

The history of breeding for basil downy mildew resistance in sweet basil (*Ocimum basilicum*)

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Abstract

Ocimum spp. is one of the most important herb genera in the world and contains over 60 different species, many originating in sub-Saharan Africa, including several economically important ones. Sweet basil (*O. basilicum*), one of these species, is ubiquitously grown throughout the world as a popular culinary herb. In the past two decades, basil downy mildew (BDM), discovered in Uganda in 1933, has spread throughout the basil growing world devastating basil crops and forcing growers to adopt costly control measures. Until recently no commercially grown sweet basils have had resistance to BDM resulting in major losses due to most pesticide regimes having little efficacy. After screening hundreds of basil accessions including exotic basil species, most from sub-Saharan Africa procured from the USDA GRIN and commercial sources multiple basils with resistance were identified. No resistance was found in sweet basils and attempts at crossing exotic resistant basils with sweet basils generally resulted in lack of fertility and breeding dead-ends. One exotic accession with resistance, named MRI, was identified only as *O. basilicum* after we conducted a genetic diversity analysis of the germplasm collection at Rutgers and when crossed with sweet basil resulted in fertile crosses. MRI, purportedly from Zanzibar, was crossed with the Rutgers breeding line SB22 and resulted in four downy mildew resistant sweet basil cultivars that are now commercially available. Other exotic sources of downy mildew resistance have been successfully introgressed into sweet basil by using embryo rescue to overcome the F1 infertility issues. This technique allows new sources of disease resistance from exotic basils to be introgressed into more widely grown sweet basils. Using indigenous wild relatives from other *Ocimum* spp. has been effective in the search for sources of genetic disease resistance, new aromas and flavors.