

A Drought Stress Inducible Plant Promoter

A short promoter for producing genetically modified, drought tolerant crops

Published: 23rd October 2017



Please note, header image is purely illustrative. Source: Gellinger, Pixabay, CC0

Background

Abiotic stresses, which include drought, salinity, cold and extreme temperatures cause extensive losses to agricultural crop production. It is estimated that these losses can be as high as seventy percent. These losses could be dramatically reduced if the crops were able to tolerate drought conditions.

Stress-inducible promoters have previously been identified, but there is a shortage of efficient promoters for gene expression that display favourable characteristics in their native plants as well as in xenogenic species. UCT researchers have developed the Psap1D promoter, which offers advantages over constitutive promoters to produce genetically modified drought tolerant crops.

The Psap1D promoter causes an increase in expression of genes under its control during adverse climatic conditions. The promoter induces expression at a level about six times higher than under unstressed conditions.

Technology Overview

Psap1D is derived from Psap1, which is a promoter isolated from the resurrection plant, *Xerophyta viscosa*. Psap1D is 1103 base pairs long as compared to the full length promoter (2083 base pairs). The reduction in size has been accomplished by removing an internal section of the promoter, which is not required for normal activity.

Benefits

- The promoter is relatively short, which is an important consideration in the creation of genetically modified organisms. This allows for better transformation efficiency and increased stability
- The promoter is inducible under drought stress, which ensures that the target protein is only produced when needed. Expression of genes in large amounts at times when they are not needed is metabolically taxing to the plant
- Expression returns to baseline upon rehydration
- The promoter is functional in both monocots and dicots

State of Development

TRL7 - Tested in multiple crops

Patents

- Brazil: BR1120150048978
- China: 201080040614.2
- South Africa: 2015/01618
- United States: 14/426,445
- Canada: XPCT/IB2013/058399

IP Status

- Patent application submitted

Seeking

- Licensing