منظمة وقاية
النباتات للشرق
الأدنى

EPPO/IOBC/FAO/NEPPO Joint International Symposium
on management of *Tuta absoluta*
Agadir, Morocco, November 16-18, 2011

Evaluation of the mating disruption method against the tomato leafminer, Tuta absoluta (Meyrick), in greenhouse tomato crops in Sardinia (Italy)

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The tomato leafminer, *Tuta absoluta* (Meyrick), was first recorded in Sardinia in late 2008

The pest spread rapidly to all tomato-growing areas, both in open field and protected crops

Damage of *Tuta absoluta* in greenhouse and open-field tomato crop

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Control methods

- **Chemical control**

- **Biological control: natural enemies, *Bacillus thuringiensis***

- **Cultural practices: soil solarization, rotation with non-solanaceous crops, ploughing, destruction of infested plants and post-harvest plant debris, removal of wild host plants, insect-proof nets**

- **Semiochemicals: male annihilation, mass trapping, mating disruption**

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Mating disruption

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Materials end methods

Trials were carried out in Sardinia in 2010-2011 in plastic greenhouses equipped with insect-proof nets using pheromone dispensers (60 mg of active ingredient) (ShinEtsu)

The effectiveness of dispensers was tested in 2 growing seasons at densities of 500 and 1000 per hectare

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Materials and methods

Parameters

Leaf damage

Male captures

Fruit damage

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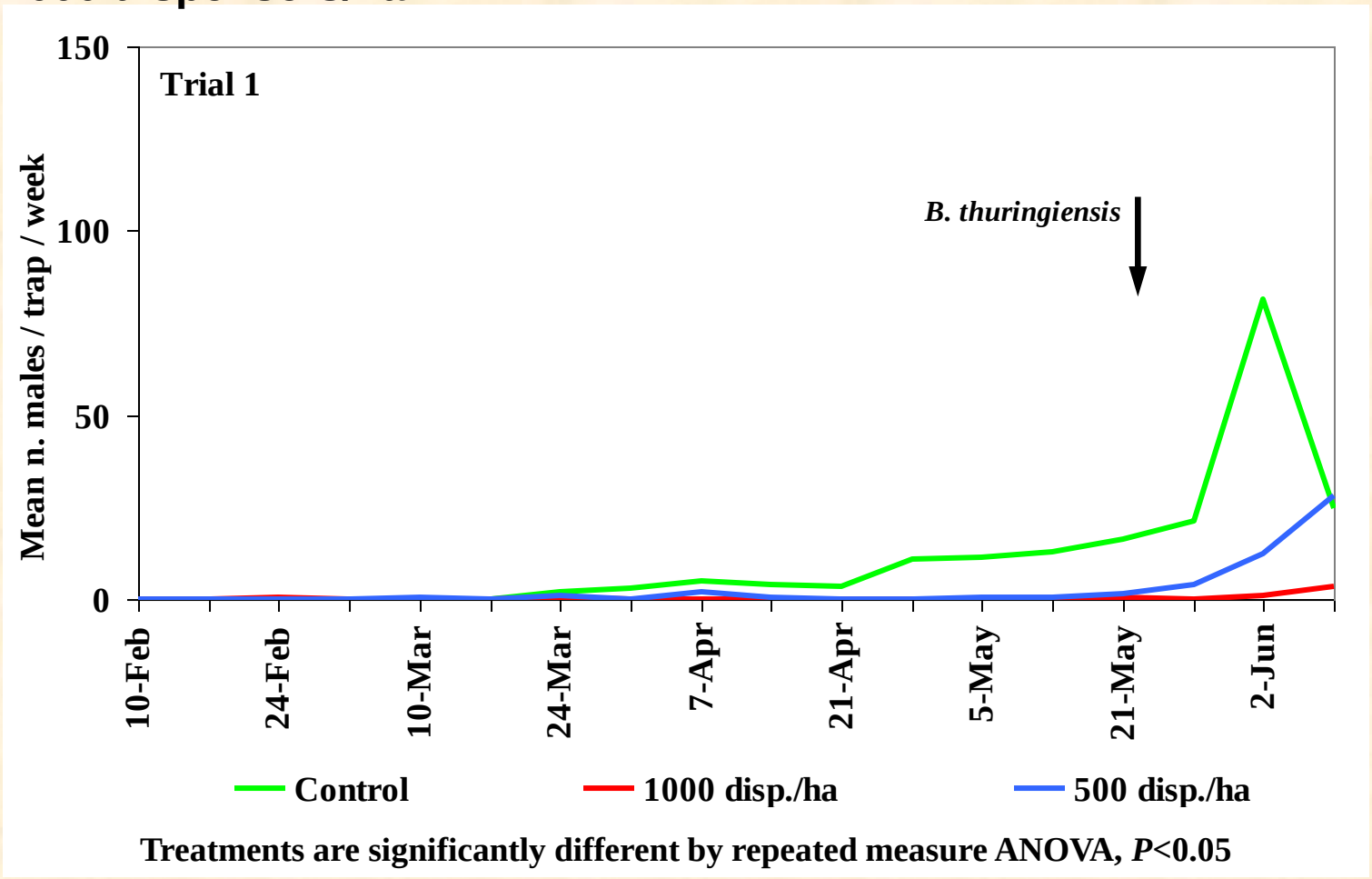
Results

