

COFFEE LEAF RUST

RUST: THE OBSESSION OF COFFEE PROFESSIONALS

H*emilia Vastatrix*, commonly known as coffee rust or *roya*, is a specific follicular disease of the coffee tree. It is propagated by winds and the splash effect. A true global scourge, it eradicated the coffee plantations of the Ceylon island in 1866, which has since been replanted with tea, then, Indonesia in 1876. This fungus was identified in Brazil from 1970, it manifested in Central America from the 1980s. The recent rust epidemic involves a new strain (like the annual flu), it started in Colombia where it has been particularly virulent since 2008, and in Central America since 2011, especially in El Salvador (-62.5% of production in 2013/2014).

According to CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement), the sudden extension of the *roya* from Colombia to other countries in 2012 could be linked to the El Niño phenomenon. *"The low rainfall did not allow the leaching of spores and was sufficient to ensure germination,"* while the heat *"shortened the latency period of the disease and greatly increased the intensity of the epidemic. It has also favoured attacks in highland areas, which are considered unfavourable to the disease because of usually cool temperatures. In these areas, producers generally do not apply a preventative treatment to control rust. The implementation of treatments in 2012 was therefore late, often when the damage was irreversible"*. The wind would have done the rest, *"by dispersing the rust over great distances."* The spore load was so large that the epidemic was huge. As a result, rust rose from country to country to Mexico, and its impact before stabilization in 2016 was immense. Central America's losses are estimated at 20% of its production. It accounted only for 10.8% of world production in 2017/2018.

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The research institutes of all the producing countries were very early mobilized and continue to develop resistant varieties by cross-breeding with *robusta*, or by exploring the crossing of resistant varieties from *C. canephora*, like the *Timor Hybrid*, with Ethiopian varieties in order to combine strength and cup quality.

To combat rust, the 'traditional' tools are the renewal of trees with younger trees, resistant species on mixed plots and the use of contact or systemic chemicals. Nevertheless, research and studies carried out in the struggle against this scourge have revealed a reality that is a little more complex.

First of all, this fungus likes humidity, it has been shown that its virulence depends on the physiological state of the coffee tree. That is, in full sun, the stressed coffee tree will produce more fruits but is also more vulnerable to rust. On plots planted with high yield/ha, the incidence of rust can be greater and the spread faster.

Secondly, research into disease management and limitation mechanisms has shown that complementary mechanisms need to be put in place. *"Fertilizer applications are critical, but little research has been done on the effects of the relationships between soil fertility management, plant nutrition and physiological resistance to rust"* (Avelino, 2016). Many research projects have emerged on this theme: such as the one led by Katherine Polakiewicz (UC Davis) and Jacques Avelino (CIRAD) - with funding from the NGO Catholic Relief Services in 2016.

The aim was to study the effect of soil fertility and coffee nutrition on the incidence and severity of rust in Honduras, Guatemala and Mexico, to enable good management practices to be put in place.

Soil science has long-neglected soil quality and 'life' issues, and our intensive production systems are a reflection of this. We have been neglectful of agronomy for years, however, living soils are now defended by media specialists like Lydia and Claude Bourguignon. Scientists and individuals are more and more numerous to seize these subjects. This is good news because the more alive soil is, the more resilient and less likely to struggle it will be.

Field projects have also shown that agroforestry systems have natural antagonists to rust. It is also possible to inoculate natural antagonists but they are expensive and the results are in the medium term (3 years). World Coffee Research has launched a program to isolate certain natural antagonists present in the forests of Ethiopia.

There are still many ways to explore rust, scientists from different research institutes around the world are mobilized to understand how to live with rust and minimize its devastating effects.