

**Soleo – a natural tool to strengthen the
plant and it's harvestable produce and
increase post harvest quality**



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Annual Biocontrol Industry
Meeting Lucerne



Daymsa: presentation

- Daymsa, began manufacturing and marketing operations 31 years old
- Daymsa belongs to a large corporate group called SAMCA.
- The SAMCA Group is located in Spain, whose activities are focused on the mining, agriculture, energy, plastics, textile and construction sectors. In all, it provides employment for more than 4,000 people. It has facilities all over Spain, as well as in other countries, such as France, Italy or Portugal.
- Daymsa reaches its consumers via a professional distribution network covering Spain and 25 countries of Europe, Africa, Asia and South America, where we have three subsidiaries (Ecuador, Colombia and Brazil).



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SOLEO: COMPOSITION

- ❑ Plant extract: Mix of natural Rutaceae extracts
- ❑ Plant strengthener: In Spain under *ORDEN APA/1470/2007, otros medios de defensa fitosanitaria.*



RECOMMENDED USES (I)

- Protection of the crop against phytopathogenic fungus, specially:
 - Botrytis (*Botrytis cinerea*)
 - Powdery mildew (e.g. *Sphaeroteca macularis*, *Sphaeroteca fulginea*, *Leveillula taurica*)

RECOMMENDED USES (II)

- ❑ Extension of post harvest life of fruits and vegetables. Improves the appearance maintaining organoleptic characteristics.



ADVANTAGES (I)

- ❑ Soleo can be used as a complement to fungicides
- ❑ Alternative to fungicides when they can't be used
 - ❑ Harvesting period
 - ❑ Organic agriculture
- ❑ Helps to the reduction of pesticide uses
 - ❑ Lower number of applications
 - ❑ Lower amount of fungicides active substances used on a crop



Main constituents and Mode of action

Natural citric and ascorbic acid, and pectins

1. Induces the plant to produce phytoalexins: Immune Response in Plant

2. Produces and accumulates antioxidants: Immune Response and Strengthening in plant

3. Physical barrier



Application method and doses (I)

- ❑ Start the treatments as soon as favorable environment condition starts for disease development.
- ❑ Use foliar application, making sure good wetting of disease susceptible organs.



Application method and doses (II)

☐ Doses:

- Botrytis: 0,5–1,0 cc/l
- Powdery mildew: 1,0-1,5 cc/l

☐ Repeat with a frequency of 10-20 days depending on the environmental conditions

SOLEO: *Botrytis cinerea* Trial in tomato



Treatments:

- Control (Untreated)
- Soleo 0,5 l/ha
- Soleo 1 l/ha
- Soleo 1,5 l/ha
- Chemical phytosanitary

Location: Andalucía (Spain). Tomato in greenhouse.

Design: Randomized blocks in 4 replicates per treatment. 10 plants/replicate.

a) Applications

First application: When the first signs of disease development. Second application and next: 10-15 days interval.

4 applications were made.

b) Parameters: Incidence and severity in leaves and fruits. Incidence: % of leaves (or fruits) with symptoms in 50 leaves of each repetition. Severity: % of damaged surface in each of 50 leaves (or fruits) of each repetition.

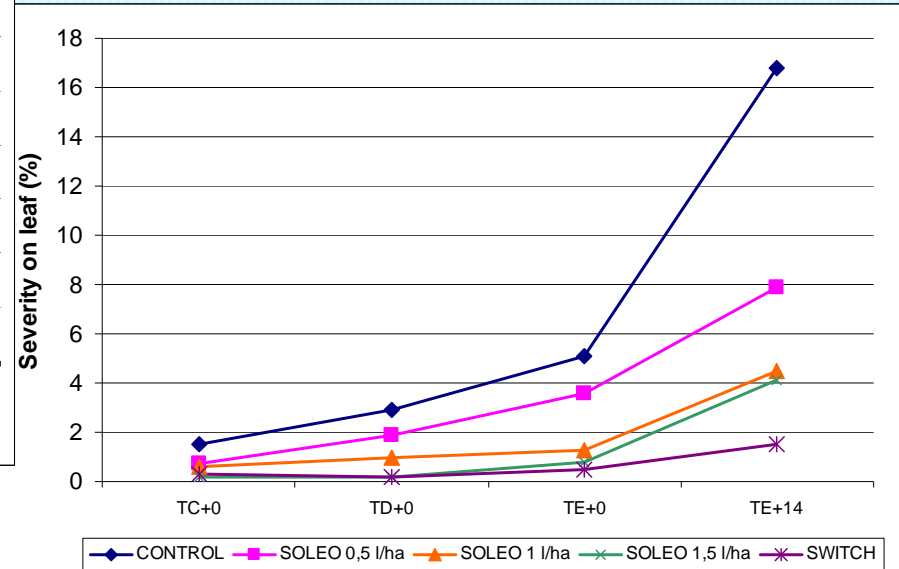
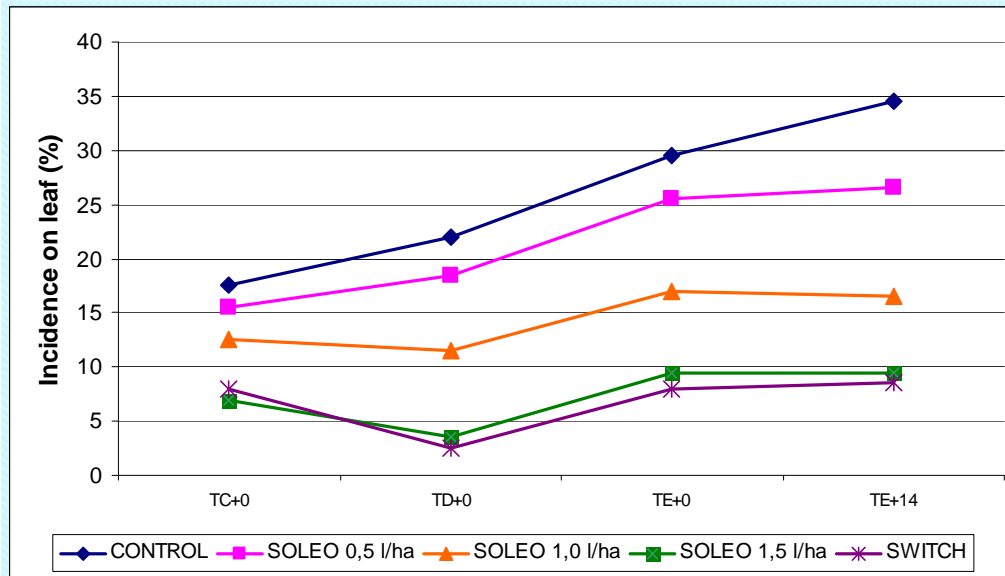
c) Assessment dates:

Before every application and 14 days after last application.



