



ECODIAN® CT W: PHEROMONE DIFFUSER FOR MATING DISRUPTION OF *Cydia fagiglandana* AND *Cydia splendana*

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XV European Chestnut Days

Friday 12th September

Natural Park Sierra de Aracena y Picos de Aroche Huelva

Hotel Barceló Aracena



Chestnut tortrix moths: generalities and harmfulness

Chestnut *Cydia* spp. tortrix moths, (*Pammene fasciana*, *Cydia fagiglandana* and *Cydia splendana*) are lepidopterans whose larvae develop on chestnuts and can result in large yield losses at harvest. Damage caused by *C. fagiglandana* and *C. splendana* can be as high as 80%.

COMMON NAME	SPECIES	SYMPTOM AND DAMAGE
Chestnut tortrix moths	<i>Pammene fasciana</i> <i>Cydia fagiglandana</i> <i>Cydia splendana</i>	The larvae feed on the fruit, digging tunnels and causing the still green or ripening urchins to drop off

Pammene fasciana
Early tortrix



Cydia fagiglandana
Intermediate tortrix



Cydia splendana
Late tortrix



Chestnut *Cydia* spp.: flight periods in Italy

SPECIES	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER
<i>Pammene fasciana</i>		←				→		
<i>Cydia fagiglandana</i>			←			→		
<i>Cydia splendana</i>			←			→		

In recent years, in Italy, some critical issues have emerged in chestnut *Cydia* spp. management, mainly due to difficulties in identifying reference species and variations in flight curves reported in the literature, probably also because of the influence of climate change.

Cydia spp. tortrix moths: chestnut's damage



***Cydia splendana* damage:**

- fruit with hole of chestnut lepidopteran larvae;
- chestnuts stored outside: larvae can be seen on the ground surface;
- dissected fruit with the presence of chestnut lepidopteran larvae.

The technique of sexual disorientation

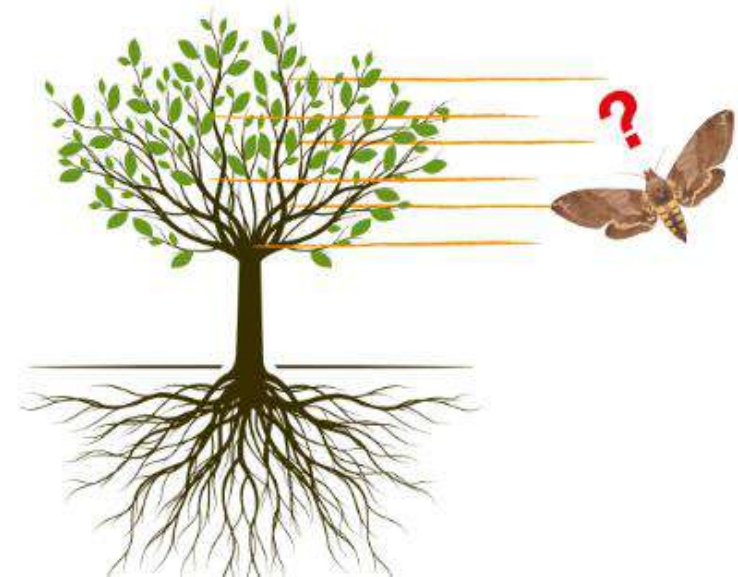
Cydia species control is very difficult because:

- insecticide treatments often prove impractical, ineffective or excessively expensive;
- the method of sexual confusion is not effective because, often, chestnut groves are in hilly areas, with uneven terrain: difficulty in creating a homogeneous cloud.

Therefore, it is not an exaggeration to say that chestnut tortricids are difficult to contain to date.

MATING DISRUPTION: is a technique for integrated control of populations of phytophagous insects harmful to agricultural crops:

- it makes use of specific pheromones that prevent opposite-sex individuals from meeting, interrupting the generational cycle of the target insect;
- this method is an alternative to chemical control;
- it does not disturb other beneficial insects such as pollinators and natural predators.



The technique of sexual disorientation

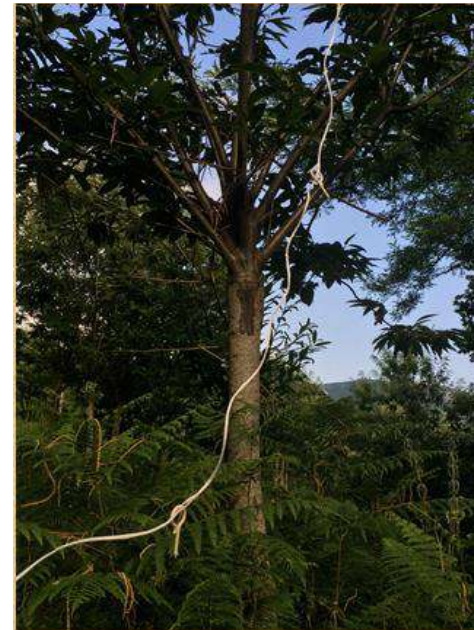
ECODIAN® TECHNOLOGY

Among mating disruption tools, ECODIAN® technology is based on the use of “**sexual disorientation**.” This technique uses a very low amount of pheromone and consists of creating “**false trails**” that the male insect follows in a vain attempt to find the female.

