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DIFFERENTIAL ESTERASE ACTIVITY IN AERIAL AND ROOT TISSUES FROM 6AS DHR WHEAT LINES AFTER PHYTOHORMONAL TREATMENTS

ACTIVIDAD DIFERENCIAL DE ESTEARASAS EN TEJIDOS AÉREOS Y RAÍCES DE LÍNEAS DE TRIGO 6AS DHR LUEGO DE TRATAMIENTOS FITORHORMONALES

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ABSTRACT

Activity of aerial and root esterases in wheat DHR lines of chromosome 6AS was tested. Different patterns were found after applying phytohormone treatments that mimic stress conditions. Ethylene treated plants showed the lowest aerial and root weights; also, the smallest foliar area, in conjunction with absence of esterase activity in more than half of the lines, was observed. Additional studies will contribute to clarify the key role of ET in the expression of defense related genes.

Key words: ethylene, esterase activity, defense related genes

RESUMEN

Se probó la actividad de estearasas en parte aérea y raíces de líneas de trigo DHR para el cromosoma 6AS. Se encontraron diferentes patrones luego de la aplicación de tratamientos fitohormonales que simularon condiciones de estrés. Las plantas tratadas con etileno mostraron los pesos más bajos de parte aérea y de raíces, así como también la menor área foliar, junto con ausencia de actividad estearasa en más de la mitad de las líneas de trigo. Estudios adicionales contribuirán a clarificar el rol clave del ET en la expresión de genes relacionados con la defensa.

Palabras clave: etileno, actividad de estearasas, genes relacionados con defensa

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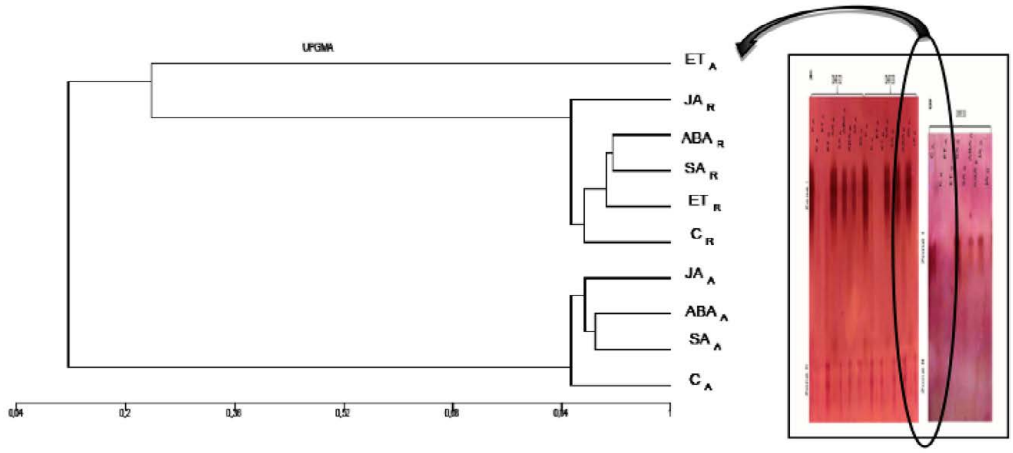

Figure 1. Dendrogram of wheat DHR lines based on esterase activity from each treatment and part of the plant ($_A$ or $_R$, aerial or roots). Right side: esterase gel with absence of band in the aerial part treated with ET (ET_A).

Plants have developed sophisticated mechanisms to sense and adapt to stress conditions. It is well known that phytohormones activate defense related genes in biotic and abiotic stress conditions (Bari and Jones, 2009). Furthermore, esterase activity measured in different plant portions was considered a biomarker of saline stress (Radic and Pevalek-Kozlina, 2010).

Some QTLs for growth responses have been localized, suggesting that wheat chromosome 6AS would carry genes related to a better plant behaviour in a biotic stress circumstance (Castro *et al.*, 2008). The aim of this study was to relate some physiological measures from aerial and root tissues with esterase patterns revealed in both parts, after phytohormone treatments which could mimic stress.

Seventy-eight wheat doubled haploid recombinant (DHR) lines of chromosome 6AS were tested. At the third leaf stage, the plants were subjected to exogenous application of 50 mM ethylene (ET) (Ethrel®), 10^{-5} M jasmonic acid (JA), 50 mM salicylic acid (SA) and 10^{-5} M abscisic acid (ABA) or water (controls). Esterases (EST 3.1.1.1) were screened by gel electrophoresis.

According to the high significant differences found between genotypes and hormonal treatments for ADW, RDW and FA (Castro *et al.*, 2008), the main point to highlight is that ET treated plants showed the lowest mean values, in conjunction with the absence of esterase activity in more than half (58%) of the lines. Additional studies will contribute to clarify the key role of ET in the expression of defense related genes.

Jaccard's similarity coefficient showed a grouped esterase presence/ absence coming from roots of all treatments and their controls, which is observed by the only one cluster that groups all of them. In contrast, aerial tissues showed two separate clusters: one of them with esterase activity coming from ET treated plants and the other with the remaining treatments (Figure 1).

In conclusion, root and aerial esterases exhibited their tissue specificity through their own pattern. Future identification and sequencing of tolerance genes is desirable to improve elite lines carrying defense related genes.

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