Università degli Studi di Firenze

Dip. Ortoflorofrutticoltura

The GoodFood vision in viticulture: user's perspective

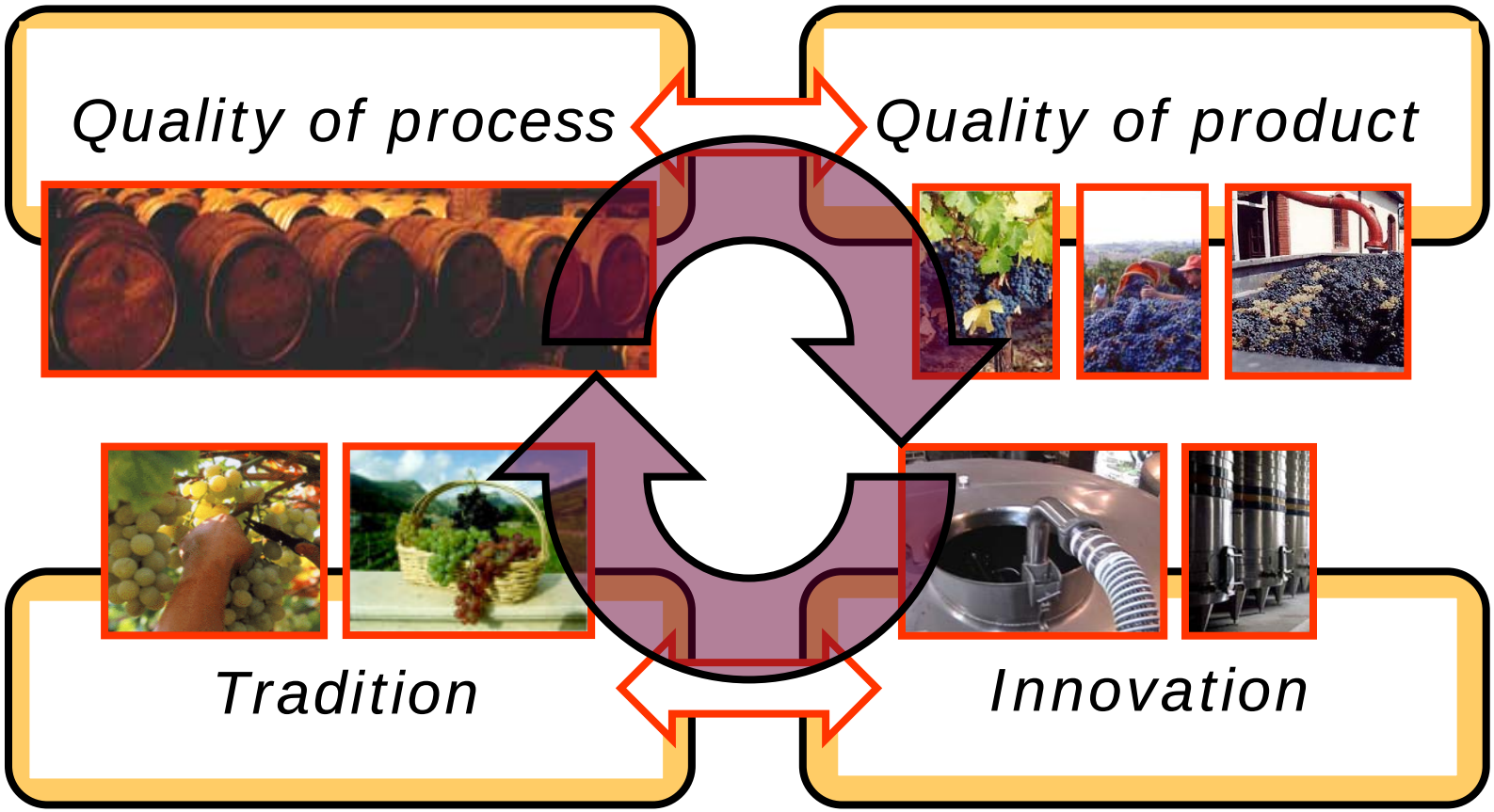
Stefano Mancuso

Firenze, 16th November 2005



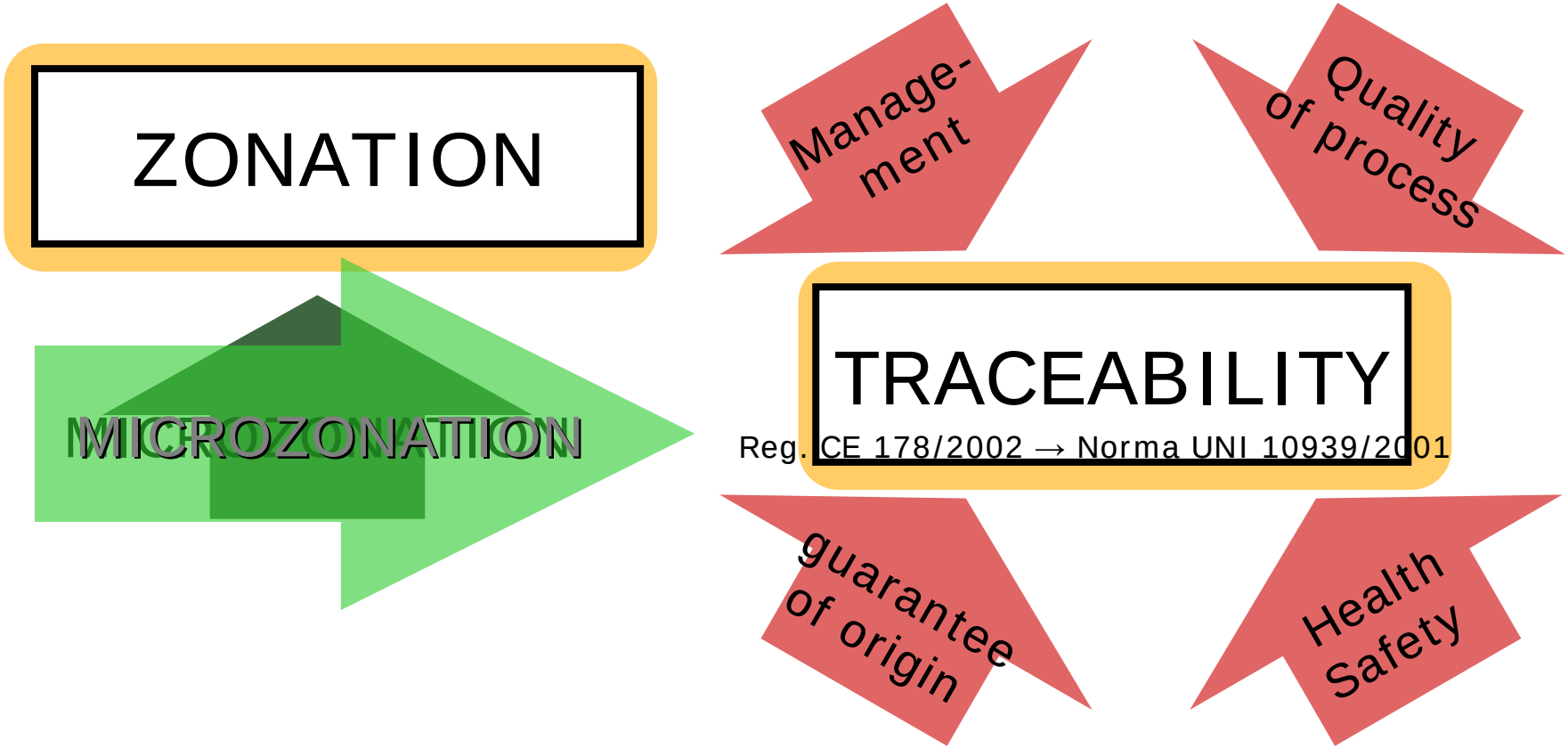
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Quality in viticulture



Tradition and innovation are “key words” for quality in viticulture

Zonation and Traceability



Increase the value of the wine

How can we achieve the zonation of the vine regions and the traceability of the vine?

Increasing the efficiency of the system

↓

State of the art technologies

↓

Monitoring → SENSORS

Physical parameters
Chemical parameters

} Plant, climate, soil, cellar, wine

Most vineyards use just a single measurement point (meteorological station) and this measure reflect the entire measurement site

When more measurement points are available they are usually averaged

If heterogeneity in the vineyard is so ubiquitous, why do plant physiologists still treat them as "unwanted noise"?!

