Metabolic control of seed germination of parasitic weeds

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Abstract: The parasitic weeds, *Striga* spp. and *Orobanche* spp. present major constraints to agriculture worldwide and a novel and effective strategy for control is desired for economical and humanitarian reasons. Chemical weed control resides on differential inhibition of metabolic pathways essential for growth and development in plants. For example, chlorsulfuron, a well-known sulfonylurea herbicide, inhibits acetolactate synthase which catalyzes the first step in the biosynthetic pathway of branced-chain amino acids. Since the life cycles of parasitic weeds are significantly different from that of their hosts, understanding of specific biological events associated with growth and development of parasitic plants is important for developing selective control strategies. The present study was focused on the germination process of parasitic weeds with the objective of identifying biological events specific to these species. A study of the metabolic profile of *Orobanche minor* seeds revealed that an unknown trisaccharide decreased concurrently with increase of glucose concentration immediately after GR24 treatment. This result indicates that glucose providing energy for germination is supplied by hydrolysis of the trisaccharide. Nojirimycin bisulfite (NJ), a potent inhibitor of glycosyl hydrolases, decreased germination of *O. minor* and *Striga gesnerioides* and reduced radicle elongation in *Striga hermonthica*. From the results, it could be hypothesized that the metabolism of trisaccharide is crucial for germination and further development of these parasitic weeds and the key enzyme in the trisaccharide metabolic pathway could be a novel target for selective control.

Keywords: *Striga*, *Orobanche*, germination, acetolactate synthase