



Corn 4-.alpha.-glucanotransferase

Description of Technology: This invention is in the field of plant molecular biology. More specifically, this invention pertains to nucleic acid fragments encoding enzymes involved in starch biosynthesis in corn plants and seeds.

Patent Listing:

1. **US Patent No. 5,994,623**, Issued November 30, 1999, "Corn 4-.alpha.-glucanotransferase"
<http://patft.uspto.gov/netacgi/nph-Parser?Sect2=PTO1&Sect2=HITOFF&p=1&u=%2Fnetacgi%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&d=PALL&RefSrch=yes&Query=PN%2F5994623>

Market Potential: Corn starch is an important component of food, feed, and industrial products. Broadly speaking, it consists of two types of glucan polymers: relatively long chained polymers with few branches known as amylose, and shorter chained but highly branched molecules called amylopectin. Its biosynthesis depends on the complex interaction of multiple enzymes (Smith, A. et al., (1995) Plant Physiol. 107:673-677; Preiss, J., (1988) Biochemistry of Plants 14:181-253). Chief among these are ADP-glucose pyrophosphorylase, which catalyzes the formation of ADP-glucose; a series of starch synthases which use ADP glucose as a substrate for polymer formation using α -1-4 linkages; and several starch branching enzymes, which modify the polymer by transferring segments of polymer to other parts of the polymer using α -1-6 linkages, creating branched structures. However, based on data from other starch forming plants such as potato, and on corn mutants, it is becoming clear that other enzymes also play a role in the determination of the final structure of starch. In particular, debranching and disproportionating enzymes not only participate in starch degradation, but also in modification of starch structure during its biosynthesis. Different models for this action have been proposed, but all share the concept that such activities, or lack thereof, change the structure of the starch produced.

The role of corn 4-.alpha.-glucanotransferase (EC 2.4.1.25; also known as "disproportionating enzyme") in starch biosynthesis, in particular in affecting the degree of branching, indicates that over-expression or reduction of expression of such genes in corn could be used to alter branch chain distribution of corn starch. While 4-.alpha.-glucanotransferase genes have been described from other plants (Takaha et al., (1993) J. Biol. Chem. 268:1391-1396), a 4 .alpha.-glucanotransferase gene has yet to be described for corn.

Benefits:

- Possible to alter branch chain distribution of corn starch

Applications:

- Food, feed, and industrial products

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