha trees, and Mill Valley, near San Francisco. Companies and organizations from around the world have employed the expertise of his California-based Boot Coffee Consulting since 1998. He offers hands-on advanced training from seed to cup. His obsession with gesha dates to 2004. (See *The Quest*, pg. 55)

Boot is keenly aware of the vulnerability of arabica. He knows first-hand the devastation caused by la roya (coffee leaf rust) and the coffee berry borer, a beetle that spread from Africa to the Americas with a host of plant diseases. His personal goal is to improve the quality of every aspect of coffee.

DNA is fundamental, he explains. According to Boot, planting the right variety to prevent major pests and diseases is ultimately the key decision a grower can make. "Instead of applying massive amounts of chemicals, growers should first look at the options provided by the natural pool of genetics provided by Mother Nature," he said.

Genetic diversity

Ethiopia is home to an estimated 40,000 wild varieties of coffee. Despite the passage of eons, most of this coffee resembles its ancestors.

This is why Boot sought to discover the link between the gesha that migrated to Panama and the trees at origin. Since the variety evolved its resistance to rust over many centuries during which the ambient temperature and rainfall varied, it is safe to assume there are similar relatives whose adaptations remain in their gene stock.

Returning to Ethiopia is a first step in the long process of invigorating coffee globally.

During the past five years the task has taken on new urgency. The spread of the la roya fungus depends on rain, wind, and higher temperatures. It was largely confined to low altitudes after its arrival in Puerto Rico in 1903. It was eradicated in the New World soon after and did not emerge as a threat until infecting Brazil in 1970. It then spread



Boot at Gesha Village Estate

The Quest

Boot reasoned that the scruffy rust-resistant wanderer that luck brought to Panama could have regal parentage.

"My theory is that we could go back and possibly find even better trees with even better resistance and flavor," said Boot.

There are five genes in coffee that can provide resistance and 49 different adaptations of coffee leaf rust discovered so far, the latest capable of attacking hybrids such as Timor, a coffee variety famous for its rust resistant properties.

The plants that eventually ended up in Panama had been selected from those bred in Costa Rica, which in turn, were planted in Tanganyika and Kenya in the 1930's. The cycles of multiplication invite genetic drift and genetic introgression.

Boot's exploits pursuing the parent trees of the Panama geisha easily fill a book. In November 2006 he spent weeks on a difficult journey into western Ethiopia, travelling from the provincial capital of Jimma.

"One of our explorations led to a vast, virgin forest southwest of Bonga. Our hike was grueling. The rains of the previous day had turned the narrow trail into a quagmire of red clay. We eventually reached a higher part of the forest. Thousands of proud, wild coffee trees greeted us defiantly. We felt like we were chosen to arrive at this sacred spot. I plucked some ripe, red berries of a mature, elongated coffee tree and tasted the lively sweetness of honey and papaya," he recalled in a 2013 article in *Roast Magazine*.



"I silently pondered the thought that this could be a wild geisha, and then I realized the miniscule, less than 1-in-50,000 chance of such a miracle," said Boot. "I came to the conclusion these were maybe cousins or second-cousins but not the trees that found their way to Panama."

His attention next turned to a heavily forested area north of Gesha in the Maji region. "My curiosity only grew stronger," he said.

In 2009 he met Adam Overton, an American documentary filmmaker and Rachel Samuel, his Ethiopian born wife and an acclaimed photographer. The two traveled from their home in Addis Ababa to Panama to visit Finca La Mula and hired Boot to help them start a coffee farm on 1,000 acres (400 hectares) near Gesha in western Ethiopia. In 2011 Boot traveled to the site of Gesha Village Estate, near the town of Gesha in the province of Bench Maji and his hunch grew stronger. At the time the "estate" was no more than a campsite with a satellite phone. Mindful of malaria, dengue and yellow fever, Boot mentions that tribespeople fled in panic at the sight of "white people in this noisy white Land Rover."

Overton had erected a primitive watchtower to sight marauding lions and bandits before it was too late. Everything was hand carried to the site which was guarded by AK47 wielding local tribes fearful of cattle rustlers. On his forays into the forest he was joined by spear-carrying locals.



Boot inspecting coffee cherries harvested in the Gesha forest in Ethiopia.



Adam Overton with the first seedling transplanted in 2013.



Indigenous gesha at the 'soldier' stage. Due to the high elevation seedlings remain in the nursery for 10-12 months.

to Nicaragua in 1976 and is now found throughout Central and South America at higher elevations where arabica thrives. Countries that are experiencing the greatest impact such as El Salvador, Nicaragua, Honduras, and Guatemala (See *Guatemala Report*, Pg. 40) simply do not have the resources to combat the symptoms without attacking the root cause.