Why indeed?

- **"Human factor": complexity**

  - requires knowledge of maths

  - much easier and quicker to average data

- **"Biological factor": unpredictability**

  - often damped

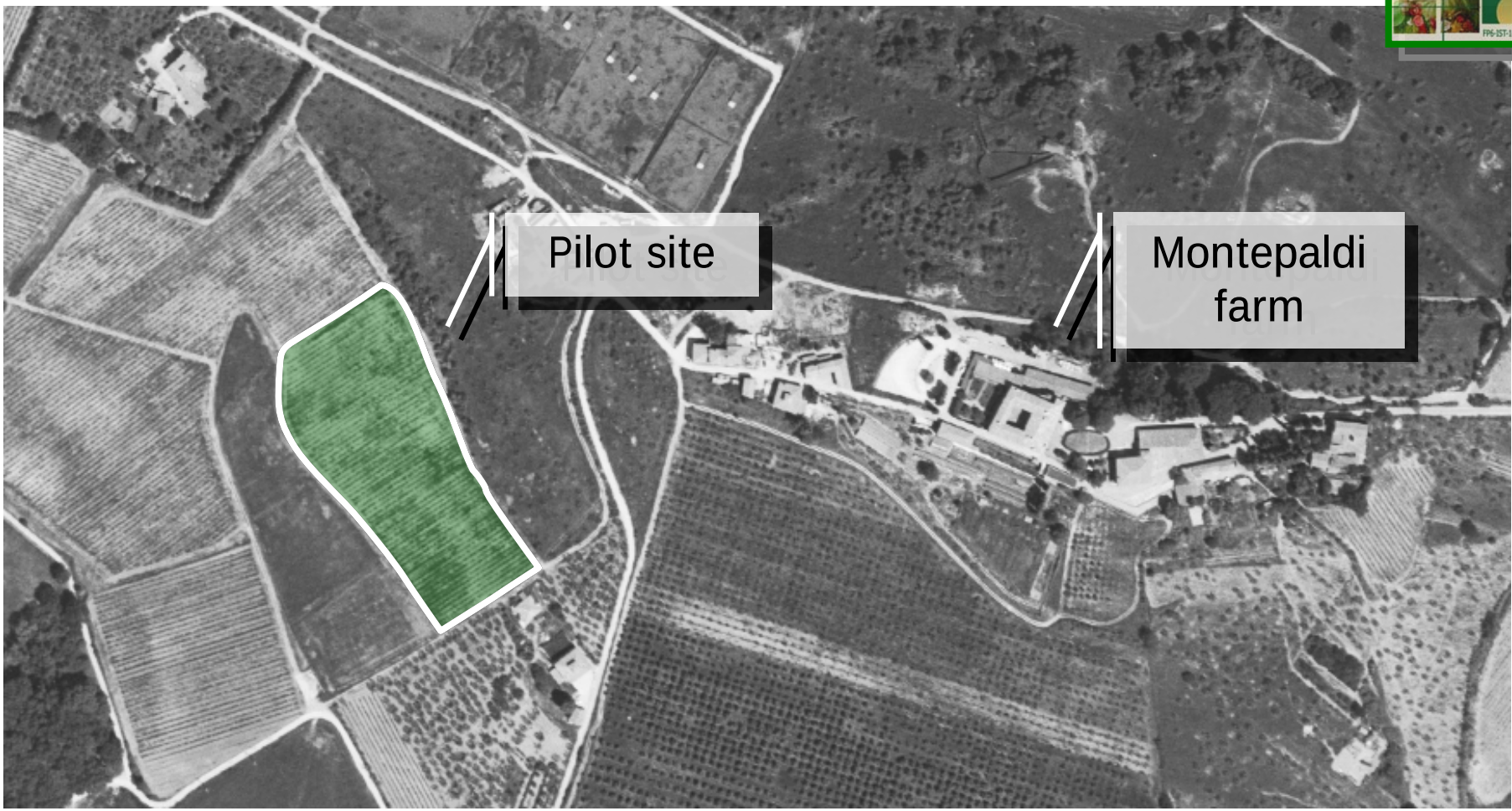
  - appears only under certain conditions

- **Is the heterogeneity an exception rather than a rule?**

The answer is NO!

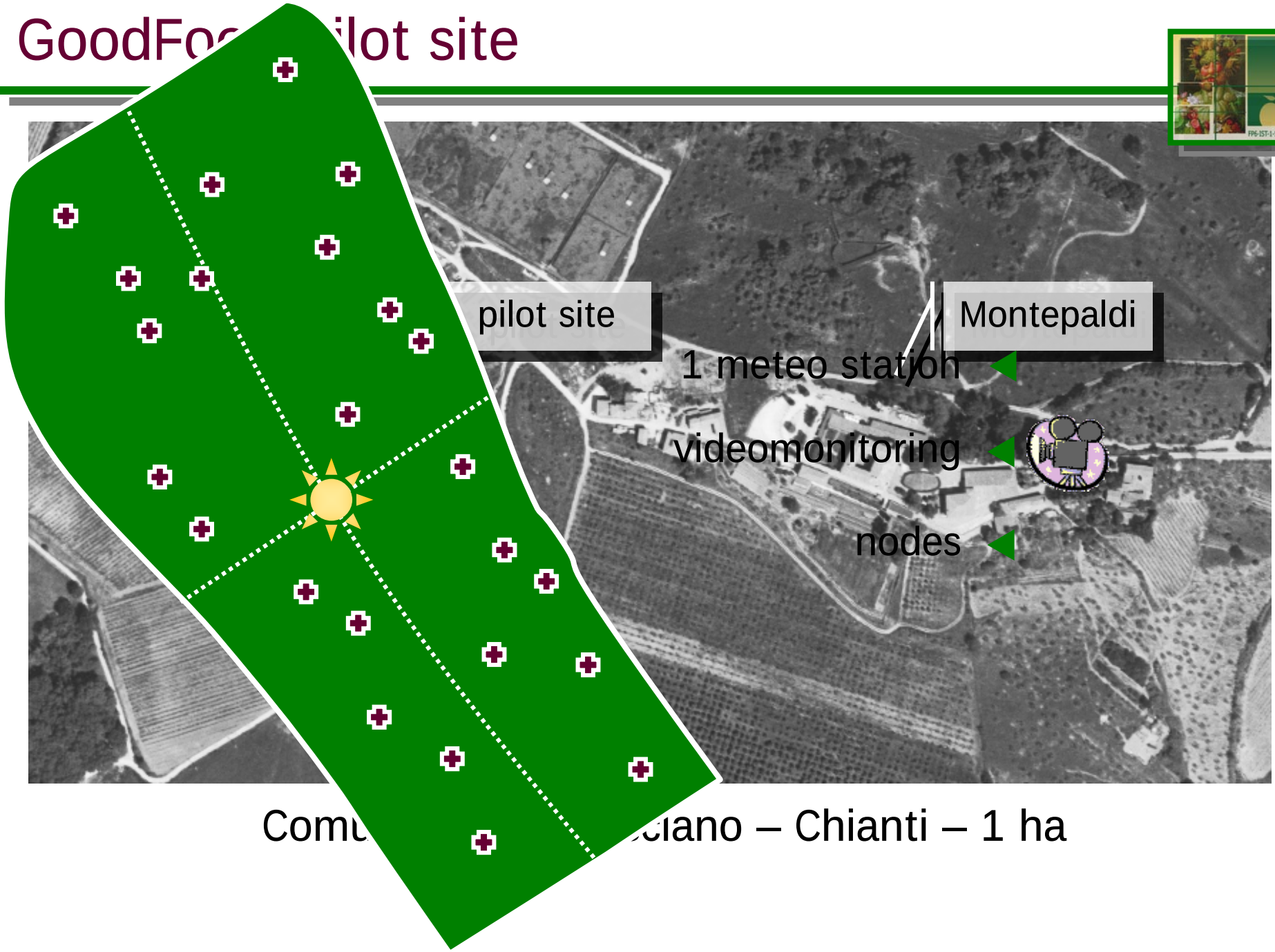
- Plant metabolism is governed by a large number of positive and negative feedbacks
- ANY non-linear feedback-controlled system should exhibit oscillatory behaviour under certain conditions
- What are these conditions???
  (a need for some modelling)

