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WHEAT CHITINASE COMPLEX AND SOME OF ITS PROPERTIES

Abstract. Chitinolytic enzymes are essential components of plants defense system against various pathogens. In higher plants the presence of substrate for this enzyme has not been found. The question of its physiological role for the plant organism in normal state remains open. Chitinase hydrolyzes N-acetyl-β-glucosamine-containing polymeric substrates (chitin, chitooligosaccharides) that included in the cell walls of fungi, nematodes and insects.

High polymorphism chitinase in cereals, including wheat, is poorly studied isoenzymes, their properties and regulation of activity are major obstacles in the understanding of the function of enzyme system.

The aim of this work is to study the cellular localization and some physical and chemical characteristics of wheat chitinase isoforms.

It is found that in the wheat seedling enzyme localizes intra- and extracellularly. Intracellular (vacuolar) chitinase is presented only by basic and extracellular (apoplast) – by acidic isoenzymes. Based on the chromatography on specific affinity sorbent the isoforms with chitin-binding domain, i.e. chitinase class I were determined. These components have pI values 9.0, 8.7, 8.2, 8.0, 7.6, 5.6, 4.3 and located in basic and acidic pH ranges. The main pool of chitinase with CB-domain is localized inside the cells. Less amount of enzyme (one component) is shown outside of cells (apoplast).

In the IEF spectrum of chitinase there were identified the exochitinase that had values IEP entirely in the acidic range of the pH ~4.0-5.0. The differences in the thermal stability of wheat chitinases were established. Basic isoforms showed a high stability to temperature increase.

The results can be used in enzymology of plants and pathogenic fungi interactions.

Keywords: wheat, chitinase, isoenzymes, apoplast, chitin-binding domain, endochitinase, exochitinase.

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ХИТИНАЗНЫЙ КОМПЛЕКС ПШЕНИЦЫ И НЕКОТОРЫЕ ЕГО СВОЙСТВА

Аннотация. Хитинолитические ферменты являются важнейшими компонентами защитной системы растений против различных патогенов. В высших растениях не установлено наличие субстрата для этого фермента, что оставляет открытым вопрос о его физиологической роли для растительного организма в норме. Хитиназы гидролизуют N-ацетил-β-глюкозамин содержащие полимерные субстраты (хитин, хитоолигосахариды), входящие в состав клеточных стенок грибов, нематод и насекомых.