Thirsty seeds reach for medicine cabinet

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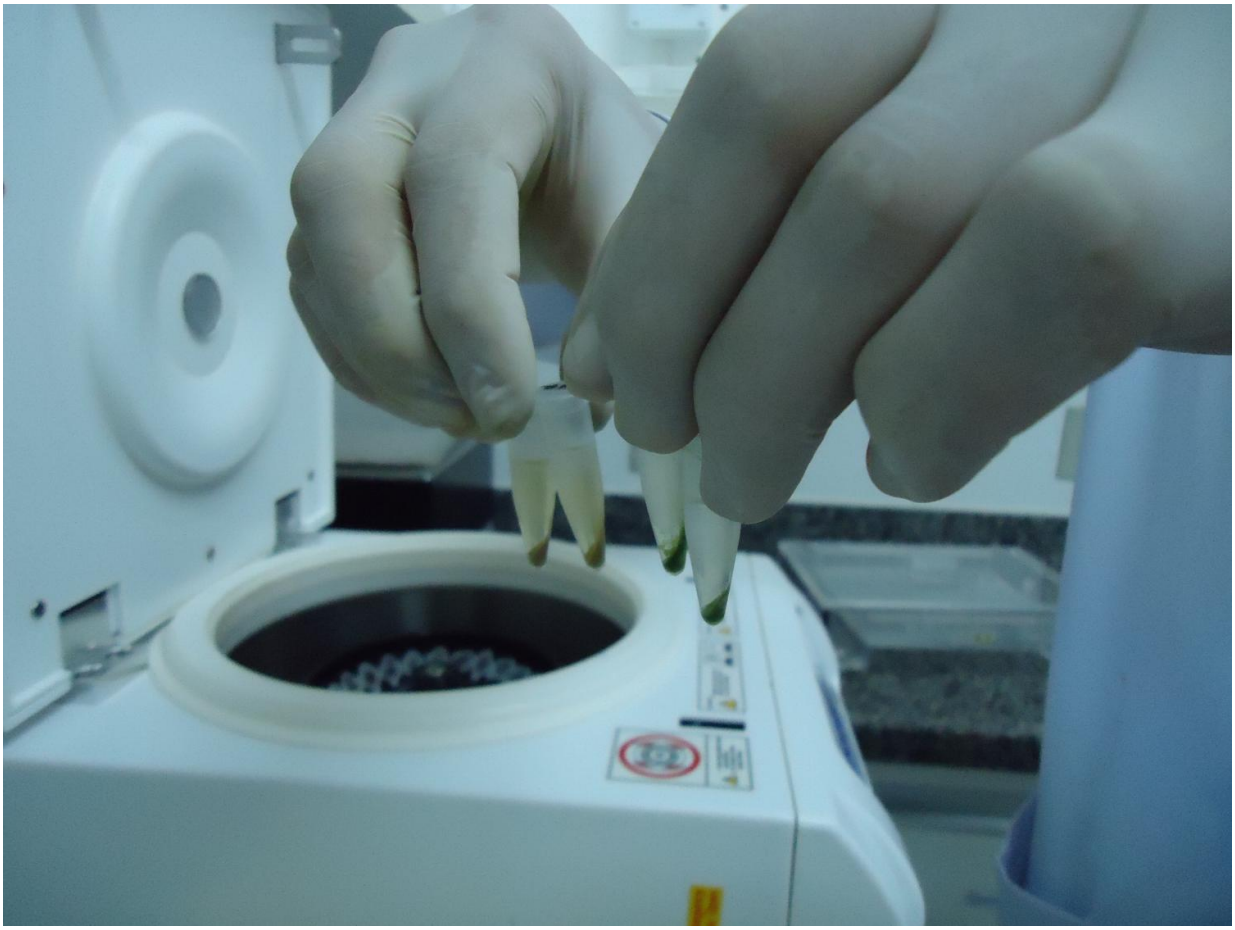

These tubes and the centrifuge are used to separate out the antioxidant enzymes to determine the amount each plant made in response to the salicylic acid treatment. Credit: Wellison Dutra.

Just like humans and animals sometimes need medicine to feel well or

perform better, so can plants.

Scientists at the State University of Paraíba in Brazil have found that salicylic acid—also used to make aspirin—can help the cowpea be more drought tolerant. They focused on germination, the period when the plant is just sprouting, and early growth.

In Brazil, the cowpea one of the main sources of protein for many people. Americans may know the cowpea by the name black-eyed pea.

In the group's experiments, the "medicine," or seed treatment, was applied to the seeds before they started to grow. The process is a widely-used technique, with a goal of improving the performance of seeds as they germinate and grow. Such treatments can lend protection from conditions such as high temperature or lack of water.

"Salicylic acid acts on responses in plants when exposed to stress condition," explains researchers Alberto Soares de Melo and Wellison Filgueiras Dutra. "These responses are associated with increased efficiency of enzymes plants use to deal with stress. The acid has the ability to act on plant growth and development."

The acid helps the plant be more drought tolerant because it improves the plant's natural mechanisms for dealing with the stress. In particular, it increases the levels of three enzymes, all of which help the plant during a drought.

Cowpeas are a major source of protein. Growing them more reliably in areas with risk of drought increases food security. Credit: Martha Pings.

But sometimes those enzymes alone are not quite enough. The salicylic acid is able to give the plant's natural protection against drought a welcomed boost.

The researchers used six different types of cowpea. They found that not all of them responded the same to the acid. It helped some overcome drought more than others. Soares de Melo says this will allow them to be more selective about which kinds of cowpea are planted.

The seed treatment was done by laying seeds on paper moistened with water and the acid. From contact with the wet paper, the water and acid

enter the seeds. They also used different amounts of the acid and water to find the best combination.

"The application of this acid is a simple and cheap treatment for increasing water stress tolerance in cowpea, a crop of great value in north and northeast Brazil," Soares de Melo says. "The increase of tolerance allows them to grow in areas with greater water irregularity."

Researchers in the plant ecophysiology laboratory prepare for their experiments. Credit: Wellison Dutra.

He adds that the next step in this work will be field research so they can determine exactly how much water the treatment helps save. An ultimate goal of their research is to expand the area of cultivation for the cowpea, especially to areas with limited water.

"These results support a step forward for new research on the role and route of action of the acid," he explains. "The acid could minimize production and productivity losses of cowpea, and other crops, when cultivated under conditions of low or irregular rainfall, such as the Brazilian Northeast."

More information: Wellison Filgueiras Dutra et al, Antioxidative Responses of Cowpea Cultivars to Water Deficit and Salicylic Acid Treatment, *Agronomy Journal* (2017). DOI: 10.2134/agronj2015.0519

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