

10° ENPI

10º ENCONTRO NACIONAL
DE PROTEÇÃO INTEGRADA

2-3-maio-2014
Auditório IPBeja

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10º Encontro Nacional de Proteção Integrada



10º ENCONTRO NACIONAL DE PROTECÇÃO INTEGRADA

IPB/ESAB
Beja
2 e 3 de maio de 2014

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Preview note:

In order to ensure the continuation of the National Meeting of Integrated Protection, the School of Agriculture from the Polytechnic Institute of Beja organized the 10th edition, intending that it be a meeting of researchers, teachers and students, technicians and farmers to debate the current state of practice of integrated pest management, after five months since the implementation of Law 26/2013 that transposing the sustainable use of pesticides Policy.

The program was organized in two days, with two thematic sessions on the first day and a field visit to farms in the region that practice integrated pest management. The thematic sessions were dedicated to the analysis and discussion of Law 26/2013 transposing the sustainable use of pesticides policy - Production, Food and Environmental Quality (Session I) and the Integrated Protection on priority crops in Alentejo (Session II) .Besides these issues, others were also addressed, namely " The phytosanitary problems of other agricultural and forestry crops " and "Pesticides", in 65 panels exposed and presented in plenary.

This publication includes almost all the summaries of oral communications by invitation and panels.

Topic I
The Law 26/2013 about transposition of the Directive on Sustainable Use of Pesticides

IPM AS A CROP PROTECTION STRATEGY TO THE SUSTAINABLE USE OF PESTICIDES

C2

Maria do Céu Godinho¹

The sustainable use of pesticides as an European thematic, leads to a strong effort to reduce pesticides use of certain a.i. and simultaneously to enhance alternative control methods according to the IPM principles. Health, food safety and environment protection are the major targets. Procedure course on agro-environment state and legislation, namely European Directive 128/2009 improved this scenario with the emphasize of IPM mandatory point, as the crop protection strategy to the future as well as the implementation of the national action plans to improve the sustainable use of pesticides. Knowledge and technology transfer are two key aspects to get a better crop protection which will be de major target of the IPM national meeting.

Keywords: Directive 128/2009, Lei 26/2013, National action plan for the sustainable use of pesticides

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IPM IN PORTUGAL: FROM POLICIES TO PRACTICE

P1

Cristina A. Costa¹, Maria Céu Godinho², J. L. Santos³, António Mexia⁴ e Pedro Amaro⁵

In the last decades, IPM practice has increased in Portugal, as a consequence of agri-environmental policy measures. The total area, the number of involved farmers, the lack of quality in the adopted practices and the public investment, as well as the priority given by the European Union in The Thematic Strategy on the Sustainable Use of Pesticides, justify the need for analysing, in detail, the technical, environmental and economic benefits obtained. The past and present of IPM in Portugal is described, based on national data and on a survey that will be used to define IPM technical profiles and to propose the most suitable environmental indicators for IPM monitoring. The 191 inquiries were applied to vineyards, orchards and vegetable crops. The farmer profile, farm description, reasons for IPM adoption, technical profiles and pesticide use were described. Differences between IPM and conventional farming were found, mostly related to crop protection and soil conservation.

Keywords: environmental indicators, technical profiles, integrated pest management.

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Topic II

**INTEGRATED CROP PROTECTION ON CROPS WITH HIGHER PRIORITY IN
THE ALENTEJO REGION**

ADVANCED TOPICS IN INTEGRATED PEST MANAGEMENT OF OLIVE GROVES

C4

José A. Pereira¹, Sónia A. P. Santos¹, Paula Batista¹ e Albino Bento¹

In integrated pest management (IPM), the control of pests and diseases is based on the understanding of the interactions that take place among the different components of the agroecosystem. In this context, the interactions between the olive tree and their pests and diseases, their natural enemies and the environment are highlighted. It is also based on the establishment of monitoring and forecasting systems, and the use of direct means of control against the target organism. In the present work, we will focus on the latest advances in integrated pest management of olive groves, with special emphasis to the research based on the olive fruit-fly (*Bactrocera oleae* Rossi) and the olive moth (*Prays oleae* Bern.) for pests, and verticillium (*Verticillium dahliae* Kleb.) and anthracnose (*Colletotrichum* sp.) for diseases. Special emphasis will be given to the strategies that promote functional biodiversity, to the interaction between the olive tree and its enemies, and to the use of biological control agents.

Keywords: Biological control, endophytic fungi, food resources, pheromones, volatiles.

This work was funded by the project EXCL/AGR-PRO/0591/2012: Olive crop protection in sustainable production under global climatic changes: linking ecological infrastructures to ecosystem functions.

