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POSTER

HOW VIBRATIONAL SIGNALS CAN GUIDE MATING BEHAVIOUR IN *SCAPHOIDEUS TITANUS*

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The development of sustainable control methods of insects requires detailed knowledge about the biology of the pest and how it communicates with conspecifics. For example when creating a mating disruption strategy to control vibrational communicating species, it is important to understand the mechanisms of the mating behaviour in such pests. We have studied the leafhopper *Scaphoideus titanus*, which is a serious pest of grapevine where it is a vector of the phytoplasma grapevine disease flavescense doreé. In laboratory experiments, males and females were positioned on different plant parts of the same grapevine cutting and the searching behaviour of the male was recorded with laser vibrometry. The communication started with an identification phase in which there was an increased male pulse period and random walking after female reply. Thereafter followed a location phase, in which male calls became shorter, with more regular pulse period and correct directional decisions were recorded towards the female leaf. When a searching male reached the leaf with the female the perceived intensity of female reply increased significantly and a courtship phase was shown until copulation. With these experiments we have shown for the first time that intensity is an important parameter in vibrational communication of plant-dwelling insects. Different phases of mating behaviour are associated with different levels of perceived signal intensity and accordingly, males adjust the emission of vibrational signals and searching behaviour. Consequently, may external interferences result in loss of information necessary either for identification or location and thus preventing mating. It is possible that mating disruption with vibrations has a successful target in the more susceptible behavioural phases of *S. titanus*.

POSTER

DROSOPHILA SUZUKII MATING BEHAVIOUR: SOUNDS AND VIBRATIONS BESIDES VISUAL SIGNALS

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Drosophila suzukii (Matsumura) (Diptera Drosophilidae), the spotted wing drosophila (SWD), is a major pest in many Holartic areas, which is spreading as an invasive species across Europe and North America. Females are able to lay eggs in ripening fruits and seem to prefer these over overripe ones, seriously affecting the production. Long-term and sustainable solutions are required to control the pest spread and damages. In several species of the genus Drosophila a species-specific courtship song has been described. Instead, to date, the mating behaviour of SWD was believed to focus only on visual signals. The aim of this study was to investigate the use of acoustic, in particular substrate-borne, signals by the SWD during the courtship. In laboratory, pairs of flies (one male and one female) were placed into a recording arena, a laser vibrometer recorded the substrate-borne vibrations and simultaneously the behaviour was recorded with camcorder for all the mating process. During courtship the male can produce three specie-specific signals: broadband pulses, associated with dorso-ventral abdominal oscillations, emitted in trains of variable length and irregular repetition rate ("quivering"), a brief sound with harmonic structure ("toot"), often associated to a "pulse" song, which consist of short trains of pulses with specie-specific pulse repetition time. The analysis of the videos showed a tight combination between visual and acoustic/vibrational cues to increase females acceptance. Further studies on the relevance of vibrational signals over the visual ones can enable the development of a specie-specific mating disruption approach, as it has already been done for other insect pests.

POSTER

RADIO FREQUENCY TREATMENT WITH FRUIT IMMERSED IN WATER TO CONTROL POSTHARVEST BROWN ROT IN PEACHES

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Brown rot caused by *Monilinia* spp. is the most important postharvest disease of stone fruit. Currently, chemical fungicides are not allowed in the European Union to be applied to postharvest of stone fruit, which has increased the need to develop new alternatives controls. Radio frequency (RF) treatment at 27.12 MHz was study to control brown rot in peaches and nectarines. From preliminary studies, a RF treatment with 17 mm distance between fruit and upper electrode and 18 min exposure time was selected as effective treatment to control brown rot without affecting fruit quality. Then, these conditions were used to evaluate the effectiveness of RF treatment to control *M. fructicola* inoculated 0, 24 and 48 h before treatment, at different inoculum concentrations (103, 104 and 105 conidia mL^{-1}) and in different fruit size. Brown rot reduction ranged from 44 to 82 % and 63 to 100 % in 'Summer Rich' and 'Placido peaches, respectively. RF efficacy generally was not affected by infection time. Brown rot incidence was significantly reduced in 'Summer Rich' peaches at all inoculum concentrations evaluated, whereas in 'Placido' peaches, RF treatment was only effective when fruit were inoculated at 103 conidia mL^{-1}. The RF treatment was also studied in naturally infected fruit where *Monilinia* spp. development was completely inhibited in both, 'Summer Rich' and 'Placido' peaches. Although high disease control was achieved, RF effectiveness was affected by fruit size and no brown rot control was observed in nectarine. In order to address these problems, RF treatment with fruit immersed in water was studied. The application of RF treatment in fruit immersed in water at 20 ºC for 9 min significantly reduced brown rot incidence in both, peaches and nectarines and no significant differences in RF efficacy were observed depending fruit size. Moreover, the decrease in treatment time with increasing water temperature was also evaluated. Reduction of treatment time to 6 and 4.5 min was achieved increasing water temperature at 35 and 40 ºC, respectively, to control brown rot without impair fruit quality in both, peaches and nectarines. In conclusion, these results indicated that RF heating with fruit immersed in water may provide a potential postharvest alternative treatment for brown rot control in peaches and nectarines.

