# UNIVERSIDAD DE LA FRONTERA

Facultad de Ingeniería y Ciencias

Doctorado en Ciencias de Recursos Naturales


# ALUMINUM-TOXICITY EFFECT ON PHOSPHATE NUTRITION AND EXPRESSION OF PHOSPHATE TRANSPORTER GENES FROM RYEGRASS PLANTS

**DOCTORAL THESIS IN FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE DOCTOR OF SCIENCES IN NATURAL RESOURCES**


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**TEMUCO-CHILE**



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**“Aluminum-toxicity effect on phosphate nutrition and expression of phosphate transporter genes from ryegrass plants”**

Esta tesis fue realizada bajo la supervisión de la Dra. MARIA DE LA LUZ MORA GIL perteneciente al Departamento de Ciencias Químicas y Recursos Naturales de la Universidad de La Frontera y es presentada para su revisión por los miembros de la comisión examinadora.

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## Thesis summary

"This research investigates the impact of acidic soil conditions on beef and dairy production in Southern Chile, where perennial ryegrass is a primary forage. The study explores the relationship between phosphorus (P) availability and aluminum (Al) toxicity in ryegrass, aiming to identify more efficient P uptake and distribution in different ryegrass genotypes. By examining the role of phosphate transporters, the research sheds light on how plants respond to P deficiency in acidic soils. The study's findings highlight the significance of P transporters in mitigating Al toxicity and enhancing phosphorus uptake efficiency, particularly in aluminum-tolerant ryegrass cultivars. This work contributes to improving pasture grass productivity and sustainability in challenging acidic soil conditions."