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EVALUATION OF THE EFFECT ASSOCIATED TO DIFFERENT PRUNING REGIMES ON OLIVE PEST POPULATIONS IN THE ALENTEJO REGION

P9

Joana Alho¹, Miguel Landum¹, António Dias¹ e Fernando Rei¹

The effect of different pruning regimes (mechanical, manual and no pruning) was evaluated in olive moth (*Prays oleae* Bern.), olive fly (*Bactrocera oleae* Gmelin) and olive psyllid (*Euphyllura olivina* Costa) populations, on olive trees in the Monforte region. Monthly, infested flowers, leaves and fruits by these olive pests were accounted in a complete randomized olive pruning assay. At the end of the first research year (2013) a total of 1077 olive moth infested fruits, 1915 olive psyllid infestations and only two olive fly infested fruits were observed. Mechanical pruning (with alternate faces) was associated to the larger percentage of olive moth infested organs (28%), while manual pruning registered the highest percentage of olive psyllid infestation (27%). However, since the infestation values associated to each pest were similar among pruning regimes, no significant differences were observed in the populations of each evaluated pest in function of the accomplished pruning type.

Keywords: Olive orchard, pests, pruning.

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EFFECT OF OLIVE GROVE MANAGEMENT SYSTEM ON ANT COMMUNITIES IN BAIXO ALENTEJO

P10

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A study was carried out to verify the effect of different management system on eight olive groves of Baixo Alentejo in the communities of ants, four of which are organic (two irrigated and two rain-fed groves) and four non-organic (two of low density and two of high density). The sampling of the ants took place between May 2011 and December 2012, using two different sampling methods, beating and pitfall traps. A total of 42864 individuals were captured, 20564 of whom were present in the irrigated organic olive groves, 9618 in the non-irrigated organic olive groves, 8441 in the high density and 4241 in intensive high density. The abundance was comparatively higher in the soil than the canopy, it was verified a gradient when comparing management system according to the following sequence: systems organic irrigated, organic rain-fed, low density and high density grove. Two new species were found, *Strongylognathus caeciliae* Forel, 1897 and *Temnothorax tyndalei* (Forel, 1909) cited for the first time in Portugal, which made the check-list of ants in continental Portugal reach up to 126 species.

Key words: Formicidae, Inventory, *Strongylognathus caeciliae*, *Temnothorax tyndalei*..

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EFFECT OF OLIVE GROVE MANAGEMENT SYSTEM IN OLIVE OIL QUALITY

P11

Natividade Costa¹, Manuel Patanita¹, João Canada² e Maria Isabel Patanita¹

The introduction of irrigation in olive grove led to the adjustment of several technical options, with particular emphasis on the choice of cultivar, planting density, fertilization and crop protection. It is therefore important to ascertain the effect of this management changes on the quality of the olive oil produced. Fruit samples were taken from different olive groves, including hedgerow irrigated system (cv. 'Arbequina'), intensive irrigated (cv. 'Cobrançosa') and traditional organic rainfed (cv. 'Galega'), located respectively in the municipalities of Serpa, Moura and Beja. The results indicated that the olive oil could be classified in the category of "extra virgin olive oil". The content of total polyphenols, chlorophyll and carotenoids were mainly influenced by the cultivar and by the olive maturation extent. The olive oil from the cv. 'Arbequina' showed acidity, peroxide and absorbance values lower than the olive oil extracted from the cultivars 'Galega' and 'Cobrançosa'. On the other hand, the olive oil from cv. 'Cobrançosa' showed the highest content in total polyphenols, chlorophyll and carotenoids.

Key-words: olive, oil, cultivar, *Olea europaea* L., quality..

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PREDICTION OF THE ACTIVITY OF THE OLIVE FLY THROUGH CUMULATIVE DEGREE-DAYS FOR CASTELO BRANCO REGION

P12

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The Castelo Branco zone, in Beira Interior region, is an important national olive production area. Olive groves are traditional and 'Galega Vulgar' is the dominant cultivar. The summer is hot and dry, favourable to the development of olive-fly, *Bactrocera oleae* (Rossi), as well as other olive pests and diseases, often responsible for large losses. The objective of this study was to forecast the evolution of olive-fly population along the olive phenological cycle, in Castelo Branco region, through the accumulation of effective temperatures, in order to correctly position the required phytosanitary treatments. Modelling was performed for the period 2010-2012 using sums of effective temperature, with 8,99°C and 30,00°C as the low and high temperature thresholds, respectively. The statistical models relating the values of accumulated relative catches and accumulated effective temperatures presented a high goodness of fit.

Keywords: *Bactrocera oleae*, degree-days, effective temperatures.

