Florida Agricultural Stakeholder Engagement Program (STEP)

Vivek Sharma (PI), Kevin Athearn, Sudeep Sidhu, Benjamin Broughton, Adam Watson, Lakesh Sharma, Robert Hochmuth, Michael Dukes, Joel Love, Kelly Aue, Jay Capasso, Mark Warren, Dan Fenneman, Tyler Pittman, Emily Beach, Kevin Korus, and Keith Wynn

The **Florida Stakeholder Engagement Program (STEP)** promotes the adoption of science-based education and outreach on Best Management Practices (BMPs) through farm management competitions focused on input use efficiency and profitability. The program:

1. Fosters peer-to-peer interaction,
2. Creates a safe environment for action-oriented learning, and
3. Supports collaboration among all members of the agricultural community.

Objectives: The main goal of the STEP is to engage agriculture stakeholders through farm management competition focusing on input use efficiency and profitability. Specific objectives include:

1. Host farm management competitions that promote profitability and efficiency through peer-to-peer interaction and allow growers to test, observe, experiment, and implement new and emerging water and fertilizer BMPs and technologies.
2. Quantify and characterize the operational and economic benefits and challenges of BMPs.
3. Integrate all members of the agricultural sector, including producers, industry, regulatory agencies, NRCS personnel, local extension agents/educators, and university researchers, in developing and disseminating effective educational, outreach, and training materials that will lead to acceptance of recommended water and nutrient management strategies.

Approach: The competition will be held under the variable rate sprinkler for corn at the University of Florida, North Florida Research and Educational Center, Suwannee Valley (UF-NFREC-SV). Each competing team will be assigned four randomized plots as part of a randomized complete block experimental design that provides statistical evaluation to determine the winners.

The project teams will manage all plots. Participants will have control over several production parameters:

1. Crop hybrid type,
2. Seeding rate,
3. Irrigation management,
4. Nitrogen management,
5. Insurance selection, and
6. Grain marketing.
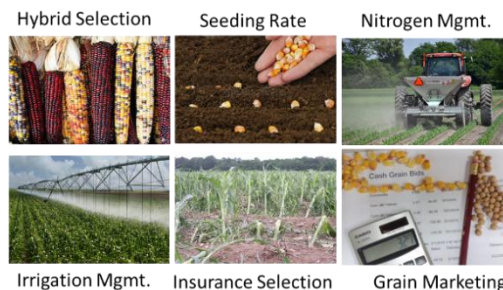
All other management decisions, such as pesticide use, residue management, among others will remain constant for all teams.

These decisions will be made in real-time using a secure online submission form (https://step.ifas.ufl.edu/).

The teams will compete for three awards:

1. Most profitable,
2. Highest input use efficiency (high-efficiency award), and
3. Lowest cost per bushel.

Winners will be awarded $2000 in each category along with plaques.

The high input use efficiency is calculated based on the Water-Nitrogen Intensification Performance Index (WNIPI), which is an integrated index of irrigation and nitrogen use efficiency.

<u>Competition Rules:</u>

1. **<u>Hybrid Selection and Seeding Rate:</u>**
   a. Each team will be required to select their seed hybrid and seeding rate.
   b. Teams are allowed to work with multiple local seed companies for hybrid selection.
   c. Teams are allowed to choose any plant population between 26K to 36K, in the increment of 2K.
   d. Teams can choose one of the four default hybrids listed below or source your seed. If sourcing your seed,15 lbs of seed must be delivered at the North Florida Research and Education Center by **March 10th**. You must provide documentation of the retail price for any seed that you source.

   Competition Default Hybrids:
   i. LC1577VT2P – Local Seed
   ii. P2042YHR - Pioneer
   iii. P1870YHR - Pioneer
   iv. A6659VT2RDB - AgriGold

2. **Nitrogen Management:**

All the plots will receive 13 gals/ac (~ 30-40 lb/ac of N) of startup fertilizer (23-9-0) at the time of planting. You can choose:

a. Conventional fertilizer program - In-season fertilizer applications of dry ammonium nitrate (34-0-0) and UAN 28% (28-0-0-5),
b. Controlled-Release Fertilizer (CRF) program – CRF blend of 43-0-0.

a. **Conventional fertilizer program**

The in-season application can occur in two stages:

a) Planting to V10,
b) V10 to Tasseling

From Planting to V10, Dry application of Ammonium Nitrate (up to 100 lbs/ac of N) in single or split applications (maximum of 3 applications) can be applied via broadcast or side-dressed.

From V10 to Tasseling, Fertigation can be applied once each week on a fixed day (Thursday) with an amount ranging from 30 to 60 lbs/ac of N per event of UAN 28% (28-0-0-5), using the high clearance rig with installed "raindrop" brand applicator nozzles to simulate a fertigation event.

b. **Controlled Release Fertilizer Program:**

For the CRF program, you can choose any CRF blend 43-0-0 (Harrells) at a rate ranging from 150 to 300 lbs/ac of N. All the CRF applications will be applied at planting.

In case of a leaching rain event (determined by the project management team), an additional application of 30 lbs/ac will be allowed.

For nutrient management, soil samples and tissue samples (FDACS, BMPs) will be taken at regular intervals throughout the growing season.

