
***MOLECULAR BREEDING FOR RESISTANCE TO SOIL-BORNE VIRUSES IN
BARLEY AND WHEAT***

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Besides fungal diseases, viruses cause severe yield losses in wheat and barley. Because of an increase of the area infested and high yield losses which cannot be prevented by chemical measurements due to transmission by the soil-borne plasmodiophorid *Polymyxa graminis*, Barley yellow mosaic virus (BaYMV) and Barley mild mosaic virus (BaMMV) with respect to barley and Soil-borne cereal mosaic virus (SBCMV) in wheat have gained evident importance in Europe. Breeding for resistance to these viruses is of pivotal importance to ensure winter barley and wheat production in the growing area of infested fields.

With respect to barley yellow mosaic virus disease, different recessive resistance genes were identified within the primary gene pool of barley and subsequently mapped on different barley chromosomes. Concerning SBCMV resistance known in French cultivars, e.g. Tremie, was mapped on chromosome 5A and a diagnostic marker suited for marker assisted selection has been developed. Closely linked molecular markers developed for these genes facilitate efficient marker assisted backcrossing procedures and pyramiding of resistance genes in order to extend the usability of partly overcome resistance genes.

Besides this, in barley the resistance locus Rym4/Rym5 on chromosome 3H has been isolated via a mapped based cloning approach and allele mining resulted in the identification of new alleles which may be used in barley breeding. Today sequence information available in rice, brachypodium, sorghum and barley and wheat itself, as well as the availability of high density genetic maps has enhanced the process of mapped based cloning considerably and may transfer breeding for resistance to soil-borne viruses to the allele level in the future.

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