SOLEO: *Botrytis cinerea* Trial in tomato

Results on the leaves



First application: 17/03

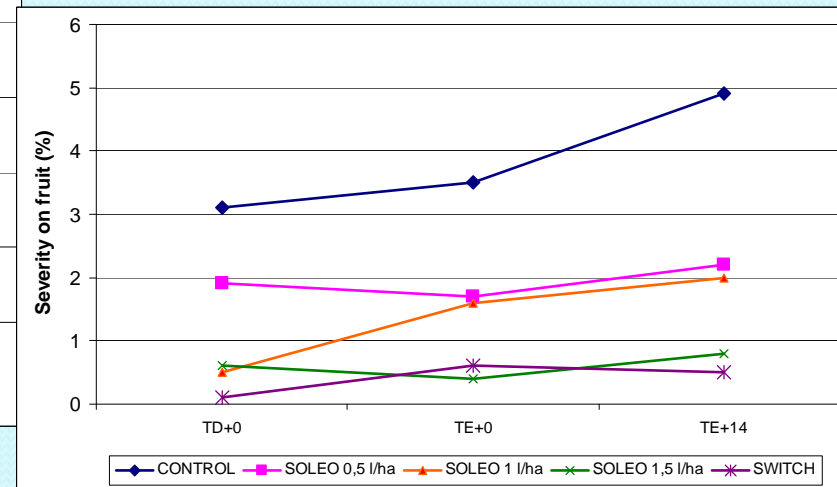
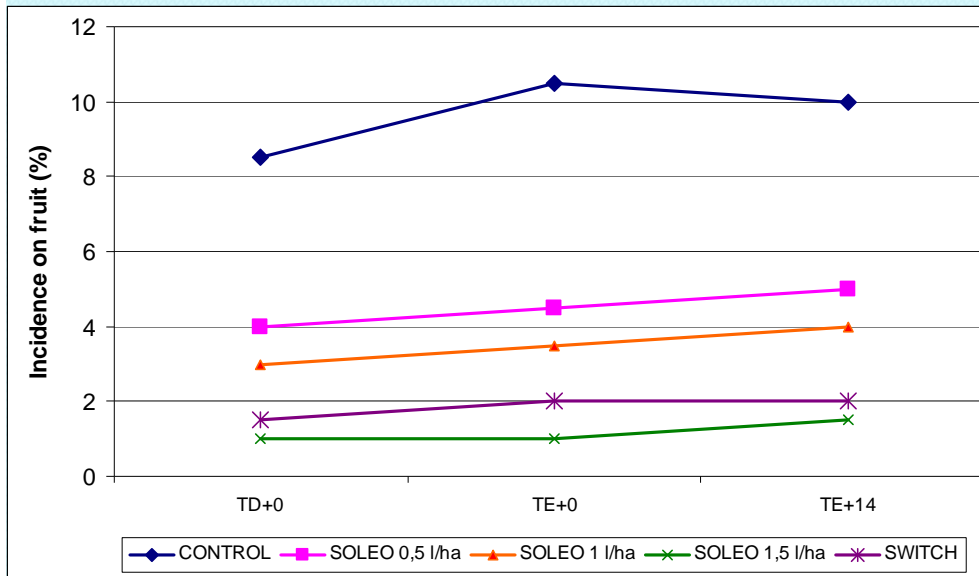
Botrytis begin significantly on 09/04

Next applications on assessment dates: 09/04, 21/04 y 02/05



SOLEO: *Botrytis cinerea* Trial in tomato

Results on the fruits



First application: 17/03

Botrytis begin significantly on 09/04

Next applications on assessment dates: 09/04, 21/04 y 02/05



Powdery mildew trial in tomato

Materials and Methods (1/2)

