MESSAGE FROM THE 2016 EXECUTIVE COMMITTEE, FLORIDA DIVISION

SUGARCANE AND THE EVERGLADES

A GOOD RELATIONSHIP SCIENCE CAN IMPROVE

Our organization agrees with many diverse groups that an effective long-term plan is needed to preserve the natural Everglades. Sugarcane farming in the Everglades Agricultural Area (EAA) and a sustainable Everglades should not be viewed as two opposing forces. The two are inextricably linked; conceptually, sustainable agriculture in the EAA and a sustainable Everglades ecosystem are interdependent. We recognize that both the natural Everglades and the farmers in the EAA face many challenges to become both compatible and sustainable in the future.

Photo courtesy of Pepe Lopez

FACTS CONCERNING THE FLORIDA SUGAR INDUSTRY

BACKGROUND:

Sugarcane is a tropical grass grown primarily for its sugar (sucrose) content. This field crop has been grown commercially in southern Florida since the 1920s and is one of the most economically important crops in the state.

The Florida sugarcane industry supports 12,300 direct jobs, operates 4 raw sugar mills, 2 sugar refineries and North America's largest renewable power plant. The industry produces 50% of America' raw cane sugar and generates a $3.3 billion impact. Florida sugar farmers have also contributes more than $200 million for Everglades Restoration projects.

Approximately 400,000 acres of sugarcane are grown annually, primarily around the lower half of Lake Okeechobee. The proximity to the lake is important in that it offers some cold protection

to the tender cane during occasional harsh winter weather. The crop does not perform well during prolonged periods of freezing and/or repeated freezing events.

SUGARCANE: MOST SUITABLE FOR THE EAA

Sugarcane planting and harvesting operations are conducted during the fall, winter and early spring. This period is typically drier than the summer months. Thus, sugarcane culture is in harmony with the South Florida climate. The cool, dry fall and winter months are good for plant emergence and mature sugarcane ripening.

Once established, sugarcane is far more water tolerant than leafy vegetables or sweet corn. This becomes an asset for summer water management practices. Area farms store water during surplus rainfall periods by maintaining higher water tables in sugarcane fields, flooding vacant vegetable and sugarcane fields, or growing paddy rice. This good soil conservation practice is also a very effective best management practice for phosphorus reduction.

Water that is managed by area farmers is monitored for quantity and quality, and reports are submitted to the South Florida Water Management District monthly. All farmers have responded well under regulatory action and made commendable gains in the management of this valuable and essential resource. EAA farms have achieved a 71% across the board reduction in phosphorus levels in the water discharged from the EAA. This reduction exceeds the 25% annual goal required for the entire EAA basin by Florida's Everglades Forever Act.

BEST MANAGEMENT PRACTICES (BMPs)

"The University of Florida/Institute of Food and Agricultural Sciences P concentration and load reduction agricultural BMP research and education program began in 1986. At that time, it was alleged that P in agricultural drainage water leaving farms in the Everglades Agricultural Area (EAA) was negatively impacting downstream and surrounding ecosystems. Furthermore, P in fertilizer applied to sugarcane crops was believed by many to be the primary source of the elevated P concentrations and loads. It was hypothesized that agricultural BMPs could contribute significantly to alleviating the problem. Prior to developing BMPs, it was necessary to provide a working definition of a BMP which would properly constrain the breadth of potential practices. That definition, pertinent to the EAA is:

> "an alternative management practice that is technically feasible, economically viable, socially acceptable, and scientifically sound, and when implemented, will lead to reduced P concentrations and loads leaving farms in the EAA, while not threatening the viability of the agricultural production system".

Since full-scale BMP implementation began in 1995, collectively the growers of the EAA basin have achieved more than a 50% P load reduction in water leaving the basin. This reduction is double that required by state law (Everglades Forever Act, 1994). Researchers continue to work with growers to develop and implement BMPs that are both effective in lowering P loads and economically viable."

This section on BMPs has been reproduced from the University of Florida Everglades Research and Education Center (EREC) website
http://erec.ifas.ufl.edu/research/bmp_soil_water_intro.shtml

SUGARCANE USES FERTILIZER EFFICIENTLY

Sugarcane is an efficient user of nutrients, especially phosphorus (P). It requires only fifty percent of the P needed for sweet corn, thirty percent of the P needed for celery, and approximately twenty-five percent of the P needed for lettuce.

Sugarcane, like any other plant, requires nutrients for optimum growth. In the EAA, nutrients are provided for plant uptake from rainfall, irrigation water, the organic soils which undergo the natural process of mineralization, and supplemental fertilizer. Research by the University of Florida to determine adequate levels of nutrient elements necessary for sugarcane production began in1929. Early research showed that the high levels of P needed for vegetable production reduced the quantity of sugar in the cane stalk. Since then, numerous research studies based on yield responses have established the guidelines currently used for fertilizer rates.

Research studies by Coale et. al. (Agron. J. 85:310-315) determined that sugarcane biomass removes more P from the soil than the quantity applied as fertilizer. This indicates that the sugarcane plant uses not only fertilizer P but also residual and naturally occurring P as well.

The study conducted by Izuno et. al. (Agricultural Best Management Practices (BMPs) for Phosphorus Loading Reduction in the Everglades Agricultural Area (EAA), IFAS, U of F, 11/29/90) showed that less P was present in drainage water from fertilized sugarcane fields than in the drainage water from adjacent non-fertilized fallow fields.

ROTATION: A NUTRIENT, SOIL CONSERVATION, AND PEST MANAGEMENT TOOL

Sugarcane is planted in rotation with rice, sod, spring and fall sweet corn, beans, green peppers, radishes, and other assorted crops. To maximize the efficient use of plant nutrients in the soil, a rotation from higher to lower fertility requiring crops is normally practiced. Soil samples collected from fields after the rotational crops are harvested will determine the available nutrient status. Fertilizer recommendations for sugarcane following these crops will account for residual nutrients present so that only the required quantities are supplemented.

