2. **NH3 loss Calculator** (http://nue.okstate.edu/N_Fertilizers/Urea.htm). Farmers wishing to apply urea on the surface without incorporation can get an estimate of the potential N loss that they will encounter. Using the Mesonet data feed, temperature, relative humidity, and wind speed are automatically accessed at the station closest to that producer, and the predicted loss of N as NH3 reported. Based on the results, farmers can either chose to proceed, or delay their application.

3. **Foliar Phosphorus for Wheat and Corn.** Using various new products currently available, foliar P will prove to be a viable fertilization option when deficiencies are not severe. Diammonium phosphate or 18-46-0 can also be used, but that requires pre application processing.

4. **P inefficient Wheat as a marker plant.** A three year project with the international research center, CIMMYT has identified various wheat biotypes that ARE NOT P-efficient, and as a result show P deficiencies more prominently. By mixing in small amounts of this P inefficient wheat seed, P deficiencies can be visibly recognized.

5. **NPKS Rich Strips.** Using the strip applicator developed by OSU engineering, we will be applying N, P, K, and S Rich strips at all locations where current OSU variety testing is taking place and at other visible locations.

6. **Use of plant stalk diameter to predict yield and adjust fertilizer rates.** Using microwave technology, the stalk diameter of individual plants can be determined. We use this information to predict by-plant grain yield, and as function of these differing yield levels, adjust fertilizer rates on a by-plant basis.

7. **Seed placement leads to fixed leaf orientation.** OSU is developing a planter that will deliver controlled leaf orientation. When leaves are symmetrically oriented across the row, light interception increases, plant populations can be increased, and corn grain yields increase.

8. **Alternative/Non-Conventional Product Evaluation.** Nitrogen stabilizers, slow release N sources, P enhancers, and soil additives are being tested in wheat, sorghum, soybeans, corn and canola. Products being evaluated are available at www.NPK.okstate.edu.

9. **Impact of Soil Acidity.** OSU research has established critical soil pH levels for sorghum, sunflower, sesame, wheat and canola. Acid soil conditions leading to decreased production must be continually monitored and lime applications encouraged where needed.

FUTURE WORK

- **Sensor detection of P, K, and S deficiencies**
- **By-plant sensing/fertilization**
- **Agricultural phone applications**
- **External grants for added funding**

OKLAHOMA STATE UNIVERSITY AGRICULTURE

Soil Fertility Research and Education

Soil Fertility Research and Education
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1989–2011

Partial funding coming from SB432 (SB314)

SUMMARY

In 1989, Dr. Robert Westerman, Mr. Arlie Goforth, and Mr. Joe Neal Hampton worked with the Oklahoma Senate Agriculture Committee, Oklahoma Agribusiness Retailers Association (formerly OFCA), Oklahoma Farm Bureau, and Oklahoma Farmers Union (now American Farmers and Ranchers) to establish an inspection fee on the sale of each ton of fertilizer ($0.35 proportioned to the Oklahoma State Department of Agriculture Food and Forestry and $0.30 to Oklahoma State University, soil fertility research). This bill was modified in 2009 (Senate bill 432) whereby the fertilizer inspection fee was increased to $1.00/ton (split between OSDA, and OSU). This sustained funding has resulted in many significant products and services for Oklahoma Producers.

DIVISION OF AGRICULTURAL SCIENCES AND NATURAL RESOURCES

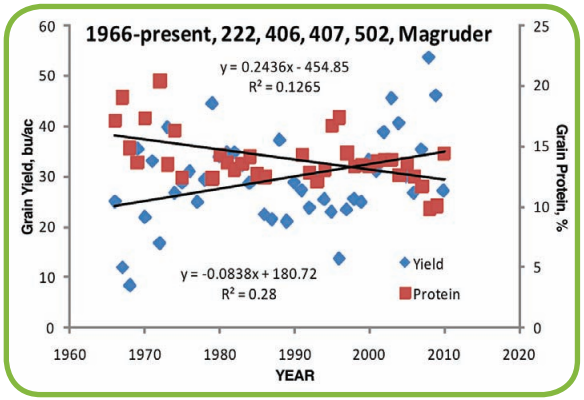
PRODUCTS

1. From 2005 to 2011, 18,413 **Nitrogen Rich Strips** were put on in Oklahoma that represented 1,473,040 acres. Average profits of $10.00/ac for OK producers using the GreenSeeker and OSU N Rate recommendation, has resulted in a total positive economic impact of **$13,610,400**.

2. **The Greenseeker Nitrogen Fertilization System** developed at OSU is used on over 2,000,000 acres in the USA. This system was endorsed by the late Dr. Norman Borlaug (Nobel Peace Prize Winner) in April of 2007. These systems are sold by Trimble, whereby producers can variably apply nutrients. These commercially available systems improve use efficiency and environmental sensitivity.

3. **OSU Pocket Sensors**, coming from the original GreeenSeeker sensor were also developed at Oklahoma State University. They have a projected retail value of around $250, versus $4000 that GreenSeeker handheld sensors sell for. Like the GreenSeeker sensor, they are being used all over the world to improve nutrient management.

4. **Grain Protein Optimizer Released**. Responding to heightened interest in grain protein, OSU developed a simple and applied on-line calculator whereby producers can enter mid-season Greenseeker NDVI values to see if they will need added N so as to stay above the 11% wheat grain protein minimum (KCBT, November 2010, "deliverable grades of HRW shall contain a minimum 11% protein …." http://www.soiltesting.okstate.edu/SBNRC/SBNRC.php, option 28



Long-term wheat experiments in Stillwater, Altus, and Lahoma show that as yields increase, grain protein decreases.

5. **Nine U.S. Patents Come from OSU Sensor Team** and the active sensor technology developed at Oklahoma State University.

6. **First Web-Based N Recommendations** for winter wheat, corn, cotton, bermudagrass, and canola. This has put Oklahoma producers on the cutting edge of precision agriculture. www.nue.okstate.edu

7. **First Variable Rate Applicator** capable of sensing and treating each 2 linear feet of row, developed at OSU. While not commercially available, OSU research has demonstrated the benefits of sensing and fertilizing each corn plant, and why this will be the future in precision agriculture.

CURRENT WORK

1. **Winter wheat-sorghum continuous no-till rotation** established by OSU in a 20-acre field just off of Highway 51 near Hennessey, OK. This highly visible site demonstrates the benefits of no-till rotations that better preserve soil moisture, and decrease weed pressure.