Compared to sexual confusion, with disorientation, slightly higher amounts of pheromone are released than the calls emitted by the females.

CHARACTERISTICS:

- Competitive mechanism;
- Low dosage of pheromone/hectare;
- Multiple emission points;
- Also suitable for small plots (>0.7 ha);
- Can be used in all environmental settings;
- Use of monitoring traps to check the effectiveness of the technique.



Nylon thread with Ecodian dispensers (no. 10 on 6 m of thread) and its subsequent evolution into Ecodian CT (Prof. De Cristofaro, 2014)

ECODIAN® CT W: A SOLUTION FOR THE CONTROL OF CHESTNUT TREE *Cydia* spp.



ECODIAN® CT W is a wire made of compostable and biodegradable plastic material impregnated with pheromone, for sexual disorientation of the main chestnut tortricids:

- Cydia fagiglandana*
- Cydia splendana*



Contents:

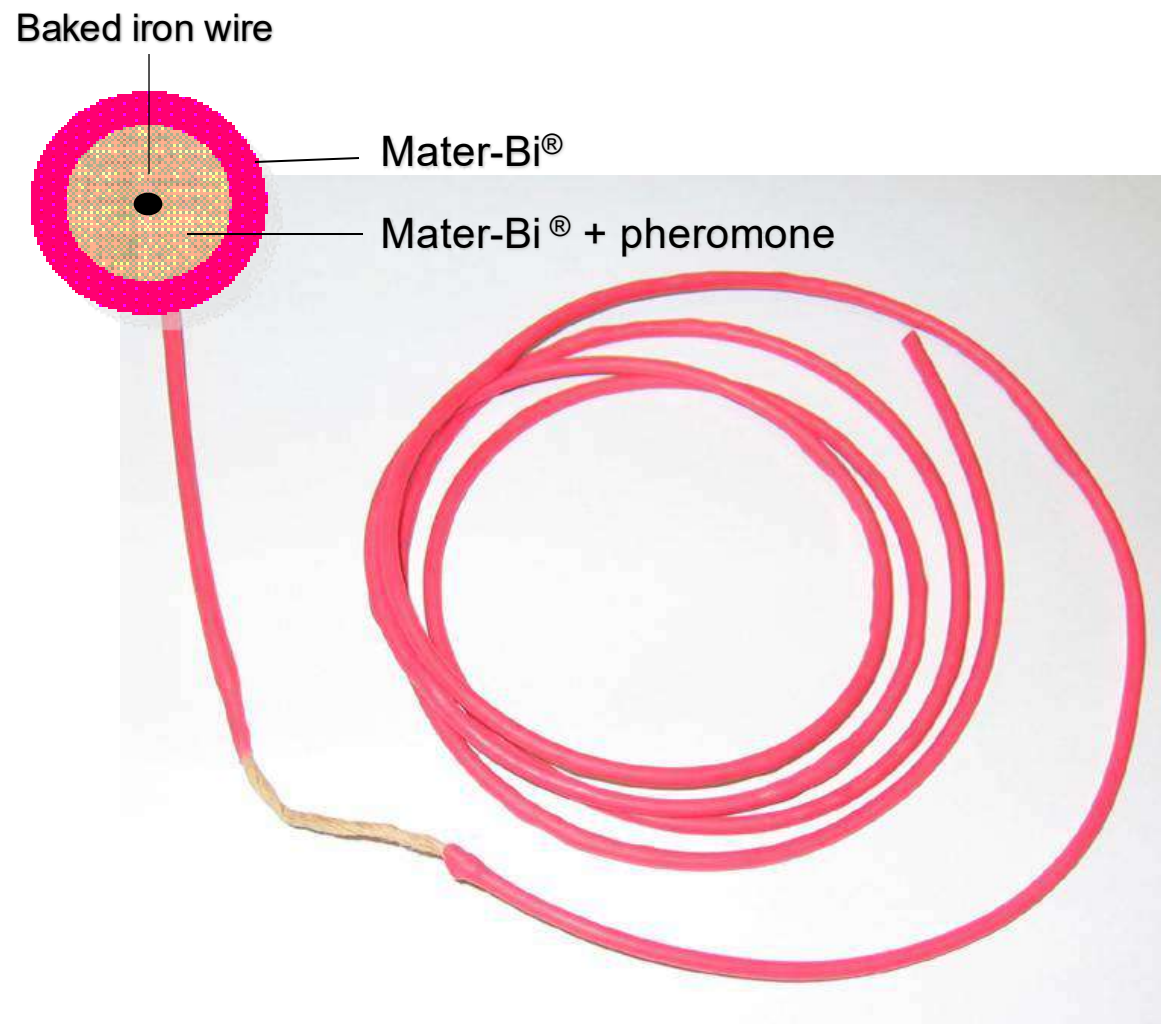
- E8,E10-dodecadienyl acetate 18.75 mg/meter diffuser
- E8,E10-dodecadienol 6.25 mg/meter diffuser

