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Development of herbicide-resistant upland crops

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The use of herbicides to control undesirable vegetation has become a universal practice. For the broad application of herbicides the risk of damage to crop plants has to be limited. In this study, we will try to introduce several genes known to be resistant to non-selcective herbicides as well as a novel herbicide-resistant genes into our upland crops such as potato, corn, soybean, wheat, and tall fescue. The major results obtained until now are as follows. Using three herbicide-resistant genes (*MxPPO, EPSPS,* and *PAT*), two promoters (CaMV 35S and ubiquitin), and three selection markers (kanamycin, hygromycin, and phosphinothrin), total seven vectors were constructed. On the other hand, four vectors for marker-free transformants were also constructed. Agrobacterium-mediated transformation system was established in the crops of tall fescue, corn, potato, and soybean. Whereas, in wheat, optimistic conditions to enhance the efficiency of regeneration from suspention culture are trying to be determined. Presently, putative herbicide-resistant transgenic plants were selected in tall fescue, corn, and potato. In the case of tall fescue, nine lines containing *MxPPO*, confirmed by southern analysis, were selected, and they are under the mass-production for the assesment of herbicide-resistant level. In maize, selection of paromomycin-resistant calli and production of transgenic plantlets was conducted by the method of *Agrobacterium tumefaciens* co-cultured immature embryos. Fifty five *EPSPS*-expressed transgenic lines were produced on regeneration medium and seventeen plants were transferred to soil. In potato (cv. Taedong), thirty one putative *EPSPS/PAT*-expressed or *MxPPO/PAT*-expressed transgenic lines were produced on regeneration medium. The presence or absence of these transgenes in the transformants of corn and potato are confirmed by PCR, southern analysis and herbicide selection. After all, these products allow the farmer to more effectively use reduced- or no-tillage cultural practices, apply more environment-friendly herbicides, and lower the cost of weed control.

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