'Dream' discovery could sow crops better equipped to weather the climate change storm

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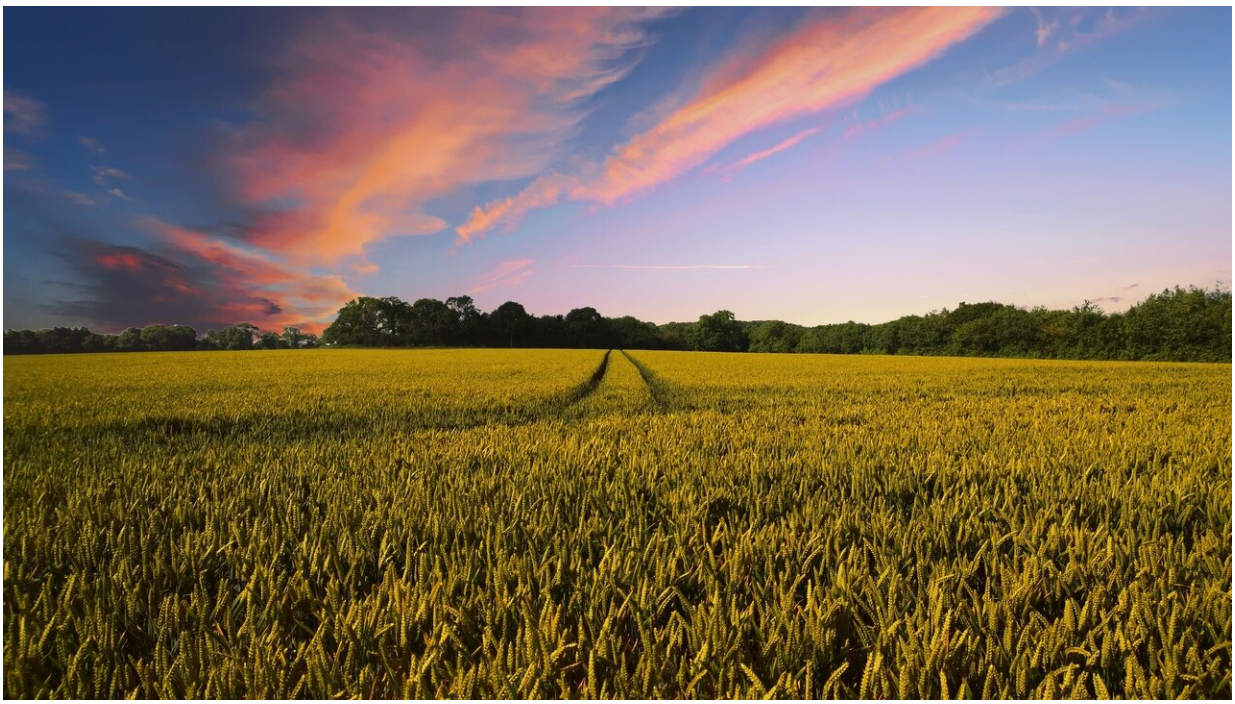

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Scientists from The Australian National University (ANU) and James Cook University (JCU) have identified an "exquisite" natural mechanism that helps plants limit their water loss with little effect on carbon dioxide (CO_2) intake—an essential process for photosynthesis, plant growth and

crop yield.

The discovery, led by Dr. Chin Wong from ANU, is expected to help agricultural scientists and plant breeders develop more water-efficient crops.

Study co-author Dr. Diego Marquez from ANU said the findings will have significant implications for the agricultural industry and could lead to more resilient crops that are capable of withstanding extreme weather events, including drought.

"Plants continuously lose water through pores in the 'skin' of their leaves. These same pores allow CO_2 to enter the leaves and are critical to their survival," Dr. Marquez said. "For every unit of CO_2 gained, plants typically lose hundreds of units of water. This is why plants require a lot of water in order to grow and survive.

"The mechanism we have demonstrated is activated when the environment is dry, such as on a hot summer day, to allow the plant to reduce water loss with little effect on CO_2 uptake."

The researchers believe this water preserving mechanism can be manipulated and, in turn, may hold the key to breeding more water-efficient crops.

According to lead author Dr. Wong, the ANU team's findings are a "dream discovery" from a scientific and agricultural perspective.

"The agriculture industry has long held high hopes for scientists to come up with a way to deliver highly productive crops that use water efficiently," Dr. Wong said.

"Plant scientists have been dealing with this big question of how to

increase CO_2 uptake and reduce water loss without negatively affecting yields.

"Having this mechanism that can reduce water loss with little effect on CO_2 uptake presents an opportunity for agricultural scientists and plant breeders researching ways to improve water use efficiency and create drought-tolerant crops."

Although the researchers have confirmed there is a system in place that is working to limit the amount of water being lost from the leaf, they still don't know what's causing it.

"Our main target now is to identify the structures inside the plant that allow this control. We think that water conduits, called aquaporins, located in the cell membranes are responsible," Dr. Marquez said.

"Once we're able to confirm this, we can then start thinking about how we can manipulate these systems and turn them into an asset for the agricultural industry."

Co-author Distinguished Professor Graham Farquhar from ANU said: "Finding the mechanism itself was one step, a big one, but there is still work to do to translate this discovery into the industry.

"We expect that both government and industry will see the value of contributing funds to achieve this goal."

Dr. Wong first alluded to this water preserving mechanism 14 years ago, but the research team has only now been able to officially confirm its existence thanks to years of experimentation and corroboration of their results.

The research is published in *Nature Plants*.

More information: Graham Farquhar, Humidity gradients in the air spaces of leaves, *Nature Plants* (2022). DOI: 10.1038/s41477-022-01202-1. www.nature.com/articles/s41477-022-01202-1

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