

Biosafety Clearing-House (BCH)

GENETIC ELEMENT (GENE)

BCH-GENE-SCBD-48365-2

LAST UPDATED: 06 JUL 2012

General information

Name of genetic element

Apyrase-gene

EN

Abbreviation

CS-apyrase

EN

Category

Protein coding sequence

Is this genetic element a synthetic molecule?

No

Donor organism

Donor organism(s)

[BCH-ORGA-SCBD-12106-6](#) ORGANISM | SOLANUM TUBEROSUM (POTATO, SOLTU)

Crops

Characteristics of the protein coding sequence

Name of the protein expressed by the coding sequence

Apyrase

EN

Biological function of the protein

Apyrases are enzymes that transform NTP (nucleoside triphosphates) via NDP to NMP without triggering an endergonic reaction in the process. These enzymes have been identified in the tissues of animals, plants (among others in *Arabidopsis thaliana*, legumes and potatoes) and fungi and apparently have predominantly regulatory functions.

Double knockout mutations of both apyrase genes from *A. thaliana* inhibit pollen germination and give rise to male sterile plants. Apyrases play a role in the formation of nodules in leguminous plants, and are also thought to be involved in phosphate uptake.

Regulation of transporters that, amongst other things, facilitate the transport of xenobiotics out of the plant cell has been demonstrated for plant apyrases. The blocking of apyrase by

EN

specific inhibitors increases the sensitivity of the plants to different herbicides, as well as the concentration of the applied herbicides in the plants. Over-expression of the apyrase psNTP9 from *Pisum sativum* in *A. thaliana* increases the resistance of the plants to herbicides and phytohormones.

Apyrase activity in the potato tubers is very high and is probably localised in the area of the cell wall. Together with other enzymes that influence the ATP/ADP/AMP ratio, apyrase activity is suspected to have a regulatory effect on starch biosynthesis in the potato tubers.

Related trait(s) or use(s) in biotechnology

Changes in physiology and/or production
Other growth, development and product quality

Additional Information

Other relevant website addresses and/or attached documents

- ? [Riewe D et al. \(2008\) The potato-specific apyrase is apoplastically localized and has influence on gene expression, growth, and development. Plant Physiol. 147\(3\):1092-109. \(English \)](#)
- ? [Windsor B et al. \(2003\) Multiherbicide tolerance conferred by AtPgp1 and apyrase overexpression in Arabidopsis thaliana. Nat. Biotechnol. 21: 428-433 \(English \)](#)
- ? [Riewe D et al. \(2008\) A cell wall-bound adenosine nucleosidase is involved in the salvage of extracellular ATP in Solanum tuberosum. Plant Cell Physiol. 49\(10\):1572-9 \(English \)](#)

[BCH-GENE-SCBD-48365-2](#)

Further Information

Questions about the Cartagena Protocol on Biosafety or the operation of the Biosafety Clearing-House may be directed to the Secretariat of the Convention on Biological Diversity.

Secretariat of the Convention on Biological Diversity

413 rue Saint-Jacques, suite 800
Montreal, Québec, H2Y 1N9
Canada
Fax: +1 514 288-6588
Email: secretariat@cbd.int