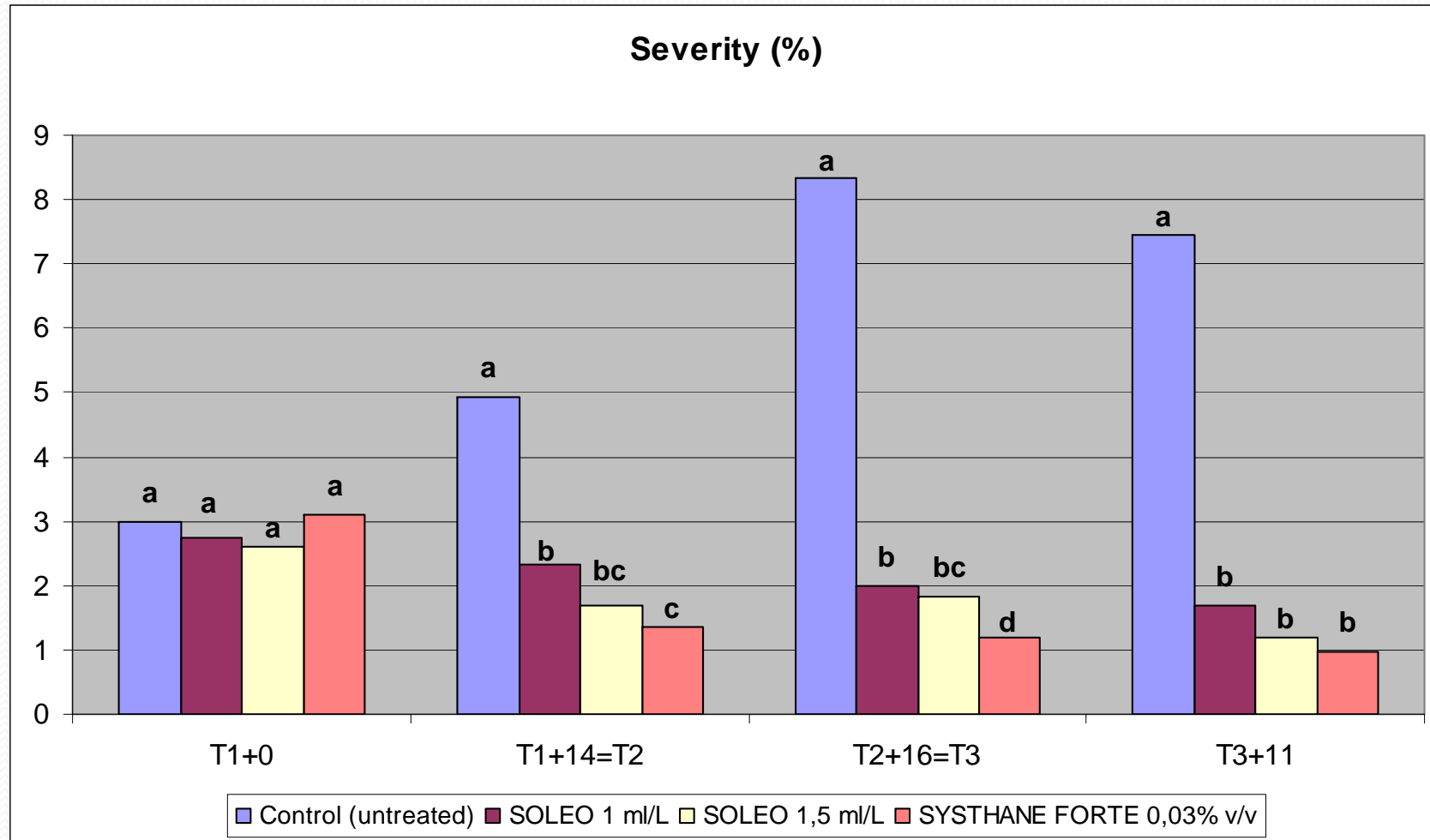


- Location: Greenhouse in Conil de la Frontera (Cádiz, Spain)
- Cultivar: Tomate var Daniela
- Disease: *Leveillula taurica*
- Plant density: 25000 p/ha
- Treatments
 - Control (no treated)
 - Soleo 1,0 L/Ha
 - Soleo 1,5 L/Ha
 - Chemical phytosanitary

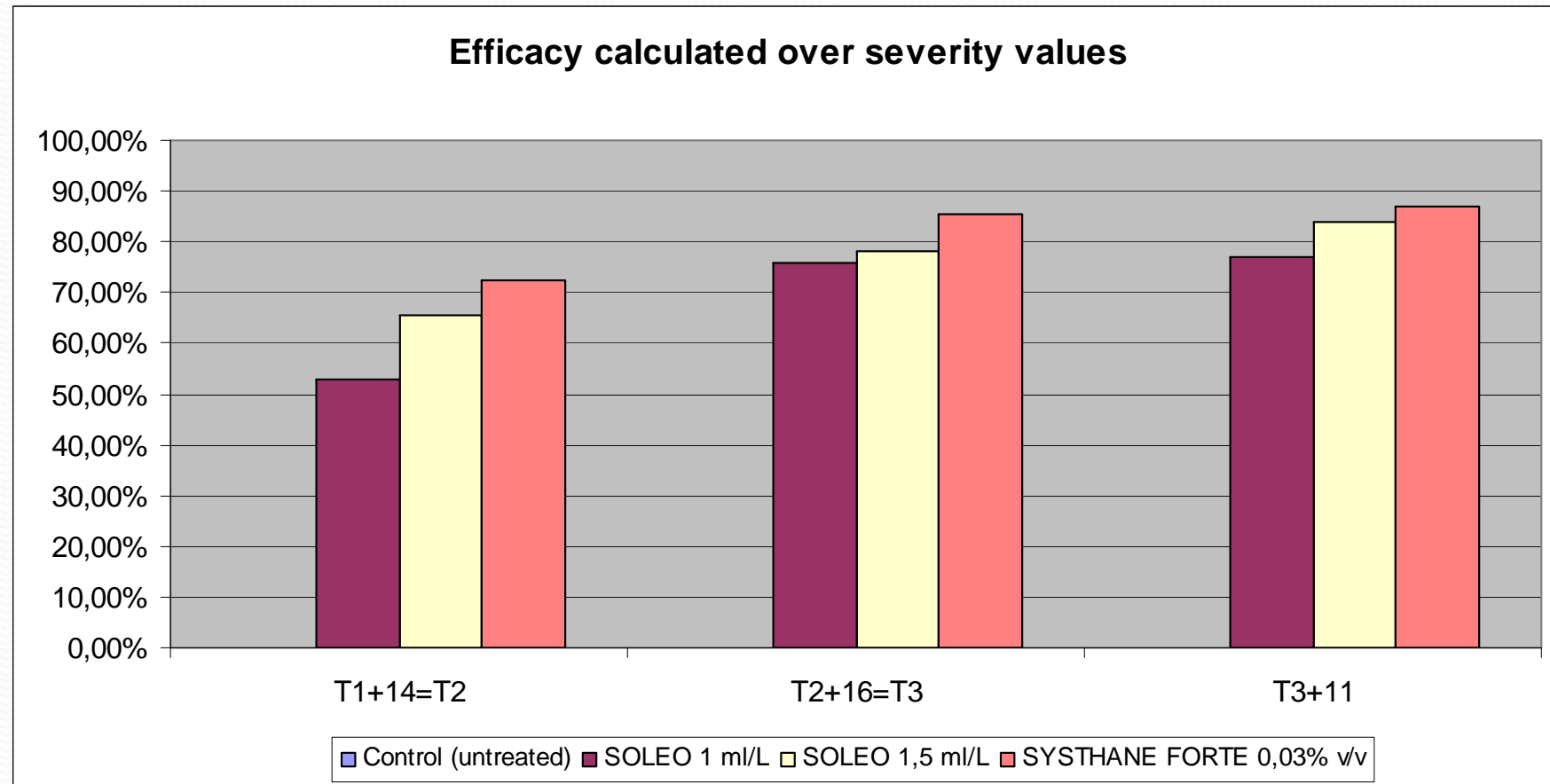
Materials and Methods (2/2)

- 3 foliar applications:
 - T1: 30/06/2009
 - T2: 14/07/09 = T1+14
 - T3: 30/07/09 = T2+16
- Application equipment
 - The products were sprayed with compressed air sprayers with a lance with cone nozzles and the pressure was 3,5 bar.
 - Spray volume of 1000 L/ha
- Randomized blocks design with 4 replicates
- Each replicate with 14 plants
- Assessments:
 - Incidence and Severity
 - Efficacy (Abbott formula)

