



alcium, that bone-building nutrient so important to growing kids, can't always come from cows. For example,

dairy products won't do as a calcium source for children who can't tolerate lactose—milk sugar.

Green beans are also a good source of calcium, and some beans are better than others.

Plant physiologists Michael Grusak and Kirk Pomper, who are with the Children's Nutrition Research Center at Houston, Texas, evaluated six bean varieties for calcium content. A variety named Hystyle had about twice the calcium as the Labrador variety, and these researchers figured out why: Hystyle is better at conserving water.

Water dilutes the calcium moving through a bean plant, reducing the amount reaching the pods that people eat.

The Houston center is a joint venture of Baylor College of Medicine and USDA's Agricultural Research Service. Many ARS scientists study how nutrients feed plants, so yields can be raised. At Houston, Grusak focuses on how crops can feed people better.

Calcium is especially important for children when their bones are growing. Other research at the Houston center suggests bone weakness later in life may be related to how much calcium children get during growth phases in childhood and adolescence.

The speed at which water gets in and out of a plant depends largely on how quickly it is transpired from leaves and other surfaces. The opening and clos-

ing of tiny pores called stomates regulate transpiration. The action is both genetically and environmentally controlled.

"We found the whole-plant transpiration rate to be twice as high in Labrador as in Hystyle, even though the amount of water transpired from the pod itself is the same for both," says Grusak.

The researchers found that the higher transpiration rate in Labrador plants resulted in lower concentrations of calcium moving in the plant's xylem stream. Xylem transports liquid and nutrients throughout the plant, somewhat as arteries in a person carry oxygen-rich blood.

Green beans like Hystyle could also be good news for farmers and environmentalists. These beans require less water, so they reduce irrigation costs.

Taking less water from area lakes, streams, or aquifers helps the environment in two ways. It conserves water in drier areas, and it reduces the amount of farm chemical runoff going back into the environment.—By **Jill Lee**, formerly with ARS.

*This research is part of Plant Biological and Molecular Processes, an ARS National Program (#302) described on the World Wide Web at <http://nps.ars.usda.gov/programs/cppvs.htm>.*

*Michael A. Grusak is with the USDA-ARS Children's Nutrition Research Center, 1100 Bates St., Houston, TX 77030; phone (713) 798-7044, fax (713) 798-7078, e-mail [mgrusak@bcm.tmc.edu](mailto:mgrusak@bcm.tmc.edu).* ♦

JACK DYKINGA (K5463-15)



**Plant physiologist Michael Grusak examines roots of hydroponically grown green bean plants.**