

# Fusion protein and transgenic plant expressing said protein.

## KEYWORDS

- ☐ DAMP
- ☐ PLANT DEFENCE RESPONSES
- ☐ PLANT RESISTENCE
- ☐ OLIGOGALACTURONIDES

## AREA

- ☐ AGRIFOOD

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(ex RM2014A000748) \_23.12.2014.

### Patent Type

Patent for invention.

### Ownership

Sapienza University of Rome 100%.

### Inventors

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Simone Ferrari, Manuel Benedetti,  
Daniela Pontiggia.

### Industrial & Commercial Reference

Countries where GMOs can be cultivated  
and/or marketed. Optimal target are the  
big Agrobiotech Companies.

### Time to Market

Experimentation in Sapienza is confined  
to model plants in the lab. Research on  
crop plants is going on outside Sapienza  
by collaboration. Time: > 2 years.

### Availability

Cession, License, Research,  
Development and Experimentation.



### Abstract

Plant diseases produce extensive damages on plant crops, causing serious economic losses. On the other hand, the use of pesticides causes serious problems to human health and to the environment.

The invention regards the improvement of the resistance of plants exploiting the innate mechanisms of defence. In this case the plant defences are activated by an in vivo controlled accumulation of pectin fragments called oligogalacturonides (OG).

This is achieved by expressing a protein fusion called "OG machine" that is capable of protecting the plant from microbial infections, in a natural way.

### Publications

- ❖ Benedetti M., Pontiggia D., Raggi S., Cheng Z., Scaloni F., Ferrari S., Ausubel F.M., Cervone F., De Lorenzo G. Plant immunity triggered by engineered in vivo release of oligogalacturonides, damage-associated molecular patterns. Proc Natl Acad Sci U S A 2015, 112:5533-5538.
- ❖ Cervone F., Ausubel F.M., Lorenzo G. Enhancing immunity by engineering DAMPs. Oncotarget 2015.
- ❖ [http://www.uniroma1.it/sites/default/files/all\\_egati\\_news/rassegna%20stampa\\_37.pdf](http://www.uniroma1.it/sites/default/files/all_egati_news/rassegna%20stampa_37.pdf).



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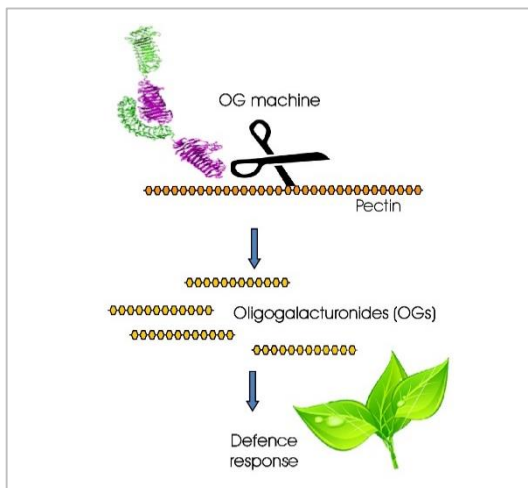
# Fusion protein and transgenic plant expressing said protein.

## Technical Description

The present invention concerns a nucleic acid molecule capable of expressing, in at least one plant tissue, a chimeric protein comprising a polygalacturonase (PG) of fungal, bacterial or insect origin and a plant polygalacturonase inhibitor protein (PGIP) capable of inhibiting said PG.

The present invention also relates to transgenic plants that express said chimeric protein.

This chimeric protein causes accumulation of oligogalacturonides in plant tissues and hence activates the plant defence responses. Plants expressing this fusion protein, under the control of a pathogen-inducible promoter, have an increased resistance against pathogenic fungi and bacteria.



## Technologies & Advantages

This invention allows to produce transgenic crop plants that defend themselves from diseases avoiding treatments with pesticides that are harmful for the animal health (including humans) and environment.

Transgenic plants expressing the construct covered by this patent are more resistant to pathogens and more promptly react to pathogen attacks by releasing oligogalacturonides from the plant cell wall that act as powerful elicitors of plant defences.

The switch that allows this machine to operate is a pathogen-induced promoter.

This allows the plant that comes into contact with a pathogen to react immediately by activating several defence responses.

The idea underlying this invention is to have an enhanced plant defence system without strong and harmful external treatments.



## Applications

This invention is applicable to agriculture, particularly in those countries where the cultivation of transgenic plants is currently permitted.

After generating plants of agricultural interest expressing our construct, it can be predicted that the use of pesticides is very limited when growing these plants in the field.

Generated transgenic plants can counteract diseases as they are able to perceive pathogen attacks and rapidly activate their defence arsenal.

In this way, the cultivation of crops could benefit both in economic and ecological terms.

The invention may be of interest to public and private companies to study plant diseases and to develop new defence strategies against plant diseases.



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