Powdery mildew trial in tomato: Results



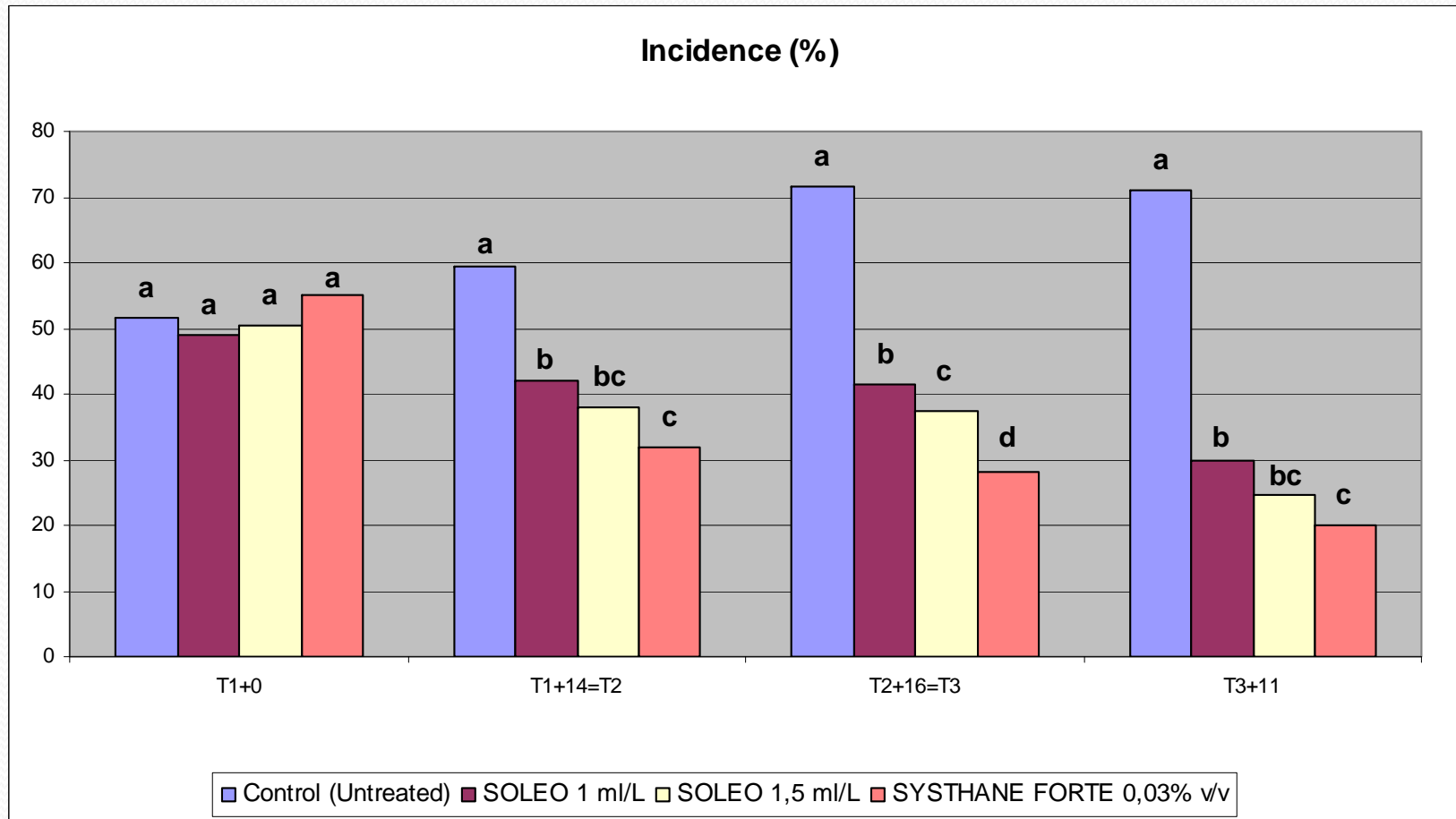
Powdery mildew trial in tomato: Results



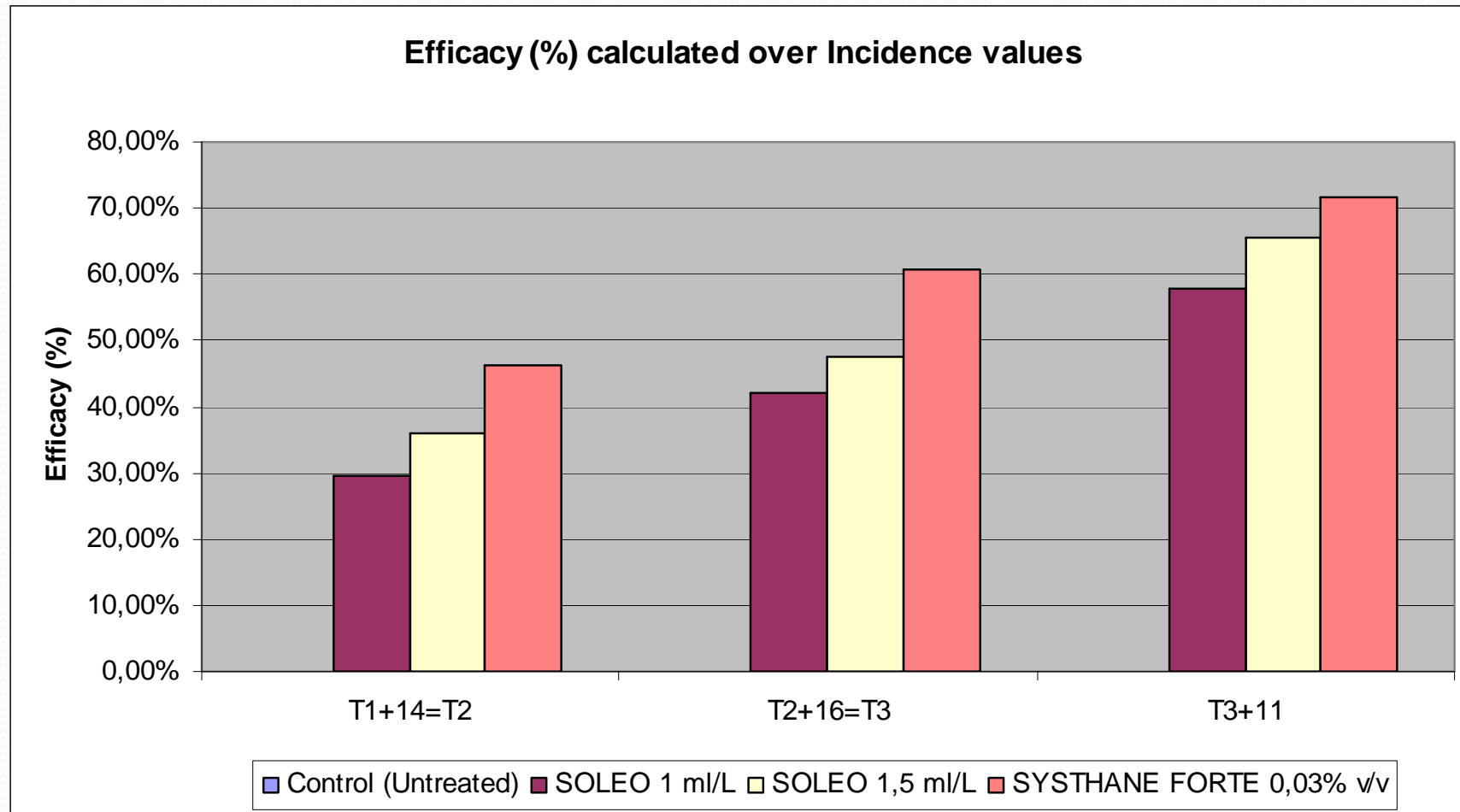
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● Powdery mildew trial in tomato: Results



