**Tyrosine Sulphated Root Meristem Growth Factor Peptides Regulate Root and Nodule Development in Soybean**

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Legumes form a beneficial symbiotic relationship with soil bacteria that can fix atmospheric nitrogen into a plant usable form, resulting in a reduced reliance on synthetic nitrogen fertilizer and the associated negative environmental issues. This process is known as nodulation and involves complex molecular signaling pathways to control the physiological changes that are required to initiate and maintain nodule organogenesis. We have identified novel tyrosine sulfated peptides, called Root Meristem Growth Factor (RGF) peptides, in one of the most widely produced legumes, soybean (*Glycine max*)1. They are homologous to Arabidopsis RGF/GLV/CLEL peptides that play essential roles in regulating meristematic activity and immune responses2. We have identified conserved orthologs in other agriculturally important legumes, including *Phaseolus vulgaris*, *Pisum sativum* and *Lotus japonicus.* Within the soybean gene family, we have functionally characterized five soybean RGF-peptide encoding genes using multidisciplinary molecular biology techniques. Our results identified that theyareexpressed in the root tip region where meristem is located and during different growing stages of lateral root growth and nodulation. They also demonstrate a systemic signal transduction pathway, which is not seen in Arabidopsis and necessary for proper root growth and nodule development. These findings enhance our understanding of legume signaling and symbiotic nitrogen fixation and benefit future legume crop development programs which will improve the impact agriculture has on the environment, human health, economy, and biodiversity.

***References:***

[1] Hastwell et al. 2024, TIPS submitted, PLANTS-D-24-00070

[2] Matsuzaki et al., 2010, Science, 329, 1065-1067