SNYDER, GORDON W., JOHN C. INGERSOLL, and LOWELL D. OWENS. USDA/ARS, PMBL, Bldg. 006 BARC-W, 10300 Baltimore Ave., Beltsville, MD 20705. Genetic transformation of sugarbeet using particle bombardment and novel plant pathogen defense genes.

Several transgenic sugarbeets have been produced each containing genes encoding pathogen-defense related proteins under transcriptional control of stress or wound inducible promoters. Promoters used in this study included the CaMV 35S, and those derived from genes encoding osmotin and pathogenesis related protein-S (PR-S) from tobacco, and proteinase inhibitor II (Pin II) from potato. The promoters were cloned 5' to cDNA's encoding either β-glucuronidase (GUS), osmotin, PR-S, barley leaf thionin, or cecropin. A sugarbeet transformation method has been developed using embryogenic callus generated from seedling hypocotyls. To date plants have been recovered which carry the following chimeric genes: 35S-GUS, osmotin-GUS, osmotin-osmotin, osmotin-cecropin, PinII-thionin, PinII-cecropin, PrS-thionin, osmotin-osmotin/osmotin-cecropin. GUS activity in the osmotin-GUS plant while in tissue culture was found to be constitutive with expression 10 times the level found in the 35S-GUS plant with no wound induction. When the plant was transferred into soil, the constitutive level of GUS expression in the leaf was found to be very low. However, GUS activity was inducible by wounding of an excised leaf, with activity peaking at about 48 hours. Most of the plants have been transferred to soil and are being tested for their response to infection by known sugarbeet pathogens.