

## **10-4 - Nachhaltiges pest management des Bekreuzten Traubenwicklers durch Pheromonverwirrung: Einsatz bioabbaubarer, elektrogespinnener Mesofaserdispenser mithilfe einer neuartigen Ausbringmethode**

*Sustainable management of the vineyard pest *Lobesia botrana* with pheromones: biodegradable electrospun mesofiber dispensers applied with novel mechanical process*

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Finding, selecting and exhaustively testing suitable biodegradable dispensers for pheromone disruption studies against a variety of insect pests is a major technological challenge. Our recent efforts concentrate on low cost, sustainable, fully biodegradable, electrospun organic mesofibers with a typical diameter range between 0.5 and 3.5 microns and made from renewable starting materials. Such fibers can either be electrospun onto inert carriers like polyethylene netting, as it is commonly used in viticulture for other purposes. Such nets can then be applied manually and discontinuously at the required density in vineyards. Or the fibers can be directly and continuously electrospun onto the growing vines of the vineyard. They also can be incorporated into the holding ropes keeping the vines in place. The dispenser material consists of the biodegradable copolyester resin Ecoflex<sup>®</sup> which can readily incorporate up to 33 weight percent of the major pheromone component of the *Lobesia botrana* (Lep.: Tortricidae) sex pheromone (*E,Z*)-7,9-dodecadienyl acetate. This volatile pheromone is subsequently steadily and constantly evaporated by controlled diffusion from the surface of these Ecoflex<sup>®</sup> fibers over a predetermined time period of several weeks. Their release rate should be tailored to the specific needs of pest insects under consideration.

Using the well established in-field enclosure technique of Doye (2006), mating disruption effects were demonstrated for continuous periods of up to 7 weeks with one single application only. Research toward extending this lifetime is desirable and should completely cover at least one flight period of the target pest. At the end of its intended life time, the fiber material will slowly decompose and completely disappear within half a year, leaving no observable residues in air, soil, or water.

The mesofibers (and likewise the sex pheromones) are free of any toxicity and ecotoxicity to non-target species and will not disrupt anybody's life cycles with the exception of the intended behavioral disruption of mating activities in target pest insects. The environmental testing has been performed and critically checked by an independent government laboratory. The mesofiber application may be combined with other cultivation measures performed within the vineyard on a regular basis and with existing cultivation machinery which needs only minor mechanical modification. Significantly, the time for one extra cultivation step will be saved. In addition, there is no need to recollect the spent fiber dispensers at the end of the growing season because they will, by prior design, fully be degraded by combined environmental influences. Related pest species using similar sex pheromones may also be treated with basically the same technical approach. Mesofibers are a step towards the goal of producing "smart" microdispensers which may occupy a future innovative place in the emerging strategy of precision agri- and viticultural systems. - In summary, this (patented) methodology may be the model for a newly emerging dispenser family. It represents a quantum step beyond the outdated filter paper, cork, or rubber stopper dispensers used in the pioneering phase of commercial mating disruption studies some 45 years ago.

Literatur

E. DOYE, 2006: *Entwicklung eines Freilandtests zur Überprüfung der Wirksamkeit von Pheromonanwendungen im Weinbau*. PhD-Thesis, TU Kaiserslautern, Dept. of Biology. Download at <http://www.wbi-bw.de/pb/Lde/1128194>