GoodFood pilot site



Comune di San Casciano – Chianti Classico Region – 1 ha

GoodFood pilot site

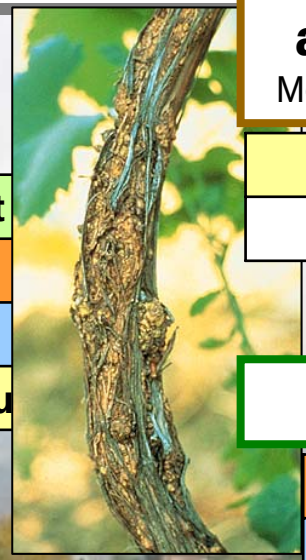


Comu[illegible]eciano – Chianti – 1 ha

Vineyard monitoring

atmosphere - air
Meteorological measurements

- Intensity of light
- PAR
- Rain Intensity
- Atmospheric pressu



atmosphere - trunk
Meteorological measurements

- Temperature
- Relative Umidity

Leaf

- Leaf temperature
- Thickness
- CO_2 consumption

row

- Continuous video monitoring

H1

H2

- Soil temperature
- Absolute humidity
- Water tension

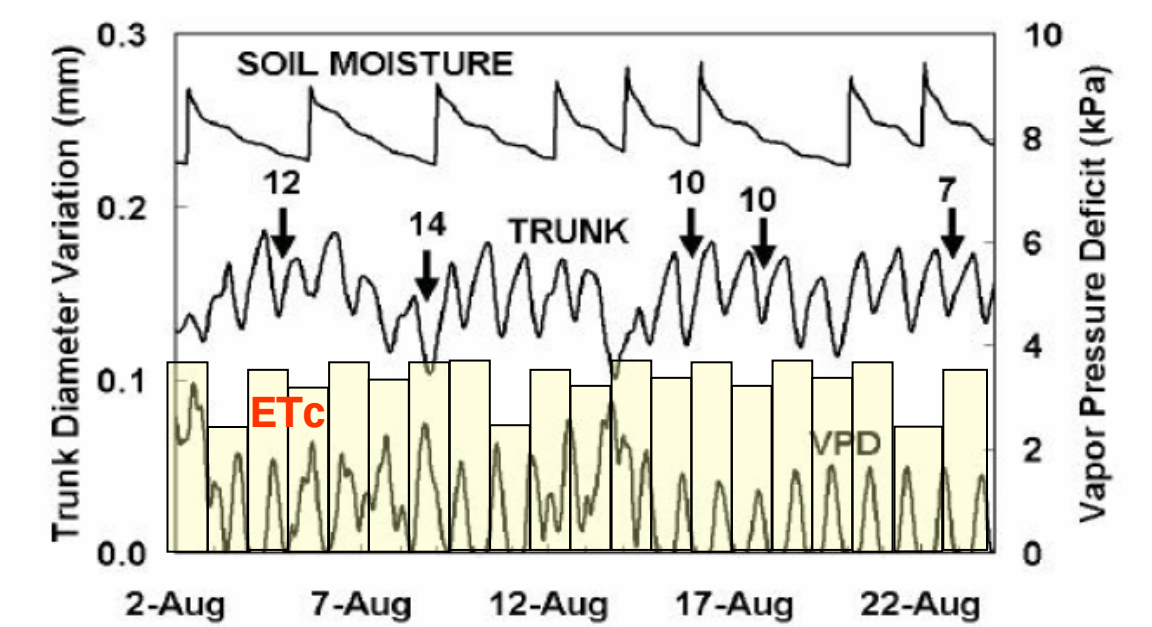
- Diametric growth
- Xilary flux

Soil | **Trunk** | **Root**

Some scenario

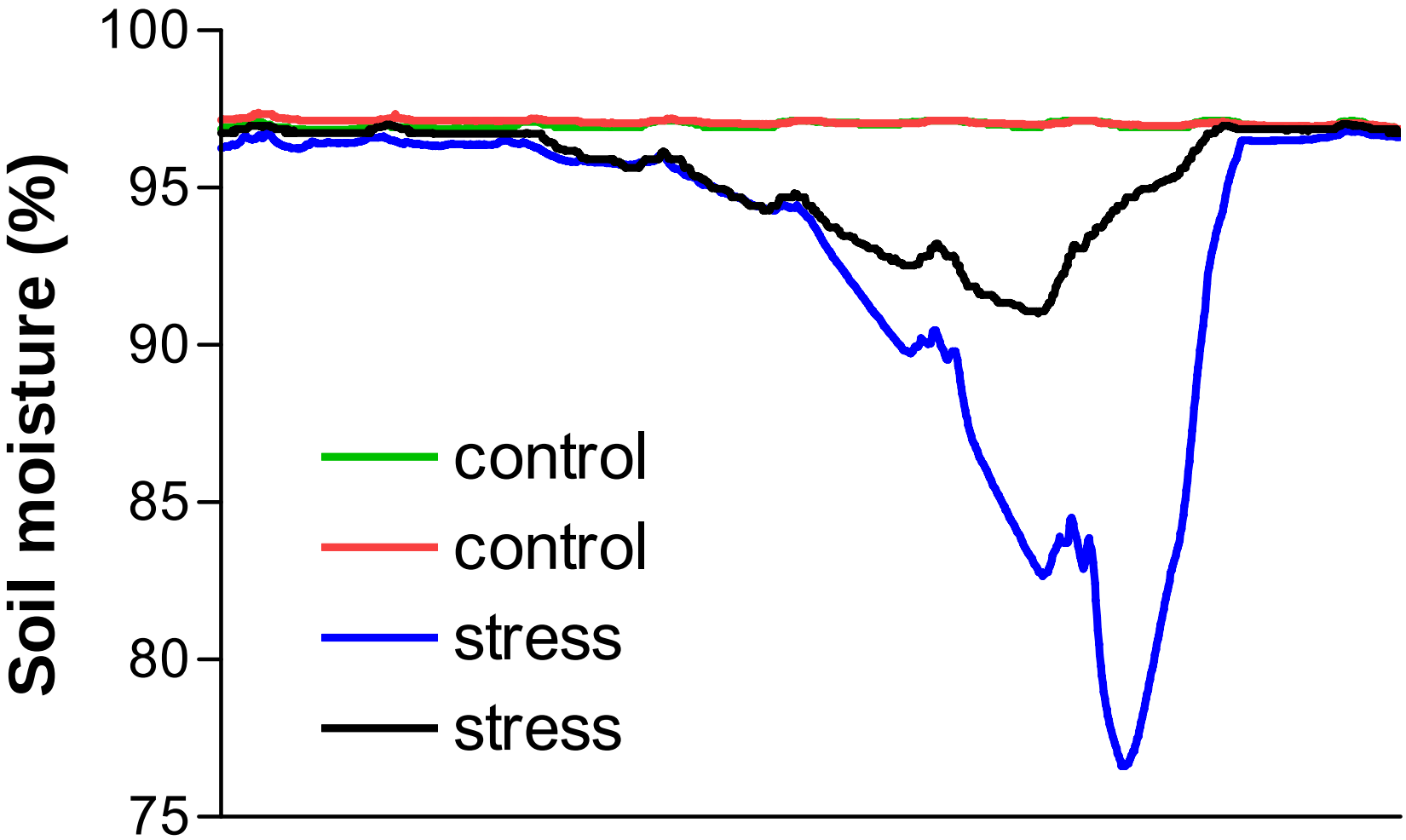
- **Irrigation**
- **Downy mildew (*Plasmopara viticola*)**
- **Fruit Quality (Fruit maturity)**
- **Microzonation**

