

Alkaloid Levels in Experimental Lines of Ryegrass in Southern Chile

Authors : Leonardo Parra, Manuel Chacón-Fuentes, Andrés Quiroz

Abstract : One of the most important factors in beef and dairy production in the world as well as also in Chile, is related to the correct choice of cultivars or mixtures of forage grasses and legumes to ensure high yields and quality of grassland. However, a great problem is the persistence of the grasses as a result of the action of different hypogeous as epigeal pests. The complex insect pests associated with grassland include white grubs (*Hylamorpha elegans*, *Phytoloema herrmanni*), blackworm (*Dalaca pallens*) and Argentine stem weevil (*Listronotus bonariensis*). In Chile, the principal strategy utilized for controlling this pest is chemical control, through the use of synthetic insecticides, however, underground feeding habits of larval and flight activity of adults makes this uneconomic method. Furthermore, due to problems including environmental degradation, development of resistance and chemical residues, there is a worldwide interest in the use of alternative environmentally friendly pest control methods. In this sense, in recent years there has been an increasing interest in determining the role of endophyte fungi in controlling epigeal and hypogeous pest. Endophytes from ryegrass (*Lolium perenne*), establish a biotrophic relationship with the host, defined as mutualistic symbiosis. The plant-fungi association produces a "cocktail of alkaloids" where peramine is the main toxic substance present in endophyte of ryegrass and responsible for damage reduction of *L. bonariensis*. In the last decade, few studies have been developed on the effectiveness of new ryegrass cultivars carriers of endophyte in controlling insect pests. Therefore, the aim of this research is to provide knowledge concerning to evaluate the alkaloid content, such as peramine and Lolitrem B, present in new experimental lines of ryegrass and feasible to be used in grasslands of southern Chile. For this, during 2016, ryegrass plants of six experimental lines and two commercial cultivars sown at the Instituto de Investigaciones Agropecuarias Carrillanca (Vilcún, Chile) were collected and subjected to a process of chemical extraction to identify and quantify the presence of peramine and lolitrem B by the technique of liquid chromatography of high resolution (HPLC). The results indicated that the experimental lines EL-1 and EL-3 had high content of peramine (0.25 and 0.43 ppm, respectively) than with lolitrem B (0.061 and 0.19 ppm, respectively). Furthermore, the higher contents of lolitrem B were detected in the EL-4 and commercial cultivar Alto (positive control) with 0.08 and 0.17 ppm, respectively. Peramine and lolitrem B were not detected in the cultivar Jumbo (negative control). These results suggest that EL-3 would have potential as future cultivate because it has high content of peramine, alkaloid responsible for controlling insect pest. However, their current role on the complex insects attacking ryegrass grasslands should be evaluated. The information obtained in this research could be used to improve control strategies against hypogeous and epigeal pests of grassland in southern Chile and also to reduce the use of synthetic pesticides.

Keywords : HPLC, Lolitrem B, peramine, pest

Conference Title : ICABBBE 2016 : International Conference on Agricultural, Biotechnology, Biological and Biosystems Engineering

Conference Location : Amsterdam, Netherlands

Conference Dates : August 04-05, 2016