PA 152 BRAZILIAN COFFEE FREE-AIR CARBON DIOXIDE ENRICHMENT (FACE) FACILITY: PREDICTING THE IMPACT OF CLIMATE CHANGE

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The atmospheric CO_2 concentration has been increasing significantly in the last decades, despite the international efforts for the reduction of emissions. The coffee FACE facility (Fig. 1) was established at Embrapa Environment in 25 August 2011, in Jaguariúna (latitude 22°41'S, longitude 47°W, altitude of 570 m a.s.l.), São Paulo State, Brazil, in order to generate field response data in broad-acre coffee to elevated CO_2 air concentration and water supply. Diseases, pests and weeds, as well as plant physiology of two coffee cultivars (Catuaí Vermelho IAC 144 and Obatã IAC 1669-20), multitrophic interactions and soil attributes have been monitored in twelve 10-m-diameter octagonal rings (plots) located within a 7-ha coffee field. Six rings, representing the control treatment, were left under untreated conditions (current atmosphere), whereas other six rings have been treated with pure CO_2 to achieve the concentration of 200 ppm above ambient concentration, supplied by a bulk CO_2 container with the capacity of 20 t.

The system instrumentation is based on wireless sensor network technology. Environmental sensors (infra-red gas analyzers – IRGA - to measure the CO_2 concentration, anemometers, sensors of air and soil temperature and humidity, solar radiation and precipitation) have been adapted to ZigBee modules. Each octagon segment has individual gas valves to compensate the wind direction and a flow control device to compensate wind speed changes.

The FACE facility is part of the project entitled "Impacts of climate change on plant diseases, pests and weeds - Climapest" (http://www.macroprograma1.cnptia.embrapa.br/climapest), which has been supported by Embrapa (Brazilian Agricultural Research Corporation).

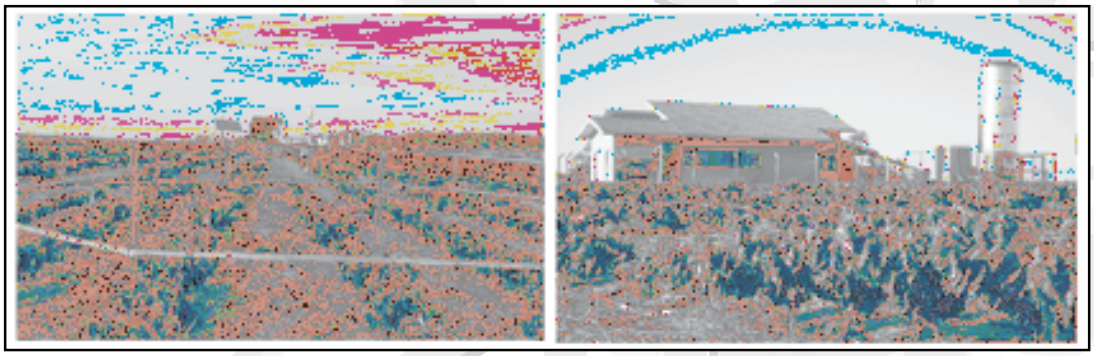

Figure 1. View of a ring (left) and bulk CO_2 container (right) of the coffee FACE facility.