Male captures

Male captures were very low for two months and increased afterwards in the control greenhouse

Nearly complete trap shutdown was achieved in the greenhouse disrupted with 1000 dispensers/ha



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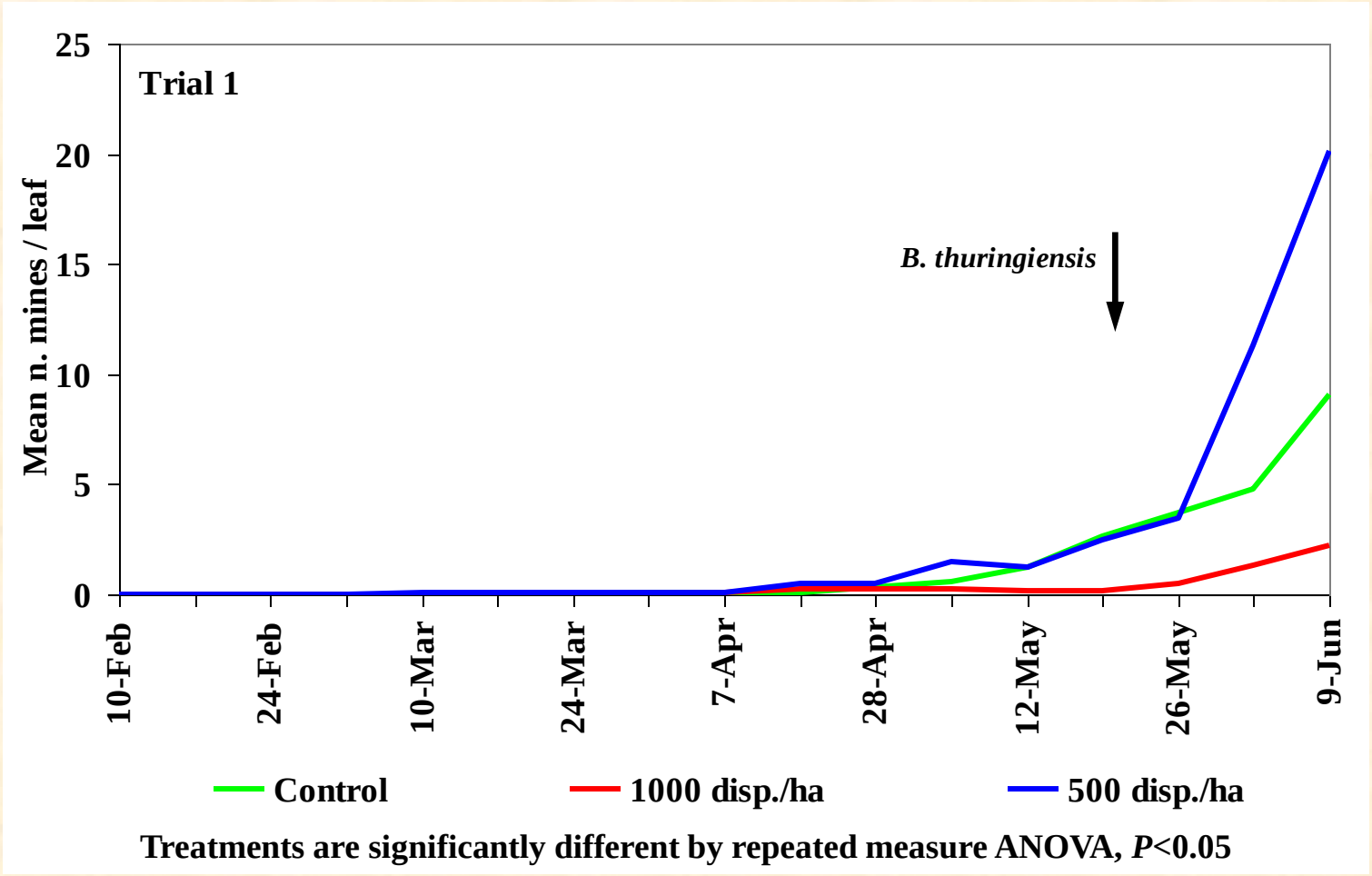
Results

Leaf damage

Leaf damage was very low in all treatments until late April, increasing rapidly especially in the greenhouse disrupted with 500 dispensers/ha and in the control greenhouse



