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Breakthrough in Storing High Quality Coffee

By Steve Aronson, Raul Raudales, Rich Trubey and Philippe Villers

Cafe Britt of Costa Rica (www.cafebritt.com), working with the U.S.-based Mesoamerican Development Institute (MDI), has developed a new technique using hermetic storage which allows pesticide-free long-term storage of coffee in its parchment state, without loss of quality, aroma, or appearance for a period of five months or more.

Until now, the problem of storing premium coffee over the post-harvest season in producing countries, that are typically hot and humid, has been largely unsolved. Even when the coffee beans are properly dried, over time they absorb moisture from the atmosphere and, as a result, deteriorate.

This is true even when coffee is stored in the parchment state, and more so with green coffee bean storage, where the bean - with its husk removed - is more susceptible to deterioration.

The new technique has been successfully applied at Cafe Britt, a major Costa Rican producer of premium grade coffees and Costa Rica's largest seller of such premium grade coffee to foreign tourists.

As an integrated supplier, Cafe Britt has its own coffee plantation, supplemented by purchases from other coffee growers, and its own facilities for processing coffee, including drying, roasting and producing vacuum-sealed, retail packages, as well as some of its own retail stores.

In Costa Rica, the coffee crop is harvested from October through February. This coffee is then consumed or exported from March onward. Therefore,



the need for long-term storage, which preserves the quality of premium coffee beans, is critical.



MDI, located in Lowell, Massachusetts, is a pioneer in environmentally beneficial methods of processing coffee, including high performance industrial solar dryers for drying coffee beans and the subsequent storage in the (patented) hermetic enclosures called Cocoons, manufactured by GrainPro, Inc., Concord, Massachusetts, U.S. The present cooperative effort in applying hermetic technology to the problems of safe commodity storage uses air and moisture-tight flexible PVC enclosures made from a special grade of UV resistant PVC to provide a hermetically closed environment. The present application is the outgrowth of two decades of scientific work and the use of hermetic storage for a variety of agricultural uses in some 20 countries, ranging from the long-term storage of seeds to the long-term storage of various grains, such as rice, wheat and corn, and most recently extended to high-value commodities, such as coffee, cacao and spices.



All these applications share the common benefit of maintaining a constant environment inside the Cocoon, meaning no increase in moisture level, retention of any gases generated by the commodity itself, and in most cases producing very low oxygen levels and high CO₂ levels due to insect or commodity respiration (when present). This low-moisture and low-oxygen state inhibits the growth of aflatoxins, a by-product of mold development that is both dangerous to health and affects quality and taste, and results in the killing of all insects without pesticides through asphyxiation.



Initial trials of the Cocoon for storage of coffee in standard jute bags of 43 Kg (94 lbs.) began at Cafe Britt's mill in Tres Rios, Costa Rica, on May 24, 2004. and covers long term storage of coffee beans for the period of May 24 to November 1, 2004. They measured the effect of storage through monthly random samples of bags of coffee beans stored in hermetic Cocoons and compared this with coffee beans stored in unprotected jute bags in their warehouse and coffee beans stored in bulk (multi-ton bins).



During this time, ambient temperature in the warehouse fluctuated from 60° to 94°F. Data recorders placed inside the Cocoon showed that the temperature inside the bags stored in the Cocoon ranged only from 70° to 80°F. During the same period the temperature of the coffee beans stored in a large open bin varied from 63° to 83°F, while in unprotected jute bags temperature ranged from 60°F to 94°F with respective averages of 70° to 71°F for all three.

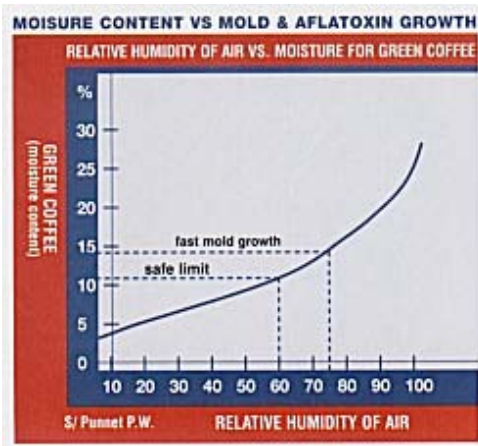


Humidity in the Cocoon, a critical parameter affecting quality, ranged from 54.2 to 57.4% and averaged 56.4%, while humidity in the warehouse ranged from 33 to 88.5% and averaged 71%. By September, the moisture level in the beans stored in the Cocoon had changed from 11% to only 11.5%, while moisture level both in the beans stored in unprotected jute bags and in bulk rose to 13%.

It is important to note that properly dried coffee needs to have moisture levels of below 13%, which corresponds to an ambient relative humidity of



60%, since mold growth and aflatoxins increase rapidly with relative humidity, and consequently moisture is absorbed by the coffee beans.



Results of Cupping Tests

Each month samples were drawn from the coffee stored in Cocoons, the coffee stored in bulk (large bins) and the coffee stored in bags. These were tested for quality with blind cupping tests by Café Britt's cupper, Carmen Lidia Chavarria, and in separate tests, by Jimmy Bonilla, the cupper for the Costa Rican Consortium, COOCAFE. Results were recorded on a five-point scale (five being perfect) for taste, aroma, body, acidity and an overall judgment

called "cup average."

After two months, there was already a significant difference between the three groups, while "cup average" of 4.0 remained for coffee beans in the Cocoon, coffee in unprotected sacks was already down to 3.8 and in large bins 3.5. The overall cup quality continued to diverge, and after a storage of five months the "cup average" remained at 4.0 for those in the Cocoon and dropped to 3.0 for both unprotected coffee beans in bags and coffee beans in bulk. The superiority of coffee stored in hermetic Cocoons became very noticeable.

For the coffee beans in Cocoons, Chavarria noted, "Very good flavor despite being from the previous harvest. Slight floral flavor." For those in unprotected bags, Bonilla noted, "Slight old flavor perceptible in the cup, slight harshness, tainted." As for the beans in large open bins, he said, "Old flavor perceptible in the cup. Slight harshness, tainted."

Follow On

As a result of this trial, Cafe Britt is now planning extensive use of Cocoons to allow long-term storage while maintaining high quality coffee. In addition, Mesoamerican Development Institute and Cafe Britt, in cooperation with the Cocoon manufacturer, GrainPro, Inc. are exploring the same hermetic technology used in Cocoons for the large open bins. This would allow safe long-term storage in either bags or bulk, depending on the need. Furthermore, they are also studying the use of a special hermetic liner for standard 68 Kg. jute bags for export using the so-called SuperGrainbags as liners. The ultra-low permeability of SuperGrainbags ensures that even with export sack sizes, there is no loss of quality during shipment from the country of origin and subsequent storage by importers and roasters all over the world, allowing for safe storage until next year's harvest becomes available.

Conclusion

Cafe Britt is now in a position to maintain freshness and high quality, allowing for storage of production until coffee from the previous harvest is consumed and new supplies become available. Studies are currently being conducted to determine if Super Grainbags would aid in maintaining freshness in coffee without refrigerated shipments and/or storage by consumers.

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The same hermetic technology, which has now been proven for coffee, has been applied to other high value commodities, where preservation of quality for long periods of time is important.

For more information contact MDI 978 937-3460 (www.mesoamerican.org); or GrainPro 978 371-7118 (www.grainpro.com).



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