ISBN: 978-85-64093-07-2

The mode of action of protodioscin, a steroidal saponin identified in Congo grass, as a growth inhibitor of beggarticks

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A phytotoxic fraction obtained from the extraction of mulches of *Urochloa ruziziensis* with butanol (BF) contains protodioscin isomers, which have some structural similarities with plant steroidal hormones brassinosteroids. Protodioscins could act, therefore, as an agonist or antagonist of brassinosteroids, or by interfering with the balance of phytohormones. This work compared the responses of the weed species *Bidens pilosa* to treatment with protodioscin (PDC), the butanolic fraction of *U. ruziziensis* (BF), brassinosteroids, indole-3-acetic acid (IAA) and abscisic acid (ABA). PDC and BF, at the concentration range from 50 to 250 µg ml^{-1} inhibited the growth of *B. pilosa* seedlings. Exogenous IAA (0.5 to 10 µM) strongly inhibited the primary root length and the fresh weight of stems. ABA (0.1 to 10 µM) inhibited seed germination and also the growth of resulting seedling. The brassinosteroid epibrassinolide (0.1 to 5 µM) inhibited the growth of primary roots, but brassicasterol was inactive. The respiratory activity of primary roots (KCN-sensitive and KCN-insensitive) was activated by PDC. IAA and ABA reduced the KCN-insensitive respiration and ABA increased the KCN-sensitive respiration. All compounds increased the activities of ascorbate peroxidase (APx) and peroxidase (POD), epibrassinolide being much more active. The activity of catalase (CAT) was stimulated by BF, PDC and epibrassinolide. PDC inhibited the activity of endo-β-mannanase. The whole of the results revealed that PDC does not act through similar mechanisms of actions of the assayed phytohormones. The data allowed identification of the probable events that contribute to phytotoxicity of PDC on *B. pilosa.* It caused a perturbation of mitochondrial respiratory activity leading to overproduction of reactive oxygen species and consequent cell membrane damage. PDC also reduced the mobilization of the carbohydrate reserves, which are requested to support the metabolic energy metabolism.

Palavras-chave: Phytohormones, brassinosteroids, oxidative stress, *Urochloa ruziziensis*, *Bidens pilosa*

Apoio: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Fundação Araucária, BASF.