# BMP Update

A production of the University of Florida,
Institute of Food and Agricultural Sciences,
Agricultural Best Management Practices Program

Summer 2016 Volume 2, Issue 3


## Coming Events

### June

June 1, 2016: Interpreting Soil, Water, and Tissue Test Results

June 1, 2016: On-Farm BMP Demonstrations

June 12-14, 2016: Florida State Horticultural Society Annual Conference

June 23, 2016: Cattle REC Youth Field Day

### July

July 26, 2016: Summer Foliage Forum


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## What Are Agricultural Best Management Practices?

Agricultural **Best Management Practices** (BMPs) are practical measures that producers can take to reduce the amount of fertilizers, pesticides, animal waste, and other pollutants entering our water resources. They are designed to improve water quality while maintaining agricultural production. The Florida Department of Agriculture and Consumer Services (FDACS) has adopted BMPs for most commodities in the state. Each BMP manual covers key aspects of water quality and water conservation. Typical practices include:

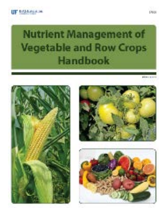
**Nutrient Management** to determine nutrient needs and sources, and manage nutrient applications (including manure) to minimize impacts to water resources.

**Irrigation Management** to address the method and scheduling of irrigation to reduce water and nutrient losses to the environment.

**Water Resource Protection** using buffers, setbacks, and swales to reduce or prevent the transport of sediments and nutrients from production areas to waterbodies.

## Inside this issue:






## SP500 - Nutrient Management of Vegetable and Agronomic Row Crops

The Florida Department of Agriculture and Consumer Services released an updated version of the Vegetable and Row Crops BMP manual in the spring of 2015. Copies of the new manual can be downloaded from the FDACS, Office of Agricultural Water Policy web site at http://www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy/Enroll-in-BMPs/BMP-Rules-Manuals-and-Other-Documents

The updated manual references nutrient management practices documented in a new EDIS document. The document was developed by compiling several existing EDIS documents on vegetable and row crop nutrition in cooperation with their authors. Electronic copies of SP500 are available at https://edis.ifas.ufl.edu/topic_sp500 and printed versions are available from the BMP Program by contacting Kelly Morgan (conserv@ufl.edu).

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## An Agroecological Approach to Enhanced Efficiency Fertilizer Use in Pastures and Hayfields

Jennifer Bearden, Okaloosa County, EA II

Agroecology is an ecological approach to agriculture that views agricultural areas as ecosystems and is concerned with the ecological impact of agricultural practices. Production practices of agroecology meet a triple bottom line, which includes:

- Economics – still need to be profitable to the farmer
- Environment – impacts of nutrients, pesticides, tillage practices
- Society – impacts on human population and societal benefits of agriculture.

Soil fertility and crop nutrient management is an important part of agroecosystems. Before determining fertilization needs, the farmer needs to determine what will be grown on the field and therefore, the target soil pH to support the crop. The soil pH should be adjusted to the optimal level for each crop before adding other fertilizers. A relatively new approach to fertilizer best management practices is to apply fertilizers considering the 4Rs – Right Rate, Right Time, Right Place, and Right Source.

The **right rate** will be determined by evaluating several factors and environmental conditions. Producers should always start with a soil test to determine current plant available nutrient levels in the soil. The UF/IFAS fertilizer recommendations are based on the plant available nutrients in the soil and the plant nutrient demand. Producers should also consider the nutrient sources (**right source**) and their predicted use efficiencies. Lastly, producers should consider how nutrients will be removed or recycled on the farm so that the nutrients are applied when (**right time**) and how (**right place**) the crop plants need them.

Nutrients should be applied when plants are actively taking up nutrients from the soil. This will be dependent on plant species, variety and planting date. Also, predictable weather patterns affect the timing of fertilizer applications. Producers should consider root depth, soil chemical reactions, soil type, and tillage systems when thinking about the right place. For perennial pastures, fertilizers are most often applied on the soil surface rather than incorporated into the soil subsurface. Choosing the right fertilizer source will provide plant available nutrients when the plants are actively taking up nutrients while decreasing nutrient losses to the environment. Nutrients include macronutrients and micronutrients. Producers should apply balanced nutrients to meet the crop demands.

