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RESEARCH BRIEFS

Hydrogen uptake genes curb energy waste

Many legumes such as soybeans, alfalfa, and peanuts, release a burnable hydrogen gas from their root nodules, and this can sometimes amount to a considerable waste of plant energy. Symbiotic bacteria turn out to be the culprits in this process, according to plant scientist R. C. Valentine at U.C. Davis.

Plants may become inoculated either with root-nodule bacteria which cause the nodules to release hydrogen, or with bacteria which do not cause hydrogen release. The difference between these "good" and "bad" bacteria is the presence in the former of a sort of "hydrogen afterburner" which takes up the hydrogen before it can escape from the plant—the active hydrogen afterburner recycles energy from the hydrogen back to the host plant.

Valentine and co-workers found that the traits for the hydrogen afterburner in one type of soil bacterium (not a root-nodule bacterium) are located in a small piece of heredity material known as a plasmid, a highly mobile form of gene which can be transmitted to cell types lacking this trait. This is the first time that a hydrogen-uptake plasmid has been obtained.

Valentine and his associates eventually hope to introduce hydrogen-uptake genes into root-nodule bacteria, thus causing them to be more energy-efficient.

Bactericides protect orchards from frost

Encouraging results have been recorded in a field test of a concept to protect citrus and avocado orchards from frost damage by killing or inactivating bacteria that play a key role in the formation of ice crystals. U.C. plant pathologist S. E. Lindow of Berkeley said bactericides applied to test trees before a freeze late last year resulted in four to five times less frost damage to navel oranges and avocado buds than was recorded for untreated trees. In earlier research Dr. Lindow found that the bacteria *Pseudomonas syringae* and *Erwinia herbicola* can serve as the nucleus particle needed to initiate the lattice structure for ice crystalization.

Salt-tolerant cells under study

Cell culture techniques are being developed to select for salt-tolerant lines of rice cells. Haploid rice cells have been cultured, and they are being used in a cell selection program, by D. W. Rains, plant breeder at U.C., Davis.

Haploid cell lines are extremely important for selection studies because of the greater potential for selecting mutant lines of cells in which the character selected is immediately expressed in the population. The haploid cells have been cultured in callus and in supervision, and have been regenerated to the whole plant from callused cells. The regenerated plant is haploid.

Haploid and diploid cell cultures have been grown on a number of media, and there is no significant difference in the growth of these cells on the media tested. Rains is currently growing haploid and diploid cells on salt and expects to select salt-tolerant lines which will show great promise for regeneration.