Robusta (*coffea canephora*), which was first discovered in 1898 in what was then the Belgian Congo, has developed a strong defense against roya but does not deliver the satisfying taste of a high grown arabica. Agronomists, during a period of 50 years, have since created several arabica hybrids that display resistance and taste good which is a promising development.

Unfortunately there are many races of coffee rust with varying degrees of virulence. These newer strains of the pathogen are unaffected by the resistance genes within specific cultivars which often take many years to develop.

Geisha goodness

Geisha T.2722 is resistant to Race II but susceptible to six of the 49 known races of la roya. Due to its low yield, geisha was initially rejected in favor of red caturra. The discovery of the Ethiopian mother stock could tip the balance in favor of geisha as there are no caturra or catuai coffees with cupping scores that rival geisha. In the past 11 years of Cup of Excellence competition hybrids have never won the top prize.

"Rust resistant hybrids that cup well are today's Holy Grail for coffee farmers around Latin America," said Boot. "Countries including Colombia and Honduras have booked great results with the development of new, higher quality, rust-resistant hybrids like castillo and lempira," he said.

Once the technical hurdles are behind there remains a political challenge. Ethiopia is a landlocked country without a single rail line. The people of Ethiopia have been exploited for centuries leading to poverty, insurrection, and general distrust of Europeans and those from the New World.

Boot is optimistic, "Hopefully, the Ethiopian government recognizes the development of hybrids as an economic opportunity and maybe this could lead to the production of super quality rust resistant varieties in the near future." ☕

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Branch of Panama geisha tree with typical large dark green oval shape leaves

What he discovered lifted his spirits. “The traits of the Panama geisha were evident in wild plants throughout the region,” said Boot. The elongated cherry, Christmas tree like branches and dark green oval foliage all resembled Panama. He returned once more in Feb. 2012 to explore a remote forest at an hour’s drive from the Gesha estate. It was then he stumbled upon a forested high plateau with acres and acres of wild coffee underbrush.

“I felt as if I were in heaven. We had stumbled upon an uncountable number of wild coffee trees growing under the soothing protection of primary shade. Practically all of the trees were in full blossom. An invigorating scent of jasmine perfumed this pollen-infused paradise. The reality had become better than the dream itself!” he recalled.

Looks can be deceiving

Boot now needed scientific proof that DNA in the Ethiopian trees was closely related to that of the Panamanian geisha. These tests are generally done using leaves or seeds but Ethiopia has strict regulations (and painful penalties) for removing tissue material.

“I was in Kingston, Jamaica working with a client and organizing my stuff while considering the protocol for gathering alternate plant material for testing. I had read of the research work of Dr. Sarada Krishnan in Madagascar and nearby Sudan. Dr. Krishnan is the director of horticulture at Denver Botanic Gardens. I decided to give her a call,” he said.

“I’m traveling in Jamaica,” he said, “perhaps we can talk next week.”

“Guess what, I am in Jamaica too!”

“We spent an hour at breakfast the next morning. I scribbled out my idea to extract the DNA from green coffee beans and compare the genetics of Ethiopian



Geisha coffee beans require a meticulous roasting. The beans have an elongated, opened structure allowing heat to penetrate easily. As a result the heat must be applied carefully with a gradually increasing Rate of Rise (RoR) and a relatively short roasting development time (Rd).

gesha with the Panamanian geisha,” said Boot. “Maybe there is a way,” she said. “I’ll do my best to make it work, but no guarantee.”

Krishnan ground the dried green beans in a Cuisinart and after modifying the extraction protocols was able to extract the genomic DNA.

“She was very diligent. It took her nine months,” said Boot.

The research paper she published demonstrates “a high likelihood that the trees we found in Ethiopia are related to those in Panama,” said Boot.

Gesha Village Estate

Overton and Samuel are tending more than 700,000 trees, of which at least half are descendants from the trees that were found in the nearby Gesha forest. Boot explains, “These Gesha variety trees already display close resemblance to the geisha coffee trees I started growing at my own farm, Finca La Mula, in Panama.”

The very first harvest has been encouraging. In November Boot cupped the first pickings publicly in Korea following a lecture on the varietal. To the Koreans “the flavor was as surprising as I recall,” said Boot.

It may take several years to develop cultivars that potentially produce greater disease resistance, higher yields and superb taste.

DNA testing in Ethiopia will continue using the beans produced at the newly established Gesha Village Estate. Now that they have ready access to a nearly unlimited gene pool, researchers like Dr. Krishnan can identify genetic markers, assess the genetic variability and dial in desired traits.

Aside from growing world-class coffee there are other truly interesting opportunities,” said Boot, adding “One day Ethiopia could make more money licensing genetic stock than exporting coffee.”

Eighty years after leaving, like the prodigal son, the legacy of Gesha has finally returned home to a promising future indeed. ☕



Ripening geisha cherries