Some scenario:irrigation

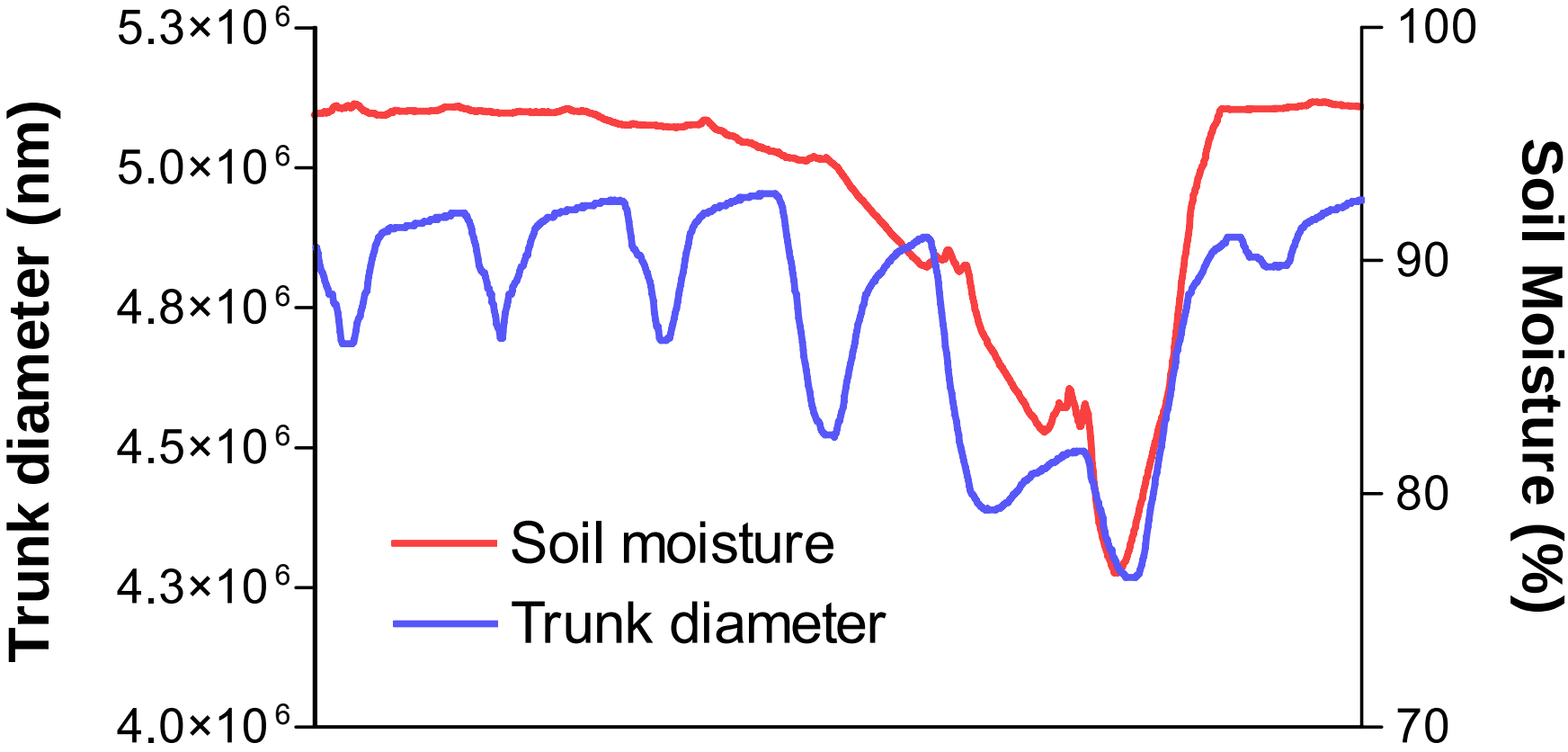


Example of an output for vineyard phytomonitoring. *Trunk* = diameter oscillation curve, *Etc* = daily ETc from CIMIS equation and Kc, *soil moisture* = data from gypsum block, *arrows and numbers* refer to soil potential values, *VPD* = data from meteo/plant climate sensors)

