Bioactivity of New Series of Zaxinone Mimics in Rice Growth and Its Effect on Striga Germination

Alhammad, Noor (School: Al-Anjal Private School)

Food demand is increasing around the globe due to the growing population, which presents the risk of starvation and future food insecurity. One pre-emptive measure is to improve the growth and yield of major crop plants and reduce parasitic plant germination. Striga, a root parasitic plant that is widespread in Africa, is a serious threat to many crop plants. Zaxinone is a biostimulant that has been found to improve not only plant growth but also reduce Striga infestation. However, zaxinone has a complex 5-step synthesis, so zaxinone mimics (MiZax) were synthesized and have shown improvement in crop yield and a reduction in Striga infestation. This study investigated the effect of the new series of MiZax on the growth of rice (Oryza sativa) and Striga germination. This included the growth effects on hydroponically grown rice seedlings under standard conditions and the effects on Striga germination by Striga bioassay and in pots under greenhouse conditions. Three new MiZax compounds were made and the structure of the two selected MiZax (MiZax3 and MiZax5) was further modified to improve their efficacy. MiZax6, MiZax3-1, and MiZax5-2 showed growth-promoting effects, a reduction in Striga germination, and an SL (Orobanchol (Oro), 4-deoxyorobanchol (4-DO), Oxocarlactone, and 4-Oxo-MeCLA) reduction in root exudate through LC-MS analysis. The results indicate that further modifications to the MiZax series could potentially improve the growth and productivity and also reduce strigolactone biosynthesis and ultimately Striga infection in rice.

Awards Won:
Third Award of $1,000