

**F**or agricultural producers with land in tropical or semitropical climates, sugarcane may be a viable business option. According to the USDA Economic Research Service (2021), sugar crops generally fetch higher prices than alternative crops. The amount of sugarcane produced in the United States has increased over the last 40 years. The adoption of new technologies, including new processing equipment, improved crop varieties and acreage expansion are all factors that have led to the increase.

Sugarcane traditionally is grown in areas near bodies of water where fields can be periodically flooded. The southern shores of Lake Okeechobee in southern Florida, and the Louisiana Delta continue to lead the U.S. in sugarcane production. Nonetheless sugarcane cultivation is expanding to drier areas, where other methods of irrigation may be necessary. The acreage of sugarcane for sugar production in the U.S. increased from 704,000 acres in the early 1980s to 903,400 acres in fiscal year 2020/2021.

## Growth Cycle

Sugarcane is not grown from seed; instead cane stalk cuttings are planted. The crop is a tall, perennial grass that takes one to two years to mature. Ripening is a continuous process. As stalks grow, each internode, or joint, functions as a single unit. After cell elongation and cell wall thickening, the storage volumes of cells fill with sugars. When leaves attached to an internode die, it is an indication the internode is ripe. Lower internodes ripen first, while upper internodes continue to grow (Sugar Research Australia, 2014).

Although a period of water stress can spur sugarcane

## Estimated crop yield (365-day crop) under rainfed and unlimited irrigation conditions (from Hardie *et al.* 2000)

Location	Rainfed (tc/ha)	Irrigated yield (tc/ha)	Increase from irrigation (tc/ha)
Bundaberg	62	130	68
Childers	60	120	60
Mackay	84	144	60
Mareeba	29	152	123
Proserpine	73	154	81
Sarina	84	144	60

to store sugar, water is necessary to fuel vegetative growth. In Australia, sugarcane has been irrigated for decades, and researchers have recorded significant yield increases with irrigation. The chart above shows that in four out of six areas studied, sugarcane yields doubled or more than doubled when irrigation supplemented rainfall.

## Irrigation Scheduling

The goal of irrigation scheduling is to maximize yield potential by minimizing water stress. Growers must estimate the available water in the crop root zone, consider how much water the crop is likely to use, and decide how much irrigation is necessary to bring available soil water up to optimum levels.



Soil's water-holding capacity varies with soil texture. In general, fine-textured soils, such as silt and clay, hold more water than coarse-textured or sandy soils. Sandy soils require frequent, light irrigation applications.

Crop root zone depth also affects irrigation decisions. Although it is possible for sugarcane roots to reach as deep as 13 feet, the deeper roots supply a very small portion of the crop's water needs. The effective rooting depth of sugarcane varies between 3 to 6 feet, depending on soil conditions, and supplies the majority of the crop's water needs.

Amounts of water to be supplied through irrigation will vary depending on the level of rainfall, average temperature, and other environmental factors. To determine how much water their sugarcane crop will use, irrigators need to reference an evapotranspiration, or ET, number for sugarcane that is calculated for their geographical region. ET is a measure of how much water is evaporated from the soil and transpired by the plant. Sugar Research Australia (2014) found that during sugarcane's peak growth phase, its water requirement is 1.25 times the reference ET. As the crop matures, its water requirement reduces to 0.7 times ET.

In Australia, where sugarcane has long been irrigated, ET numbers are readily available. In the U.S., such data may be more difficult to obtain. For example in Louisiana, where sugarcane cultivation is expanding northward into the central part of the state, researchers at Louisiana Southern University's AgCenter are beginning to study sugarcane irrigation to provide better recommendations for growers (Gautreaux, 2021). In the absence of ET data, growers may want to consider using a soil moisture sensor. Such sensors indicate how much water is available in the crop root zone.

"Really the method of irrigation scheduling depends on how the grower thinks about it," said Stacia

Conger, adjunct assistant professor, at Louisiana State University. "If they are technologically savvy and looking for more information about what's going on in their soil, a soil moisture sensor is better for that type of person. But sometimes sensors can be overwhelming. It really just depends on their comfort level."

### Recommended Irrigation Systems

Sugar Research Australia (2014) notes that lateral move and center pivot irrigation systems are beneficial because they allow for precise irrigation methods, use low pressure and have low labor requirements. In addition, large areas can be irrigated efficiently and water application rates are easily varied by changing the system's speed of travel.

Although Sugar Research Australia notes problems with center pivots irrigating the corners of fields, Reinke already has come up with a solution. Decades ago, the company pioneered the swing arm corner (SAC) as an attachment for center pivots to irrigate in field corners. In 2020, Reinke introduced the electronic swing arm corner (ESAC), which greatly improved the uniformity of water application in field corners.

Reinke also manufactures the Sugargator, a center pivot that is customized for sugarcane operations. With a height of 14 feet, the Sugargator stands 5 feet taller than Reinke's standard pivot, and accommodates tall sugarcane crops.

Sugar Research Australia also recommends larger pipes for any overhead irrigation system. Although larger pipes initially cost more than pipe with smaller diameters, they lower pumping costs through reduced friction losses and result in savings over the life of the irrigation system. Reinke offers a variety of pipe materials and sizes to optimize irrigation for water quality and efficiency.

### References:

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