Restoring Profitability to American Agriculture

Agricultural Management Systems, Inc.

7601 Eastgate Drive
Oklahoma City, Oklahoma 73162
Phone: 850-893-6539
Email: rthull62@hotmail.com

OUR TECHNOLOGY: **fixing the Flaws**

■ A GOVERNMENT MANDATE

USDA and NASA have promised a powerful system of crop production management through remote sensing to US agriculture for 25 years. USDA considers remote sensing to be one of its two "fast track" technologies vital to the future of American agriculture. This is their description of how they wanted the technology is to work:

> *Sensors aboard an aircraft or satellite fly frequently over a field to **detect and record all problems** and conditions of interest to the farm manager in their early or pre-visible stage. This information is utilized to improve the timing of conventional treatments and also to reduce agricultural "inputs" – the materials used to grow the crop -- through "site-specific" application. (Site-specific application is use of agricultural materials only when and where they are needed in the field, and only in the amounts needed.) In addition, many causes of yield-reduction are detected and corrected before yield-loss occurs, so that yields increase dramatically.*

■ AMS SUCCESS

After 22 years, AMS's technology generates the only consistent, reliable agricultural imagery produced to date. Unlike all other systems, which are subject to masking of field problems by the atmosphere, AMS imagery displays -- in their early or pre-visible stage -- all field problems and conditions that stress the crop, each time its system flies over the field. Some causes of stress – e.g., foliar diseases -- can be detected by the AMS system as much as two weeks before they turn visible to the human eye.

■ AVOIDING PROBLEMS

Just as important, there are no false positives in AMS imagery. False positives are features that appear to represent agricultural stress, which are really placed into the imagery by "atmospheric clutter." These features of non-agricultural origin are major time-wasters for agricultural scouts or fieldsmen and major sources of uncertainty. No matter how long a fieldsman remains at the location of a false positive, he cannot differentiate between the false positive and a pre-visible stress.

■ TESTING RESULTS

Key AMS personnel successfully tested "clutter-compensated" imagery for nearly two years in South Texas over a small commercial vegetable and citrus acreage, but this was before computers had reached the capacity to allow the technology to service large acreage.

■ VERIFYING RESULTS

The performance of AMS's technology has recently been independently verified, over an entire cropping season in the Imperial Valley of Southern California by a noted agricultural researcher from the University of Arizona and a crop consultant from Yuma, Calif., on a USDA Grant awarded to AMS. Testing was high profile and engendered much local interest. AMS was offered significant commercial acreage even before the testing was completed.

OUR SERVICE: **remote-sensing from aircraft**

■ IMAGERY FROM AMS'S AIRCRAFT

AMS can provide weekly airborne data (imagery) of a crop that can be used to optimize almost every aspect of crop production.

"We can measure stress quantitatively from the air. No one else in the WORLD can do that."

Steve Paley
AMS President

■ DOWNLINKING DATA

In the past, the aircraft had to rush back to "home base" to deliver the hard drive of its airborne computer so that data could be sent out to customers over the Internet. Now, our aircraft is free to go from one accumulation of acreage to another, as we can deliver data from the air. The downlink is totally secure; only the grower whose imagery is being down linked at the time can receive the data.

■ THE IMAGES

AMS's "agriculturally clean" imagery -- no masking and no false positives -- provides the basis for seven league advances in imagery-assisted scouting. Fieldmen will detect virtually all problems that stress the crop in their early or pre-visible stages. With AMS imagery, each fieldman, through ***imagery-directed scouting,*** may be able to handle significantly more acreage than his present peak acreage.

■ POSSIBILITIES FOR MARKETING THE SERVICE

Individual growers may benefit from AMS's technology by ultimately subscribing to selected, local, service-oriented agri-businesses including service-oriented agricultural chemical and fertilizer dealers who employ scouts, and scouting organizations. Synergistic and mutually beneficial marketing partnerships between AMS and such agri-businesses are anticipated to develop because of the customer bases that such AMS "partners" have among growers, and their ability to provide scouts to utilize AMS imagery in the field. AMS imagery can also be directly down linked to large growers, who have the on-staff personnel to make full use of the data, once they are taught how to use it.

■ AMS's LEADING EDGE

The AMS system can do certain important things for crop-production-management that other systems cannot do safely or in a manner that is practical. In terms of interest in remote sensing and timeliness, NASA is currently running a very large scale experiment in several states. Their Project 20/20 is trying to apply remote sensing to precision agriculture. Rockwell is also flying the Imperial Valley/Yuma Arizona areas once every three weeks at 30,000 feet, and golf courses in Southern California are using satellite imagery.

All current systems except for the AMS system, however, are subject to atmospheric masking of field stresses so that they generally do not detect all the sites of a vector in the field. The AMS system, on the other hand, is not subject to atmospheric masking (clutter). It is also extremely sensitive by comparison with conventional systems, so it is unlikely to miss anything. For site-specific treatment of disease and/or insects, it is important not to miss even the smallest area of infestation. Otherwise, sources of re-infestation will remain after treatment.

If a conventional system indicates stress at a particular point, and the scout sees nothing when he gets there, he can't tell if it is a pre-visible stress or a false positive. If the same thing happens with ASM imagery he knows it is a pre-visible stress because AMS imagery doesn't produce false positives. The scout will, therefore, be able to economically take a plant and soil into the lab from the location to identify the cause of the stress. (With AMS imagery there is no such thing as "wasting" money in sampling by taking a sample from the "wrong" location.

Because AMS imagery does not produce false positives, there are many fewer features in the imagery and, therefore, fewer locations to inspect. (An academic working in remote sensing recently published a wish list of characteristics for future remote sensing systems for agriculture. In it he specified a system with no more than 30% of the features being false positives!) Because of the large number of features in conventional imagery a scout can only inspect the most severely stressed -- which invariably already have locked-in either yield loss or the spread-of-vectors. Not AMS imagery.

The AMS system not only compensates for atmospheric masking but it also exceeds the sensitivity of many military systems -- which means that it can detect and display stresses early enough so that treatment can be carried out for certain types of stress before yield-loss or the spread-of-the-vector has occurred.

Again, this is accomplished by having fewer features in AMS imagery (by eliminating the false positives) and detecting problems much earlier than other systems -- even pre-visibly -- by eliminating atmospheric masking and having significantly greater sensitivity than other systems.

OUR VISION: **the future**

AMS is strongly positioned to remain the exclusive provider of imagery capable of crop production management for years to come based on the innovative nature of its own technology plus the general background AMS engineers bring from working many years in the defense sector.

- **NATIONAL RECOGNITION**

AMS has been featured in an article that has appeared in the mid-March, 2002 Technology issue of Farm Journal. Stories about AMS's technology, as it has been developing, have also been featured in Modern Agriculture as well as in many other agricultural magazines such as Newsweek and the Mid-April issue of California Farm Press. For a complete list of press publications in which AMS has been featured, Click Here.