How is made ECODIAN® CT W

Thanks to studies conducted in recent years, ECODIAN® CT W has improved pheromone release over time. In fact, the new product releases the pheromone more evenly and consistently, allowing it to last longer (90-120 days).

The technology is patented.

- ✓ *Flexible*
- ✓ *Resistant*
- ✓ *Durable*



Characteristics

- ❖ Ecodian® CT W comes in 100-meter spools of wire with a diameter of 3mm
- ❖ Ecodian® CT W is applied before the start of *Cydia spp.* flights (late June to mid-July): the use of specific Traptest® monitoring traps is recommended
- ❖ Ecodian® CT W can be used in Organic Farming, leaves no residue and is selective towards beneficial insects.



The importance of monitoring

Monitoring in the field is of paramount importance:

- to know the population density in the chestnut grove;
- for proper placement of ECODIAN® CT W wires.

USEFUL TIPS FOR FIELD ACTIVITY:

- Set the traps before the first flights of the moths;
- Check weekly the catches and replace or clean the glue base;
- Replace the pheromone dispenser monthly;
- Knowledge of adult morphology for recognition.



Monitoring traps

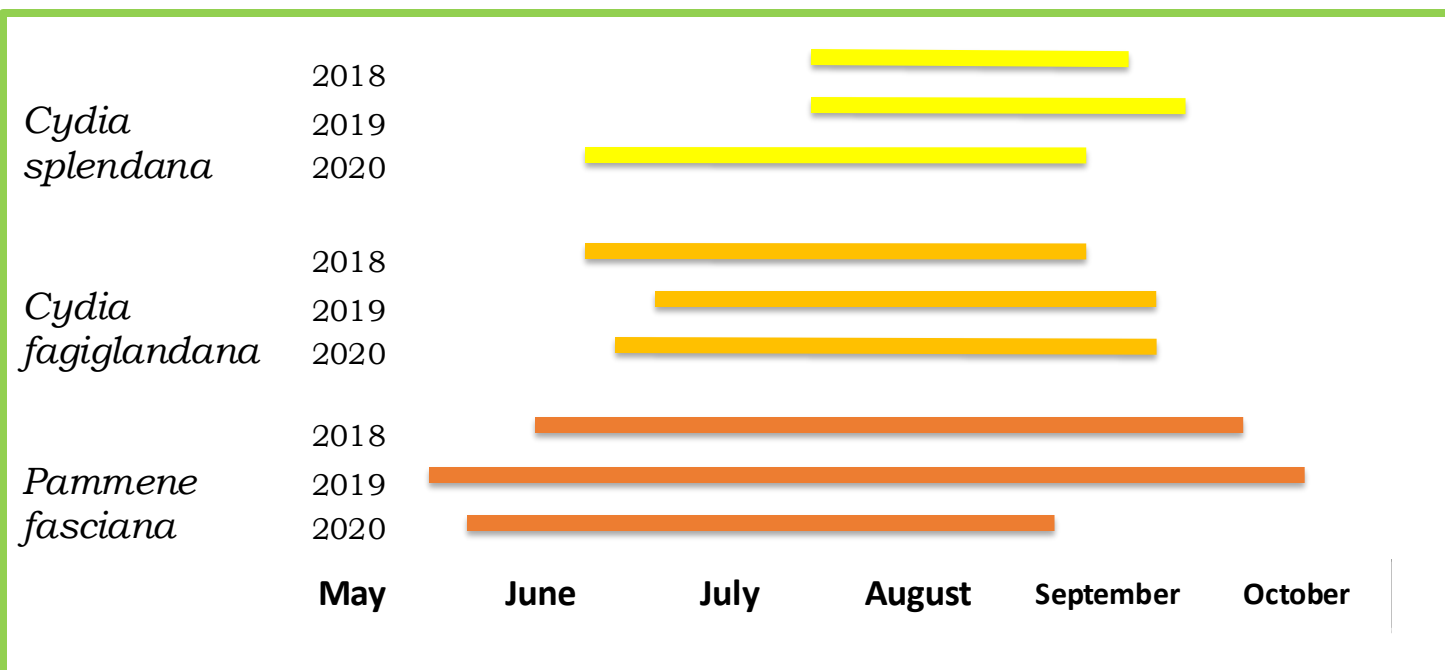