Powdery mildew trial in tomato: Results



SOLEO: Powdery mildew *Sphaeroteca fulginea* in Cucumber

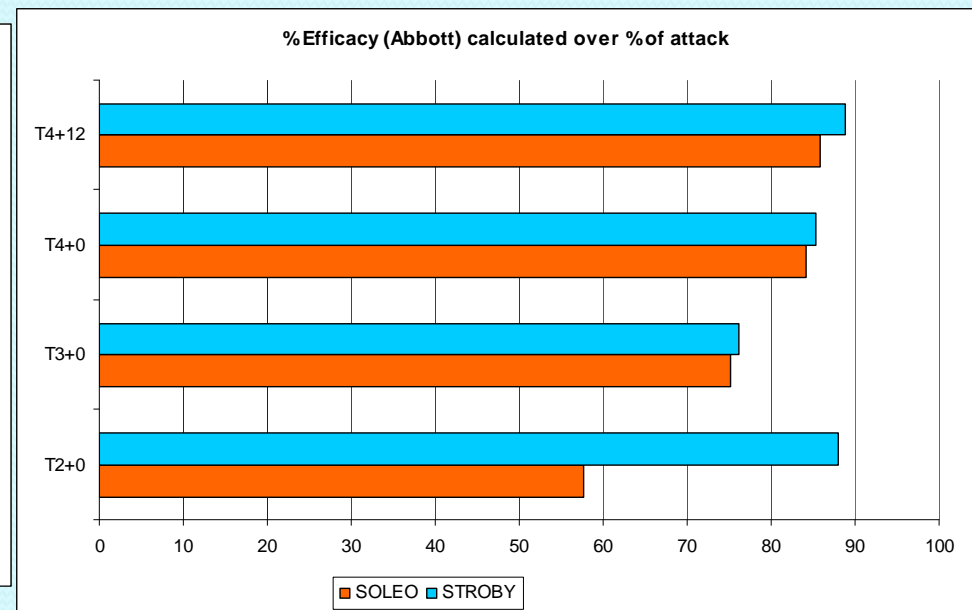
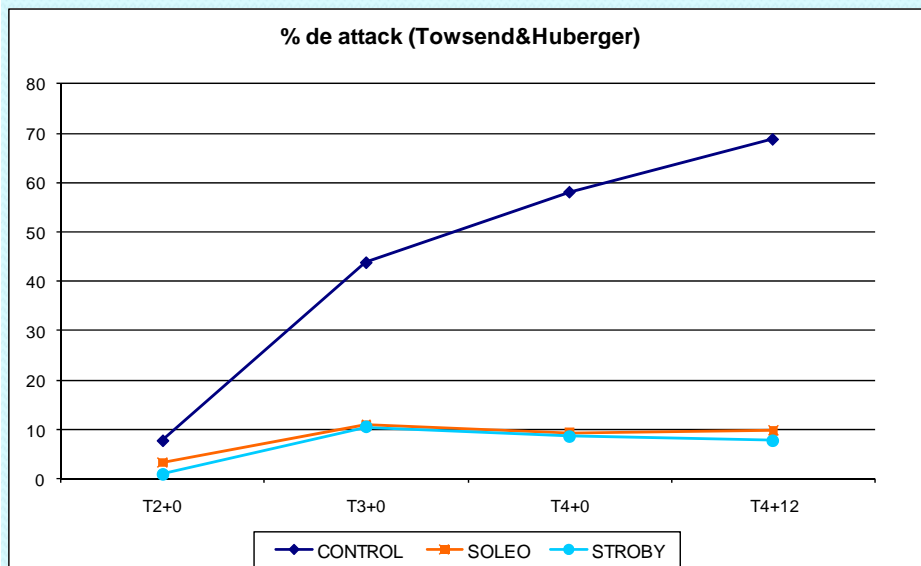
- Location: Greenhouse in Los Palacios (Sevilla)
- Cultivar: Suso
- 4 applications. Spray volume in 1st application: 1000 L/Ha. In the 3 successives: 1500 L/Ha.
- Applications: T2=07/05/2008, T3=21/05/2008, T4=04/06/2008

TREATMENT	DOSAGE
CONTROL (UNTREATED)	-
SOLEO	1 L/Ha
Phytosanitary	0.03%

PARAMETERS	SAMPLE	DATES
N° LEAVES WITH SYMPTOMS	20 Leaves/plot	T2 + 0 days T3 + 0 days T4 + 0 days T4 + 10 days
% OF ATTACK 0-5 (Towsend & Huberger)	20 Leaves/plot	T2 + 0 days T3 + 0 days T4 + 0 days T4 + 10 days
PHYTOTOXICITY (0-10)	PLOT	T2 + 0 days T3 + 0 days T4 + 0 days T4 + 10 days



SOLEO: Powdery mildew in Cucumber



SOLEO on lettuce: *Botrytis cinerea*

- Location: Benicarló (Castellón, ESP)
- Cultivar: Valladolid. Density: 0,3x1,2. Plantation date: 29/12/2009.
- Start of applications: preventive, when the conditions are favorable to development of the disease.
- 4 applications. Spray volume in 1st application: 500 L/Ha. In 2nd 600 L/ha; in 3^d and 4th: 800 L/Ha.
- Dosage: 0,5 cc/L
- Applications:

