



United States
Department of
Agriculture



Cooperative State
Research, Education, and
Extension Service

National Research
Initiative Competitive
Grants Program

2004 No. 3

*Changbin Chen, Adam Marcus, Wuxing Li, Yi Hu, Jean-Phillippe, Vielle Calzada, Uli Grossniklaus, Richard J. Cyr and Hong Ma. May 2002. The Arabidopsis ATK1 Gene is Required for Spindle Morphogenesis in Male Meiosis. **Development** 129(10): 2401-2409.*

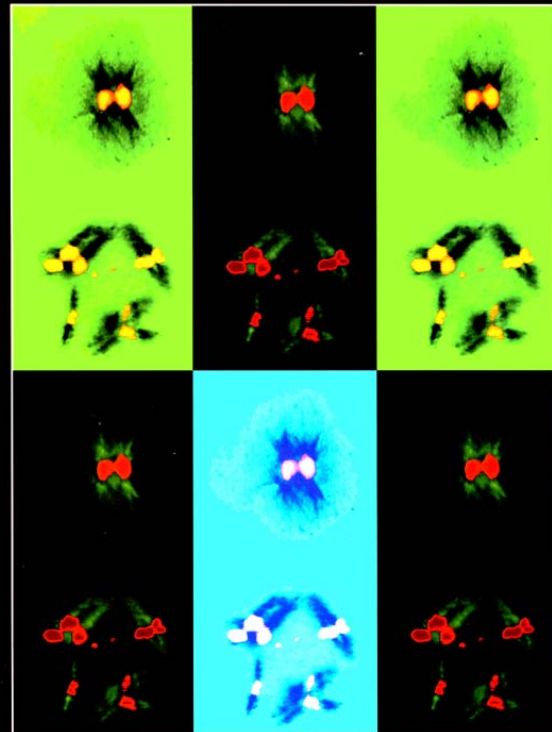
Cover Stories:

Major Scientific Publications Featuring
NRI-funded Research

Development

Volume 129 (10)

May 2002



Cover reprinted with permission by The Company of Biologists Limited.

P

lant reproduction requires proper development of pollen grains from the male spores, which are the result of specialized cell division called meiosis. Meiosis involves two rounds of chromosome separation. (Chromosomes are the carriers of genetic material.) In order for chromosomes to separate, a tiny intracellular structure called a spindle is required. If the spindle is not organized correctly, the chromosomes will not separate properly, leading to abnormal pollen development. Since very little is known about how the spindle is formed, Chen et al., in research supported by USDA-NRI, describe the analysis of a gene from the plant *Arabidopsis thaliana*. This gene called *ATK1* codes for a protein that can move along tiny fibers that make up the spindle. When the *ATK1* gene is inactivated, the cell's fibers cannot be organized into a correctly shaped spindle. As a consequence, chromosomes do not move properly and meiosis can not be completed normally. The authors propose that the *ATK1* protein is a rod that associates with one fiber at one end and moves along another fiber at the other end. By "holding on" to one fiber while "walking along" another fiber, the *ATK1* protein helps organize multiple fibers into a spindle that functions the way it should. This research opens the door to a better understanding of the mechanics of the spindle, which may result in improved crop plants and agriculture.

This research was supported by the Genetic Processes & Mechanisms of Crop Plants Program in the Competitive Programs Unit



Designed and produced in
cooperation with the National
Agricultural Library, ARS, USDA