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PREDATION OF THE OLIVE FRUIT-FLY BY *CALATHUS GRANATENSIS* (COLEOPTERA: CARABIDAE)

P13

Ana M. Dinis¹, José A. Pereira¹ e Sónia A. P. Santos¹

The olive fruit-fly (*Bactrocera oleae* Rossi) is an important pest of the olive tree that presents during the pupae phase, a major exposure to predation by edaphic arthropods. The goal of this work was to evaluate the consumption of olive fruit-fly pupae when offered isolated or in association with the Mediterranean fruit-fly (*Ceratitis capitata* Widemann) pupae to a species of edaphic carabid abundant in olive groves, *Calathus granatensis* Vuillefroy. Consumption and food preference assays were made in controlled laboratory conditions. Each *C. granatensis* was placed in a box with soil, and also with a Petri dish filled with sand and with 10 pupae buried about 0.5 cm deep. The consumption of pupae was recorded every 48 hours. The results show differential consumption of the two species of fly and a food preference for olive fruit-fly pupae. These data indicate that *C. granatensis* may be a potential predator of the olive fruit-fly.

Keywords: *Bactrocera oleae*, *Calathus granatensis*, Carabid, Predator, Food preference.

This work was funded by the project EXCL/AGR-PRO/0591/2012: Olive crop protection in sustainable production under global climatic changes: linking ecological infrastructures to ecosystem functions..

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BIODIVERSITY OF CARABIDS ACROSS AN INCREASING GRADIENT OF AGRICULTURAL PRACTICES IN OLIVE GROVES IN ALENTEJO

P14

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Cláudia Gonçalves³, Maria Isabel Patanita³ e Sónia A. P. Santos¹

Carabids, due to their diversity and function in agroecosystems, can be used as biological indicators for evaluating quality and sustainability of olive groves. The aim of this work was to study diversity patterns of the community along a gradient of agricultural practices in olive groves from Alentejo. In 2011, carabids were collected in eight groves, four organic groves (two irrigated and two rain-fed groves) and four non-organic (two low density and two high density groves). Sampling took place in May, June, September and November and 16 pitfalls were placed in each olive grove. A total of 1031 specimens belonging to 56 species were captured. The dominant species were *Pterostichus ebenus* (Quensel) (683), *Carabus rugosus* (Germar) (81) and *Bembidion lampros* (Herbst) (30). The results showed that organic groves reached higher abundances and richness of carabids than intensive and hedgerow olive groves.

Keywords: Abundance, carabids, organic groves, *Pterostichus ebenus*, species richness

This work was funded by the project PTDC/AGR-PRO/111123/2009: The use of biological indicators as tools for assessing the impact of agricultural practices in sustainability of olive grove.

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ENDOPHYTIC FUNGI DETECTED IN OLIVE LEAVES INFECTED WITH PEACOCK DISEASE

P16

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António Dias¹ e Maria do Rosário Félix¹

Endophytic fungi inhabiting naturally in plant tissues are gaining attention as a subject for research and applications in Plant Pathology. However, little is known about the endophytes presence in olive tree tissues. In this work, a first approach was done to relate the presence of endophytes and the pathogenic fungus *Spilocaea oleagina* (Castagne) Hughes, the causal agent of peacock disease. For that, in Spring and Summer of 2013, leaves of three olive cultivars, Cobrançosa, Picual and Galega, obtained from 4 different orchards in different regions of Alentejo and showing typical peacock lesions were collected and the total DNA extracted. A PCR was performed using ITS universal primers (internal transcribed spacer) (and the amplified fragments were cloned. Ten clones from each cultivar were sequenced and analyzed. A 'BLAST n' search allowed the identification of fungi belonging to the families Botryosphaeriaceae, Dothioraceae, Leptosphaeriaceae, Mycosphaerellaceae, Phaeosphaeriaceae, Pleosporaceae, Sclerotiniaceae and Venturiaceae.

Keywords: Endophytic fungi; Peacock disease; olive leaves.

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POLLEN SOURCES OF *EPISYRPHUS BALTEATUS* (DE GEER) IN OLIVE ORCHARD AND SURROUNDING LANDSCAPE DURING AUTUMN PERIOD

P17

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António Mexia³, Albino Bento¹ e José A. Pereira¹

Pollen and nectar are food sources for adult syrphids, potential predators of important olive tree pests. The existence of non-crop plants may favor the maintenance of syrphids in the agroecosystem. Thus, in this work, the different plants that can represent sources of pollen to *Episyrphus balteatus* (De Geer), an abundant species in olive groves, were studied. In autumn (2012 and 2013), adult syrphids were collected from 45 delta traps, used to monitor *Prays oleae* (Bernard) and placed in nine plots (three of olive grove, three herbaceous and three scrublands) located in Mirandela region. The gut contents of *E. balteatus* specimens were analyzed and pollen grains were identified. Pollen composition was compared with the abundance of flowering plants observed in the nine plots studied and registered during the same period. *E. balteatus* showed a great degree of selection of the ingested pollen grains. The most abundant pollen types consumed by this syrphid species belonged to Asteraceae, Ranunculaceae, *Daphne gnidium* type and *Arbutus unedo*.

