

State-of-the-Art of Developing Arabica Coffee Cultivars with Durable Resistance to Coffee Berry Disease (*Colletotrichum kahawae*)

H. A. M. VAN DER VOSSEN

Plant Breeding & Seed Consultant, 1606 CA 18 Venhuizen, the Netherlands
E-mail: herbert.vandervossen@quicknet.nl

SUMMARY

In response to heavy crop losses caused by recurrent CBD epidemics in arabica coffee in Africa, breeding programmes aimed at developing cultivars with host resistance to this destructive fungal disease were initiated some 35-40 years ago in Kenya, Ethiopia and Tanzania. The release of CBD resistant cultivars to the coffee growers has been in progress in the first two countries since 1985 and more recently also in Tanzania. The resistance of cultivars like Ruiru II (Kenya) and Ababuna (and other cvs in Ethiopia) appears to be of a durable nature, since confirmed cases of a breakdown of host resistance under field conditions have not been reported over the past 20 years. Isolates of the CBD pathogen from divergent origins may vary considerably in aggressiveness when tested under controlled conditions by inoculation of berries and seedling hypocotyls, but statistically insignificant pathogen-plant interaction effects indicate the absence of physiologic races. Host resistance to the hemibiotrophic fungus *C. kahawae* appears to be of a quantitative nature but is nevertheless practically complete in some genotypes of arabica coffee. There is still no consensus among coffee breeders on the type of genetic system, some claiming convincing evidence for oligogenes (1-3 major genes) and others for polygenes determining CBD resistance. In this review, further evidence for major-gene resistance will be presented from earlier genetic studies based on arabica germplasm of Ethiopian origin. The discovery of closely linked molecular markers and very recently even the genetic mapping of one major gene for CBD resistance present in certain Hibrido de Timor genotypes provides additional support for oligogenic inheritance of CBD resistance. In the case of CBD, observed plant-pathogen interactions include an active defence mechanism of cork barrier formation preventing the pathogen from invading more host tissue at an early stage, which can be interpreted as race non-specific resistance. However, much more needs to be known of plant-pathogen interactions at the molecular level, in particular the cascade of defence responses through downstream signal transduction triggered by the initial invasion of host cells by the CBD pathogen, to understand and possibly improve the durability of CBD resistance. The development of cultivars combining yield and quality with durable host resistance to CBD is a most effective way of increasing economic sustainability of arabica coffee production in Africa. It has also considerable relevance to Latin America and Asia, where CBD is still a quarantine disease but with the constant threat of one day becoming endemic, just as has happened earlier with the coffee leaf rust disease. Adequate funding and close networking among all major coffee research centres in the world, in conventional and molecular breeding for durable CBD resistance, are prerequisites to achieving such cultivars.