Enhanced Efficiency Fertilizers (EEFs) include controlled-release mineral fertilizers and slow-release fertilizers such as biosolids, animal manures, compost, and wood ash. In recent years, the price has become more affordable, making farmers take another look. Nitrogen (N) can leave soil by volatilization, soil erosion, runoff, leaching, and crop removal. Nitrogen fertilizer losses should be minimized for environmental, as well as economic reasons. The greatest N loss globally, is due to leaching, erosion, and runoff.

Biosolids are nutrient-rich organic matter recycled from sewage for use in agriculture. Biosolids are not the same as sewage sludge which contains untreated solids from wastewaters. Animal manures can contain a large amount of nutrients depending on the species of animal and how the animals were managed. Due to the high variability of nutrient levels in animal manures, producers should test the nutrient levels of animal manures prior to applying to pastures and hayfields. Compost is high in organic matter but is difficult and expensive to apply in great quantities on pastures and hayfields. It also is commonly low in nutrients. Controlled-release fertilizers have either a physical or chemical barrier protecting the nutrients from releasing immediately into the environment. Sulfur coated urea is urea granules that are coated with several layers of molten sulfur and then coated with a soft wax. This coating slowly breaks down and allows nutrients to be released. Polycoated urea is urea coated with a polymer that limits the amount of N released into the soil through small pores in the coating. The release of N from the polycoated urea is dependent on temperature and moisture. Urea in the soil is converted with the help of an enzyme called urease to ammonium (ammonia in high pH soils). Urease inhibitors slow this conversion thus decreasing the loss of N through leaching and volatilization. The next step in the conversion of urea to nitrate is nitrification (ammonium converted to nitrate). Nitrification inhibitors slow down this conversion and thus decrease N losses also.

For fertilization recommendations for agronomic crops in Florida, refer to the following EDIS Publications:
http://edis.ifas.ufl.edu/ss163
http://edis.ifas.ufl.edu/aa130

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## Implementing BMP to Improve productivity of Vegetables: Optimizing Crop Rotation and Fertilization

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A sweetcorn and snap bean rotation cropping field trial was conducted at the Experimental Farm at UF/IFAS Tropical-TREC in Homestead. Sweetcorn was grown on raised beds before the rotation trial started. Each bed was 3 ft wide, lay flat supply tubing and driplines with a valve for each bed were installed. One dripline was laid out in the center of each bed and dry fertilizers was applied in the middle of each bed and covered with soil before seeding. Sweetcorn was planted on February 16 with 12 inches spacing in the center of the bed. On the same date, two rows of snap beans with 6 inches were planted in the same beds. Liquid fertilizer with a formula of 3-0-10 (N-$P_2O_5$-$K_2O$ in %) was injected through fertigation in a rate of 2 lb of N per acre per day starting from the second week after seeding. Snap beans were harvested on April 16 and, and sweetcorn were harvested on May 11.

The second seeding date in the bean plot was April 16, the same day of the first snap bean harvest. Therefore, the overall rotation and fertilization schemes were as follow:

- Sweetcorn – bean (S-B rotation) vs. sweetcorn – sweetcorn (S-S monoculture);
- Bean – sweetcorn (B-S rotation) vs. bean – bean (B-B monoculture); and each one of them had two fertilizers: CRF and Conventional fertilizer (COF) with the same rate.

Normal farming practices, such as irrigation and pest control, were applied during the trial. During the first rotation, results from statistics (SAS) indicated that there is a significant difference among the treatments. Regarding the fertilizer treatment, the yield of snap beans was increased by 30.5%, and the sweetcorn yield increased by 2.8 folds with CRF as compared with conventional fertilizer. The study showed rotation of sweetcorn with snap beans can produce a significantly higher yield for beans, and growing sweetcorn without rotation associated with either type of fertilizers cannot produce economically profitable yield. It also implies that the application rate of basal dressing fertilizers – 80 lb/ac of N is sufficient for snap beans but insufficient for sweetcorn under the experimental conditions though a liquid fertilizer was applied. For instance, the yield of sweetcorn was 443 lb/ac with conventional fertilizer compared with 1,482 lb/ac with CRF; for beans, 346 lb/ac with conventional fertilizer compared to as high as 638 lb/ac with CRF.