TRAPTEST® ONE

This is an adhesive trap for universal use that, thanks to a special pheromone, is particularly suitable for monitoring small and medium-sized Lepidoptera, such as the three chestnut *Cydia* spp.: ***Pammene fasciana***, ***Cydia fagiglandana*** and ***Cydia splendana***.



The importance of monitoring

Identification and flight curves



Performance of Pheromone-Baited Traps to Monitor the Seasonal Abundance of Tortrix Moths in Chestnut Groves

Insects 2020, 11, 807

Chiara Ferracini, Alberto Alma et al.

Department of Agricultural, Forest and Food Sciences (DISAFA), University of Torino, Largo Paolo Braccini 2, 10095 Grugliasco, Italy;

In the three-year period 2018-2020, ISAGRO-GEA funded the UNIVERSITY of Turin (Prof. Alma; Prof. Ferracini) an experiment carried out in North-Central Italy, with the following objectives:

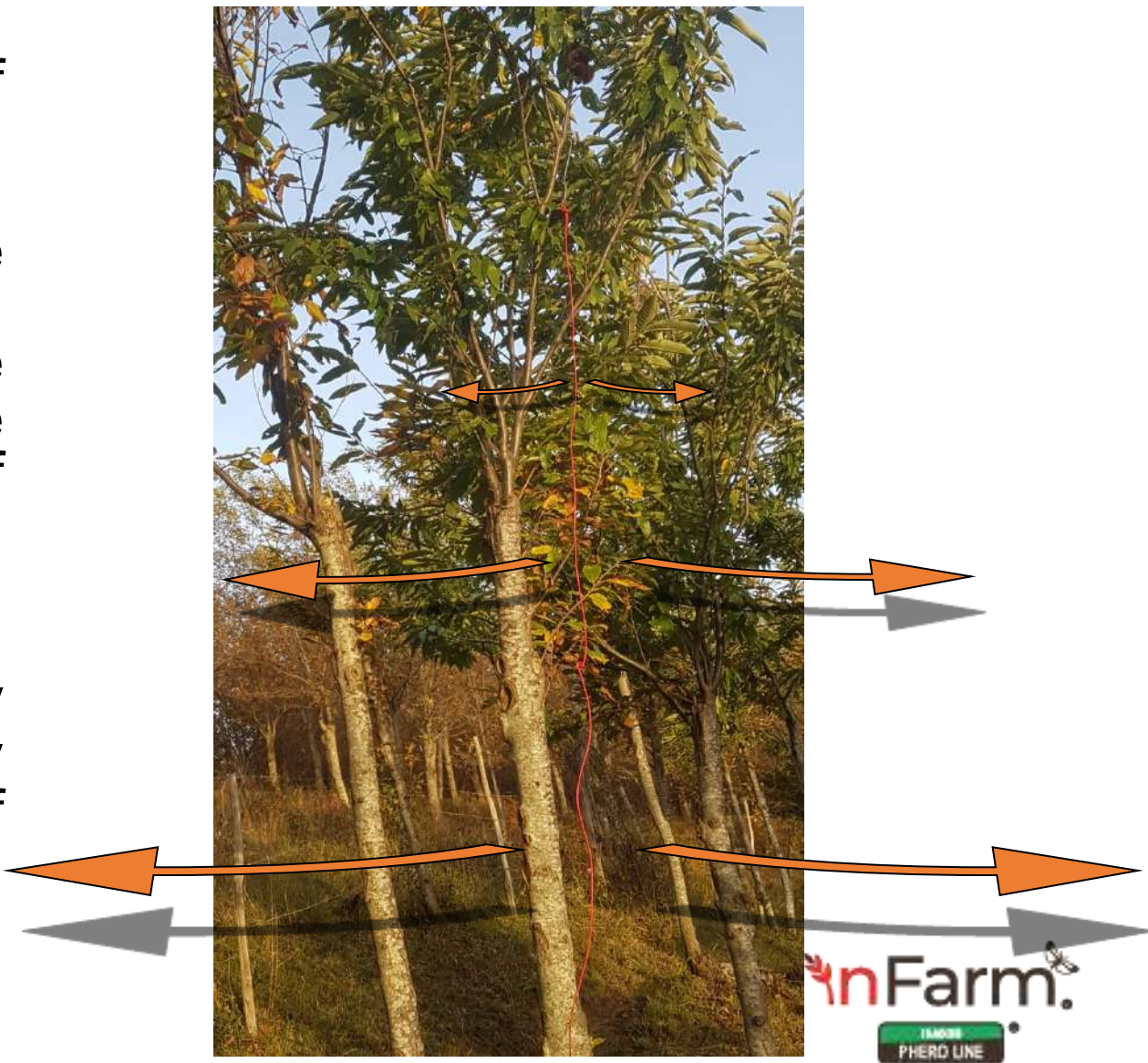
- create a monitoring network to assess the presence and size of *Cydia* spp populations and determine their flight curves
- update knowledge on biology
- assess the effectiveness of sex pheromone traps and improve dispensers
- determine a correlation between catches and damage

