OWENS, LOWELL D.*, RUSSELL O. NORDEEN, AND JOHN C. INGERSOLL, USDA, Agricultural Research Service, Plant Molecular Biology Laboratory, Beltsville, MD 20705. - Design and testing of novel genes for defense against sugarbeet pathogens.

New sources of resistance to microbial pathogens are needed for sugarbeet. As part of a program to develop novel defense genes for introduction into sugarbeet we investigated the feasibilty of engineering the cecropin gene for protection against bacterial pathogens. Cecropins are a family of small (4kD) bacteriocidal polypeptides that are important in the immune response of insects. Lethal concentrations of cecropin SB37 to *Erwinia carotovora* subsp. *betavasculorum* ranged from 1.2 to 2.8 μM, depending on the strain, while for sugarbeet protoplasts the value was 41 μM. These differences in relative toxicities suggest this approach may be feasible. A DNA sequence encoding a modified form of the mature cecropin polypeptide was fused to a secretory sequence from a barley α-amlyase gene and introduced into tobacco. The R_1 progeny of selfed transgenic plants were shown by northern hybridization analysis to contain cecropin messenger RNA, but efficacy against bacterial challenge has yet to be demonstrated. In related studies, using GUS (β-glucuronidase) fusion constructs and microparticle acceleration techniques, a promoter from a class 5 pathogensis-related (PR) protein gene of tobacco was more efficiently expressed in sugarbeet leaf tissue than the 35S promoter from cauliflower mosaic virus.