Impacts of salinity determined for agave

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As groundwater levels decline, identifying plants that can thrive in low water conditions is increasingly important. A new study focused on *Agave*, a species that has the ability to be highly water-use efficient in hot, drought-prone environments. The authors said that *Agave*, traditionally used as a source of food, beverages, and fiber, has the potential to be cultivated more widely to produce alternative sweeteners, bioenergy, and for other end uses. They said that determining how *Agave* species respond when grown in saline soils in semiarid regions could help increase production.

In a report in the January 2016 issue of *HortScience*, corresponding author J. Ryan Stewart, from the Department of Plant and Wildlife Sciences at Brigham Young University, said that increased production of select *Agave* species could also help address dwindling water reserves in semiarid regions such as the southwestern United States. Stewart explained that agaves use the crassulacean acid metabolism (CAM) photosynthetic pathway, which allows the plants to shift CO_2 uptake to the night. "Cooler nighttime temperatures reduce the vapor pressure gradient between agaves' leaves and the air, resulting in low transpiration rates. Consequently, CAM confers the ability to agaves to be highly water-use efficient in hot, drought-prone environments."

Stewart and researchers Steven Bergsten and Andrew Koeser designed experiments to better understand how agaves respond to high salinity environments. "The tolerance of *Agave* to salinity appears to vary depending on species, suggesting that some species may be more tolerant to salinity than generally assumed," they said. "If salinity severely

impacts growth, cultivating or reestablishing these species for commercial purposes may not be feasible in dry regions."

The scientists created four separate species-level experiments to analyze *A. parryi*, *A. utahensis* ssp. *kaibabensis*, *A. utahensis* ssp. *utahensis*, and *A. weberi*. Agave plants were grown hydroponically in a greenhouse under supplemental light (12 hours daily) with average temperatures of 25 ± 5 °C during the light period and 15 ± 2 °C during the dark period. Relative humidity during the study period ranged from 6% to 75%, with a median value of 47%.

"Several *Agave* species show variation in response to high levels of salinity. However, age and stage of development may have played a factor in the degree of tolerance," the authors said. Analyses showed that *Agave utahensis* seedlings were very sensitive to high levels of salinity, with growth and survival greatly decreasing in higher salinity treatments. In contrast, *Agave parryi* and *Agave weberi* plants were relatively tolerant to high levels of salinity.

The authors said that both *A. parryi* and *A. weberi* show potential to be grown in saline soils in semiarid regions as crops. They recommended additional research be done determine the species' degree of establishment and productivity under field conditions.

More information: *HortScience*, hortsci.ashspublications.org/c … ent/51/1/30.abstract

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