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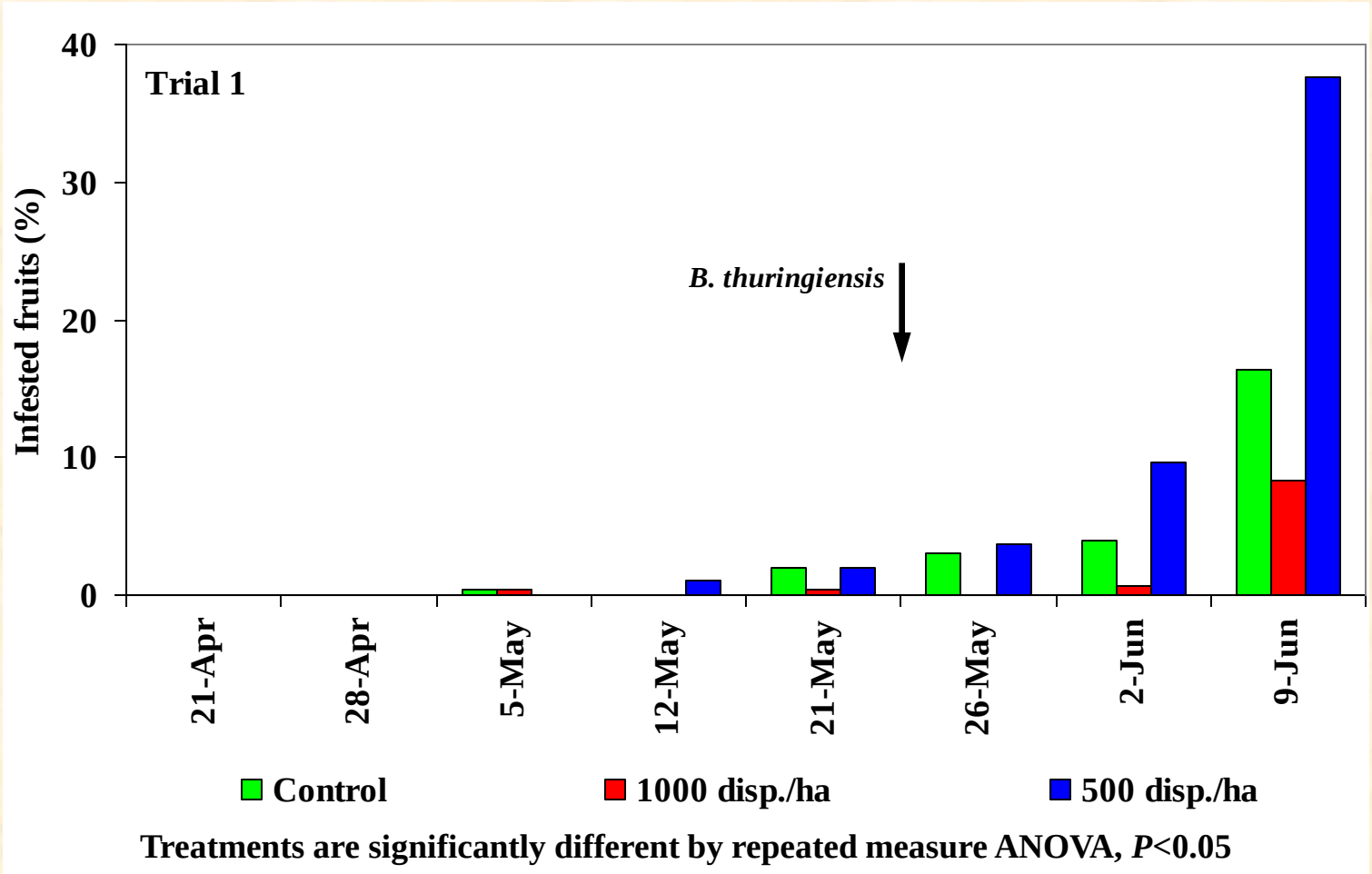
Results

Fruit damage

The highest infestation on fruits was detected in the greenhouse disrupted with 500 dispensers/ha

The lowest damage was in the greenhouse protected with 1000 dispensers/ha



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Results

	Growing season	Treatment	Total male captures (n./trap)	Leaf damage (n. mines/leaf)	Fruit damage (%)
Trial 2	Winter-spring	Control	594	7	9
		Mating disruption (*)	6	1	1
Trial 3	Summer-winter	Control	809	3	8
		Mating disruption (*)	37	0.5	1
Trial 4	Summer-winter	Control	661	1	4
		Mating disruption (*)	47	0	1

