Suicidal Germination of Striga hermonthica in Response to Various Cytokinins in Combination With Fluridone/1-Aminocyclopropane-1-Carboxylic Acid

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Striga species, particularly S. hermonthica, is a serious parasite and one of the major threats to food security, especially in third-world countries. They are causing significant loss to cereal crops and affecting the lives of 300 million Africans. Suicidal germination can be a good solution to lower Striga seed bank in the infested soils. Strigolactones have been used as suicidal germination agents, but have displayed difficulties in their implementation. In pursuit of novel and affordable germination stimulants, five cytokinins were tested alone, in combination with a carotenoid inhibitor fluridone (FL), and with an ethylene precursor 1-aminocyclopropane-1-carboxylic acid (ACC) for Striga seed germination activity. The commercially available five cytokinins, namely, trans-zeatin (tZ), kinetin (KIN), 6-benzylaminopurine (BAP), diphenyl urea (DPU) and thidiazuron (TDZ) were tested in various Striga seed germination bioassays under lab conditions. TDZ appeared highly active and its combination with FL/ACC showed maximum activity for Striga seed germination (>90%). The gene expression and hormonal profiling studies show that application of TDZ+FL treatment led to inhibition of abscisic acid level, lowering seed dormancy to enhance germination. While induction of the ACS1(1-aminocyclopropane-1-carboxylic acid synthase) gene has resulted in Striga seed germination. Results indicate that the proposed treatments can be good alternatives to strigolactones due to their simple synthesis, easy availability, and effectiveness. Hopefully, these treatments can soon be employed as suicidal germination stimulants against Striga in African agriculture.

Awards Won:
Third Award of $1,000