

Copycat plant booster shows promise in trials

September 28 2020



Zaxinone and zaxinone mimics (MiZax) have the potential to alleviate purple witchweed infestation. Credit: KAUST; Boubacar A. Kountche and Jian You Wang

A molecule that can mimic the function of zaxinone, a natural growth-promoting plant metabolite, has been designed and fabricated by an international team led by KAUST and the University of Tokyo. Their successful mimic may have wide-reaching applications in plant biology and agriculture, including the promotion of plant growth and limiting the infestation of witchweed.

"We identified zaxinone in a previous study and found that it both stimulates the growth of rice plants and appears to reduce infestation by the root parasite *Striga* (witchweed)," says Jian You Wang, Ph.D. student under the supervision of Salim Al-Babili. "It is tempting to jump in and say we can harvest zaxinone from plants, study its [activity](#) and use it to boost [crop yields](#), but it is not that simple."

Living organisms produce growth regulating metabolites, such as zaxinone, at very low concentrations, and the molecules themselves are often short-lived and unstable. The team realized that to make full use of their discovery, they would need to design a synthetic molecule that can mimic zaxinone's function, rather than using the metabolite itself.

"We first identified the parts of zaxinone that are crucial for its activity and the other parts that can be replaced or modified," says Wang. "These results helped our team to design a series of easy-to-synthesize zaxinone mimics called MiZax."



By applying MiZax to the soil containing Striga seeds, the researchers found that the Striga emergence was significantly decreased (left) and the growth of rice plant roots were remarkably boosted in the hydroponic system (right). Credit: KAUST; Salim Al-Babili

The team trialed MiZax by adding them to soil and measuring their ability to improve root growth and limit Striga infestation in rice [plants](#). Two of the mimics, MiZax3 and MiZax5, proved particularly effective, with MiZax3 performing even better than zaxinone itself.

"We were excited to see the excellent activity and stability of MiZax3, even when it was used at very [low concentrations](#)," says Wang. "It is important to note that we still do not know precisely how zaxinone itself works. MiZax3 will help us investigate the mechanisms behind zaxinone's activity and how it changes plant hormone patterns and metabolism."

Al-Babili says: "We will also perform controlled field and safety tests to evaluate MiZax activity on cereals and horticultural crops in greenhouse and research farms in the Kingdom. MiZax will help us improve our understanding of the development, growth and biotic interactions of cereals, particularly rice."

Al-Babili is also going to integrate MiZax into a wider project he is leading, which is funded by the Bill & Melinda Gates Foundation, on combating Striga in sub-Saharan Africa.

More information: Jian You Wang et al. Efficient Mimics for Elucidating Zaxinone Biology and Promoting Agricultural Applications,

Molecular Plant (2020). [DOI: 10.1016/j.molp.2020.08.009](https://doi.org/10.1016/j.molp.2020.08.009)

Provided by King Abdullah University of Science and Technology

Citation: Copycat plant booster shows promise in trials (2020, September 28) retrieved 13 March 2024 from <https://phys.org/news/2020-09-copycat-booster-trials.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.