

# TEA & COFFEE

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A golden Dallah, a traditional Middle Eastern coffee pot, stands on a sand dune. The pot is ornate with intricate patterns and has a long, curved handle. The background is a vast, undulating desert landscape under a clear sky.

**Middle East:**  
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Blends Traditional  
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## Update on Brazil: Challenging Agronomics and New Genetic Tools

Brazil's ongoing drought has caused a flurry of market speculation and driven prices to new highs. Crop estimates appear weekly assessing the damage of the drought and weather effects on Brazil's 2013-14 and 2014-15 harvests of Arabica.

As the world's largest coffee producer, Brazil's output obviously has a major impact on global supply. The country's ongoing drought has caused much market speculation and driven prices to new highs. New crop estimates continue to emerge weekly to assess the damage of drought and weather effects on Brazil's 2013-14 and 2014-15 harvests of Arabica coffee. But this year's drought and weather events have not affected the country uniformly. Individual farms have experienced individual challenges, but recently developed genetic mapping tools are providing new ways for Brazilian producers to exercise greater input in the way the coffee trees they plant react to sporadic weather.

### Weather's Effects on Production and New Plantings

NUCOFFEE is an integrated consortium of Brazilian growers and cooperatives based in Sao Paulo. The company focuses on two-way traceability through the supply chain and monitors how agronomics translate to final cup quality. "The impact of the high temperatures, low humidity and rainfall during January through March 2014 have caused a permanent measurable damage in productivity to the current crop and likewise to the next crop now to flower," said Christian Wolthers, CEO and president of Wolthers Douque, Ft. Lauderdale, Fla., the exclusive US importer of NUCOFFEE.

"Now it is important to follow the weather pattern and hope for plentiful rains during October 2014 through March 2015, safeguarding the minimum 40 – 45 million bags expected after the

drought effect. [Output] is very difficult to measure as the effect of the drought was very severe throughout all farms in the impacted areas," noted Wolthers.

Nobletree Coffee, New York, is a similarly integrated enterprise. Starting in Brooklyn earlier this year, they roast and wholesale beans from their two Brazilian farms, Monte Verde and Santa Izabel, in the Sul de Minas region of Ouro Fino in Minas Gerais.

Byron Holcomb, on-site director of agribusiness with Nobletree, observed several impacts of Brazil's lack of timely rainfall. "Both farms have experienced the drought in two main ways: first is a drop in production of over 30 percent for the 2014 harvest crop from our last crop estimates. Second is an extreme stress on the plants, compromising the harvest for 2015. A third effect was on the planting carried out from January to April 2014. Planting during a drought is difficult. However, the trees have stayed dormant and not really grown because of the lack of rain from February to May. Therefore, the future commercially viable productions of those trees has been pushed back almost a full year."

Calculation of harvest volumes is an important component of assessing whether or not decreases in Brazilian production will lead to an overall global supply deficit, but the more significant drought impacts might not be felt until future harvests, when lower production for consecutive harvests means a void of carryover stocks to soften the blow of scanty harvests. During the annual September meeting at its London-based

headquarters, the International Coffee Organization reported that Brazil's 2015-16 harvest might be the crop year with cause for real concern.

"There is no doubt that there is a deficit in the market for 2014-15, but we have two years of good stocks [from Brazil] so the industry is okay for 2014-15, but the 2015-16 season is dubious," said Mauricio Galindo, head of operations, ICO. "Another bad weather situation could make stocks more vulnerable."

### Drought Drives Up Production Costs

One side effect of Brazil's drought is the unexpected way it is driving up costs of production through an increased need for manual labor.

Nobletree's CEO John Moore said, "We found this year that we have smaller seeds and more damage to the seed, which we believe was due to the drought. As the seeds this year were smaller, it took more cherries to make a volumetric unit of "measure" that serves as the baseline for payment and productivity. This means more fruit picked to equal that measure, which means more labor per measure which in turn means higher cost per measure because the fruit itself was smaller."

Prices may currently be high, but any increase in earnings will go directly to offsetting the higher costs that proved necessary to produce this year's limited harvest. "The seed formation inside of the fruit was smaller since the plant was more worried about sustaining itself and surviving than propagating fully developed seeds. As a result, the weight of each seed was less, which means we needed more seeds to make up the final exported unit of measure, the 60 kg or 132 lb bag," said Moore.

NUCOFFEE experienced a similar reduction in bean size, but noted that the smaller beans, while more expensive to harvest, still deliver a desirable flavor profile. "One thing is sure, the quality is now measured to be very good although smaller in bean size," said Wolthers.