How Ecodian® CT W works?

ECODIAN® CT W uses the technique of sexual disorientation.

ECODIAN® CT W releases the pheromone for a period of 90-120 days, preventing the male from recognizing the natural pheromone emitted by the females; thus, the meeting and mating of the two genders is prevented: therefore, the formation of larvae and new adults.

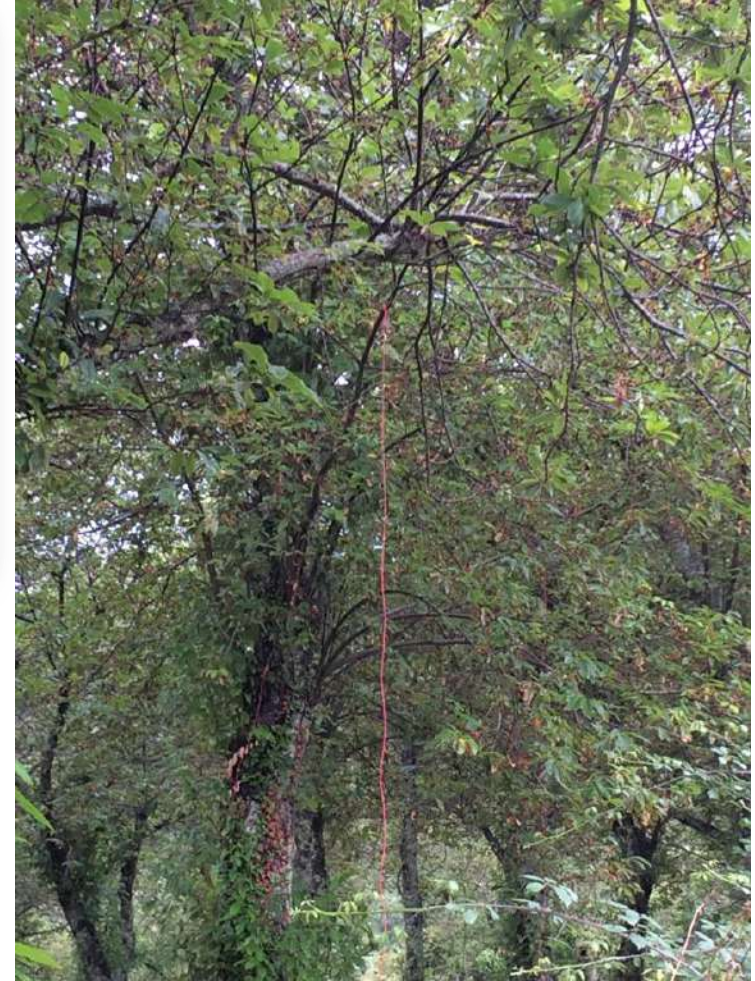
The lifetime of the diffuser is influenced by climatic parameters, particularly temperature, windiness and level of exposure to sunlight.



How to use ECODIAN® CT W in traditional chestnut groves

- ❖ The wire is applied to each individual plant in the chestnut grove via vertical segments.
- ❖ The length can be variable depending on the height of the plants (max. 6 meters).
- ❖ Ecodian® CT W is secured to a hook made of bioplastic material and attached to the plant. Attached to the branches at the intersection of the first limbs, suspended approximately 1.80–2 meters above the ground.
- ❖ The application amounts of Ecodian ® CT W is from 600 to 900 m/ha, depending on the insect pressure and the layout of the chestnut grove (height, area and geometry). Segments should be installed as evenly as possible in the plot with a maximum spacing of 30 meters between wires.