KEY-WORDS: Autumn, Biological control, *Episyrphus balteatus* (De Geer), olive grove, pollen resources.

Work funded by the project EXCL/AGR-PRO/0591/2012: Olive crop protection in sustainable production under global climatic changes: linking ecological infrastructures to ecosystem functions..

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PATHOGENICITY OF *Beauveria bassiana* ISOLATES ON *Ceratitis capitata*, *Rhagoletis cerasi* AND *Bactrocera oleae*

P18

Valentim Coelho^{1, 2}, António Mexia², Albino Bento¹ e José A. Pereira¹

The use of entomopathogenic fungi as biological control agents is an alternative to chemical control against important pests. The aim of this study was to compare the pathogenicity of four *Beauveria bassiana* isolates on *Ceratitis capitata*, *Bactrocera oleae* and *Rhagoletis cerasi* pupae under laboratory conditions. For each isolate, five concentrations of spores were prepared and 100 µL were sprinkled over 10 pupae placed in plastic cages with sand; Tween 80 was used as control. Five replicates were used for each concentration and isolate and maintained under controlled conditions until adult emergence. LC₅₀ varied from 5.91×10⁴ conidia/mL for the most virulent isolate till 4.2×10¹³ conidia/mL for the least virulent isolate. The results show that some of the isolates tested can have great potential in biological control against *C. capitata* and *B. oleae*.

Keywords: *Bactrocera oleae*, *Beauveria bassiana*, *Ceratitis capitata*, *Rhagoletis cerasi*, Pathogenicity.

Work funded by the project EXCL/AGR-PRO/0591/2012: Olive crop protection in sustainable production under global climatic changes: linking ecological infrastructures to ecosystem functions..

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ASSESSMENT OF PESTICIDE RESIDUES IN "OLIVE TABLE" IN TERCEIRA ISLAND, AZORES

P19

Carla M. G. Meneses¹, David J. H. Lopes¹ e Maria Manuela B. Correia²

The olive fly (*B. oleae*) is the primarily responsible for the majority of losses in production of olive growers of Terceira Island. Because of that, many of the olive growers have the trend to overuse the pesticides to try to reduce the damages in the olive. This overuse in its turn can cause the presence of chemical wastes in the final olive production. Therefore, this study aimed to evaluate the presence of pesticide residues in olives. This study was conducted in 3 olive orchards in Porto Martins, Terceira Island. The obtained results of the determination of dimethoate in olive pulp after harvest, showed high levels of waste. However the pulp of olives analysed after the brine did not show any kind of chemical waste. Thus the acquired results clearly show the need of producers engage in the principles of integrated crop protection in the Oliveira.

Keywords: Brine, Maximum Residue Limit (MRL), Olive.

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OLIVE FLY MONITORING (*Bactrocera oleae* GMELIN), IN OLIVE ORCHARDS OF PORTO MARTINS, TERCEIRA ISLAND, AZORES

P20

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The olive fly is one of the main pests of the olive tree in Portugal and was considered one of the main enemies of the olive culture in Terceira Island. For effective protection against this pest, a daily basis follow-up is needed to apply the principles of integrated protection and investing in risk estimation. The present study aims to monitor the population levels of the olive fly along a campaign in 7 olive orchards in Porto Martins. The results show that the larger population abundance of adults of *B. oleae* were recorded between August and October. Regarding the impact of olive fly in the fruits, the comparison between treated and untreated plots, the feasible production obtained in the untreated orchard was very low, with 90 % of damaged fruit. It is concluded that the control of *B. oleae* is essential to obtain a good production in terms of quantity and quality.

Keywords: Control, Integrated protection, Olive damages, Oliveira.

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INTEGRATED PEST OF VINEYARDS AND SUSTAINABLE VITICULTURE: THE ECOVITIS PROJECT

C6

Laura Torres¹

During the last few years, viticulture is being subjected to fresh socioeconomic pressure, in particular following the globalization of trade and the taking into account of the sustainable development concept. The protection of plants is particularly affected by this development, which presses towards reducing the use of pesticides. In this context the practice of integrated pest management is of utmost importance, namely with regard to the increment of the natural control of pest populations. In the present communication we analyze the possibilities of increasing this ecosystem service, based on the experience acquired during the implementation of the project "EcoVitis: Maximizing ecosystem services in vineyards" underway in the Douro Demarcated Region, under a partnership involving the Companhia Geral da Agricultura das Vinhas do Alto Douro, S.A. (acting as promoter), the University of Trás-os-Montes and Alto Douro, the Association for the Development of Viticulture from Douro and Sogevinus Quintas S.A.