T1+11	T1+22= T2+11	T1+32 = T3+10	T1+40 = T4+8
1/2/10	12/2/10	22/2/10	2/3/10

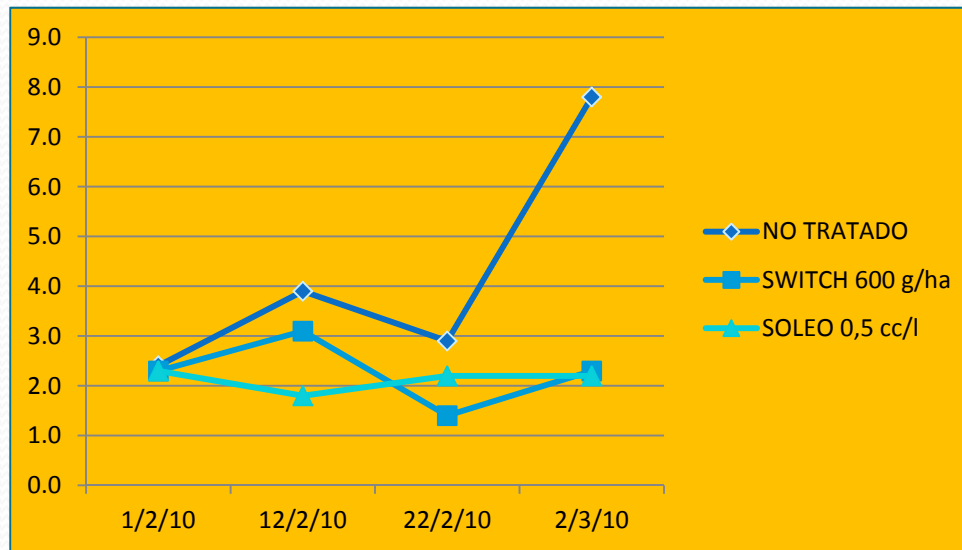
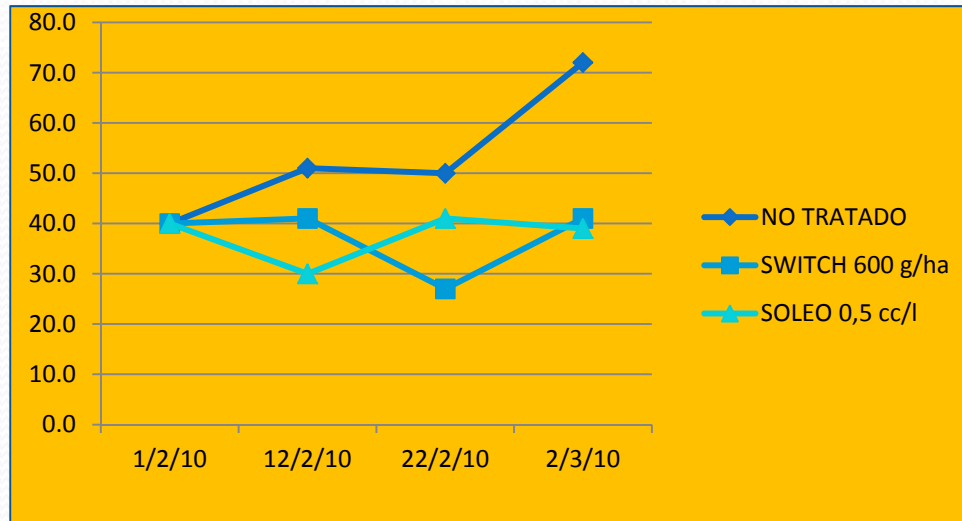


Soleo on Lettuce

Botrytis cinerea:

incidence and

severity results



Soleo trial on Lettuce *Botrytis cinerea*: Damage assessment

Damage assessment (%)

	Control	Phytosanitary	Soleo 0,5 cc/l
1= No attack	28	61	59
2= Slight attack, with only the basal stems damaged	67	39	41
3= No commercial lettuce	5	0	0



SOLEO: Powdery mildew in Strawberry

- Objective: check Soleo efficacy on *Sphaeroteca macularis*, in comparison with standard Triadimenol 25% EC.
- Location: Greenhouse in Moguer (Huelva)
- Cultivar: Camarosa
- 4 applications. Spray volume used: 1000 L/Ha.

TREATMENTS	DOSAGE
CONTROL (UNTREATED)	-
SOLEO	1 L/Ha
TRIADIMENOL 25% EC	0.05%



Materials and methods

EC in 'Camarosa' cultivar grown under macrotunnel, in BBCH 89 phenological stage. Plant density was 50.000 plants/ha.

The trial design was set up as a randomized block in 4 replications per treatment (E.P.P.O N° 1/104(2)). The row spacing was 1,20 m. The plots had 4 m long, with 2 lines per plot.

The products were sprayed with compressed air sprayers with a lance with cone nozzles and the pressure was 3,5 bar.

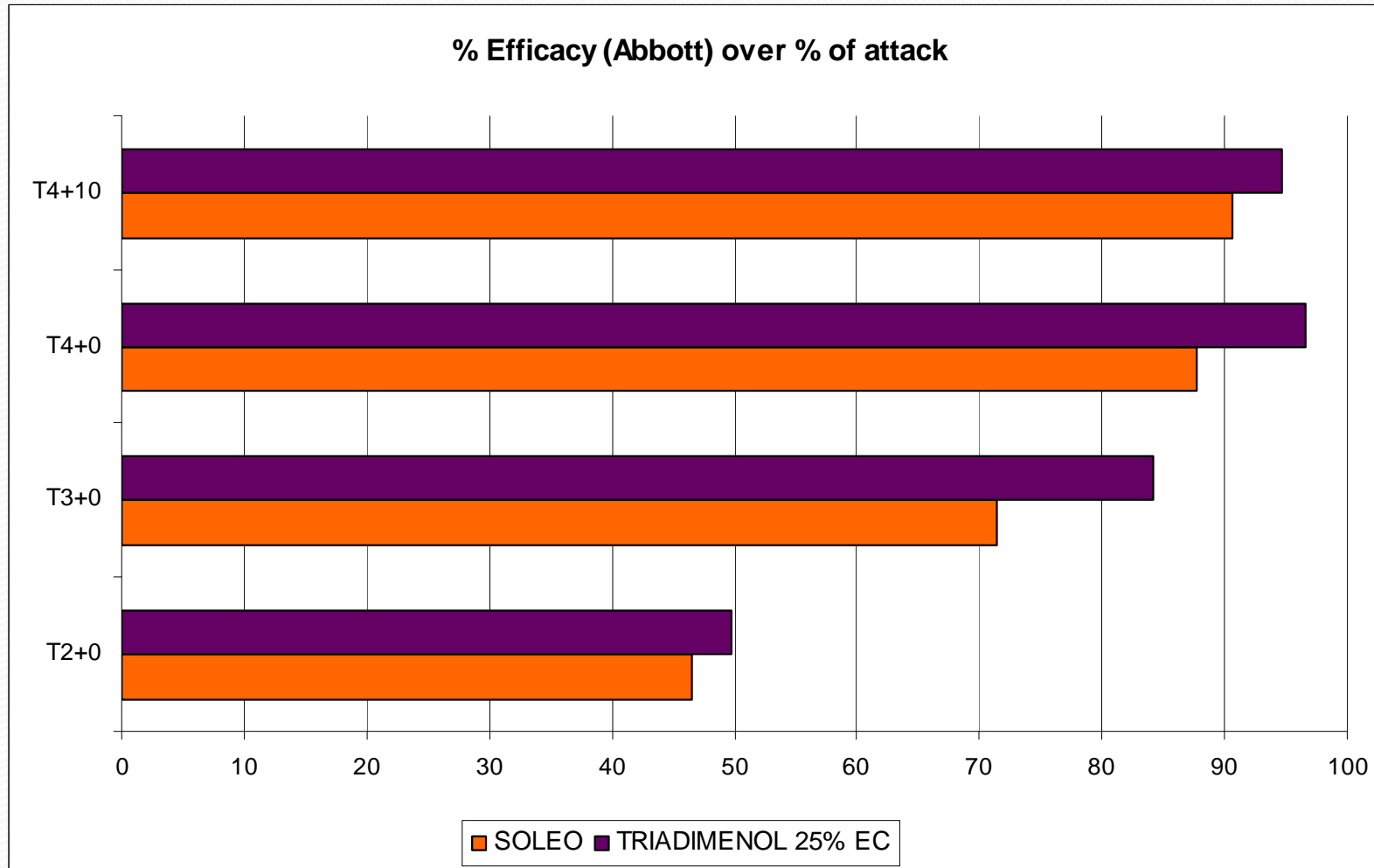
Incidence, severity and phytotoxicity were assessed on the following dates: T3+0, T4+0 and T4+10. In previous dates (T1+0, T2+0) not enough disease development was observed in order to make the evaluation.