Methods of application



Possible application method in new cultivation systems

Horizontal positioning:

The wire is tied to the first plant in the row, at approximately 1.80 meters in height, and is run along the entire row, secured every 4–5 plants with a simple loop around a branch.

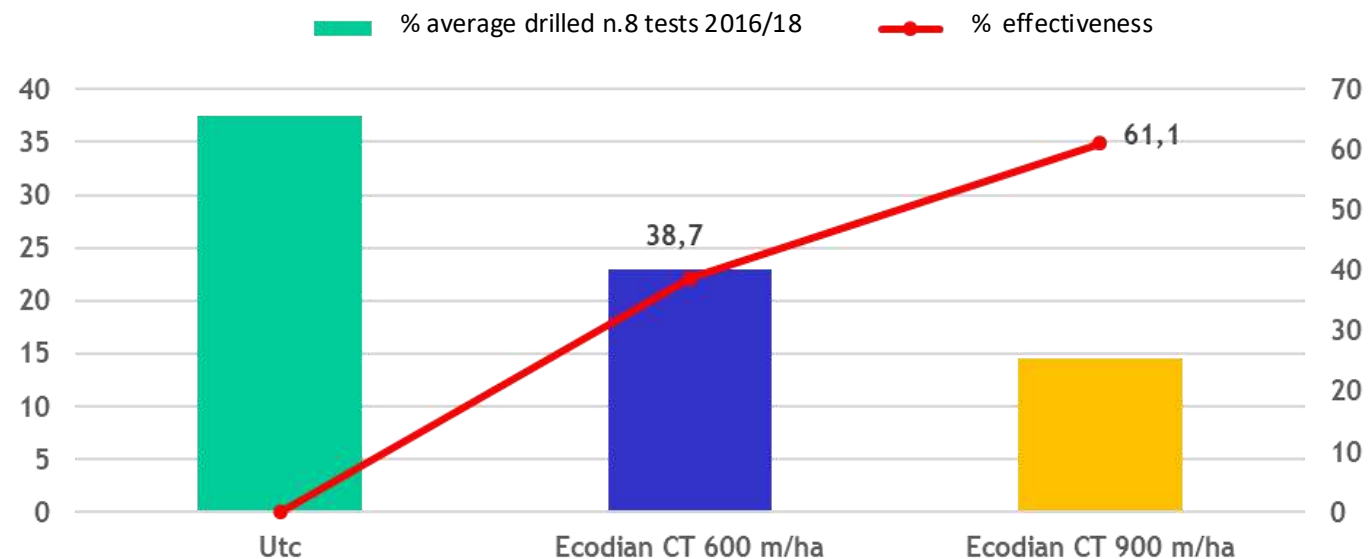


Evidence of effectiveness

Average of 8 recorded evidence 2016/2018

Thesis N°	Product	% wormy fruits media no. 8 evidence	% Effectiveness
1	UTC	37.5	0
2	Ecodian® CT 600 m/ha	23,0	38,7
3	Ecodian® CT 900 m/ha	14,6	61,1

Prove castagno Ecodian CT 2017



Evidence of effectiveness

Evidence University of Turin / Isagro

This research was conducted over a two-year period (2019-2020) in chestnut tree (*Castanea sativa* Miller) groves located at four sites in four regions of northern Italy, namely Emilia Romagna, Liguria, Piedmont, and Tuscany. The population dynamics of *C. fagiglandana* and *C. splendana* were studied using sex pheromone baits (codlemone acetate: (E,E)-8,10-dodecadien-1-yl acetate; codlemone: (E,E)-8,10-dodecadien-1-ol) and sticky traps (Traptest). Sexual disorientation was performed using the Ecodian® CT W dispenser.

Pheromone-Mediated Mating Disruption as Management Option for *Cydia* spp. in Chestnut Orchard

Insects 2021, 12, 905

Chiara Ferracini, Alberto Alma et al.

Department of Agricultural, Forest and Food Sciences (DISAFA), University of Torino, Largo Paolo Braccini 2, 10095 Grugliasco, Italy;



