

EXSYS Case Study

Maximum Yield/Minimum Resources Farm Advisors



Agricultural Research Service

The National Peanut Research Laboratory and the US Dept. of Agriculture have developed several knowledge automation systems and farm-planning modules. EXNUT, for example, is a knowledge automation system to help manage irrigated peanut production. The system compiles data from individual peanut fields throughout the growing season and makes recommendations for irrigation, the application of fungicides, and if favorable pest conditions might exist.

Peanut farmers were not achieving the yields and quality they knew was possible. Scientists felt knowledge automation systems provided the best way to deliver recommendations to the farmers. This technology was also chosen due to its ease of use, its ability to run external programs, and access external data files. The ability to examine the reasons for each decision was also a feature farmers desired.

The scientists collected an extensive knowledge base consisting of plant, soil, weather, and agronomic data. The data provided new concepts for irrigation, fungicide treatment and pest management such as using more plant growth stages, withholding water during certain growth stages, and using the maximum and minimum soil temperature as an indicator of soil moisture and plant health. EXNUT also optimizes irrigation management based upon peanut plant, soil, weather, insects and plant diseases. The system has been evaluated on over 50 farms and thousands of acres of peanuts. The fields managed by EXNUT have consistently produced higher yields and quality using less water and fungicides, than those managed by even the most productive farms without the technology. Additional versions for many other regions have been developed for different growing conditions and peanut varieties.

Many other knowledge automation systems have been developed at the NPRL that make decisions on variety selection, land preparation and harvest scheduling, as well a whole farm-planning modules, which use a linear programming interface for optimization. Each of these knowledge automation systems function as stand-alone systems or as modules in farm operations management.