(*) Application rate 1000 dispensers/ha

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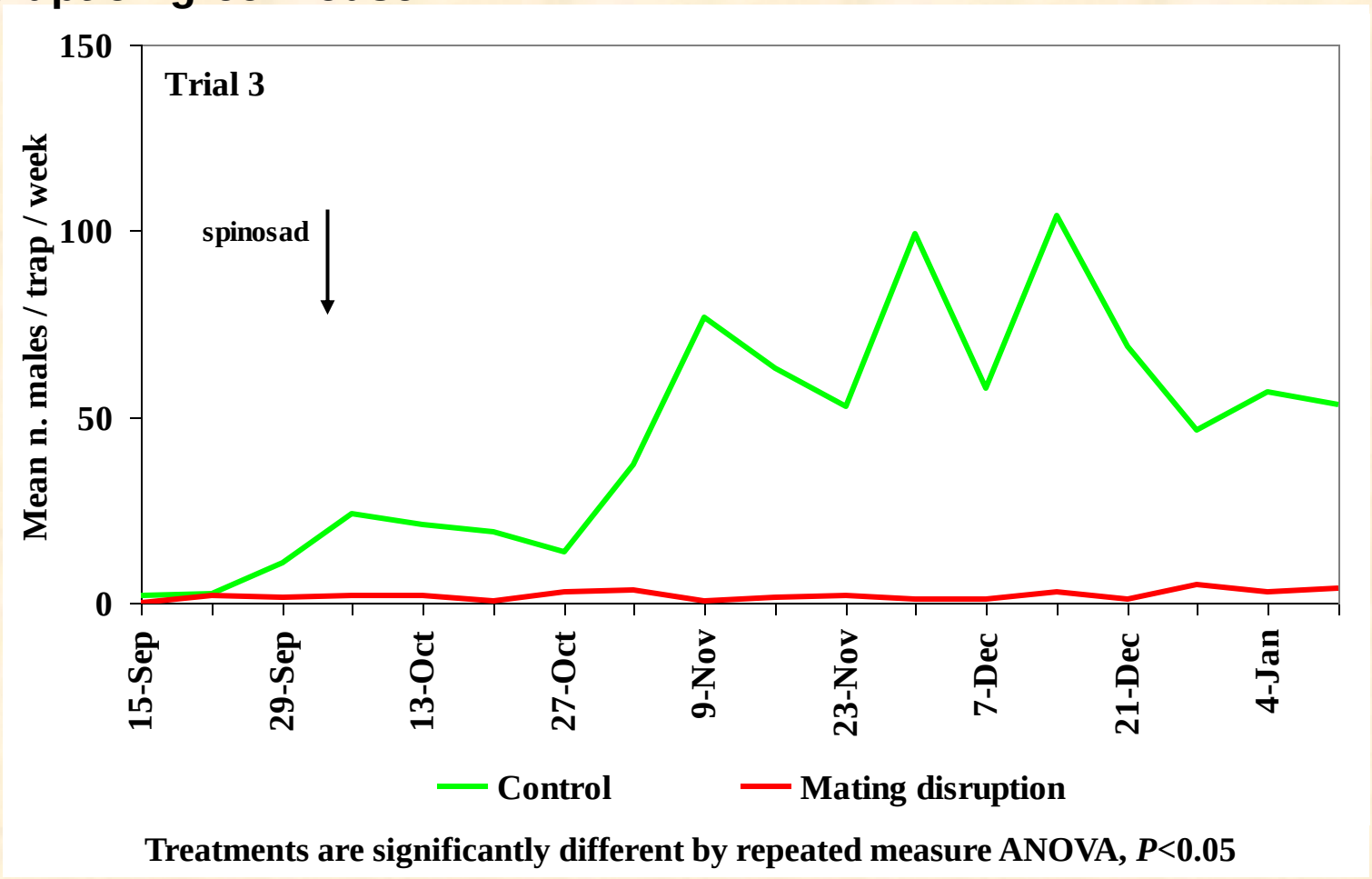
Results

Male captures

Male captures in the control greenhouse were high from the beginning of the cultivation

Captures were very low and stable throughout the season in the mating disruption greenhouse



Treatments are significantly different by repeated measure ANOVA, $P<0.05$

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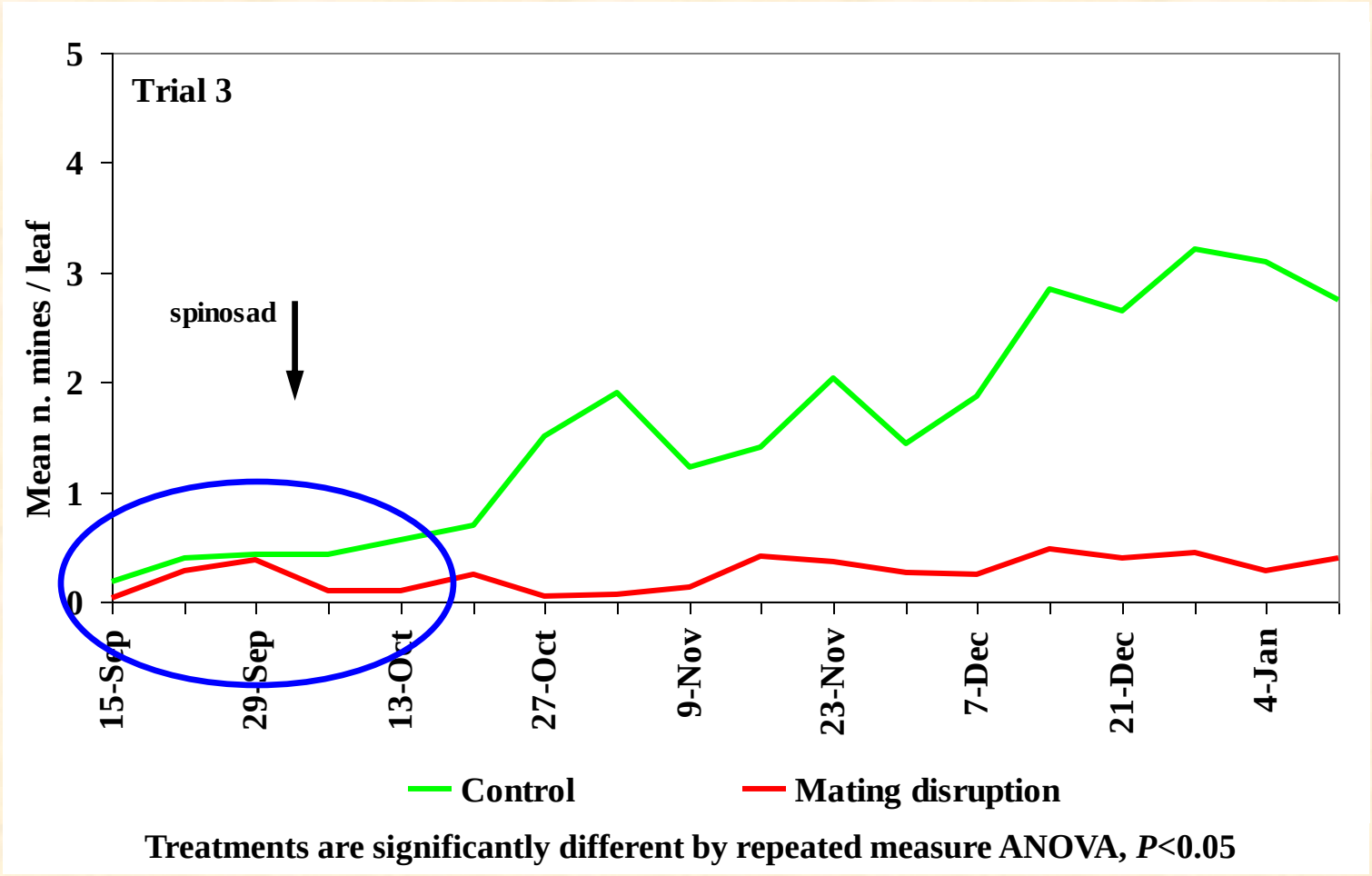
Results

