

EUREKA PROJECT E!2131 - EUROAGRI FROST

1. General description

Project	E! 2131 - EUROAGRI FROST	Status	Announced - 29-JUN-1999
Title	Development Of A Fast Method For The Definition Of Frost Damage In Plants.		
Class	Sub-Umbrella	Technological area	Medical and Biotechnology
Start date	01-DEC-1998	End date	01-DEC-2001
Duration	36 months	Total cost	1.26 Meuro
Partner sought	No		
Summary	A Study Of The Response Of Flowers And Fruit To Low- Temperature Thermal Shock And Its Evaluation By Isolation/ Identification Of Cold Shock Proteins (Csp) And Phenolic Markers. Design Of A Kit For On-Site Frost Detection.		

Budget and duration

Phase	Budget(Meuro)	Duration (Months)
Definition phase	0.16	3
Implementation phase	1.1	33
Total	1.26	36

Member contribution

Member	Contribution	Position	Since
Spain	50.00%	Contact Member	29-JAN-1999
France	50.00%	Participating Member	29-JUN-1999

Participants

Company	Country	Type	Role
AGRUP.ESP.DE ENTIDADES ASEGUR. DE LOS SEGUROS AG.COMBIN.S.A.	SPAIN	Large company	Main
MATRA SYSTEMES & INFORMATION	FRANCE	Large company	Partner

2. Project outline

Project description

In some micro-organisms, when temperatures drop below the optimum, a response is generated in the form of synthesis of a protein chain, these proteins being known as cold-shock proteins - CSPs. Such proteins have also been isolated in certain horticultural plants when temperatures drop below the optimum.

In addition to CSPs, it has also been observed that, in response to cold, recently formed flowers and fruits synthesise phenolic substances following a frost. AGROSEGURO's experience with frost has revealed and enabled us subsequently to simulate in the laboratory a variety of frosts, and has shown how the temperature at which a flower or fruit freezes varies according to the species and the phenological state. This means that study is required using both stone fruits (peaches and cherries) and pip fruits (apples), while examining the effects of frost during the four phenological phases (F, G, H and I).

The most common frost types are defined using impact maps drafted by MATRA SYSTEMES & INFORMATION, which take account of SPAIN's various agro-meteorological zones and temperatures taken by satellite.

Damage caused by frost depends not just on how the frost occurred (intensity, type and duration) but also on the plant's phenological state: hence the need to classify all frost types.

Plant material is to be gathered and field conditions will be simulated in the laboratory.

The plant material collected will be freeze-dried and the Cold Shock Proteins (CSPs) isolated and identified using electrolysis: the polyphenols are isolated and identified with High-Performance Liquid Chromatography (HPLC).

Following isolation and identification of both the CSPs and polyphenols associated with frost formation in the tissues, a kit will be designed to detect frost by a colorimetric reaction.

Technological development envisaged

A. - Identification of CSPs according to frost type and the phenological state of the samples:

- Separation of the proteins, using electrophoresis.
- Identification of proteins by immune-reaction and autoradiography, using antibodies identifying the previously separated proteins.

B. Identification of polyphenols according to each type of frost and the phenological state of the samples, using HPLC.

C. Design of the kit.

Markets application and exploitation

It is absolutely essential to detect frosts reliably and quickly for the service to be provided to farmers. If

output values fall, it can be precisely specified whether that was due to a frost or any other element, thus simplifying decision-making.

The results will ensure the correct application of the insurance provisions in cases of claim.

This method could also be extended to examine other stress situations, such as water damage, hail damage or phytotoxicity, for application to crops other than fruit trees.

Project codes

BSI

B	measurement, testing and instruments
BQD.Q	non-volatile matter determination
BX/BY	biological analysis and testing
DSI/DSK	phenols
DVU	proteins
EGO	cartography
EI	meteorology
GB/GL	environmental engineering
HGN	crop protection
VL	biotechnology

NACE

01	Agriculture, hunting and related service activities
0141	Agricultural service activities
7310	Research and experimental development on natural sciences and engineering

3. Main participant

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Organisation type Large company
Participant role Main

Contribution to project

Will develop the technique, carry out all laboratory trials, collect plant samples, do laboratory simulation of frosts, study of frost effect in 4 phenological states, classify/ identify CSPs, classify/identify polyphenols, design kit.

Expertise

4. Partner

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Organisation type
Participant role

Large company
Partner

Contribution to project

1.Design system providing output of impact maps for SPAIN's agro-meteorological zones/temperatures taken by satellite 2. Integrate various thermal models into processing chain. 3. Disclose results through an interactive server.

Expertise