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FOUR YEARS OF THE EUROPEAN D.A.R.E. PROJECT : NUMEROUS RESULTS ON APPLE SCAB AND POWDERY MILDEW RESISTANCE GENE MAPPING.

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The D.A.R.E. project (Durable Apple Resistance in Europe, 1998 - April 2002, partly supported by the European Union, DG VI, FAIR5-CT97-3898) is devoted to the development of plant material, pathogen reference strains, genetic maps and marker-assisted selection ; the basis for the creation of new apple varieties carrying durable resistance against scab (*Venturia inaequalis*) and powdery mildew (*Podosphaera leucotricha*). The genetic architecture of apple resistance against these two fungi is more specially analysed. Four related F1 progenies have been used to construct the corresponding parental genetic maps using AFLP, SSR, RAPD and isozyme markers. NBS-type resistance-gene-analogs have been isolated from apple cultivars and mapped as RFLP or CAPS markers in the reference population Prima x Fiesta (Maliepaard et al., 1998). Several of them are clustered at the bottom of LG-5 and at the top of LG-10 (Durel and van de Weg, unpublished). Two major genes for scab resistance are segregating in several of these progenies : *Vg* (resistance to *V. inaequalis* race 7) which is located on LG-12 (Durel et al., 2000) and the newly-identified gene *Vd* (from Italian cultivar 'Durello di Forlì') which confers resistance to *V. i.* race 6 (Tartarini and Durel, unpublished, not yet mapped). Numerous QTLs for partial scab resistance have been identified, by means of field assessments (LG-2, -3, and -17) (Van de

Weg, unpublished) as well as by greenhouse tests with single-spore isolates, most of the latter being strain-specific. But two of them exhibit a more general effect : a QTL on LG-2 for resistance to races 6 and 7, and a QTL on LG-17 for resistance to races 1 and 6 (Calenge et al., 2002, PAMG X, poster). Beside, a major non-race-specific QTL has been mapped on LG-10 in Durello di Forlì (Tartarini, unpublished) close to the NBS-analog cluster. Molecular markers closely linked to three major genes for powdery-mildew resistance, *Pl1*, *Plw* and *Pld*, have been identified by BSA approaches. A major QTL for field resistance to *P. leucotricha* have also been identified on LG-2 (Dunemann et al., 2000). Interestingly, on LG-2, the QTLs for scab and mildew resistance are co-localizing. D.A.R.E. web-site: <http://www.inra.fr/Internet/Projets/DARE/>
