

GENE FLOW IN BIRDSFOOT TREFOIL (*LOTUS CORNICULATUS*) CULTIVATIONS

M. BELLUCCI, F. DE MARCHIS, S. ARCIONI

Institute of Plant Genetics – CNR, Research Division of Perugia, Via della Madonna Alta 130,
06128 Perugia, Italy – michele.bellucci@igv.cnr.it

birdsfoot trefoil, forage legume, gene flow, pollen dispersal, transgenic plants

Genetic engineering is becoming a useful tool in the improvement of plants but concern has been expressed about the potential environmental risks of releasing GM organisms into the environment. Attention has been focused on pollen dispersal as a major issue in the risk assessment of transgenic crop plants. Birdsfoot trefoil (*Lotus corniculatus*) is a perennial forage legume with high nutritive value used for pasture and hay. At this time, there are no data concerning the pollen diffusion from transgenic *L. corniculatus* field. The present communication wants to clarify the possibility, in central Italy, of gene escape, the frequency at which this occurs and the eventual cross pollination between birdsfoot trefoil and two related species, *L. tenuis* and *L. pedunculatus*. Plants of *L. corniculatus* transformed with either the *E. coli* asparagine synthetase gene *asnA* or the β -glucuronidase gene *uidA*, have been used as pollen donor. Non-transgenic plants belonging to the species *L. corniculatus* L., *L. tenuis* and *L. pedunculatus* have been utilized as recipients. In the experimental field located in Perugia, two pollinating plots have been transplanted at the two opposite corners of a 64 x 40 m field. Sixteen recipient plots were distributed in the whole area of the field. In each plot, 4 non-transgenic plants for each of the three species considered were transplanted. In the experimental field in Rome, a 2 ha field trial was prepared to address the effect of field size on pollen. Ten recipient plots were distributed in the field. Seeds were hand-harvested at the end of summer in both fields and were sown in the greenhouse for DNA investigation. Gene flow was evaluated by PCR. For the *uidA* gene, the X-Gluc staining assay was also performed to confirm data obtained from PCR amplification. Gene flow was measured as the percentage of plants with a transgene-specific PCR product with respect to the totality of plants analysed. Plants carrying the *uidA* gene were partially sterile, therefore only the *asnA* gene was used as tracer marker. No transgene flow between *L. corniculatus* transformants and the non-transgenic *L. tenuis* and *L. pedunculatus* plants was detected. As regards non-transgenic *L. corniculatus* plants, while in Perugia the pollen diffusion was contained and occurred just for 18 meters away from the *asnA* pollinating plot with a frequency of 0,24%, in Rome the distance reached by the transgene is considerably higher, being the gene detectable till the distance of 120 m away from the source plot with a frequency of 0,74%. The results demonstrate that birdsfoot trefoil pollen can travels and that the percentage of gene flow is far from to be zero also at considerable distances.