PIRAMIDAÇÃO DE ESTRATÉGIAS BIOTECNOLÓGICAS PARA O CONTROLE DE NEMATOIDES DAS GALHAS NA CULTURA DA SOJA

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Abstract:
Soybeans are the most important crop grown in Brazil due to their economic profit and the multifunctional nature of its grain. Among the challenges in soybean production, the parasitism by root-knot nematodes (RKN) of the genus *Meloidogyne* stands out. This endoparasite feeds on the roots of economic crops and produces giant cell clusters called galls that interfere with the plant's uptake of water and soil nutrients. RKN is controlled by nematicides, which are inefficient and highly toxic, crop rotation, and moderately resistant cultivars derived from a single genetic source in soybean. Therefore, the use of biotech approaches to incorporate new sources of resistance into elite cultivars is promising. Here, two biotechnological strategies were used simultaneously to RKN control in soybean: (1) Overexpression of the *AdEXLB8* gene, which encodes the *Arachis duranensis* expansin-like protein B, involved in cell wall loosening. The *AdEXLB8* overexpression in model plants showed increased resistance to RKN; (2) RNAi-mediated silencing of nematode genes involved in its primary metabolism or plant infection process, such as those encoding cysteine protease, isocitrate lyase, splicing factor, and the effector 16D10. Soybean genetically modified (GM) plants were obtained using the *Agrobacterium*-based transformation method. These plants were screened by transgene amplification by PCR and enzyme-linked immunosorbent assays to detect phosphinothricin N-acetyltransferase protein. Plants from three independent transformation events at T2 generation were selected for challenge assays against *Meloidogyne incognita*. The experiment was carried out twice in a completely randomized design with 10 replicates in a greenhouse. Fifteen-day-old plants were inoculated with 1,000 J2 juveniles of *M. incognita*. After 60 days, the GM plants showed a significant reduction in the number of galls per gram of root (22.0-34.0%), in the number of egg mass per gram of roots (46.0-50.0%), in the number of eggs per gram of roots (59.0-59.6%), and in nematode reproduction factor (30.0-50.0%) compared to wild-type plants. So far, the pyramiding strategy appears effective in controlling *M. incognita* and can be applied to soybean breeding programs as a complementary source of resistance to RKN.
Key-words: *Glycine max*; RNAi; *Meloidogyne incognita*; ;

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