### Genetic Sequencing Offers Long-Term Impacts

Climate variability is emerging as the new

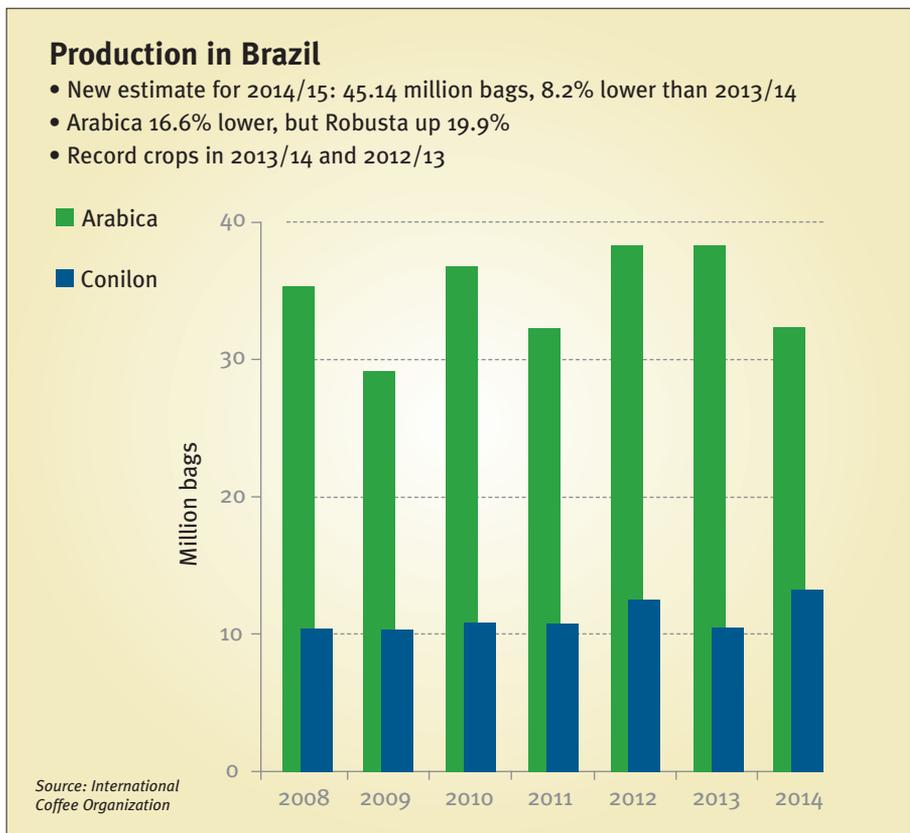
norm for coffee production, and to respond to rapidly shifting environments, geneticists are mapping and sequencing genes of Robusta (*Canephora*) and Arabica coffee in order to precisely locate the genes and alleles (versions of a gene) that allow certain coffee plants to adapt and survive in climates with unprecedented patterns of temperature and rainfall.

The research report, “Towards a Better Understanding of the *Coffea Arabica* Genome Structure,” was presented at the 25<sup>th</sup> Annual Association for Science and Information on Coffee (ASIC) conference in September in Armenia, Colombia. The report’s abstract states that, “In an effort to elucidate the complex evolutionary history of *C. arabica*, as well as generate critical information for breeding programs, a genome sequencing project has been initiated. The goal of the sequencing project is to produce a high quality genome and develop tools that will make the finished genome accessible and useful to breeders and researchers.”

Brazilian institutions worked with US universities and European research centers to realize the genetic mapping and sequencing project. Participating researcher, Alexandre de Kochko of International Research for Development (IRD) in Paris cites “collaboration with EMBRAPA (Brazilian Agricultural Research Company) for the sequencing of the *Canephora* genome and with EMBRAPA and IAPAR (Paraná Institute of Agronomy) for the sequencing of Arabica.”

Genetic mapping is a process that identifies the general locations of genes within a plant’s DNA and sequencing provides the information on diversity within the genome that can be exploited for potential improvement. “Sequencing a genome means deciphering the sequence of the DNA that constitutes the chromosomes of that organism. Here, a high quality genome means that we could obtain about 80 percent of the genome of *C. canephora*,” said Kochko.

Kochko explained that once the research team obtains a sequence of genes, “It will be possible to identify differences within these genes among different



clones or cultivars. It will then be possible to establish relations between a plant’s [genetic] composition and the behavior of a plant in defined conditions, such as during drought or pest attacks, and also between its yield, quality and other phenotypic traits and its composition of alleles [specific versions of a gene]. Alleles related to a specific trait can easily be transformed into molecular markers and thus be used for selecting plantlets [early] in a breeding program.”

More accurate selection during plant breeding allows coffee growers to propagate only coffee trees that have desirable traits. The more trees that make it to the field ready to face variations in climate and corollary pests/plagues means less loss when extreme weather events and disease outbreaks occur.

“Among the different things that the sequence of a genome reveals, there is also information about gene functions and their regulation. This is also valuable information for better understanding how an organism functions and evolves. This is very useful to draw models of probable evolution to come according to the changing environmental

conditions,” said Kochko.

Nobletree is already actively exploring the intersection between the variable genetics of coffee varieties and Brazil’s many coffee-conducive climates.

“On both farms we have five commercially productive varieties,” said Holcomb. On Santa Isabel we have installed three variety gardens each with the same 15 varieties, but in two different altitudes (one at 1180 meters and two near 1000 meters) and the other is organic production. Our focus is on the combination of genetics with the environment. We plan to dedicate areas on both farms to variety gardens that will provide a testing ground for the combination of genetics with specific environments. Once those trees start producing, we can evaluate the third element, which is the cup quality.”

Brazilian producers are preparing for effects of a drought that carry long past this year’s harvest. Perhaps the greatest impact of Brazil’s 2014 drought is the motivation it gives stakeholders to invest in researching diverse varieties and their interaction with Brazil’s array of coffee production climates.—*Rachel Northrop*