Leaf damage

Leaf damage increased steadily in the control greenhouse

Pest population on leaves was stable in the disrupted greenhouse



Treatments are significantly different by repeated measure ANOVA, $P<0.05$

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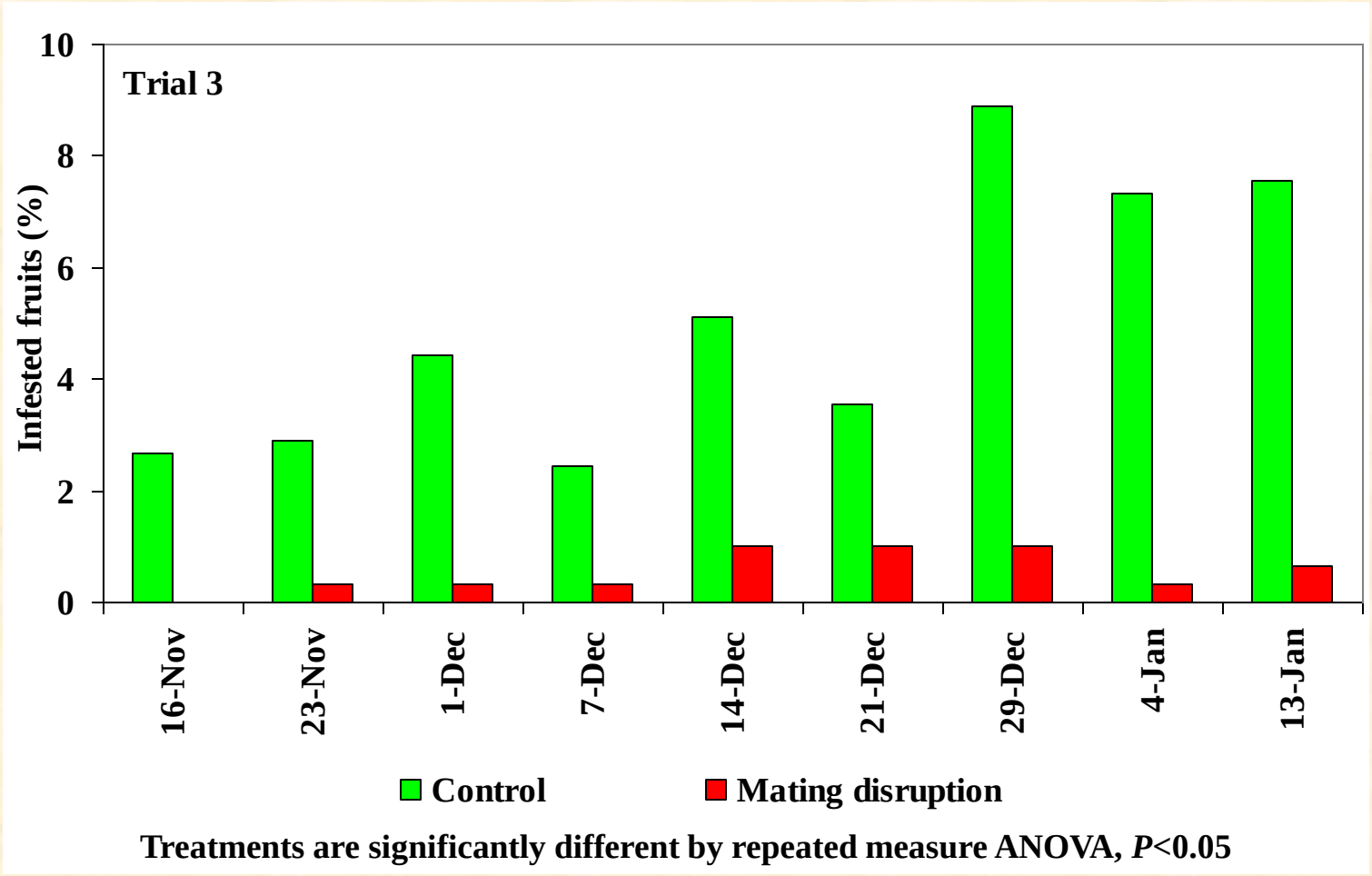
Results

