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MYB103 AS CANDIDATE GENE FOR MALE STERILITY IN LEAF CHICORY, RADICCHIO

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We report the high-density linkage map construction in chicory (*Cichorium intybus* var. *foliosum*) and the fine mapping of the linkage group region carrying a recessive gene responsible for male-sterility (*ms1*). An experimental BC1 population, segregating for the male-sterility trait, was preliminary screened through a multiplexed SSR genotyping analysis for the identification of microsatellite markers linked to the *ms1* locus. Two backbone SSR markers belonging to linkage group 4 of the available *Cichorium* consensus map were found genetically associated to the *ms1* gene at 5.8 cM and 12.1 cM apart. A GBS strategy was then used to produce a high-density SNP-based linkage map, containing 727 genomic loci organized into 9 linkage groups and spanning a total length of 1,413 cM. Many segregating SNP markers allowed us to narrow down the chromosomal region containing the *ms1* gene. In particular, 13 SNPs proved to be tightly linked to the *ms1* locus and fully co-segregated with male-sterility. A mesosynteny analysis revealed that 10 genomic DNA sequences encompassing these selected SNPs of chicory mapped in a peripheral region of chromosome 5 of lettuce (*Lactuca sativa*) spanning about 18 Mbp. Since a MYB103-like gene, encoding for a transcription factor involved in callose dissolution of tetrads and exine development of microspores, was found located in the same chromosomal region, this orthologous was further investigated. The amplification and sequencing of its CDS using unrelated *C. intybus* accessions with contrasting phenotypes/genotypes (*i.e.* male sterile mutants, *ms1ms1*, and male fertile inbreds, *Ms1Ms1*) enabled to detect an INDEL in its second exon, responsible for an anticipated stop codon in the male sterile mutants. This polymorphism for the MYB103-like was subsequently validated through allele-specific PCR assays and the gene selected as candidate for male-sterility. Our molecular data could be practically exploited for genotyping plant materials and for marker-assisted breeding schemes in chicory.

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