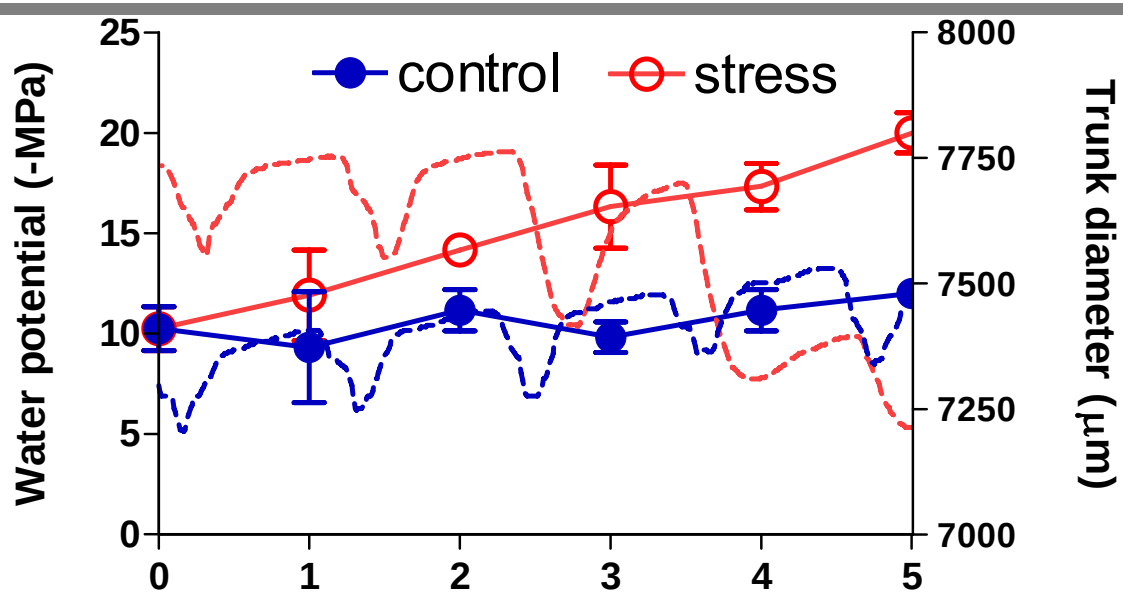
Some scenario: IRRIGATION

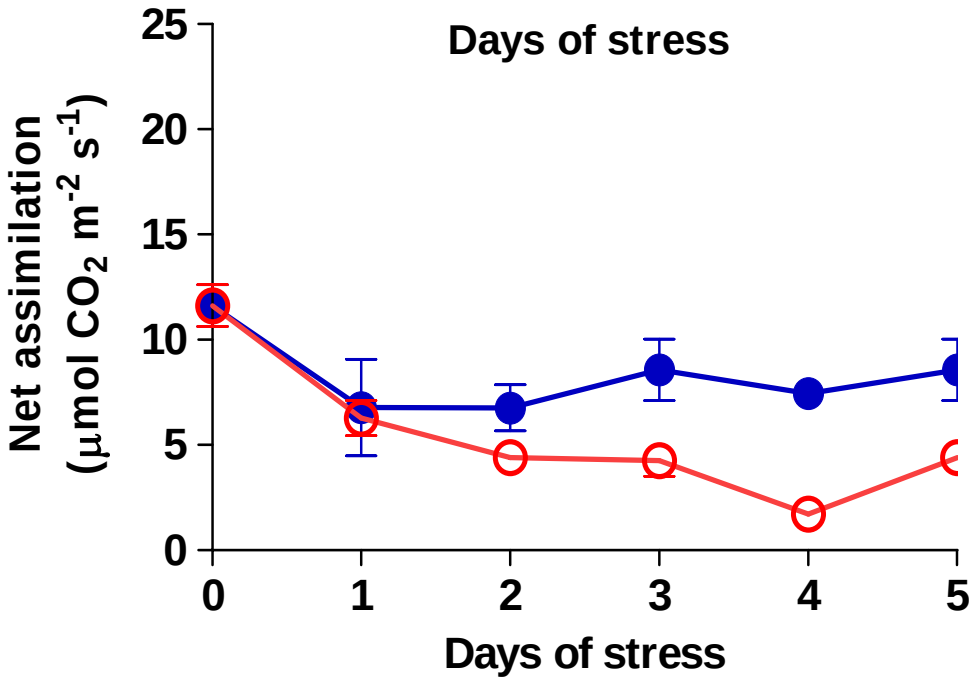


Some scenario: IRRIGATION

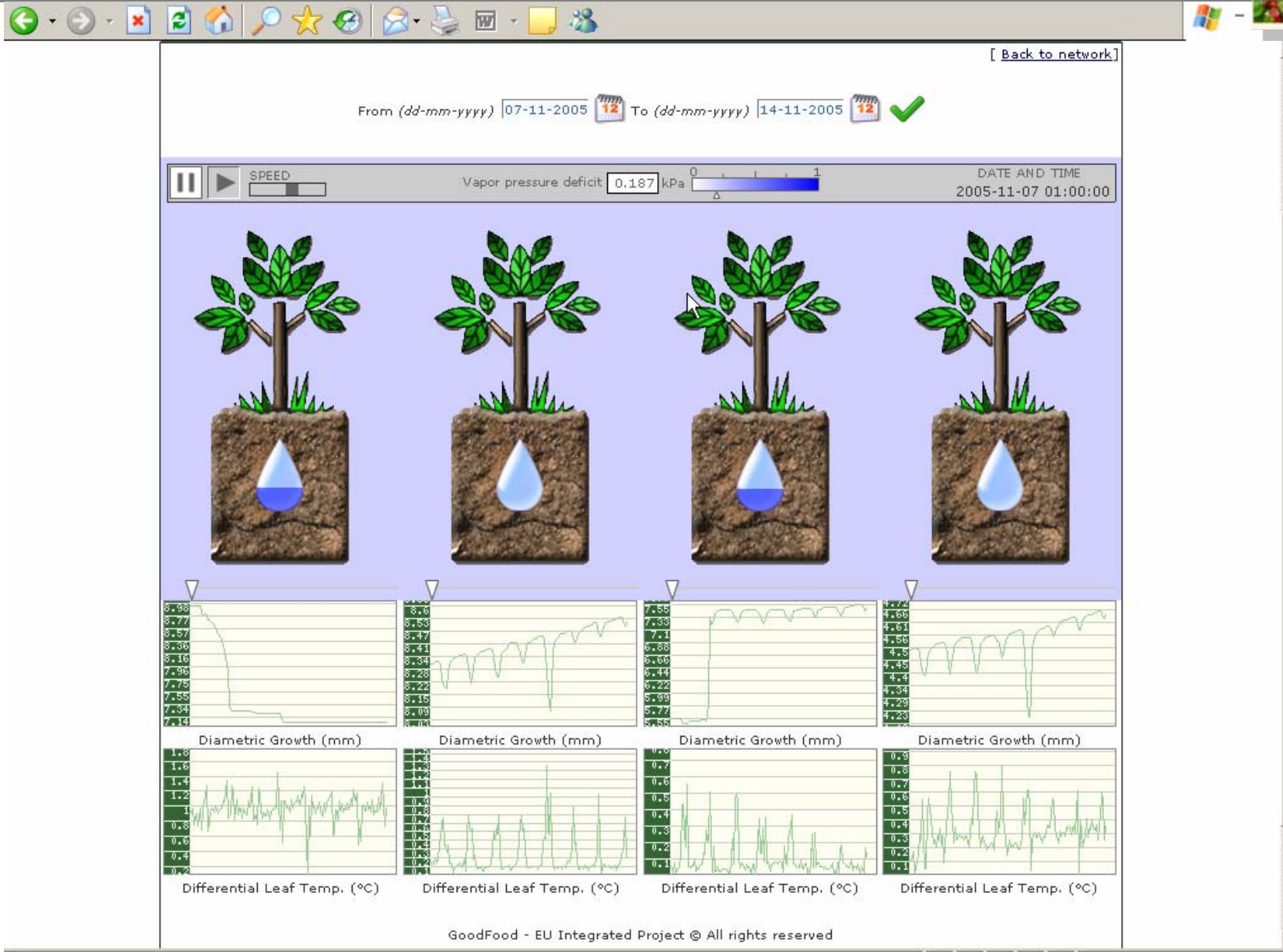


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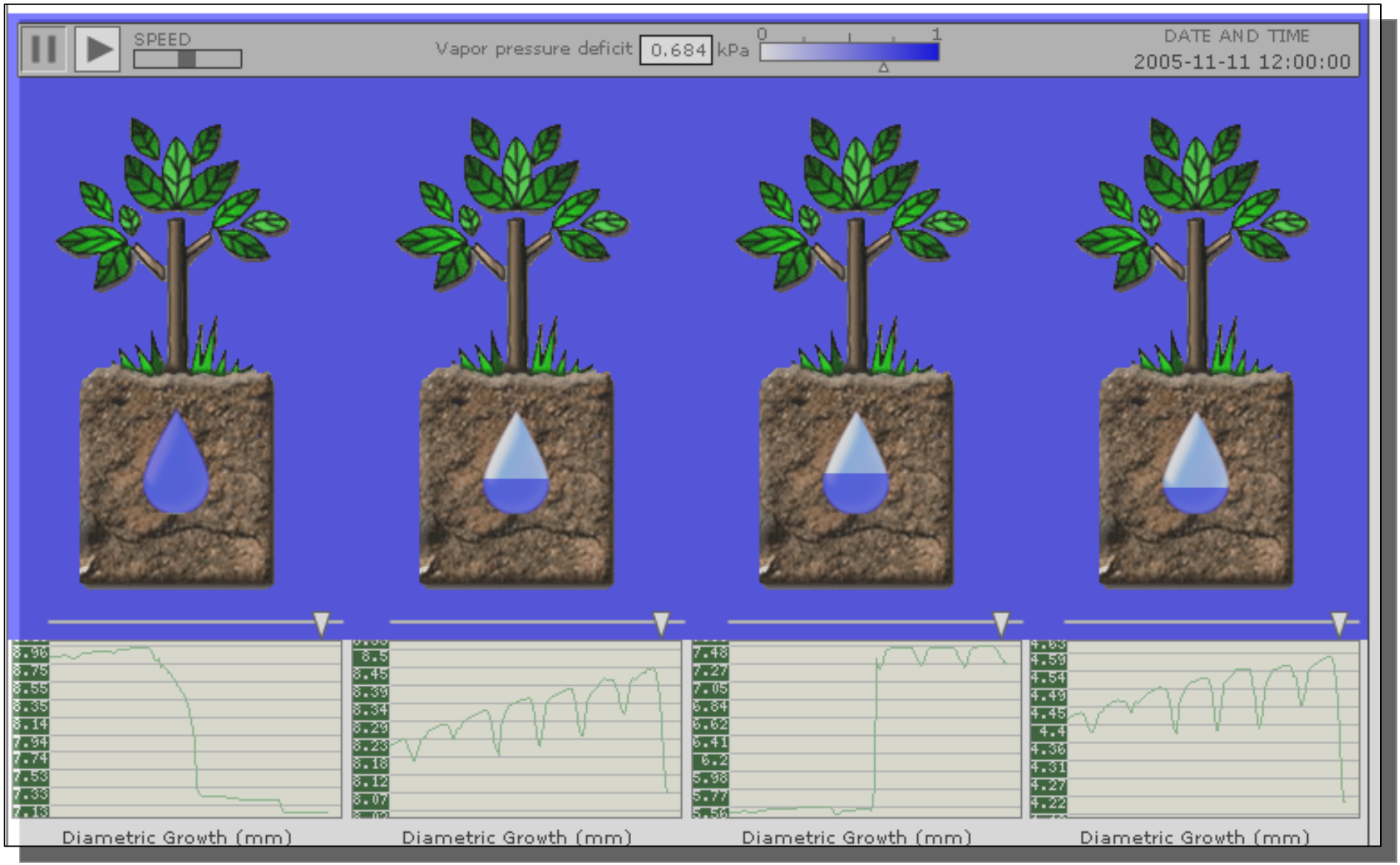