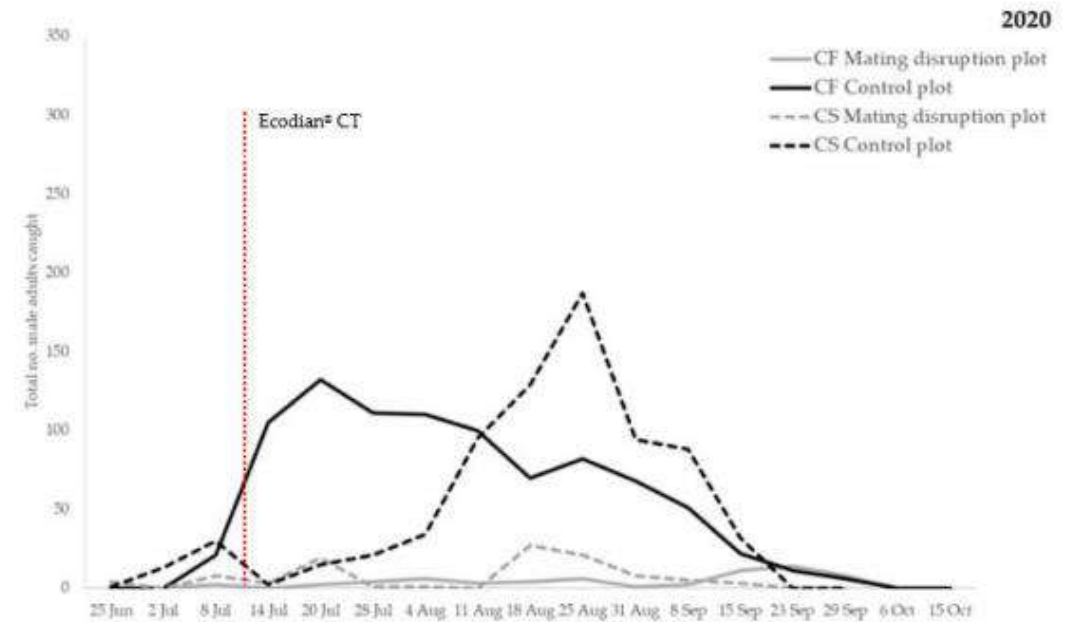
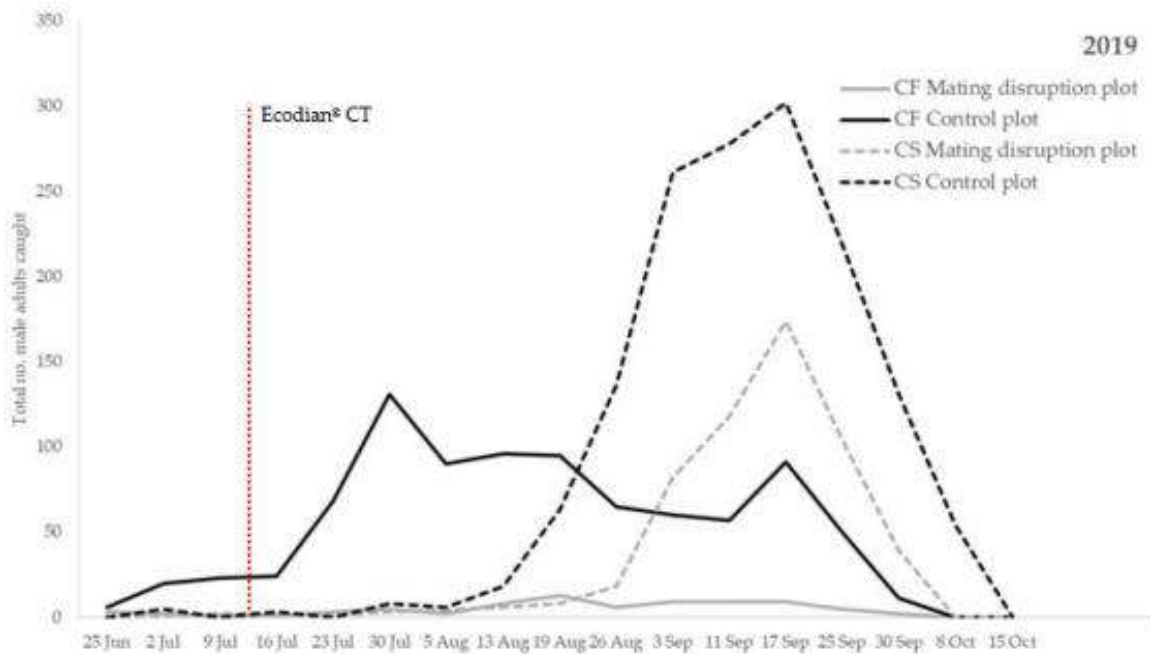