3. <u>Irrigation Management:</u>

The team will have three options for irrigation management: a. Soil moisture-based irrigation scheduling, b. Evapotranspiration-based irrigation scheduling, or c. Pre-determined calendar-based irrigation scheduling. One set of soil moisture sensors will be installed per team for soil moisture monitoring. You may choose one of the following types of soil moisture sensors:

    a) Sentek drill and drop probe (Ag holder)
    b) BMP logic
    c) AquaSpy
    d) High Yield Ag Solution - KTS

Irrigation Selection Criteria:

- Select the irrigation amount (depth) in 0.05-inch increments at least one day before the application.
- From Planting to V10, the maximum irrigation depth per application is 0.25 inches.
- From V10 to harvest, the maximum irrigation depth per application is 0.5 inches.
- No irrigation will be applied if no selection is made.

4. <u>Insurance Selection:</u>

You must select crop insurance at the minimum (catastrophic) level or above. Crop insurance options include:

    a. Revenue Protection
    b. Yield Protection plans.

You can find more information about crop insurance on the USDA website or by contacting your local insurance agent. You may choose the following coverage levels: 50%, 60%, 70%, or 80%.

Insurance selections must be made by the planting.

Once your insurance choice has been submitted, it cannot be changed for this year's contest.

5. Marketing Selection:

Teams must make marketing selections for the simulated 1,000-acre farm. The total number of bushels marketed will be the average yield per acre harvested from your research plots times 1,000 acres. Simulated delivery of the harvested grain corn is assumed to take place on the actual research plot harvest date, which will be in August or early September.

No postharvest (storage) marketing is allowed for this competition.

Teams may choose flat-price or basis contracts (for August/September delivery) between the competition start date and July 29th. Contract prices will be posted weekly on the STEP webpage (https://step.ifas.ufl.edu/). The basis contract is tied to the Chicago Board of Trade (CBOT) September 2022 futures price.

The contract price or basis associated with your selection will be the weekly posted price or basis in effect on the date you submit the contract selection. Teams may select multiple contracts.

For each basis contract selected, you must complete the contract on the date you want to complete the contract (lock in the futures price). If a contract is not completed by July 29th, we will use the July 29th futures price to complete the contract. The closing futures price on the date you complete the contract, plus the amount of the basis on the date of contract initiation, will be used to calculate the contract price.

Any bushels not sold through contracts (total bushels harvested for the simulated 1,000-acre farm minus the number of bushels contracted) will be "sold" at the spot market price on the date of harvest. If more bushels are contracted than harvested, you will be charged the difference between the spot market price and highest contract price (if the spot market price is higher), plus a $0.20/bu handling fee, on the number of bushels over contracted.

AWARD CALCULATIONS

1. Most Profitable:

The "most profitable" award will go to the team with the highest simulated profit (net income) per acre. Net income per acre will be calculated as follows.

Net income per acre =

> \+ Yield (bu/acre) x [Average delivered price per bushel - $0.30/bu hauling cost]
> \+ Simulated insurance indemnity payment received ($/acre), if any
> \- Insurance premium paid ($/acre)
> \- Seed cost ($/thousand) x Amount of seed planted (thousands)
> \- Fertilizer material cost ($/lb) x Amount of fertilizer applied (lbs)
> \- Fertilizer application charge x number of applications
> \- Irrigation cost ($/acre-inch) x inches of water applied
> \- Fixed production costs per acre (the same fixed cost will be charged to each team)

Yield (bu/acre) will be calculated based on the average yield from each team's corn plots, at 15.5% moisture. The average delivered price per bushel will be determined by each team's marketing choices. Material and application costs for seed, fertilizer and irrigation will be determined by each team's management choices.

2. Most efficient:

The high input use is calculated based on the Water-Nitrogen Intensification Performance Index (WNIPI) which is an integrated index of water intensification performance index (WIPI; equation 1) and nitrogen intensification performance index (NIPI; equation 2) as:

$$WIPI = \frac{\left[\frac{Y - Y_n}{Y_n}\right]}{\left[\frac{ET_n + I}{ET_n}\right]}$$

$$NIPI = \frac{\left[\frac{Y - Y_n}{Y_n}\right]}{\left[\frac{U_n + N}{U_n}\right]}$$

Where, Y = grain yield of the farm under evaluation; Y_n = grain yield of the zero-input treatment; ET = crop evapotranspiration of the farm under evaluation; ET_n = crop evapotranspiration of the zero-input treatment; U_n = aboveground nitrogen uptake of the zero-input treatment; and N = fertilizer nitrogen applied by the farm under evaluation.

Yield (bu/acre) will be calculated based on the average yield from each team's corn plots, at 15.5% moisture. ET is calculated using the water balance approach. There WINIP is calculated as:

$$WINIP = \frac{\left[\dfrac{Y - Y_n}{Y_n}\right]}{\left[\dfrac{ET_n + I}{ET_n}\right] * \left[\dfrac{U_n + N}{U_n}\right]}$$

3. Lowest Cost Per Bushel Award

The "lowest cost per bushel" award will go to the team with the lowest calculated production cost per bushel. Marketing and insurance choices will not affect the production cost calculation.

Production cost per bushel = production cost per acre ÷ yield (bu/acre)

Total production cost per acre =

> + Seed cost ($/thousand) x Amount of seed planted (thousands)
> + Fertilizer material cost ($/lb) x Amount of fertilizer applied (lbs)
> + Fertilizer application charge x number of applications
> + Irrigation cost ($/acre-inch) x inches of water applied
> + Fixed production costs per acre (the same fixed cost will be charged to each team)

Yield (bu/acre) will be calculated based on the average yield from each team's corn plots, at 15.5% moisture. Material and application costs for seed, fertilizer and irrigation will be determined by each team's management choices.