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Lettuce lines with potyvirus resistance: differential set for strains studies and genitors of new resistance

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Lettuce mosaic virus (LMV; genus *Potyvirus*) is distributed worldwide. This potyvirus could be destructive for lettuce crops and some strains are seed-transmitted. Two resistance alleles of the *mol* gene were identified: *mol*¹ from Gallega de Invierno was used in European breeding and *mol*² from PI 251245, a wild Egyptian lettuce, was used in breeding in the USA. Among different LMV isolates collected in Europe, both alleles conferred a partial resistance and untransmissibility by seeds to the common isolate LMV-0, and were overcome by isolates LMV-E and LMV-13. However, these genes showed a differential reaction to isolates LMV-1 and LMV-9, since only *mol*² was resistant to isolates LMV-1 and LMV-9. To study new LMV isolates or new potyviruses, the set of differential hosts includes butterhead genotypes for susceptibility and for *mol*¹ and iceberg genotypes for *mol*². The growth of these lettuce types could be different; moreover iceberg lettuce is more difficult for inoculation and symptom observation due to the leaf structure and head shape. Besides that material, a new resistance gene (*Mo3*), efficient against all LMV isolates, has been identified in *L. virosa* PIVT1398 and introgressed into butterhead-type lettuce. Projects were developed to create a set of near-isogenic butterhead lettuce lines useful to characterize LMV and potyvirus pathotypes.

To created near-isogenic lines with *mol*, a backcrossing programme was used for introducing the *mol*¹ gene from the butterhead variety Mantilia or the *mol*² gene from the iceberg variety Salinas88 into LMV-susceptible Girelle and Mariska butterhead cultivars. Between backcrosses (BC), resistance tests were made on F₂ plants with LMV-0 for *mol*¹ screening and LMV-9 for *mol*². With this method, four lines with butterhead phenotypes were obtained after four or five BC for *mol*¹ and eight BC for *mol*²; these lines are named Girelle-*mol*¹, Girelle-*mol*², Mariska-*mol*¹ and Mariska-*mol*². That material could be useful for research on new LMV isolates or new potyviruses.

The *Mo3* was introgressed from *L. virosa* into two butterhead lettuce by backcrosses after interspecific F₁ hybrids (Maisonneuve et al, 2018. Plant Pathol). The screenings for *Mo3* were made by tests of resistance to LMV-13, LMV-0 or LMV-9. The two near-isogenic lines created, named Girelle-*Mo3* and Mantilia-*Mo3*, were very useful to demonstrate the efficiency of *Mo3* against a new potyvirus present in South-East France: lettuce Italian necrotic virus (LINV). Some physiological disorders (necrotic streaks on stem or corky stem basis), resulting probably from interspecific crosses, were still observed in bolting and flowering despite seven or nine BC by lettuce cultivars. Nevertheless these lines could be interesting for research and as genitors for breeding.

All *mol*⁺, *mol*¹, *mol*² and *Mo3* near-isogenic lines are released for research laboratories.

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