POSTER

USE OF ELECTROLYZED WATER TO IMPROVE FRUIT QUALITY OF SOME *CITRUS* SPECIES

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To reduce *Citrus* fruit losses and enhance fruit quality is important to implement strategies for preventing microbial contamination both during the pre-harvest and post-harvest phases. Few chemicals are left available in post-harvest application and can only be used in small amounts or under restrictive conditions; moreover the current production trend is aimed at intensifying the use of integrated strategies to protect the environment and to minimize potential damages resulting from the use of pesticides. A very promising alternative to chemicals application in post-harvest is the use of Electrolyzed water (EW). EW is obtained either by adding KCl to tap water or by reverse osmosis in a container with a separating polyester membrane. It has good antioxidant and antimicrobial effects, therefore it can represent an alternative technology for the preservation of agro-food quality and an effective surface sanitizer of post-harvest pathogens. In this work *Citrus* fruits of sweet oranges (cvs. Valencia late and Navelina) and 'Common' clementine were treated with EW produced on site by equipment Eva System® of Industrie De Nora S.p.A. Italy, in the field or immediately after harvest. In both cases fruits were stored at 4°C±1 for 20 days. At the end of the conservation stage, the shelf life was evaluated by storing the fruits at 23°C for 7 days. During the conservation Colony Forming Units (CFUs), constituted by fungal contaminants (yeasts and filamentous fungi) present on fruit surface were evaluated every 7 days. The results revealed that the EW treatment significantly reduces microbial CFUs both when applied in the field and when used after harvest, congruently with the induction of fruit shelf life. The use of EW provides a very interesting means for improving the quality of fruit production by limiting the use of pesticides due to its effectiveness, low costs and ease of use.

POSTER

SOIL SOLARIZATION FOR A SUSTAINABLE MANAGEMENT OF NEMATODES AND WEEDS IN VEGETABLE CROPS IN SOUTHERN ITALY

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Soil solarization has been known as an effective method for the integrated management of phytoparasitic nematodes and weeds since many years. The interest in this technique has been renewed following the withdrawal of most chemical nematicides and herbicides available on the market. This technique is particularly suitable to vegetable crop systems of Southern Italy, where summer climate is more suitable to raise soil temperatures up to values sufficiently high to cause irreversible damages to nematodes and weed seeds. The effectiveness of repeated soil solarization treatments, as well as of different solarizing materials, on root-knot nematodes, weeds and crop yield was assessed in the greenhouse studies overviewed in this work. Two different trials were carried out in plastic-greenhouse conditions at Metaponto, Southern. In the first experiment solarization was performed for one, two or three consecutive years in a soil infested by the root-knot nematode *Meloidogyne javanica*. In the second experiment, four different solarizing plastic materials, EVA, LDPE, ultrathin coextruded (EVA + LDPE) and corn starch-based biodegradable film, were comparatively evaluated for their solarizing effectiveness. Nonsolarized soil was used as a control in both experiments. In each trial, tomato or melon crop were carried out after the solarization treatment. Crop yield, nematode infestation parameters and weeds were recorded at the end of each crop cycle. Application of soil solarization throughout two or three consecutive years significantly increased crop yield and quality and strongly suppressed nematodes and weeds compared either to non-solarized soil and a single heating treatment. Different plastic films satisfactorily controlled root-knot nematodes and weeds and improved crop yield, with no significant differences among them. In conclusion, these studies confirmed soil solarization as an effective tool for a sustainable and cost-saving management of root-knot nematodes and weeds in greenhouse crop systems of Southern Italy. Use of eco-compatible solarizing plastic films, such as biodegradable and co-extrusive ultra-thin films can furtherly improve the environmental safety of this technique.