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Genetic Analysis of the Restoration of Male Fertility in Italian Ryegrass (*Lolium multiflorum* Lam.)

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Summary

To facilitate a program focused on the development of a cytoplasmic male-sterile (cms) Italian ryegrass, attempts are underway to develop a male-sterility maintainer 'B' line. Testcrosses between a cms individual (CL1) and W59 individuals (normal cytoplasm) were performed to generate a 'B' line which could be used to maintain male-sterility. A male sterile line ('A' line) was obtained following recurrent backcrossing between non-recurrent cms parents and a 'B' line (recurrent parent). Hybrids obtained from this backcrossing resulted in the generation of male-sterile individuals at a frequency of 86.4% and 87.7%, in the BC_2 and BC_3 generation, respectively. Progeny tests utilizing male-sterile x male-fertile sibs, originally derived from the CL1 x W59 hybridization, generated segregation ratios of 1:1 and 1:3 (sterile:fertile). These observations, suggest that two complementary loci may be involved in the expression of male sterility. However, the frequency of male-sterile individuals obtained following the backcrossing of the 'A' line with the 'B' line, suggest that another gene (s) are affecting the outcome of the anticipated, simple two locus model. Additional research is underway to further elucidate the complex inheritance and expression of cms restoration in Italian ryegrass.

Keywords: Italian ryegrass, Cytoplasmic male sterile, Restorer gene, Inheritance model