

Boron for Brazil

With spectacular success in controlling inflation, the economic giant of South America is beginning to fulfill its industrial potential, after years of underperformance. In Brazil, the stable new (*Real*) currency, the return to democracy, the expansion of diversified mining activities, and the establishment of vast new agricultural areas on land previously considered infertile, are all vital factors - yet it can still be argued that a buccaneering phase in the history of coffee has given Brazil its thirst and impetus for modern development.

Indigenous only to Ethiopia, coffee (*Coffea arabica*) was an Arabian, mainly Yemeni, monopoly for centuries. The secrets and fruits of its cultivation were closely guarded, and export of seedlings or fertile berries was forbidden on pain of death. Yet a very lucrative trade was enjoyed with parts of Asia, and later Europe, in beans that had been boiled or parched to destroy their ability to germinate.

The Dutch succeeded in stealing a healthy coffee plant in 1690 (earlier according to some reports), nurturing it at the Amsterdam botanical gardens, and planting its progeny in the Netherlands East Indies. In 1714, a Dutch-grown coffee plant was presented to Louis XIV and entrusted to his royal botanist, de Jussieu. It in turn blossomed at the Jardin des Plantes (Paris), but a few years later de Jussieu refused to cooperate with a young officer from Normandy who conceived the idea of growing coffee in the French West Indies. Accordingly Mathieu de Clieu

helped himself to one of the plants, and bore it off quickly and secretly to Martinique. The plot now thickens.

Coffee acclimatized very successfully in Martinique, and spread to other Caribbean islands, as well as to Cayenne and Surinam (respectively French and Dutch Guiana) on the South American mainland. Fierce rivals territorially and commercially, both the latter colonies banned the further export of coffee seed or seedlings, especially to their big Portuguese neighbor Brazil. In 1727, however, Brazil was invited to arbitrate in a border dispute between the French and the Dutch, and sent Colonel Francisco Melo de Palheta. Whilst in Cayenne, Palheta divided his attention between the boundary problem and the French governor's wife. Equally successful in both endeavors, he was presented at a farewell banquet with a bouquet of local flora in the bosom of which the governor's wife had hidden fertile coffee beans and seedlings.

And now because of that farewell bouquet, 'there's an awful lot of coffee in Brazil'? Not quite; they tried planting coffee in the northern state of Pará but it failed. It was in Paranã, south of São Paulo, that coffee first brought out the genius of Brazilians.



Engraving of *Coffea arabica* - coffee



"Café de Brasil madame, monsieur?" Likely a less common question today, unless borates had helped establish Brazilian coffee plantations.

Part of the reason for the initial failure was probably boron deficiency - lack of borax - in the soils of the Amazon basin.

The element boron is one of the seven micronutrients which are essential to all plant life, but it is required in larger doses by some plant species than by others. Coffee, brassicas and grapes, for example, are all very susceptible to boron shortage while most cereals are much less susceptible. With boron supplementation to the soil, many other parts of Brazil now

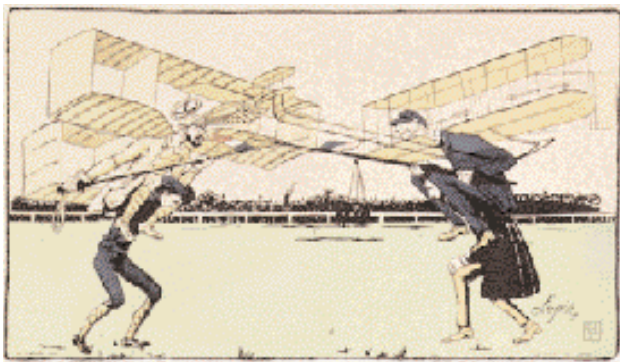
grow excellent coffees, helping the country to maintain its position as the world's premier producer - a position which it has maintained in the face of stiff competition for well over a century. This is largely thanks to the coffee culture skills and enterprise which Brazilians have developed in different regions, and which are now being transferred to new crops and new territories.

