New plant hormone functions offer solutions for parasitic weeds

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(PhysOrg.com) -- New functions of the plant hormone strigolactone, discovered by researchers at the RIKEN Plant Science Center and University of Toronto, have provided first-ever clues on the germination mechanism for the world's most destructive species of parasite weeds.

Every year, across Africa, Asia and Australia, parasite weeds of the genus Striga cause billions of dollars in damage to global agriculture. As parasite plants, Striga possess few storage reserves of their own and survive off nutrients produced by their hosts, which include some of the world's most important crops. Seeds of the parasite plants, dormant in the ground for many years, germinate only when they sense a host nearby, through a mechanism that is poorly understood.

Triggering this mechanism is the plant hormone strigolactone, which in addition to regulating shoot branching patterns, also acts as a chemical cue for Striga germination. To clarify the latter function, the researchers explored the effects of 10,000 small, membrane-permeable molecules on germination and early seedling development in Arabidopsis, a model plant more amenable to experimentation than Striga. Chemical screening revealed five structurally-similar compounds, "cotylimides", which specifically boost strigolactone production, bleaching Arabidopsis seed leaves.

The researchers tested these five compounds on seeds derived from 520,000 mutant Arabidopsis plants and identified 246 lines which exhibited reduced bleaching, indicating cotylimide resistance. By

analyzing a subset of these lines with characteristics similar to Striga, they uncovered that strigolactone production is boosted by light, and that the plant hormone plays a role similar to sunlight in stimulating Arabidopsis germination and greening.

These findings, published in the journal *Nature Chemical Biology*, expose a previously-unknown relationship between light and strigolactones with deep implications for our understanding of parasitic plants. As a step toward developing parasite-resistant plant species, the hints these findings provide promise to contribute to tackling food security challenges affecting millions worldwide.

Provided by RIKEN

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