Blue stars survive between rock and hard place

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Blue stars have both anatomical and chemical features that protect it from the extreme heat of the area. Credit: sunphlo

Unlocking how some of this state's hardiest plants make a living out of the dry crevices on harsh rocky outcrops could help toughen future food crops against drought as water becomes scarcer globally.

Researcher Michael Shane travelled to Pate's Patch near Denmark,

Western Australia, to investigate the tuberous root geophyte Chamaescilla cormbosa, commonly known as blue stars, a small hardy plant found in sandy soils across the state's south-west, and to build on the geophyte research of renowned WA botanist John Pate.

As blue stars are geophytes, they are drought avoiding plants with underground food storage.

Prof Shane took the first samples of the plant in February when the plant was in full summer dormancy then April, July, September and November when the plants were growing and flowering and the final harvest was March the following year.

After converting Prof Pate's music room into a laboratory, they dissected the plants for immediate testing, and froze other material for analysis back in a university laboratory.

They found that blue stars have both anatomical and chemical features that protect it from the extreme heat of the area.

"This study was over the entire life cycle of the plant and we looked at the whole phenology that enables it to survive between a rock and a hard place," Prof Shane says.

"It's got a very tough life in summer with the heat and extreme dry that completely desiccates the soil but the plant doesn't dehydrate, so it has anatomical features that protect it, like the skin of an onion."

"In addition, it has chemical conditions that occur in the tissues that enable it to survive during summer drought conditions."

The report concluded there was no evidence of dehydration of the stem or root tubers in underground dormancy, despite summer drought.

In addition, the dormant stem is protected underground and enclosed in fibrous leaf sheaths, which likely acts in parallel with the accumulation of large reserves of sugars.

This accumulation of sugars alleviates the effect of drought by aiding the plants retention of water and helps to maintain the structural integrity of the cell membrane.

Prof Shane says more research is needed into geophytes in different ecosystems to test the theory that multiple adaptive traits are common and to find out what trade-offs geophytes make in adapting to survive drought.

A better understanding of these geophytes could inform where and what to plant against drought for future food crops.

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