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A potent stimulant induces parasitic plant germination that causes it to die

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oot parasitic weeds of the Oro-banchaceae such as broomrapes and witchweeds form a serious threat to agriculture in many countries around the world (1). They cause large yield losses in crops such as sorghum, millet, maize, rapeseed, tomato, sunflower, and legumes (1). These obligate parasitic plants are dependent on a host for survival, using them to grow and reproduce on. Therefore, they only germinate in the presence of a germination stimulant exuded by the host root (2). On page 1301 of this issue, Uraguchi et al. (3) reveal the discovery of a potent synthetic germination stimulant. Their discovery provides the basis for the development of an agrochemical that may be used to germinate parasitic weeds in the absence of a host (so that they will die, called suicide germination) and gives insight into what may be determining host specificity of these parasites.

The tight control of germination of these root parasitic plants is caused by their ability to respond to germination stimulants (4). These are secreted by the roots of host plants and induce seed germination. Although several compounds, from different chemical classes, in the root exudate have been identified as germination stimulants, the most important class is the strigolactones (5) (see the figure). The first discovered strigolactone, strigol, was isolated from the root exudate of cotton and induced germination of the root parasitic plant Striga...
Strigolactone signaling in plants

Plants secrete different types of strigolactones from their roots into the soil, where they induce the germination of parasitic plant seeds and hyphal branching of symbiotic AM fungi. The strigolactones are also a plant hormone with endogenous functions, such as the inhibition of branching.

The work of Uraguchi et al. confirms the crucial importance of the D-ring for the biological activity of the strigolactones. Importantly, the authors touched on a phenomenon so far hardly addressed in the field: Does specificity in germination contribute to target host specificity (5)? A number of *S. hermonthica* hosts produce quite different strigolactones (5, 7). Sorghum produces mainly strigol-type strigolactones, such as the 5-deoxyxystrogl that was also used by Uraguchi et al. (3, 5, 7). Millet produces mainly orobanchol-type strigolactones, whereas maize produces noncanonical strigolactones (5, 7). Yet, all three are severely infected by *S. hermonthica*, albeit by different strains. Whether selectivity to the strigolactones produced by these hosts plays a role in this strain preference, and whether ligand specificity of the different ShHTLs is important, is a conundrum.

SPL7 is an interesting lead for the development of suicide germination stimulants that could be used to clear fields from *Striga*, before a crop is planted. There are, however, several challenges that need to be overcome. For application in the African continent, the molecules must be extremely cheap, if not free. In addition, the application on a field and sufficient penetration into the soil will probably need large amounts of water (15). Clearly, a lot of research is still needed to bring this finding to the field. However, the study of Uraguchi et al. may lead to new approaches, such as engineering of the strigolactone profile of the crops, which could also result in solutions for this tremendous agricultural problem that causes hardship for millions of African farmers.

REFERENCES