

USE OF AIRFLOW  
TECHNOLOGY  
IN GRANULAR  
FERTILIZER  
APPLICATION  
DELIVERS  
HIGHER YIELDS.\*

\* According to independent studies conducted by Jackson State Community College, Jackson, TN

# PRECISION PLACEMENT IMPROVES YIELD PERFORMANCE

**W**hen Tim Sharp, Department Chairman for Agriculture, of Jackson State Community College started to compare Variable Rate Crop Input Application (VR) to Conventional Uniform Rate Application (CV) of crop inputs for physical and economic impact of the two systems, he also made another discovery.... that precision placement with airflow boom spreaders improves yield performance.

“Here at Jackson State Community College we are doing research into uses of the various technologies of Precision Agriculture, specific to cotton production. We do detailed work on the uses of Multispectral image analysis and how this is used to evaluate crop performance as well as how to use imagery to create VR mission plans and evaluate variable rate application systems.

One area of study is the impact of fertilizer distribution on crop development and yield. We have studied the difference between spinner applicators, liquid application systems and air boom spreader systems. We have combined image analysis with yield maps to investigate the difference between these systems.

In our studies we have found that most often the spinner spreader system, when used in an operational environment as we have observed in total farm scale production studies, often result in pronounced streaking. This is usually most evident in either nitrogen application or when lime is spread on a 50 foot spreader pattern.

“Liquid application systems and dry air boom systems did not exhibit significant streaking within the patterns.”

We have observed that there can be as much as 250 pounds of lint yield difference within a 50 foot spinner spreader pattern for both lime and nitrogen.

When this is compared to either a liquid system or air boom system, we have not observed this level of streaking impact.

Liquid application systems and dry air boom systems did not exhibit significant streaking within the patterns.

In our studies we have used mainly rolling coulter applicators for liquid fertilizer and we have used the Valmar Air Boom\* spreader for our dry fertilizer applications. We have specifically modified the Valmar Air Boom Spreader for Variable Rate Dry Fertilizer Application. This system was not set up for multi-product application. We have found that the Valmar Air Boom Spreader VR application system worked very well.

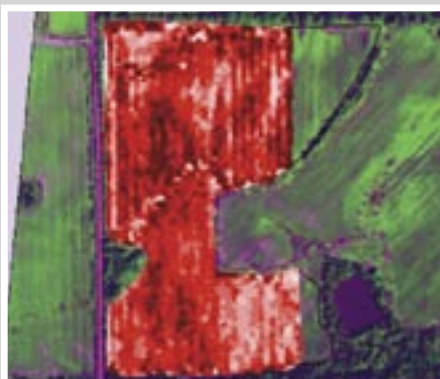
We found the system to be especially good for in-season or top-dress nitrogen application when used in the variable rate mode. The variable rate technology performed well with no problems; we got very good results from the applications with no streaking. Simply, it did what it was supposed to do in both VR mode and Non-VR mode.

We have installed a much larger study this year to directly compare spinner-applied top dress nitrogen to the Valmar Air Boom system to further confirm earlier observations.”

## Tim Sharp

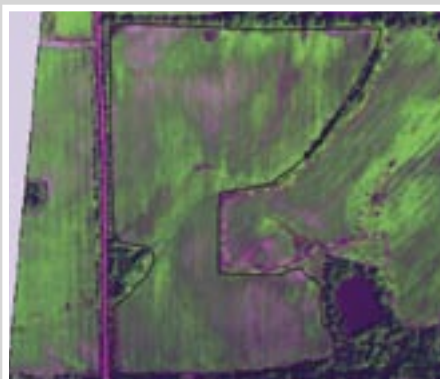
Department Chairman, Agriculture  
Jackson State Community College  
2046 North Parkway, Jackson, TN 38301  
tsharp@jsgcc.edu

\* Note: The Valmar Airflo uses the same patented technology seen on the AirMax system manufactured by LOR\*AL and AgChem.



**Photo 1: Yield Map – Spinner Spreader**

Image shows when strips are over-fertilized and others under-fertilized, the total yield will be less than if correct amounts of fertilizer were spread evenly.



**Photo 2: Aerial Digital Multispectral Image – Spinner Spreader**

Image shows streaking that resulted from a spinner spreader application. Note: This is the same field as shown in Photo 1.



**Photo 3: Yield Map – Airflow Boom Spreader**

Image shows yields can be maximized when uniform distribution is achieved.

Color	Cotton Yield
Light pink	< .75 bales/acre
Pink	.75 - 1.25 bales/acre
Dark Pink	1.25 - 1.5 bales/acre
Red	1.5 - 1.8 bales/acre
Dark Red	> 1.8 bales/acre

Color	Cotton Yield
Yellow	< .75 bales/acre
Light Green	.75 - 1.25 bales/acre
Medium Green	1.25 - 1.5 bales/acre
Med/Dark Green	1.5 - 1.8 bales/acre
Dark Green	> 1.8 bales/acre

## RESEARCH HAS SHOWN SIMILAR RESULTS IN CORN, WHEAT, AND OTHER CEREAL CROPS

### OMAF Reports a 28% Difference in Yields Between Under and Fully Fertilized Strips in Cereal Crops

#### "Uniformity of Nitrogen Fertilizer Application

To maximize yield, nitrogen must be applied uniformly across the field. Uniform application is more critical than the form of nitrogen fertilizer applied. Table 6-13, Yield Loss Associated with Inaccurate Nitrogen Application Patterns shows the yield loss associated with inaccurate spread patterns. A 1.48 t/ha (22 bu/ac) yield difference was found between the fully fertilized and under-fertilized strips in the field.

