HECKER, R. J.*, and M. E. McClintock. USDA, Agricultural Research Service, 1701 Center Ave., Fort Collins, CO 80523. - Use of sugarbeet pollen for genetic assay and selection.

Pollen is a unique plant tissue that is potentially useful for genetic assay and selection. Methods were explored with sugarbeet pollen to assay for disease resistance and heterosis, and to select for tolerance to cold, salinity, and aluminum. Several pectolytic and cellulosic enzymes known to be produced by *Rhizoctonia solani* had no consistent differential effect on in vitro germination and K^+ leakage of pollen from root rot resistant and susceptible sugarbeets. Pectin lyase produced by a root rotting strain of *R. solani* had a potent negative effect on pollen germination but no resistance differentiating power. Cercosporin toxin reduced pollen germination and generally increased K^+ leakage, but did not discriminate between leaf spot resistant and susceptible pollen sources. Four cycles of low temperature challenge of pollen during fertilization showed evidence of genetic gain for cold tolerance. Three cycles of a more intense in vitro cold challenge of pollen gave a modest genetic gain in one of two separate lines, the gain being detected by measurements in both pollen and seedlings. Pollen challenged by salinity for 3 cycles resulted in more salt tolerant pollen but no change in plants. Challenge of pollen for aluminum tolerance is in the first cycle. Pollen-stigma complementation vs. heterosis for root yield showed a positive relation, but, if used, would result in the discard of some lines potentially good as parents for hybrids. Pollen size and variance were unrelated to sporophytic heterozygosity, hybrid vigor, and combining ability. Cryopreserved pollen appears to have lost 69% of its original viability after 5 years.

YU, M. H.* USDA, Agricultural Research Service, 1636 East Alisal St., Salinas, CA 93905. - Observations on the occurrence and inheritance of some induced variations in sugarbeet.

Explants of certain sugarbeet (*Beta vulgaris* L.) genotypes were induced to generate new plants through an in vitro process. When leaf sections from plants with monosomic additions that were descendents of sugarbeet and *B. procumbens* Chr. Sm. interspecific hybrids were cultured, the majority of regenerants expressed similar phenotypes and growth profiles to the donors. Nonetheless, over 20% of regenerated plants had leaf intumescence, chromosomal, or both, variations. In diploid sugarbeet, on the other hand, variations in derivatives from leaf cubes and unpollinated ovules were primarily chromosomal. In either case, the majority of karyotypic variation was chromosome doubling. Transverse sections of the intumescent leaves exhibited multi-layered epidermis with proliferated cells that formed wart-like protrusions and occasional trichomes, especially beneath the vascular bundles of minor veins. The malformed leaf traits were transmitted to progeny when intumescent diploid and tetraploid monosomic additions were crossed to normal sugarbeet pollinators. From these crosses, additional aneuploid classes of progeny with chromosomes ranging from 9 to 39 occurred. Leaf intumescence was inherited as dominant character and was associated with the addition chromosome.