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ABSTRACT BOOK
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The FEM grapevine breeding program for downy and powdery mildew resistances: towards a green viticulture

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During the last decade, besides the emerging need of innovation raised by grapevine growers, the quest for sustainable viticulture has been addressed to the development of new varieties (mid-) resistant to the major pathogens challenging grapes in temperate-humid climates. In order to achieve this goal, a FEM double-step breeding program has been undertaken. During the initial scouting phase, a total of 264 accessions acquired from (non-)European breeding programs, an Italian private breeding platform and wild-collected in north-eastern America were studied. Most individuals were phenotyped for downy and powdery mildew resistance, while all were genetically characterized. Firstly, 9 reference microsatellite (SSR) markers were used for the true-to-type identification through international and private databases, where feasible. Secondly, in order to validate the available pedigree information and to infer new relationships, 50 informative SSRs were analyzed and employed for parentage analysis. Moreover, all studied accessions were screened at 12 exploitable disease resistance-associated (R) loci derived from *Vitis* spp. and described in literature; this novel “all vs all” approach allowed the discovery of unanticipated R-loci combination in traditionally bred material. Moreover, the distribution of loci related to downy (Rpv) and powdery (Run/Ren) mildew resistance and the field response unveiled potentially novel and exclusive genetic resources. During the following operational phase, the Marker-Assisted Breeding program took off taking advantage of the preparatory information. Nowadays, 32% of the selected genotypes is pyramided for 2 Rpv and 2 Run/Ren loci, while 6% conveys 3 Rpv and 3 Run/Ren loci. Currently, several genotypes carrying up to 7 R-loci are under selection.

Keywords: marker-assisted selection, pedigree analysis, resistant varieties, R-loci