

INNOVATIVE NETWORK ON RNA INTERFERENCE AND ARTIFICIAL INTELLIGENCE: DEVELOPMENT OF INNOVATIVE TECHNOLOGIES FOR CROP PROTECTION

Luis Antonio de Avila¹; Aldo Merotto Junior²

¹Universidade Federal de Pelotas, RS, Brasil. laavilabr@gmail.com; ²Universidade Federal do Rio Grande do Sul, RS

Destaque: Develop of exogenous RNAi technology to control weeds and insects with localized application through artificial intelligence and Drones.

Resumo: Interfering RNA (RNAi) is an alternative tool for crop protection. RNA delivery to the biological target and the high cost of the technology are the main challenges. Thus, it is essential to combine molecular biology, formulation chemistry, application, and artificial intelligence to accelerate the development process of this technology. For this reason, in 2022 it was established the **Innovative Network in Molecular Biology and Artificial Intelligence (SmartRNAi)**, was established. The network was financed by FAPERGS aiming to establish in the Rio Grande do Sul state research networks to generate technology and innovation in strategic areas. The **SmartRNAi** network is composed of researchers from different areas of expertises and different institutions from Brazil (UFPel, EMBRAPA, IFRS, IFSUL, UFSM, UFRGS, and UNESP) and abroad (Colorado State University, University of Arkansas, USDA- ARS, Ghent University, Rothamsted Research, and University Hohenheim). Our research objectives are: 1) to develop a viable system for exogenous RNAi application to control weeds and insects, focusing on RNAi formulation; 2) to prospect for new targets of weed and insect metabolism with potential for RNAi use; 3) to develop of weed and insect detection systems for selective application to biological targets; and 4) to access the risk of the technology. Our research group has progressed on RNAi in weeds and insects and on weed identification using machine vision. Our research group has significant results in gene silencing upon exogenous application of dsRNA targeting to *PDS* gene in rice and *GFP*, *Scr* and *Pb* genes in *Euschistus heros*. Our main goal is to develop and formulate shelf-stable RNAi with penetration into the biological target to control weeds and insects and improve a weed detection system through artificial intelligence, enabling the identification of weed species for localized herbicide application.

Palavras-chave: dsRNA; nano encapsulated formulations; post-transcriptional silencing; siRNA; machine vision

Agradecimentos: To the company Skydrones S.A. and the startup Accore.

Instituição financiadora: Fundação de Amparo à Pesquisa do Estado do Rio Grande do Sul – FAPERGS through the call 06/2021 - Programa de Redes Inovadoras de Tecnologias Estratégicas do Rio Grande do Sul – RITEs-RS