Fruit damage

Damaged fruits were observed in the control greenhouse from the beginning of the fruit ripening
Fruit damage in the mating disruption greenhouse did not exceed 1%



Treatments are significantly different by repeated measure ANOVA, $P<0.05$

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Conclusions

Population dynamics

The pest population was very low at the beginning of the tomato cultivation in the winter-spring growing season

The pest population was high at the beginning of the summer-winter growing season

Deploy the pheromone dispensers at transplanting in the summer-winter season

In the winter-spring season, pheromone dispensers can be deployed at the time of the first male capture

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Conclusions

Mating disruption with 500 disp./ha (30 g a.i./ha)

Pheromone dispensers were not effective in reducing the pest population

Male captures were reduced in the disrupted greenhouse by 74%

Population density on leaves was always higher than in the control greenhouse and soared in the last two weeks

Damage on fruits was higher than in the control greenhouse, especially in the last sampling date

The density of 500 dispensers/ha partially interfered with the ability of males to locate virgin females, but did not impede the build up of the pest population at the end of cultivation

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Conclusions

Mating disruption with 1000 disp./ha (60 g a.i./ha)

Application rate of 1000 dispensers/ha effectively reduced the pest population in both growing seasons for 140 days

Male captures were significantly reduced to a nearly complete trap shutdown, with percentages of reduction in the mating disruption greenhouses of 97, 99, 93 and 95%

Damage on leaves on disrupted greenhouses was reduced by 77, 85, 57 and 84%

Damage on fruits on disrupted greenhouses was reduced by 62, 88, 75 and 89%

Our results show that the mating disruption method successfully reduced tomato leafminer infestations and represents a promising tool to control the pest reducing the number of insecticide applications

Thank you

for your attention

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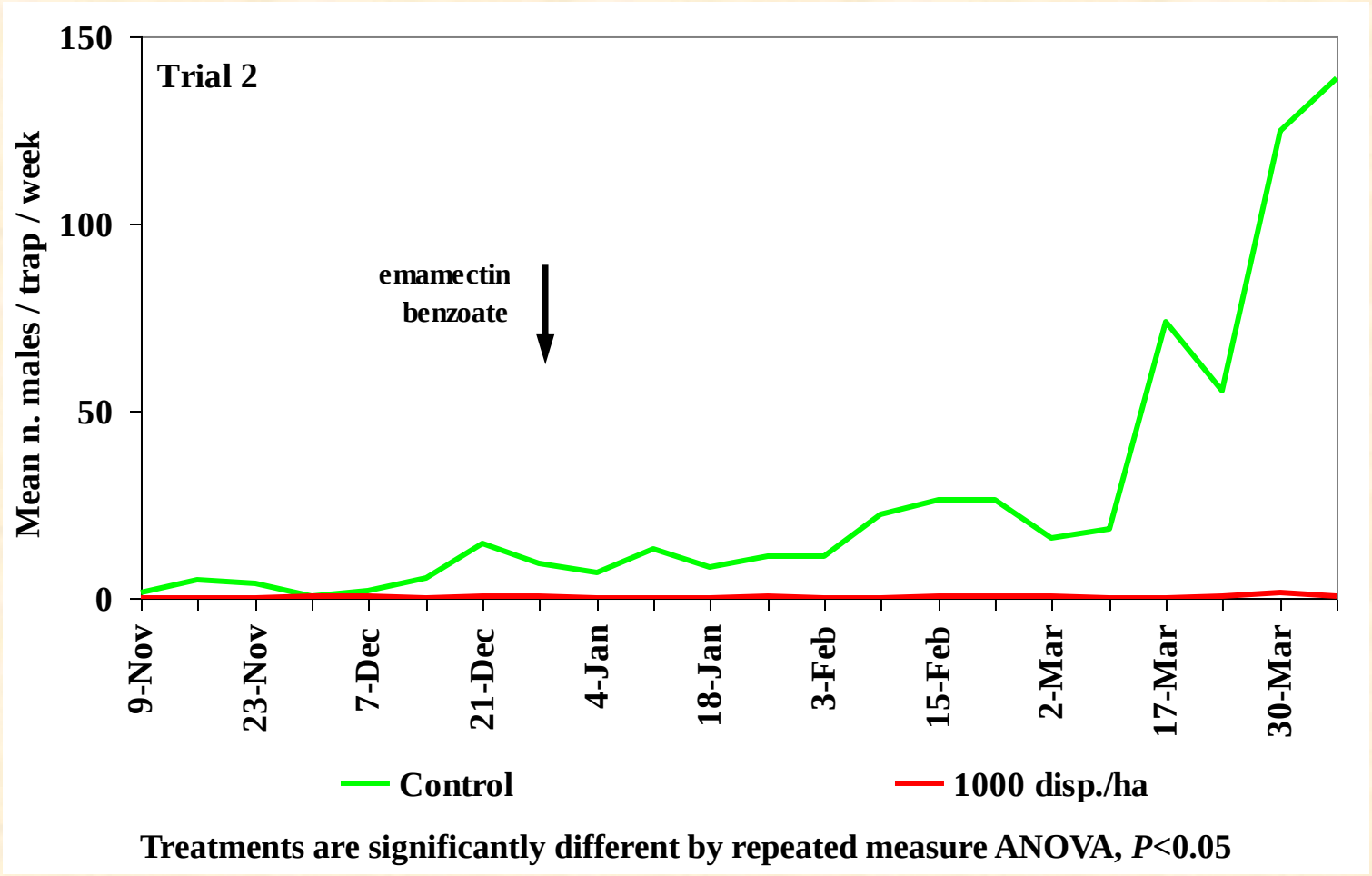
Supplemental material

