



Organization, Regulation, and Distribution of Genes Responsible for the Utilization of Deoxyfructosyl Glutamine an Amadori Opine

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Dfg is an Amadori opine found in plant tumors induced by chrysopine-type strains of *Agrobacterium tumefaciens*. Cosmid clones responsible for utilization of dfg from genomic library of pAtC58 were isolated. Characterization of the cosmid clones indicated that a 6.2-kb *BglII* (Bg2) region is essential for utilization of dfg. This region contains five ORFs-*socRABC* and *D*. SocR negatively regulates the expression of *socR* itself and *socABCD*. SocA and SocB are ABC-type transporters responsible for transport of dfg and MOP. SocC and D could be responsible for enzymatic degradation of dfg, being homologs of sugar oxidoreductases and an amidoriase from *Corynebacterium* sp., respectively. The repression of *soc* operon by SocR was relieved when cells contain a *mocC* clone and also MOP was supplied, suggesting that dfg or other catabolic intermediate of MOP is an inducer. By Southern hybridization analyses, various *Agrobacterium* and related soil-bacterial collections in the family Rhizobiaceae were examined for the presence of homologs of *socD* and *mocD* in the genomes, which are essential for degradation of dfg in the two gene sets responsible for the catabolism of dfg. It appears that *mocD* homologs are specific to Ti plasmids in agrobacterial species, and *socD* homologs are present in non-Ti plasmid episomes in *Agrobacterium*, and also present in some of *Rhizobium* and *Sinorhizobium* spp. examined. All of the *Agrobacterium* strains and some of the *Rhizobium* strains containing *socD* homologs were able to utilize dfg as sole carbon source. Based on results of Southern hybridization and dfg-utilization traits, *Agrobacterium* isolates examined could be divided into seven groups.