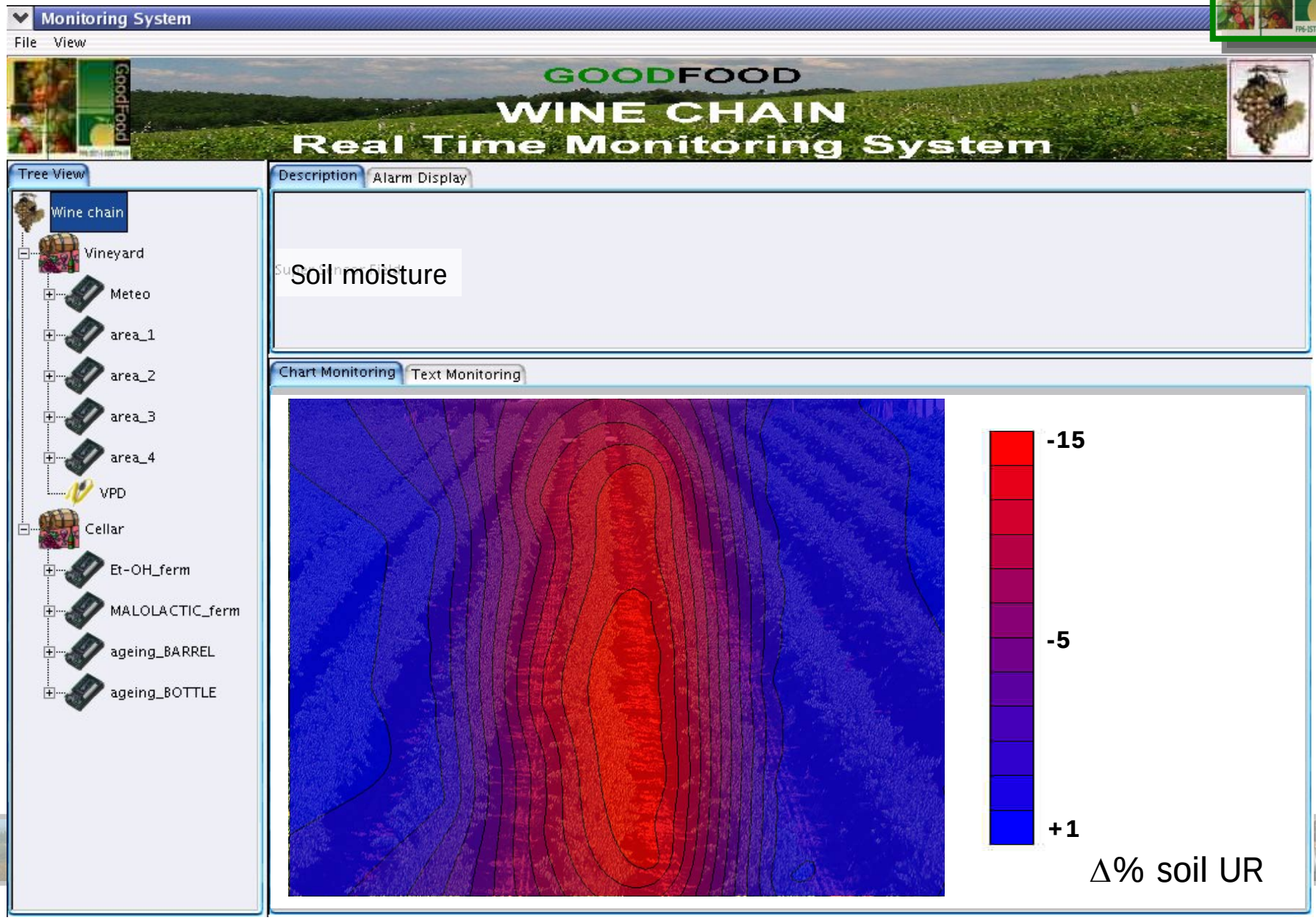
Some scenario: IRRIGATION – SALT STRESS



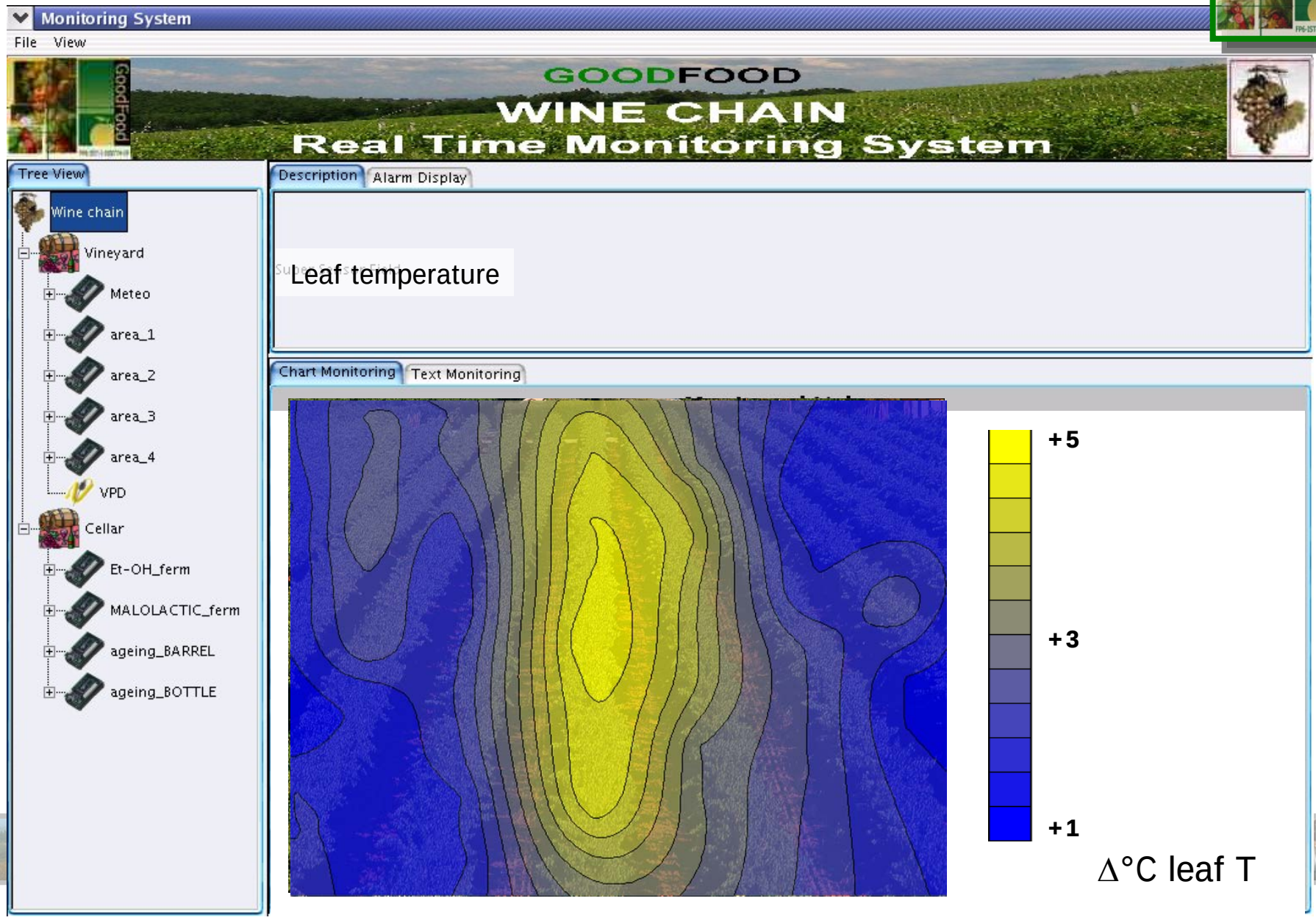
Some scenario: IRRIGATION



Some scenario: Irrigation



Some scenario: irrigation



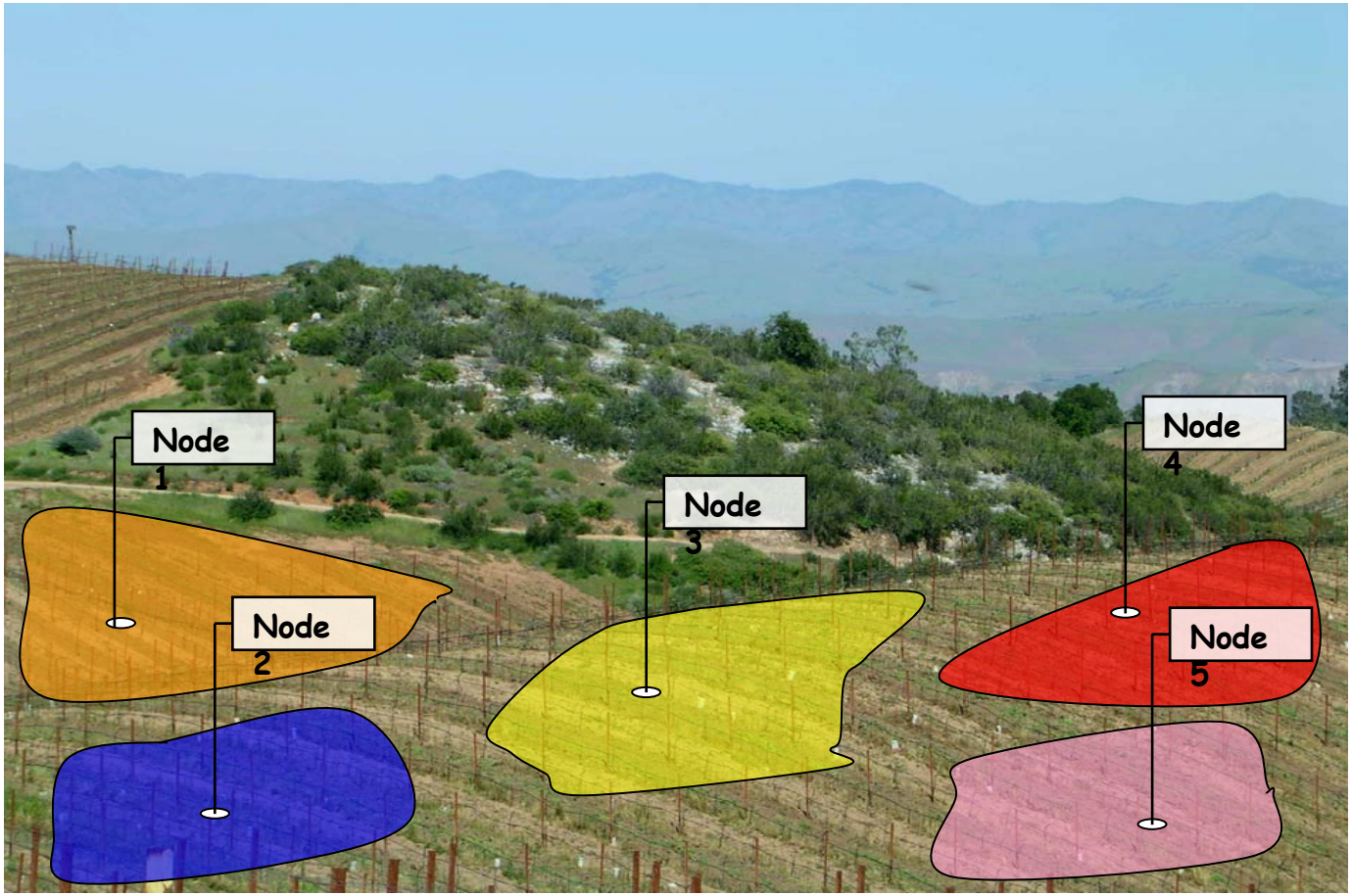
Some scenario: *Peronospora* prediction

The **PLASMO model**, implemented by collaboration among the Institute of Agrometereology and Environmental Analysis for Agriculture (IATA) of Florence, the National Research Council (CNR), the Department of Agronomy and Land management (DISAT) of Florence, the Centre for the Application of Computer Science in Agriculture (Ce.SIA) of Florence and the Accademia dei Georgofili, simulates grapevine **downy mildew** biological cycle on the basis of agrometereological parameter, **allowing the best timing for fungicide treatments**.

Parameter
RH = hourly* relative humidity (%)
Rn = hourly net radiation (Wm^{-2})
T = hourly air temperature (Celsius)
U = hourly wind speed at 2 meters ($m\ s^{-1}$)
LW=hourly leaf wetness (0=dry, 1=wet)

Some scenario: *Peronospora* prediction

At the moment, *peronospora* models are developed for very large surfaces, and their scalability is relatively high, about 1 square kilometre.