Spinner spreaders are not recommended for nitrogen application on cereals, due to the inconsistency of their spread pattern. If spinners are employed, consider double spreading the field (6 m or 20 ft centres at half the rate, instead of 12 m or 40 ft centres) to overcome this inconsistency."

**Table 6-13.**

#### Yield Loss Associated with Inaccurate Nitrogen Application Patterns

Yield t/ha (bu/ac)	
Low N	3.72 (55.3)
Full N	5.20 (77.3)

Note: Based on two locations in Middlesex County, Ontario.

Source: Ontario Ministry of Agriculture and Food (OMAF) Excerpt from Agronomy Guide for Field Crops (Chapter 6) OMAF Publication 811: Agronomy Guide for Field Crops

### Uneven Distribution of Lime and Fertilizer Can Reduce Crop Yields

"Research conducted at Virginia Polytechnic Institute and State University indicates that when one area of the field is over-fertilized and another is under-fertilized, the total yield will be less than if the correct amount of fertilizer were spread evenly over the entire field.... On the low fertility soil, maximum yields of wheat occurred where the fertilizer had been spread uniformly.... In cases where the fertilizer had been applied in a skewed or non-uniform pattern, yields were reduced by 20% to 25%.... A similar response was obtained using corn as the test crop. The results of this research proved conclusively that non-uniform application of fertilizers resulted in less total yield than uniformly applied fertilizers, even though the same total rate per acre had been applied in each case.... Spreading problems can occur with both lime and fertilizer materials on farm fields.... applicators should be calibrated for each kind and rate of material applied....

#### .... Problems of spinner spreaders include:

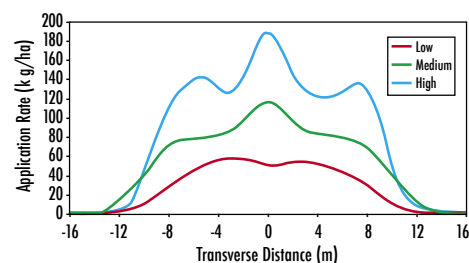
- Uneven distribution patterns
- Lack of operator understanding of calibration and adjustment procedures
- Material drift"

Source: Maryland Co-operative Extension University of Maryland College Park, Eastern Shore Publication: EB-254

### Distribution Pattern Shifts Observed with VR Spinner Spreader

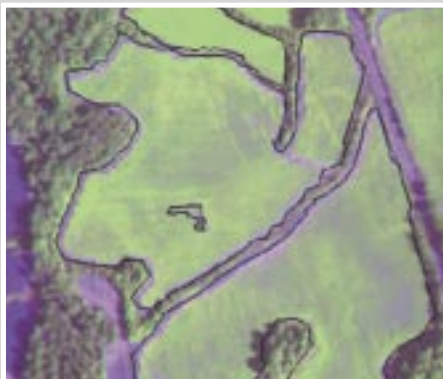
"Another issue observed with VR spinner spreaders is distribution pattern shifts. Undesirable distribution patterns are sometimes created at different application rates. These different patterns indicate that spreader settings need to be simultaneously adjusted during rate changes to maintain a desirable distribution pattern."

#### Distribution patterns shifts with changes in application rate



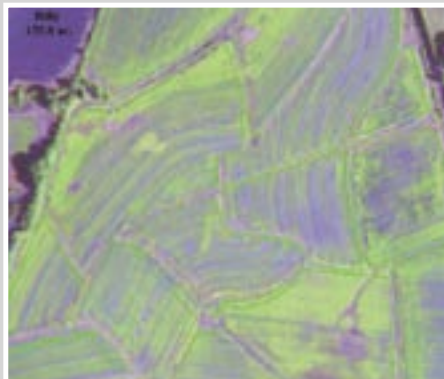
Source: UK Co-operative Extension Service University of Kentucky, College of Agriculture Site Specific Issues - A Precision Agriculture Newsletter Spring Planting 2003

Article: VR Fertilizer and Lime Application By: John Fulton, Research Engineer, Biosystems and Agricultural Engineering Department, University of Kentucky



**Photo 4: Aerial Digital Multispectral Image**

Image shows that application with an airflo boom spreader will over time reduce and eliminate streaking. Note: This is the same field as shown in Photo 3.



**Photo 5: Aerial Digital Multispectral Image**

Image shows streaking caused by continued misapplication will be evident for years to come.



**Photo 6: Aerial Digital Multispectral Image – Airflow Boom Spreader**

Image shows uniform application of nitrogen by an airflo boom spreader.

TO IMPROVE YOUR  
GRANULAR FERTILIZER  
PLACEMENT AND  
INCREASE YOUR  
YIELDS, CONTACT:



AG CHEM  
APPLICATION DIVISION  
202 INDUSTRIAL PARK  
JACKSON, MINNESOTA  
USA 56143  
(507) 847-2690  
[www.agchem.com](http://www.agchem.com)



VALMAR AIRFLO INC.  
BOX 100, ELIE, MB  
CANADA ROH OHO  
(204) 353-2782  
[www.valmar.com](http://www.valmar.com)



*AgChem 1264 Rogator with AirMax 180*



*AgChem 8103 TERRA-GATOR with AirMax 1000*



*Valmar Airflo 7600 Pull Type*