Powdery mildew incidence was evaluated with the percentage of affected leaves, assessing 50 leaves per replication. The degree of foliar damage was calculated in accordance with Townsend and Heuberger's formula. For this, severity was evaluated on 50 leaves per replication. Efficacy was calculated using *Abbot's formula, based on the degree of damage*. *Phytotoxicity was assessed with a 0-10 range*.

Statistical analysis were assessed using Newman-Keuls Test.



SOLEO: Powdery mildew control in strawberry



SOLEO EFFICACY EVALUATION ON POST-HARVEST DISEASES OF PEACH

Objective: Check out the efficacy of the foliar treatments of the product SOLEO for the control of post-harvest diseases

Trial location: Alcalá del Río (Sevilla, ESP)

Treatments area selection: Peach Sweet Robin cultivar. A band of 15 rows was selected where the different treatments were located.



Treatments:

Treatment A: *Iprodione* (Iprodione 50% w/v CS) , 18 days before harvest day (31/03).

Treatment B: A first application of *Iprodione* (Iprodione 50% w/v CS), 18 days before harvest and one application of *SOLEO* on, 2 days before harvest (16/04).

Treatment C: Two applications of *SOLEO*. A first application 11 days before harvest (7/04) and a second application 2 days before harvest (16/04).

SOLEO dosage: 1 L/ha (1 cc/L).



Podredumbres causadas por patógenos en la muestra de melocotones.

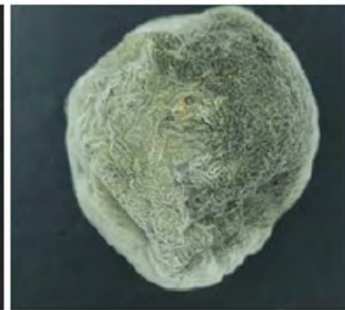
Cladosporium sp.



Cladosporium sp.
Penicillium sp.



Botryosphaeria sp.



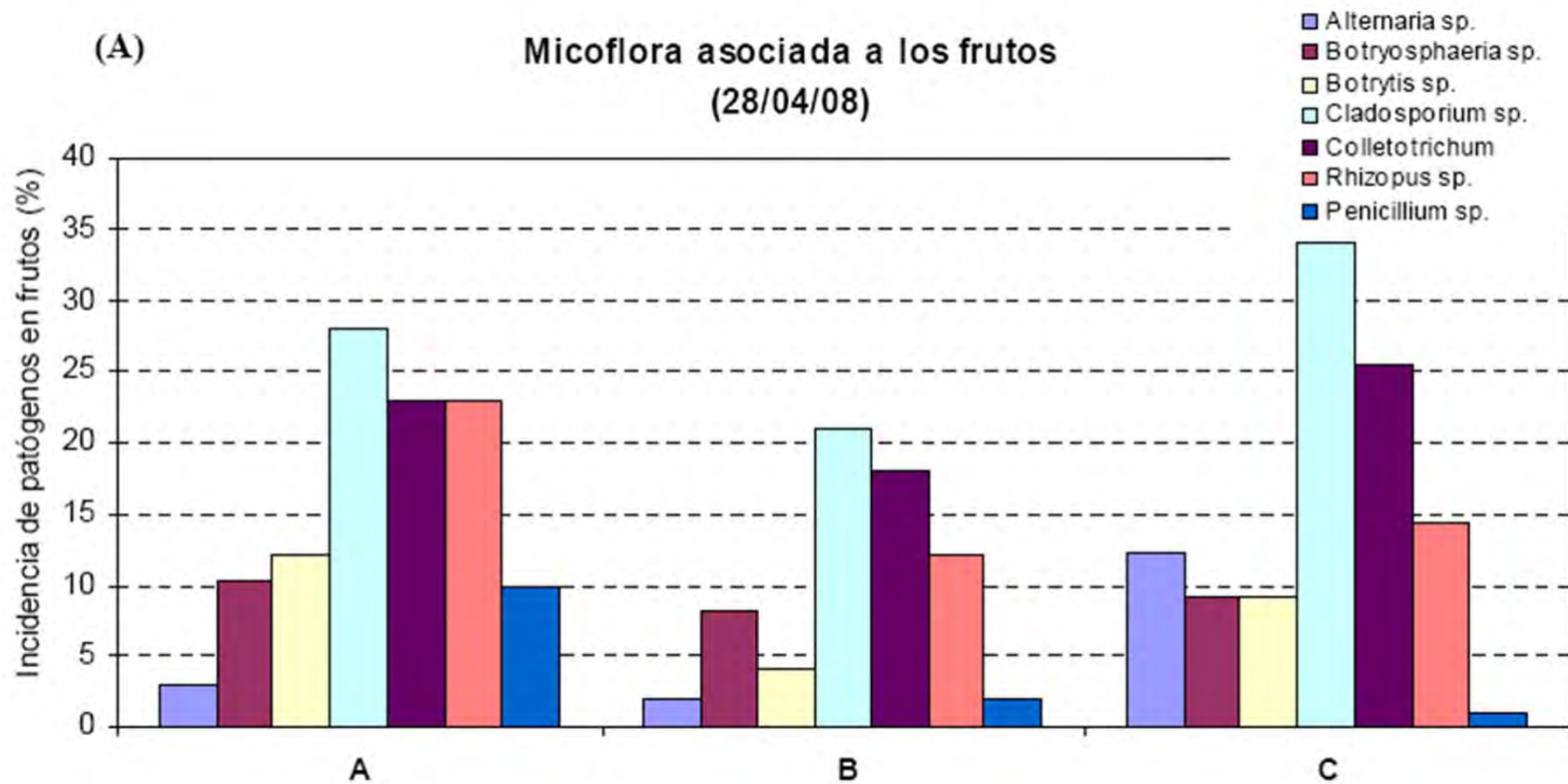
Botrytis sp.