Key-words: indirect plant protection, conservation biological control, ecological infra-structures, functional agrobiodiversity

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EVALUATING THE INFLUENCE OF WATER REGIME IN DOURO DEMARCATED REGION VINEYARD

P21

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In integrated production vineyards, the water used in irrigation is a major factor for its sustainability. Beyond its influence on grape water content, that affects vineyard growing and grape quality parameters, nowadays it is imperative to rationalize the use of water resources. The object of this study was to evaluate the influence of water regime in a vineyard, with Touriga Nacional, located in the Douro Demarcated Region, at Quinta dos Aciprestes, Foz do Tua. Based on the SIMDualKc model, the leaf and stem water potential were used to assess the water regime. The SIMDualKc simulations showed that the different irrigation options adopted in Douro vineyards did not have a significant impact on the available total soil water reserve. The climatic conditions and the soil water available have influenced in a direct way the evolution of leaf and stem water potentials patterns.

Keywords - Water, Leaf water potencial, Leaf water stem, SIMDualKc model

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EFFECT OF IRRIGATION ON YIELD AND QUALITY OF 'ARAGONEZ' GRAPEVINES (*Vitis vinifera* L.) UNDER DIFFERENT SOIL COVER MANAGEMENT CONDITIONS

P22

Alexandra Tomaz¹, José M. C. Martinez² e Carlos A. Pacheco³

In Mediterranean-type climates, increased irrigation efficiency is a key goal for viticulture, as it is for fruit production in general. The objective of the present study was to determine the responses of productivity, fruit quality, and wine quality to various degrees of irrigation supply and different soil coverage conditions in a vineyard. Data were collected during two years (2007 and 2008) from 'Aragonez' grapevines (*Vitis vinifera* L. syn. 'Tempranillo'). The experimental site was located in a private vineyard in the Baixo Alentejo, southern Portugal. The vineyard – with a root system that reaches about 3.00 m in depth – is grown on vertisols, with drip irrigation. In the 4 ha area under study, a cover crop between the rows was grown in half the plots, with the natural vegetation maintained in the other half. The irrigation treatments were: high water comfort; moderate water comfort; deficit irrigation; ultra-deficit irrigation; rainfed. The irrigation contribution to production depends on the intra-annual distribution of rainfall and its effectiveness in humidifying the soil volume that contributes to the vine's water uptake. Vegetative growth and yield were lower in the presence of cover crop. The best performance for the phenolic compounds was obtained in plants growing on plots with cover crop and when deficit irrigation was successfully applied.

Keywords: 'Aragonez'; irrigation; intercrop; rainfed; vertisols.

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COMPARISON OF TWO FORMULATIONS OF THE SEX PHEROMONE IN MONITORING THE FLIGHT OF *PLANOCOCCUS FICUS* AND ITS PARASITOID *Anagyrus* SP. NEAR. *pseudococci*

P25

Fátima Gonçalves¹, José Carlos Franco², Cristina Carlos^{1,3}, Susana Sousa¹ e Laura Torres¹

The vine mealybug, *Planococcus ficus* (Signoret), has gained increasing importance in vineyards of the Douro Demarcated Region. This study, conducted in 2013, aimed to compare two formulations of sex pheromone (a commercially available in Portugal (FC), and another from Israel (FI)), in monitoring the flight of adults, as well as of the parasitoid *Anagyrus* sp. near *pseudococci* (Girault), taking advantage of its kairomonal response to pheromone. The first captures of the parasitoid and of *P. ficus* were observed on 18 April and 16 May respectively. The pattern of the flight curve of both species was similar between formulations. However, the number of captures per trap was higher in FC compared to FI, with statistically significant differences in the case of *P. ficus* (1064.25 ± 71.97 in FC vs 620.25 ± 99.95 in FI), but not in the case of the parasitoid (119.25 ± 32.81 in FC vs 89.25 ± 14.60 in FI).

Key-words: *Anagyrus* sp. near *pseudococci*, pheromone, *Planococcus ficus*, vine mealybug, vineyard.

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CONTRIBUTION FOR THE STUDY OF THE BIOECOLOGY OF THE LEAFHOPPER, *Scaphoideus titanus* BALL, N IN DOURO DEMARCATED REGION

P26

Fátima Gonçalves¹, Cristina Carlos^{1,2}, Branca Teixeira², Susana Sousa¹ e Laura Torres¹

In order to contribute to the knowledge of the life cycle and the natural mortality factors of *Scaphoideus titanus*, a study was carried in July of 2013 in two vineyards of the Baixo Corgo Region. Sampled insects were observed under a stereomicroscope to record the developmental stages and the mortality and were kept in the laboratory until the emergence of *S. titanus* adult and/or parasitoids. From the 173 individuals collected, 12.7% were adults and 87.3% were nymphs of various instars. Although in the initial population of adults, there were a predominance of males (94.1%), suggesting that they emerge before the females, the sex ratio of the sample collected showed a slight predominance of females (1:0.87). The mortality rate in the field was 6.9% and of these, 41.7% showed signs of predation. An individual of *Dictyna* sp. (Aranea) was observed to prey on a nymph. No parasitoid was observed in the sample collected.