The good food approach will reduce the detail to less than 10 m

Practical Potential of GoodFood vision

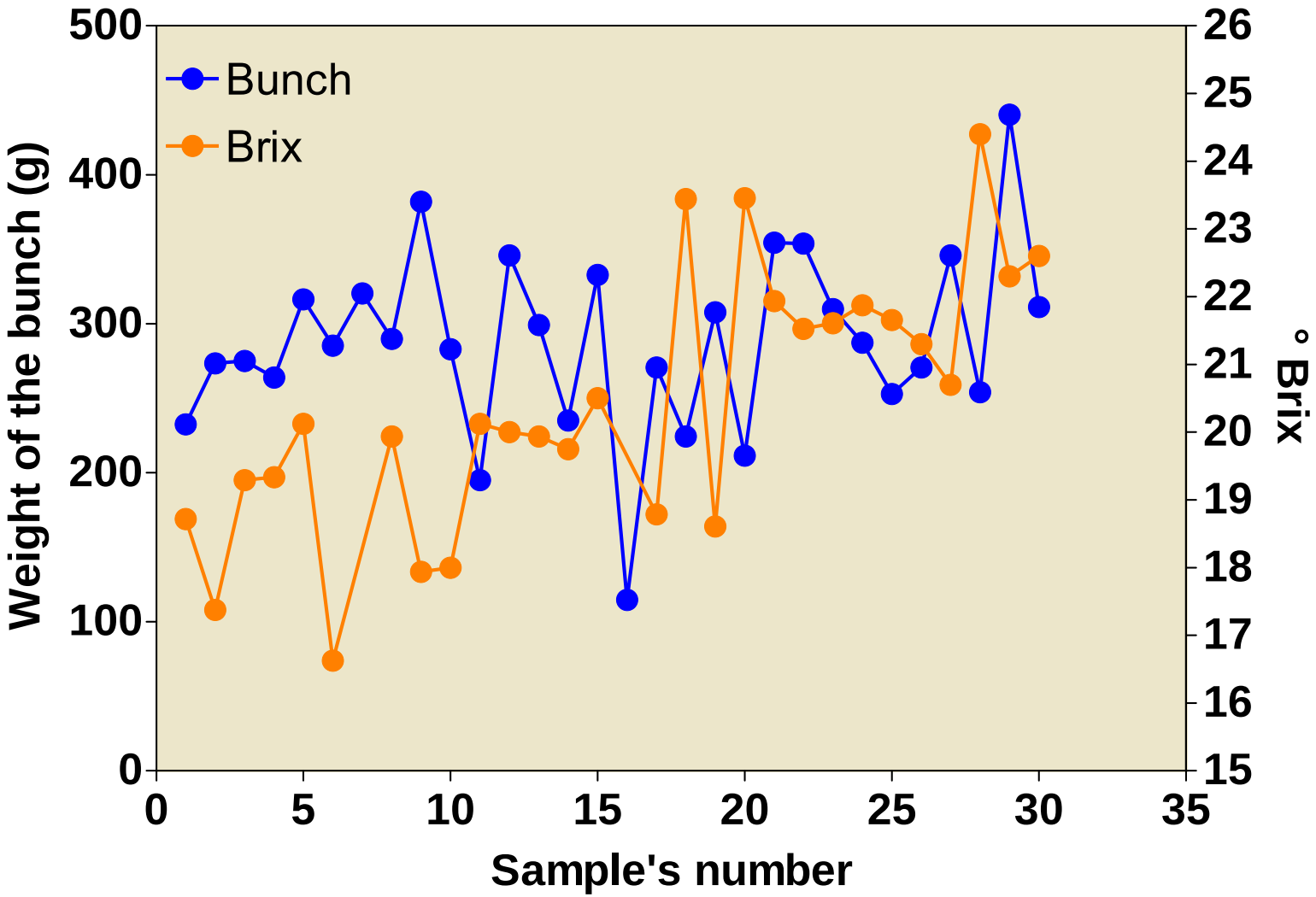
A Geography of Viticulture

Concept of Terroir

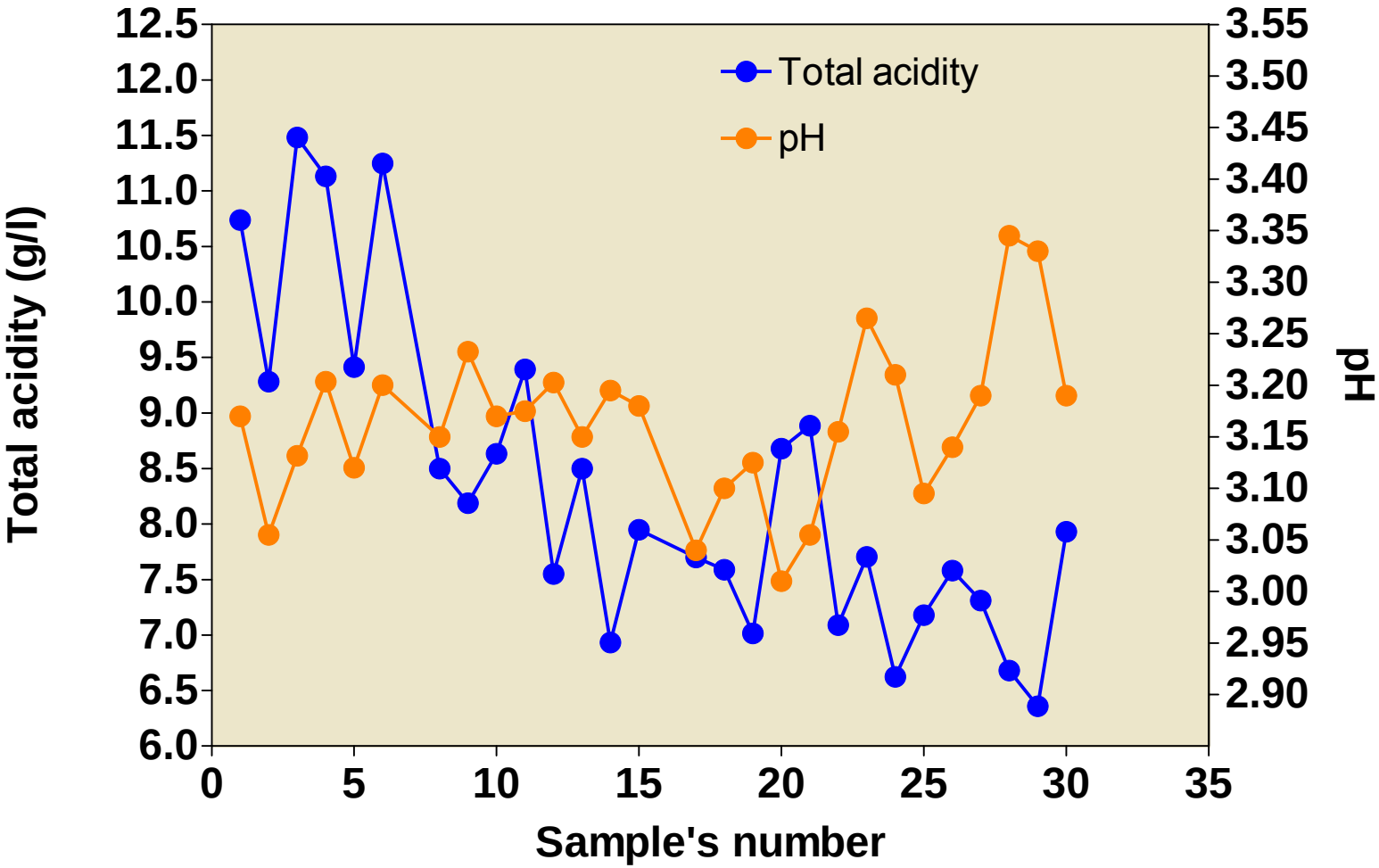
It embraces the soil landscape and subsoil, the geology (bedrock and landforms); microclimate down to the vine, the macroclimate of the region; elevation, slope, and aspect; proximity to other features—lakes, streams, windbreaks, or the structures of man; the viticulture (variety, rootstock, pruning, and training) and enology (fermentation style, length of maceration, and refinement); and the culture (ethnicity, traditions, and beliefs) of the site. The combined effect of a region's geomorphic, pedologic, and climatic processes

Defines the growing environment
Reflects "uniqueness of place" or "sense of place".

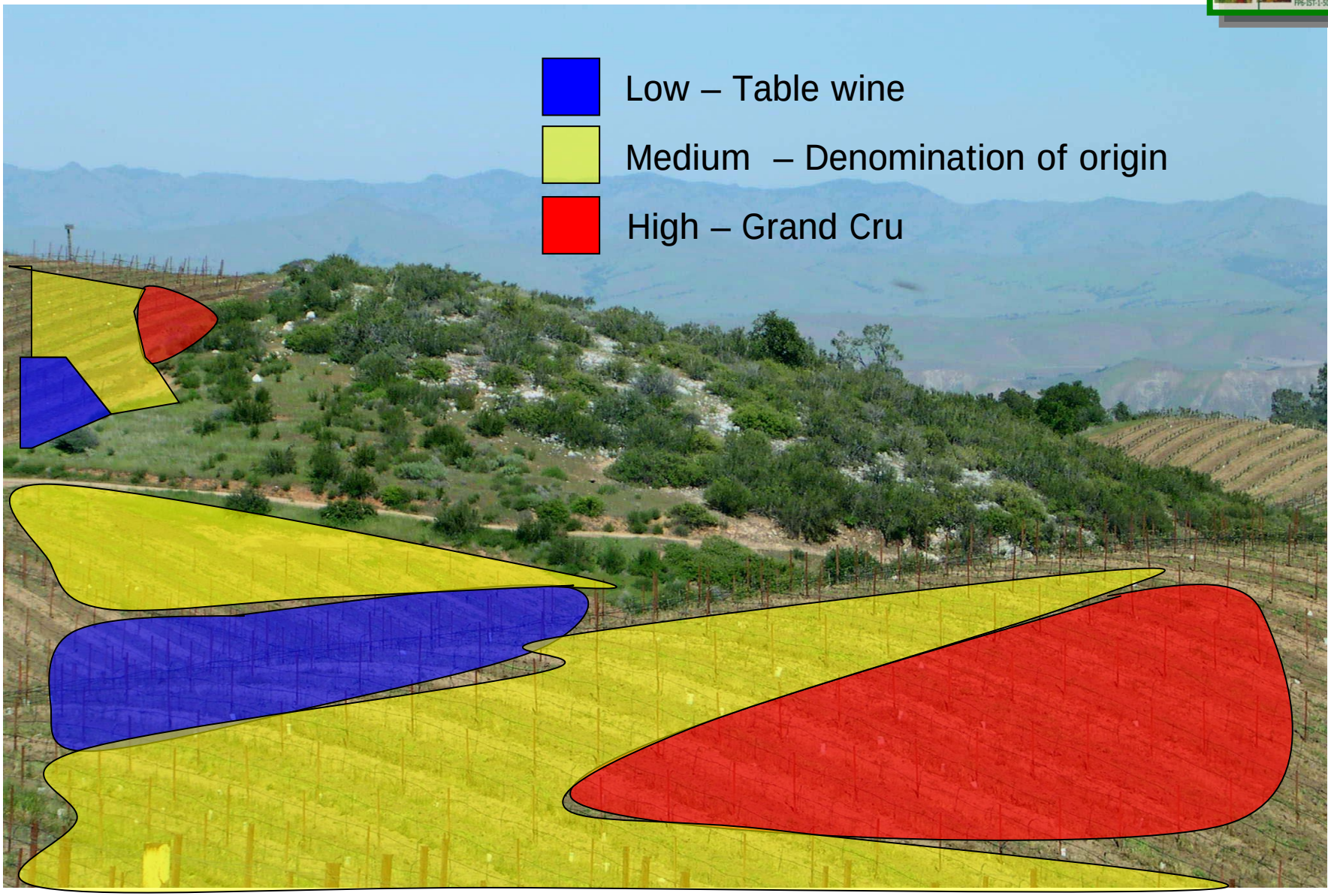
Some scenario: Quality - Heterogeneity



Some scenario: Quality - Heterogeneity



Some scenario: Quality - Microzonation



Practical Potential of GoodFood vision

- Increasing transparency in the productive chain
- Increasing confidence of the consumers

- Quantification of empirical observations
- Database for each vineyard

Advantages - Management

Management of the vineyard

Real-time monitoring of all the productive parameters

Recording of any significative productive step
Simplification of the documentation

Increasing of QUALITY and EFFICIENCY

COMPETITIVITY

Advantages – Ethic

Development of sustainable strategies

Preventive strategies against pathogen

Optimization in the use of water, fertilizers, pesticides in the vineyard and of chemicals in cellar

Increasing EFFICIENCY and RESPONSABILITY

MONEY SAVING

Conclusion

Vinery

The GoodFood approach is a model for the business development in Viticulture

Region

The GoodFood approach can be applied to different level: from the "micro" vineyard level to the Wine Region level (es. Denomination of Origin Consortia)

The European Community is offering the chance of experiment a completely new system potentially able to increase the competitiveness of the wine industry