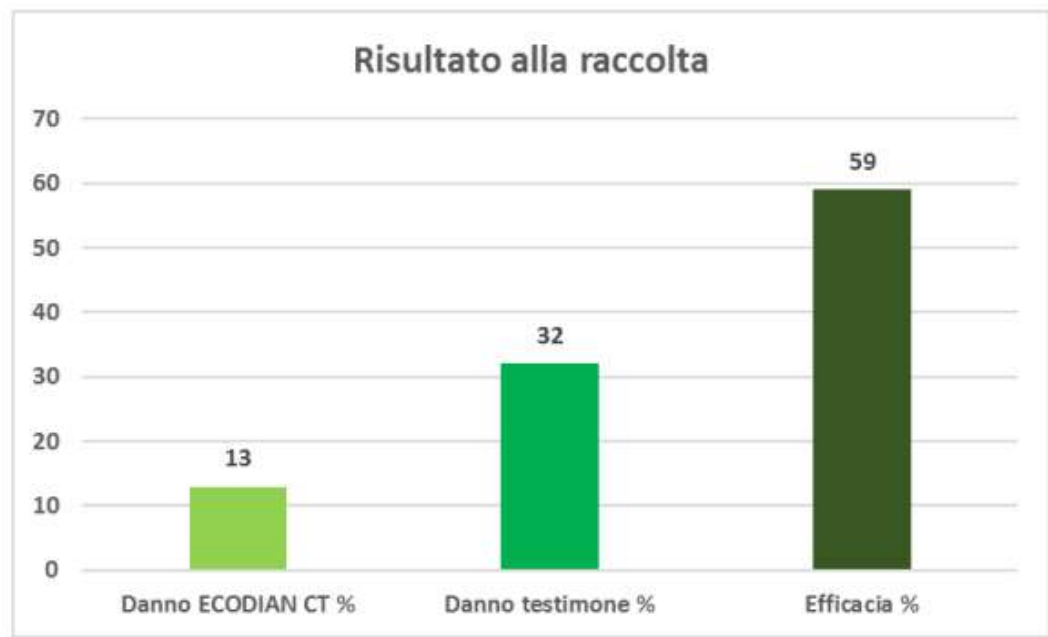
Figure 1 and 2: Total number of male adults per week of *Cydia fagiglandana* (solid line) and *Cydia splendana* (dashed line) collected with pheromone traps at all sites surveyed, in plots where sexual disorientation (MD) was applied (gray lines) compared to control plots (black lines) in 2019 and 2020. The vertical dashed line (red line), corresponds to the application of sexual disorientation of Ecodian® CT W.

Evidence of effectiveness

Evidence of Provincial Phytosanitary Consortium of Modena 2020/2022

Ecodian® CT was installed in July. The plot is 2 ha large and is located in Varana di Serramazzoni (MO). Sufficiently distant from the disoriented area, the 1 ha control area is located to carry out the comparison.

ECODIAN CT (2 ETTARI, DOSE 900 MT/HA)				Testimone (1 ETTARO)			
n° frutti bacati	n° frutti sani	n° frutti controllati	% danno	n°frutti bacati	n° frutti sani	n° frutti controllati	% danno
81	518	599	13	94	200	294	32



ECODIAN® CT W: Conclusions

- Good efficacy, especially when used under ideal conditions (right dose, appropriate time of use, and proper installation), allowing a high reduction in wormy fruits at collection, caused by *Cydia* spp.;
- In traditional chestnut groves, a damage reduction of 50–60% is observed, while in modern ones with horizontal positioning, it can reach up to 90%.
- Does not release persistent microplastics into the environment;
- No toxicity to humans and no residues on chestnuts;
- No interference with the activity of *Torymus sinensis*;
- Can be used in organic farming.
- ECODIAN® CT W is registered in Italy (No. 18450 of 10.06.2024) and Portugal (No. 2286 of 23.10.2024) for use in the field.



ECODIAN® CT W: Future developments

- Field trial assessing the efficacy of horizontal wire placement in modern chestnut cultivation systems.
- Extension of registration in Spain and France.
- Optimization of application techniques, adaptation to different cultivation systems, and evaluation of efficacy under varying environmental conditions.



inFarm Chestnut Line

GEA offers the following chestnut tortrix moth products in its catalogue:



Ecodian® CT W: Pheromone wire diffuser for sexual disorientation of Chestnut *Cydia* spp.

CONTENT: 1 spool with 100 m red-colored wire made of biodegradable material, 20 hooks.



TRAPTEST® ONE: is an adhesive trap consisting of a roof and a glued bottom, joined together with crossed axes; the pheromone dispenser should be placed in the center of the glued bottom.

CONTENT: 1 trap, 3 glued bottoms.



PHEROMON DISPENSER:

Dispenser for *Pammene fasciana*, *Cydia fagiglandana*, *Cydia splendana*. Each bag contains 3 pheromones.

ECODIAN® CT W: Tutorial video



THANKS FOR YOUR ATTENTION!

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