Key-words: *Dictyna* sp., life cycle, natural mortality, sex ratio, vineyard.

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MITE FAUNA OF VINEYARDS AND WEEDS IN SETÚBAL REGION

P28

Paula T. Santos¹ e Maria dos Anjos Ferreira²

During 2004 acarological surveys were carried out monthly on two vineyards and weeds in Setúbal region, in order to study species diversity and population interaction. Twelve mite species were identified on vineyards, *Calepitrimerus vitis* (Nalepa) and *Tetranychus urticae* Koch being the most important, mainly the grape leaf rust mite. The most common predacious mites were *Homeopronematus anconai* (Baker), associated to eriophyids, and phytoseiids, especially *Typhlodromus pyri* Scheuten and *Typhlodromus phialatus* Athias-Henriot. From the 167 weed species identified, 115 were host plants of mites with agricultural interest, 32 mite species being identified. Tetranychids and phytoseiids, in particular *T. pyri*, observed on 22 weed species, were the predominant mites. *T. urticae*, phytophagous mite also identified in the culture, was present only on five weed species. From acarological point of view, safeguarding the competition relatively to some vegetal species, ground cover vegetation may be a component of conservation biological control in vineyards.

Keywords: eriophyids, *Homeopronematus anconai*, phytoseiids, tetranychids.

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ARE TRICHOGRAMMA PARASITIDS PROMISING BIOLOGICAL CONTROL AGENTS AGAINST THE GRAPEVINE MOTH IN DOURO DEMARCATED REGION?

P29

Fátima Gonçalves¹, Cristina Carlos^{1,2}, Susana Sousa¹ e Laura Torres¹

In the total of known natural enemies of the European Grapevine Moth, *Lobesia botrana*, there are about 15 species of egg parasitoids from *Trichogramma* genera. The objective of this study, was to evaluate the possibilities offered by these insects to control the pest, in the Douro Demarcated Region. The work was done in 2013, in four farms from the region, during the egg-laying period of the first generation of *L. botrana*, and was held in two phases: a) installation, at the bunch level, of capture devices containing eggs of *Ephestia kuehniella*; b) examination of *L. botrana* eggs in floral clusters, to identify possible parasitism. In neither case were obtained *Trichogramma* parasitoids, a situation that is believed to be related to the high temperatures that occur in the region and the use in vineyards, of fungicides based on sulfur.

Key-words: eggs parasitoids, *Lobesia botrana*, natural control, *Trichogramma*, vineyard.

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APPLICATION OF IBE FUNGICIDES IN VINEYARDS AND POSSIBLE INDUCTION OF RESISTANCE IN *Aspergillus* SPP.: COMPARISON WITH SITUATIONS DESCRIBED IN CEREALS

P31

Ana Aguiar¹, Magali Lago² e Eugénia Pinto²

The identification of *Aspergillus* isolates in humans resistant to azol drugs, in persons that have not been exposed to these drugs, suggests that the resistance may have arisen in environment. To verify if the use of azols in vineyards induce *Aspergillus* resistance to azol drugs, assays were held in 2 viticulture regions (vinhos verdes and douro). It was not observed any decrease of susceptibility to the medical azoles tested throughout the testing period in any of the treated plots. The situation is different from some regions in north Europe where fungicides azols seem to have induce *Aspergillus* resistance.

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SUSTAINABLE MANAGEMENT STRATEGIES FOR *Lolium perenne* RESISTANT TO GLYPHOSATE

P32

João Portugal¹, Isabel M. Calha², F. Gonzalez-Torralva³, R. Roldan³ e R. Deprado³

Glyphosate resistant has been recently reported in olive groves, vineyard and citrics in *Conyza* and *Lolium* species. *Lolium perenne* resistant to glyphosate was identified in Douro vineyards. Resistance management strategies are based on diversification of weed control techniques, but herbicides are still the major tool, providing alternation of MOA are forseeked. This report presents the results of a field trial implemented in one Pinhão vineyard with resistance to glyphosate. The aim of the study was to assess the efficacy of herbicides, (mixtures and sequences) and integration of mowing with glyphosate, as potential sustainable solutions. Mowing was an effective strategy in reducing soil seed bank. Herbicide programs combining glyphosate with either cycloxydim, flazasulfuron or quizalofop-ethyl could be effective alternatives for the control of R *Lolium perenne*. However clethodim, diquat and fluazifop-P-butyl were not effective. Integration of mowing with chemical control may contribute to sustainable weed management in vineyards.

Key words: herbicides, ACCase inhibitors, ALS inhibitors, soil seed bank

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THE RESEARCH IN INTEGRATED PEST MANAGEMENT OF CITRUS IN PORTUGAL

C8

José Carlos Franco¹

The evolution of research activities which have been carried out in Portugal related with integrated pest management of citrus will be analyzed, considering as a temporal landmark the 1st National Meeting on Integrated Pest Management, which took place at the University of Évora in 1991. Some of the actually most relevant subjects on the issue will be identified.

