THE STRIGOLACTONE MIMIC “DEBRANONES” IS APPLICABLE TO MANY ASPECTS OF AGRICULTURAL ISSUES

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Strigolactones (SLs) are recognized as a novel plant hormone, being involved in many aspects of plant growth and development. Meanwhile, SLs behave as a rhizosphere communication agent, which stimulates seed germination of root parasitic plants belonging to Orobanchaceae and induces hyphal branching of arbuscular mycorrhizal (AM) fungi. Plant hormonal functions of SLs are recently being uncovered well. SLs inhibit axillary shoot branching, influence root formation, and positively regulate the plant responses to drought stress and so on. Therefore, SLs have potential as a plant growth regulator for agricultural use. On the other hand, root parasitic plants such as Striga cause severe damage to crop production in sub-Saharan Africa. In this context, the research of SLs should be beneficial for agriculture and biomass resources. However, natural SLs were poorly available for academic and agricultural use because they are less stable and not easily synthesized. So, the development of easily obtainable and stable SL agonists has significance with regard to above issues. Recently we found novel compounds that can be readily prepared from phenolic compounds and exert SL action in shoot branching inhibition assay using rice SL deficient mutant. We called this type of chemicals “debranones”. We prepared several derivatives of debranones and evaluated their SL activities by two typical SL assays, axillary shoot branching inhibition assay of plants and seed germination stimulation assay of root parasitic plants. As a result of structure-activity relationship study, we found that there are close relationships between a variety and positions of substituents on the phenyl ring of debranones and their SL activities. Through this research we found unique compounds. One compound showed strong shoot branching inhibition activity but not strong germination stimulation activity. On the other hand, another compound showed weak shoot branching inhibition activity but strong germination stimulation activity.