Male captures

Male captures increased steeply in the control greenhouse in the last month

Nearly trap shutdown was observed in the disrupted greenhouse



Treatments are significantly different by repeated measure ANOVA, $P<0.05$

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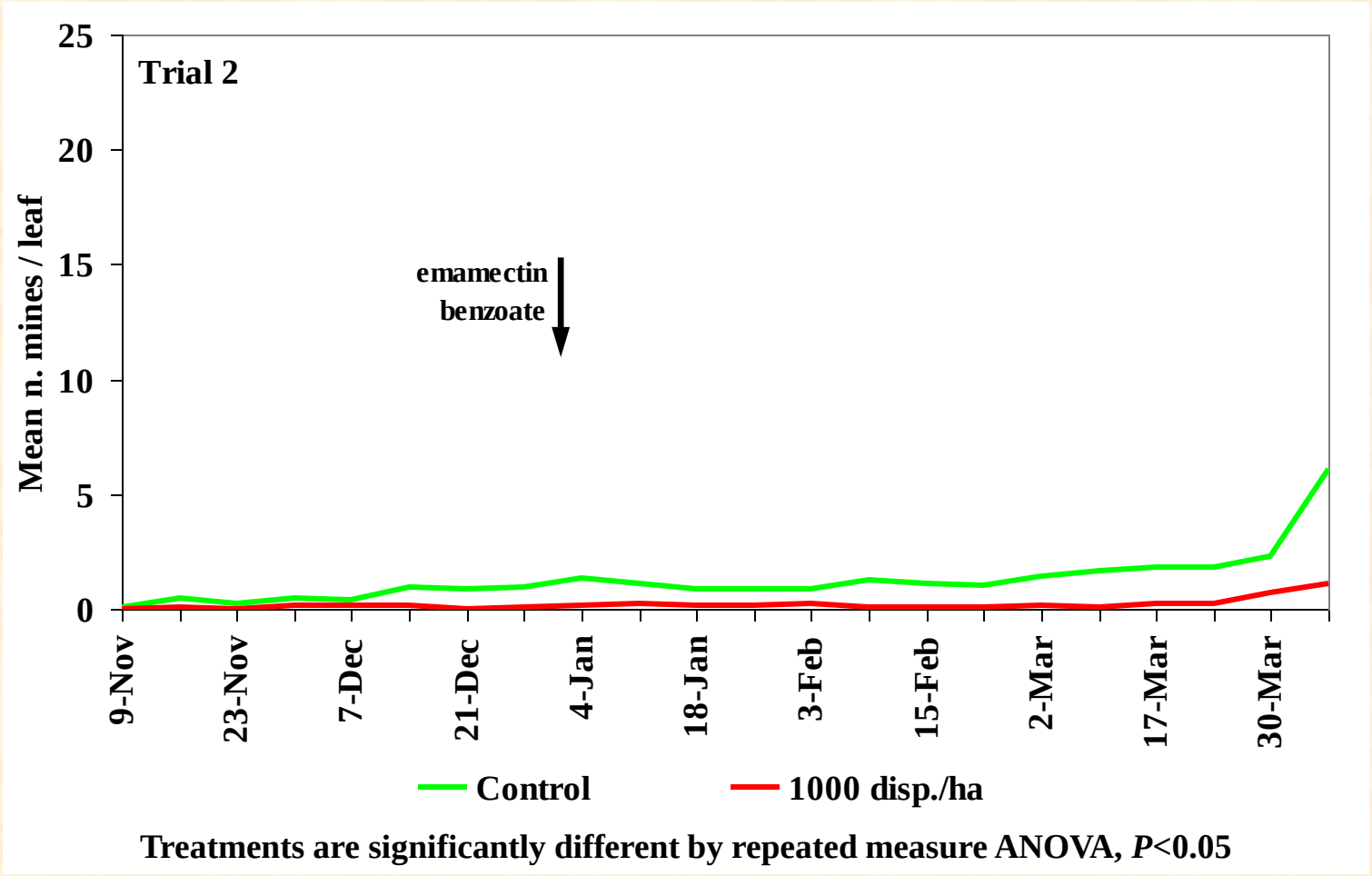
Supplemental material