In conclusion, a crop rotation of non-legume with legume, such as sweetcorn with snap beans, or vise a versa, can dramatically improve the crop yield and profit. Controlled release fertilizer (CRF) has shown a great potential to increase the crop yields for both sweetcorn and snap beans, and it also can suppress some field pests, especially fall armyworms, bean root rot and bean golden mosaic virus. With the same rotation of sweetcorn and snap beans, the bean yield can be increased by more 30% and sweetcorn by up to 3 folds by the application of CRF. In addition, applying CRF can reduce nutrient leaching and improve the nutrient use efficiency. As a return, it can improve the water quality by reducing the non-point pollution and promote the sustainable development of agriculture, which has shown a great potential in south Florida, especially in the agricultural area of Miami-Dade County, where the farmland is adjacent to the vulnerable environment – the Everglades. Nevertheless, 80 lb/ac of N associated with P and K in the CRF is sufficient and feasible for snap beans, but more N with basal dressing seems necessary for sweetcorn in the Miami-Dade area, where the soil fertility is low. Application of the liquid fertilizer with the experimental rate and frequency seems insufficient to compensate the N deficit from the beginning for crop establishment.

**Acknowledgements**

The authors gratefully acknowledge FDACS for the financial support of the project, and sincerely thanks to Mr. Bobby Shekels (Crop Production Services, Inc.), Mr. Robbie Bishop (27 Farms Inc.), and Mr. Jose Castillo (TREC-Homestead) for their generous supports in conducting the field trial.

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## Demonstration of Soil Testing Calibration for Tomato Grown on a Calcareous Soil

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Agricultural Best Management Practices (BMPs) are designed to improve water quality by reducing the amount of nutrients and other pollutants while maintaining agricultural production. The vegetable BMPs have adopted all current University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) recommendations.

Utilizing soil testing to determine crop nutrient requirements is an important part of vegetable crops BMPs. The objective of soil testing is to provide fertilizer recommendation that is sound considering both economic and environmental effects. Some soils in south Florida, particularly in Miami-Dade County, contain large amounts of calcium carbonate, have soil pH greater than 7.5 and cannot be adequately acidified to the typically suggested pH of 5.5 to 6.5. Fertilizer nutrient are not readily available in such calcareous soils, and there is no current recommendations for soil test based fertilizer recommendations in calcareous soils.

A study was conducted to 1) evaluate four soil extractants (water, Mehlich3, Olsen, and AB-DTPA) and determine the relationship between plant nutrient uptake, marketable yield, postharvest quality of tomato and the amount of nutrient extracted by a particular soil test method; 2) determine N, P and K requirements for tomato at different soil test values; and 3) develop nutrient application recommendations for tomato from soil nutrient concentrations, and other economic, environmental and climatic information. A demonstration field trial with the lowest concentration of soil P was selected based on analyses of soil samples collected throughout the research farm at UF/Tropical Research and Education Center (TREC). The site was plowed and a cover crop, sorghum sudangrass was planted on August 28, 2014, and mowed on September 30, 2014. Cover crop residues were removed for purpose of equalizing soil fertility conditions. The fertilizer application rates were 0, 50, 100, 150, 200, 300 lb N/acre; 0, 60, 100, 160, 200, 240 lb $P_2O_5$/acre; and 0, 60, 100, 160, 200, 240 lb $K_2O$/acre; N, $P_2O_5$, and $K_2O$ will be supplied at 200, 160, and 160 lb/acre, respectively, if that nutrient was not a treatment factor. All cultural practices except fertilizer application were managed according to the IFAS recommendations for tomato production. Total marketable yields were significantly affected by application of potassium fertilizers in the winter season of 2014 to 2015. Optimum potassium rates that produced the maximum extra-large fruits and total marketable yields were 170.7 and 184.7 lb $K_2O$/acre, respectively