Keywords: research, R&D, IPM, citrus.

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THE PROJECT PRODER *GREEN LEMON*: MATING DISRUPTION TO CONTROL THE CITRUS FLOWER MOTH, *Prays citri* (MILLIÈRE)

P34

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Rui Marçal³, Rosário Antunes² e José Carlos Franco¹

The citrus flower moth (CFM) is a key-pest of lemon orchards in Portugal, completing six to eight generations per year in the Oeste region. The management of CFM is actually based on chemical control, but only two insecticides are registered for minor uses: emamectin benzoate and lambdacialotrine. However, the frequent use of insecticides is not a sustainable practice. Aiming to find new alternative tactics for the control of CFM in IPM strategies, a mating disruption formulation was developed in collaboration with Shin-Etsu and Biosani. The project PRODER “Green Lemon” aims at assessing the implementation of mating disrupting for CFM. With that purpose, this tactic was applied in a total of about 25 ha of experimental plots from growers of Frutoeste, in 2013. Preliminary results on the monitoring of male flight activity of CFM, using pheromone traps, as well as of flower and fruit injury will be presented.

Key words: lemon, pheromones, insect pests, Portugal.

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GEOGRAPHIC ANALYSIS OF THE WILD POPULATIONS OF *Ceratitis capitata* WIEDEMANN IN S. JORGE ISLAND, AZORES

P35

Reinaldo M. S. Pimentel¹, David J. H. Lopes¹ e António Mexia²

The objective of this study is to evaluate the distribution of wild populations of *Ceratitis capitata* Wiedemann and determine whether there is any relationship with the geographical features. This work is framed within the project monitoring work CabMedMac (MAC/3/A163) that is taking place on the island of Sao Jorge in the Azores. The monitoring of wild populations of *C. capitata* was performed using traps like Mcphail type with acetate of ammonium, putrescine, trimethylamine and a pellet of DDVP. According to the results, it appears that there is a strong and significant correlation between the abundance of the captured adults with the geographical characteristics in function of the distance to neighboring places. The results also indicate that females are more aggregative than males, so this will be an important factor when considering a future application of measures to control/limitation of this insect.

Keywords: CabMedMac, *Ceratitis capitata* Wiedemann, Fruit fly, Geographic regression, Mediterranean fruit fly.

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VALIDATION OF TWO FOR INFECTION FORECAST OF PEACH LEAF CURL

P36

Nuno Pinto e João Pedro Luz¹

An Israeli model and an improved Italian model, in Northern Italy, for the forecasting of infection risk of peach leaf curl, were validated in 10 orchards of Beira Interior. Both models determine infection risk, based on daily precipitation exceeding 10 mm and the maximum daily temperature above 5°C, and estimate the periods of symptoms onset. In the year studied, the plants remained susceptible to leaf curl for about 9-10 weeks, starting in mid-February and persisted in some cases until mid-May. The Italian model was effective in forecasting infections, because most of the symptoms observed in the orchards had correspondence with the onset of symptoms forecasted by the model. This model was equally effective in forecasting secondary infections. The Israeli model has not been validated for Beira Interior conditions, because it did not predict the infections that caused symptoms from April onwards and showed a noticeably reduced period of symptoms onset.

Keywords: models; forecasting; risk of infection; *Taphrina deformans*..

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CHARACTERISATION OF PORTUGUESE ISOLATES OF *Erwinia amylovora*

P37

Conceição Amaro¹, João Pedro Luz¹ e Carlos Reis¹

After the detection, in Portugal, of two outbreaks of fire blight (*Erwinia amylovora*) in 2006 and further outbreaks thereafter, it was considered essential to characterise some Portuguese isolates. Forty-four 44 isolates from symptomatic apple and pear plants were characterised. The identification of *E. amylovora* by biochemical and nucleic acid techniques, as indicated by EPPO, is described. Also discussed are the results of pathogenicity tests on pear and loquat. Only 25% of the isolates showed growth halt at 36°C, but this increased to 68% when subjected to 39°C. This finding may show an adaptation of bacteria to our climatic conditions. The physiological, biochemical, and molecular characterisation of Portuguese isolates of *E. amylovora*, in our conditions, may contribute to a better control of fire blight.

Keywords: fire blight; apple trees; pear trees; *Malus domestica*; *Pyrus communis*.

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INTEGRATED WEED MANAGEMENT TODAY AND IN THE FUTURE

C10

João Portugal¹

It is presented an overview of the current issues that are being investigated in Portugal about weed management. It is giving a special emphasis on herbicide resistance, estimation risk and economic threshold of the cultures. It will be, also, discussed the evolution of the weed control methodologies over time, as well a preview of what would be expected in future.

