Citrus Grove Mapping

Citrus growers have long used aerial photography to inventory the number of groves in production. A new development—aerial mapping of groves with color infrared (CIR) film—affords an important advance in grove management by detecting and locating unhealthy trees long before they could be detected by ground survey methods. The technique has been known for years, but earlier experiments failed to produce a viable system for a variety of reasons, principally inadequate knowledge of the special requirements for photographing citrus groves, such as the best times of the year for taking pictures and the proper sun angles and exposures. Additionally, photo interpretation procedures needed improvement and there were difficulties associated with handling and processing of the sensitive CIR film. A new CIR mapping system, developed by Kennedy Space Center (KSC) in cooperation with the University of Florida's Institute of Food and Agricultural Sciences (IFAS), bridges the knowledge gap and provides a means of monitoring the vigor of every tree in a grove with 99 percent accuracy.

Aerial CIR photography picks up light reflected from foliage—light not visible to the human eye—and enables differentiation between healthy and "stressed" (diseased) trees, as shown in the accompanying photo of a Florida orange/grapefruit grove. Taken during KSC/IFAS tests, the photo shows healthy trees in red; the gaps in the tree rows indicate varying degrees of stress. Computer-aided photo interpretation techniques permit grading diseased trees—lightly, moderately or severely stressed, or dead. The KSC/IFAS system employs enlarged aerial CIR photographs as a mapping base for follow-up ground survey of a grove in about one-tenth the customary time.

Last year the new system was demonstrated on a large-scale basis. Citrus growers from four Florida counties financed and participated in a program involving CIR photography of some 70,000 acres. With KSC support, workshops were conducted to familiarize growers with photo interpretation procedures and ways of translating CIR information into computer-compatible formats for rapid data analysis and storage.

The KSC/IFAS system has aroused considerable interest in Florida. This method of grove mapping offers advantage to citrus growers in early disease warning, possible savings through water regulation, and provision of a permanent record of grove growth patterns. It also interests others doing business with citrus growers. For example, a county tax appraiser is testing the system as a means of evaluating tree losses due to disease or frost, and a nursery manager is using CIR photographs of his customers' groves to anticipate the number of replacement trees he will have to plant.

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