This crop rotation not only maximizes the use of residual fertilizer, but also follows a decreasing intensity of drainage and pest management requirements.

SUGARCANE IN FLORIDA RECEIVES RELATIVELY LITTLE PESTICIDE

Sugarcane in Florida requires a minimum amount of pesticides. There are several reasons why this is the case. First, sugarcane is relatively tolerant to damage by most pest species in part due to the tough texture of the leaf tissues that similarly to rice accumulate silica and form a mechanical barrier for most pathogen and insect pests. This is especially true with respect to

pests which attack foliage. Taking advantage of this tolerance, sugarcane growers have successfully implemented natural control strategies for most pests. In addition, the extensive breeding program aims to select not only higher yielding varieties but also those that are more resistant/less susceptible to diseases and insects pests afflicting the sugarcane plant. This breeding program, a partnership between the USDA, the University of Florida and the local growers, tests the varieties under selection on growers' fields to reflect existing varying soil and temperature conditions. The program is also responsible for development of varieties that are resistant to bacterial, fungal and viral diseases. Thus, the use of pesticides in sugarcane is much lower than that for non-organically grown vegetable crops.

Natural control of insect pests through the preservation and encouragement of insect parasitoids and predators is recognized as an important tactic of integrated pest management (IPM). For insects and mite pests of sugarcane, biological control (using predators, parasites, and other beneficial organisms to control pests) has been an outstanding management strategy.

While EPA-approved insecticides may occasionally be required, the use of chemicals in Florida sugarcane is best described as limited.

EAA AMBIENT AIR MONITORING

The Palm Beach County Health Department and the Florida sugar industry have conducted programs of air quality monitoring in the EAA since the late 1960's. These programs are designed to monitor particulate matter, sulfur dioxide, and ozone under sampling protocol and regulations of the U. S. Environmental Protection Agency and the Florida Department of Environmental Protection.

Air quality in the EAA is well within state and federal air quality standards and is comparable to both the statewide and coastal Palm Beach County averages.

Palm Beach County Health Department measurements show that less than 2% of the airborne particulate matter measured at their five monitoring stations is from agricultural origins.

PUBLIC AND PRIVATE GROUPS WORK TO SUSTAIN AGRICULTURE

Sugarcane breeding programs have focused on cultivated sugarcane varieties with high yields and disease resistance. Varieties originating in the EAA have substantially improved sugar production in Florida, Louisiana, Texas, Latin America, and other regions throughout the world.

Geneticists and agronomists are currently broadening their programs to seek varieties that are even more nitrogen and phosphorus efficient and are more tolerant to high water tables. The nutrient efficiency research is two-pronged; isolate the ability to achieve high yields with less fertilizer, and select for the ability to remove more nutrients from the soil so that they do not reach the water bodies.

Research and commercial conditions in the EAA, and other countries, have shown that sugarcane tolerates short-term floods, and that this characteristic could be genetically improved. More

water-tolerant sugarcane would have side benefits of enhancing soil conservation efforts and further reduce P runoff from EAA soils.

AT THE FACTORIES

In Florida, the four existing sugar mills process approximately 16,000,000 tons of sugar cane, from which about 2,000,000 tons of raw sugar and about 100 million gallons of black strap molasses are produced each year. Raw sugar is used by refineries to produce refined sugar.

Chemically classified as a carbohydrate, sugar is a natural energy source. Black strap molasses is normally used for cattle feed or as a feed-stock in the production of alcohol, a renewable fuel.

The production of sugar from cane involves several well established processes: extraction, clarification, evaporation, crystallization, and mechanical separation. **None of these processes involve the use of hazardous or environmentally undesirable** materials. Current emphasis in the industry is towards improved process control and efficiency.

At the grinding station, juice is extracted by crushing the cane through a series of three or four roll mills. The fiber residue left from grinding the cane, bagasse, is sent to the boilers as fuel. Using bagasse as the renewable fuel makes Florida sugar cane processing operations almost energy self-sufficient.

With the modern boilers now in use, the sugar industry produces a surplus of energy, available as electric power to domestic and industrial users. Flue gas generated during boiler operations has a higher moisture content because the bagasse itself is a moist material. This helps to produce a very clean stack gas which is in compliance with all local and federal clean air laws.

Fuel biomass, bagasse, is almost entirely plant material. The ash from this biomass can be used as fertilizer due to its high mineral content. Once these materials have been returned to the cane field, a very natural cycle has been completed.

Clarification of the juice is normally carried out with the help of lime and heat in cylindrical tanks. Clarified juice and a precipitate are obtained. This insoluble precipitate, comprised of field soil and plant material, is filtered out and retained in ponds for eventual return to production fields. Again, this completes a natural cycle.

The clarified juice is concentrated in evaporators and seeded with fine sugar powder to serve as nuclei for the sugar crystals. Finally, the crystals, raw sugar, are separated from their surrounding molasses by centrifugal force and sent to storage or to cane sugar refineries.

QUALITY CONTROL IN THE FLORIDA SUGAR INDUSTRY IS STATE-OF-THE ART

The United States cane sugar industry has much more regulatory control than most of the foreign suppliers of sugar. These regulations impact many aspects of operations, including cane production, construction of new equipment and facilities, worker safety, and the environment. If

rationally conceived and implemented, such ordinances are desirable for the industry to be a good citizen and neighbor.

Compared with many over-seas milling operations, Florida sugar mill technologists have successfully created a safe and environmentally compatible industry.

Updated: January 2016.

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