Soil Sampling and Fertility Build-up Management
Principal Investigators: Gene Stevens and David Dunn
University of Missouri-Delta Research Center, Portageville, Mo

Objectives: (1) Study economics of short term fertility build-up programs of less than 4 years versus the default 8-year build-up program used in MU soil recommendations. (2) Determine the effects of P and K fertilizer application timing on crop yields in low fertility fields.

Current Status/Importance of Research Area: This is a request to continue funding of a long-term buildup project which was begun in 2003. We are working with farmers who own their land and were willing to cooperate with us for the full span of the experiments. All of the test fields were initially low in either P or K or both. In 2003, experiments were established in soybean and rice fields near Malden, Mo and fescue pasture and hay sites fields near West Plains. In 2006, we established test sites on cotton fields at Clarkton and Wardell, Mo.

The profitability of treatments is being studied with different time lengths (years) for building up low test soils. For example, a 1 year build up treatment started in 2003 had all the fertilizer applied to bring P and K above sufficiency levels in the first year. In following years, only maintenance applications (crop removal) are being made. In contrast, an 8 year build up treatment only had 1/8 of the amount needed to build the soil to optimum plus crop removal for that year. The same pattern is being repeated for the life of the project. Other treatments between 1 and 8 year build up treatments are also included in each experiment. At the end of eight years, the P and K fertilizer in the different build up programs will all total the same amount. The “pay me now or pay me later” applies to this situation.

Although not complete, important information has already been learned. The magnitude of yield increases from P and K fertilizer in 1 and 3 year buildup programs relative to 8 year buildup has been surprising. As more years occur, we expect the difference in yields between treatments to decrease. Economic factors such as the value of the crop and cost of the nutrient needed most (P vs. K fertilizer) are being considered. The percentage yield increase from short term buildup P and K, relative long term buildup, has been greater with fescue hay than rice and soybeans. To date, it appears that a long term buildup may be more justified with most row crops than hay due to the greater value of row crops.

We are also finding that a good fertility program may provide some crop insurance against dry weather. Often N is emphasized at the expense of P and K. When the beef farmer cooperator at West Plains saw the yield increases we are harvesting from P and K fertilizer in test plots, he began an aggressive fertilization program on the rest of his farm. Although fertilizer is no substitute for rainfall, he produced more grass in pastures and hayfields than his neighbors through the mid-summer drought of 2006.
Time table:

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>February-March</td>
<td>Land and equipment preparation in fields where fertilizer build-up applications will be made. Weigh out fertilizer treatments.</td>
</tr>
<tr>
<td>April-October</td>
<td>Apply fertilizer treatments, collect soil and tissue samples, plant rice, cotton and soybeans, spray, and harvest research plots.</td>
</tr>
</tbody>
</table>

Strategy for transfer of knowledge:

Results will be shown at extension grower meetings, field days, and at the Southern Plant Nutrition Conference. When the study is completed a final report will be written and a manuscript submitted to scientific journal such as the Journal of Plant Nutrition.

Budget:

<table>
<thead>
<tr>
<th>Expenses</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
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</thead>
<tbody>
<tr>
<td>Res. Specialist salary (0.25)</td>
<td>$12,000</td>
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<tr>
<td>Fringe benefits</td>
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<tr>
<td>Supplies and lab analyses</td>
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<td>Travel</td>
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<tr>
<td>Total</td>
<td>$17,600</td>
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</table>
WILLIAM E. (GENE) STEVENS

Extension Associate Professor  
Department of Agronomy  
University of Missouri-Delta Research Center  
Portageville, MO 63873  
Phone: (573) 379-5431  
Email: stevensw@missouri.edu

EDUCATION

Degree: Ph.D., Agronomy, 1992  
Institution: Mississippi State University

Degree: M.S., Plant and Soil Science, 1982  
Institution: University of Tennessee-Knoxville

Degree: B.S., Biology, 1979  
Institution: Union University

EMPLOYMENT

1994 – Present  University of Missouri-Delta Research Center, Portageville, MO  
Extension Crop Production Specialist

1990- 1994  Mississippi State Univ./USDA Crop Simulation Lab, Starkville, MS  
Soil Scientist

1984- 1990  North Mississippi Branch Experiment Station, Holly Springs, MS  
Research Associate

REFEREED PUBLICATIONS:


CURRICULUM VITAE

DAVID J. (Dave) DUNN
University of Missouri
Delta Center, P. O. Box 160
Portageville, MO 63873
Phone (573) 379-5431
dunnd@missouri.edu

EDUCATION:

Degree: M.S. Geology (with emphasis in soils development) 1985
Institution: Iowa State University
Professor: Dr. Carl F. Vondra

Degree: B.S. Geology, 1980
Institution: Iowa State University

PROFESSIONAL EXPERIENCE:

Supervisor: Soil Testing Lab 1997-present
University of Missouri-Delta Center, Portageville, Missouri
Responsibilities:
1) Communicate to public the role of an integrated soil fertility program in crop production and environmental protection.
2) Provide relevant and understandable soil and plant analysis results to customers.
3) Maintain quality control of laboratory results while ensuring that results are available to customers in timely manner.
4) Supervise and train administrative and support staff, develop and implement annual working budget, maintain and purchase supplies and equipment as needed.
5) Develop and administer a soil fertility research program.
6) Provide research assistance to other multidisciplinary University of Missouri staff.

Iowa State University, Ames, Iowa
Responsibilities:
1) Supervise and train student hourly workers.
2) Maintain equipment and purchase consumable supplies as needed.
3) Maintain quality control of laboratory results.
4) Communicate soil test results to customers.
5) Provide research assistance to other multidisciplinary Iowa State University staff, includes training of graduate students in use of analytical instruments.
Iowa State University, Ames, Iowa
Responsibilities:  
1) Supervise and train temporary and student workers.  
2) Maintain equipment and purchase consumable supplies.  
3) Maintain quality control of laboratory results.  
4) Maintain records of laboratory results for compliance with local, state and federal environmental laws.

PROFESSIONAL SERVICE:

1998- present  University of Missouri Soil Testing Lab Advisory Committee.
1997- present  University of Missouri Soil Test Recommendations Review Committee.
1997- present  University of Missouri Soil Fertility Working Group.
1999-2001  Editor of Missouri Rice Research Update.

PROFESSIONAL SOCIETY MEMBERSHIPS:

American Society of Agronomy
Soil Science Society of America
Rice Technical Work Group

RECENT PUBLICATIONS:

Referred Publications:
Dunn, D, and G Stevens. 2007, Phosphorus Management in a Dry-seed, Delayed Flood Production System in Missouri, Better Crops International, (in press)


http://www.plantmanagementnetwork.org/pub/cm/research/2005/boron/


**Agricultural Bulletins and Extension Publications:**