Colletotrichum sp.



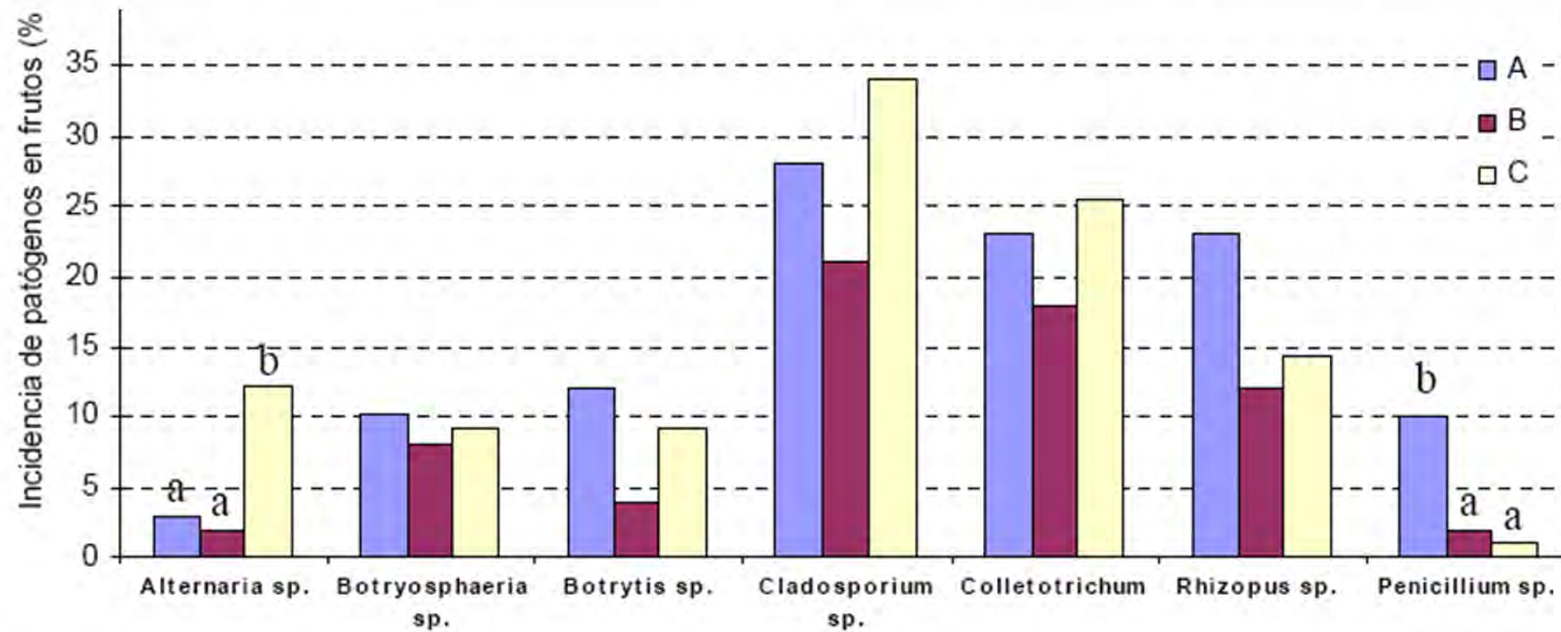
Post Harvest Trial on peaches: Results after 10 days 20°C (1/2)



Post Harvest Trial on peach: Results 2/2

Tabla 1. Número medio de frutos en porcentaje afectados obtenidos en cada tratamiento. Fecha de evaluación 2/05/08.

tratamiento	Frutos afectados (%)								
	Dañados	Con lesiones	Alternaria sp.	Botryosphaeria sp.	Botrytis sp.	Cladosporium sp.	Colletotrichum sp.	Rhizopus sp.	Penicillium sp.
A	50,0	6,0	3,0	10,2	12,0	18,0	23,0	23,0	10,0
B	35,0	4,0	2,0	8,1	4,0	21,0	18,0	12,0	2,0
C	47,9	1,0	12,2	9,2	9,2	34,0	25,5	14,3	1,0



Post Harvest Trial on peach: Conclusions

- Soleo applications have permitted obtain a good production of quality fruit erasing the last fungicide Iprodione treatment and, thus, deleting the risks of pesticides residues in post-harvest period. Only a little part of control of *Alternaria* sp has been reduced, although the *Penicillium* sp control is widely better with two Soleo applications with respect to Iprodione use.
- Soleo treatment made 2 days before harvest did decrease the incidence of all pathogens in evaluated fruits (*Alternaria* sp, *Botryosphaeria* sp, *Botrytis* sp, *Colleotrichum* sp, *Rhizopus* sp and *Penicillium* sp), except for *Cladosporium* sp, which is the only evaluated pathogen where control has been decreased.
- The replacement of a final Iprodione treatment (18 days before harvest) for 2 Soleo applications, apart from delete the risks of residues for that application, has permitted a similar control of the *Botryosphaeria* sp, *Botrytis* sp and *Colletotrichum* sp post-harvest development.
- The replacement of a final Iprodione treatment (18 days before harvest) for 2 Soleo applications, apart from delete the risks of residues for that application, has reduced the incidency of the *Rhizopus* sp and *Penicilium* sp post-harvest development.
- No physiological alterations and no phytotoxicity in the crop were observed.
- No spots, derived from product application, were observed on fruits.





Thank you ii



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