Leaf damage

Leaf damage was low in both treatments, but consistently higher in the control than in the disrupted greenhouse



Treatments are significantly different by repeated measure ANOVA, $P<0.05$

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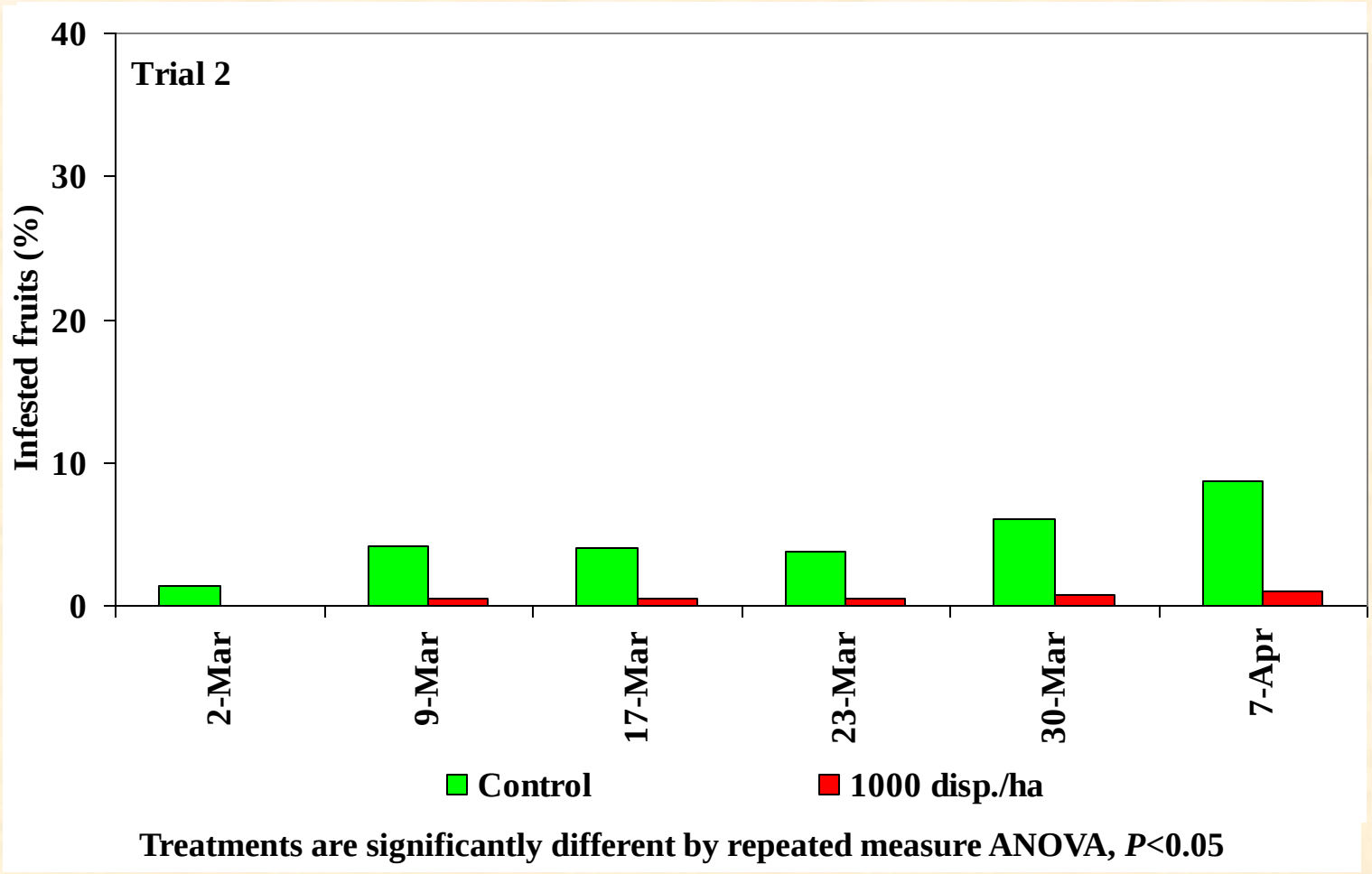
Supplemental material

Fruit damage

Percentage of damaged fruits in the control greenhouse increased steadily during the harvest period

Fruit damage was negligible in the disrupted greenhouse



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Supplemental material

Metric conversion

1000 disp./ha
(60 g a.i./ha) → 100 disp./1000 m^2
(6 g a.i./ 1000 m^2)

500 disp./ha
(30 g a.i./ha) → 50 disp./1000 m^2
(3 g a.i./ 1000 m^2)

Field trials lasted from 120 days (Trial 3 and 4) to 140 days (Trial 2)

The release rate of pheromone dispensers was assessed in both tomato growing seasons. At the end of field trials, 50-60% of the active ingredient was unreleased

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Supplemental material

Physiological mechanisms of mating disruption

Sensory overload

Camouflage

False-plume following

Sensory imbalance