Today the price of coffee is at an all-time high, for reasons that include shortages and low prices in

the early '90s, a cyclical predominance of low-yielding young plantations, and bad weather. The high prices are enabling growers to invest positively in the future by the optimal application of fertilizers and micronutrients, such as borates. Yet the more important future benefits of the coffee experience may be seen as preparation for the agricultural development which is now helping to transform the Brazilian economy. For example, Brazil has become



The sinuous groves of Brazilian coffee cultivation



*Early flight pioneers Santos Dumont and Wilbur Wright duel for aviation honors.
Cartoon by Lupin Honroca, 1908.*

Aviation age brewed up by Brazilian coffee

While the American Wright brothers are justly honored for the first heavier-than-air powered flight (1903), Brazil's Alberto Santos Dumont made a spectacular contribution to man's mastery of the air. 'Le P'tit Santo' worked in Paris, but he funded all the aircraft he designed and built from the Brazilian coffee fortune he inherited from his father. His achievements include the first flight in a given time from St. Cloud to the Eiffel Tower and back (1901), the first airship station (1903), the establishment of a fleet of dirigibles which he flew around the streets of Paris between the houses, and prize-winning heavier-than-air flights in 1906 with *espresso* speeds above ten meters per second (say 25 mph). However, his outstanding achievement was the 'demoiselle' or 'grasshopper' of 1909, the first successful monoplane and true forerunner of modern light aircraft. Without coffee, man would still have mastered flight, but it may have taken a little longer.



one of the world's leading producers of cotton, and its apple production is growing year by year. Both these crops are strongly boron-dependent. Boron is also applied widely in the orange plantations which make Brazil a world-class citrus producer.

Soybean expansion

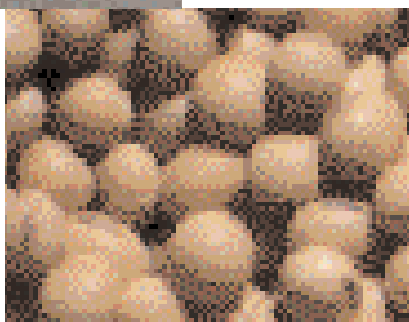
Agricultural expansion and diversification is also illustrated by the expansion of soybean as a major crop in a very short space of time. Originally grown in the southern states of Paraná and Rio Grande do Sul, the soybean is now being cultivated over more than three million hectares of Mato Grosso, Goiás, and Pará way to the north. In only three years, soybean productivity across this huge area has grown to match the rates achieved through high technology agriculture in the United States - although this part of the Amazon basin, known as *cerrado* and long believed to be low in fertility, is boron deficient.

Agricultural borates, therefore, are an essential partner to Brazil's new soybean farmers, enabling them to

compete internationally with the world's best, and take full advantage of the great transportation system provided by the Amazon and its southern

tributaries. This gives them savings of \$25 per tonne compared with growers in the traditional areas.

Despite the country's giant size, no viable borate deposits have been found in Brazil. Its giant status in world agriculture, however, owes much to judicious application of agricultural borates.



Soybeans

Borax services in Brazil

Borax Brasil was set up in São Paulo in 1994, at the start of the country's new economic era, further to develop services provided in the country by Borax Argentina for some 50 years. The borosilicate glass, fiberglass, and ceramic industries are by far the most important borate users - the present scale of their operations being illustrated by such figures as an annual production of over 15 billion ceramic tiles.

Borax ensures that these industries have the best possible choice of borates. Still working very closely with Borax Argentina, it is responsible for a borate supply system which brings 20 Mule Team® products to a vast territory, providing Solubor® and other fertilizer borates from Argentina, North America and Europe, boric acid from North America, and borax, Boroglas® and hydroboracite from the Andes.

The expertise and services of Borax Technology are available at short notice to all Brazilian customers, and technical service visits by specialists in both industrial and agricultural applications are regularly undertaken as part of the worldwide Borax philosophy. As this article goes to press, for example, the multi-disciplinary ceramics team, featured in Borax Pioneer No. 10, is at work in Brazil.

"Borate use inevitably increases with industrial expansion, and Borax Brasil is committed to full collaboration with industry and agriculture as our country continues to develop its economy," says Sergio Perella, Borax manager in São Paulo.