Keywords: Herbology; herbicide resistance; risk estimation; economic thresholds, control methods..

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CULTURE OF TOMATO IN METHOD OF INTEGRATED PRODUCTION IN GREENHOUSE TOMATO

C11

Pedro Mota¹

Cultivation of tomato under protected cultivation is today one of the most studied and disseminated in the world cultures. In Portugal met ideal conditions for its production in greenhouses, especially in the coastal strip. However, their cultural intensification brought increased pressure from disease and pests. In Hortipor since 2001 is introducing the practice of pollinators, as well as biological control using predators and / or parasitoids to maintain the level of economic attack. In 2013 began the start of merídios (*Nesidiocoris tenuis*) in tomato plants still in the seedbed, coming anticipate much its installation in greenhouses, for the usual dropped in situ.

Keywords: Biological Fight, Greenhouse, Parasitoid, Predator, Tomato.

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SUSTAINABLE USE OF PESTICIDES ON PROCESSING-TOMATO CROP: INNOVATION AND TECHNOLOGY TRANSFER TO CONTROL *TOMATO MOTH*

P38

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Processing tomato is a priority crop in the context of the sustainable use of pesticides due to its economic importance and crop enemies which force to regular treatments.. In this situation, it is important to develop technologies based on well-defined rules and incorporation of knowledge and technologies to improve decision-making processes. The “Protomate” - *Desenvolvimento de uma nova ferramenta de apoio à gestão da cultura do tomate para garantia da qualidade do produto final*” aims to contribute to the accomplishment of the central goals involving European commitments. This network allows a constant sharing of knowledge, experience, and results in a timely manner. It is organised by COTHN, ESAS/IPS, ISA/UL, UE, FNOP and Agromais. Additionally, 15 producers' groups with 18 technicians, Sugaldal and Italagro, representing the processing industry, and the company Lusosem, which also participates in this project.

Keywords: processing tomato crop, technology transfer, sustainable use of pesticides.

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SUPPORT TO IPM DECISION MAKING ON TOMATO PROCESSING CROP TO CONTROL *Tuta absoluta*

P39

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Tomato moth, *Tuta absoluta*, is presently an important pest on processing tomato crop in the Ribatejo region. This species was detected in 2010 and caused significant losses in 2011. The goal of this project is to develop decision-making tools to improve crop protection. During 2013, monitoring of the adults with sexual pheromone traps and the incidence on sampled plants, according to the crop age was carried out weekly. Samples of entomological material were analysed in the laboratory to detect parasitism. In addition to this technical monitoring in the field, risk factors have been identified in order to build risk maps for decision-making support. At this stage, were identified some difficulties in controlling this pest related, among other reasons, with structural aspects (e.g. land ownership, alternative hosts in the neighbourhood) and to knowledge gap on the pest bioecology.

Keywords – processing tomato crop, risk assessment, risk maps, South American tomato moth, sustainable use of pesticides.

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***Nesidiocoris tenuis* – A PREDATOR OR A PEST IN TOMATO PROTECTED CROPS IN ORGANIC FARMING SYSTEMS?**

P40

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The mirid *Nesidiocoris tenuis* has been used as a biological control agent, mainly for whiteflies and South American tomato moth control, in protected crops, in Europe, and in particular in the Mediterranean. However, this insect presents phytophagous behaviour and the necrotic rings that it causes often lead to cut the stem and the sequent production losses. To understand this insect's behaviour, its vertical distribution in the plant and the relation with prey populations and with damage on plant were studied in 2011 and 2013, in organic farming tomato greenhouse, in Montijo region. Nymphs and adults preferred apical zone of the plant. The correlation coefficients suggest that nymphs were the more important developmental stage regarding plant damage. Apparently, there were no relation between prey presence and the number of necrotic rings produced on plants or mirid population density.

Keywords: damage, mirid, necrotic rings, vertical distribution, zoophytophagy.

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RELEASE OF COMMERCIAL BENEFICIAL INSECTS IN PROTECTED CROPS IN OESTE REGION –A SURVEY

P41

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The raising concerns about human health and environment preservation have been promoting integrated pest management strategies. According to the Directive 2009/128/CE (Annex III) control methods alternative to chemical protection, and in particular biological control, should be used to control plant enemies. In intensive vegetable production systems, such as protected crops, inundative or inoculative releases with commercial biological control agents (BCA) are often made without previous estimation of the population density of the naturally occurring beneficial arthropods and subsequent evaluation of releasing needs. The probably excessive use of released arthropods can lead to a decrease on biodiversity and affect the natural control/conservation efficacy. In order to obtain information about release history in nurseries and vegetable greenhouses in the Oeste region, the results of an enquiry by questionnaire to nurseries, vegetable production and BCA sellers companies is presented.

Keywords: biological control, biological control agents, biological control releases.

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CONTRIBUTION TO THE KNOWLEDGE OF THE TIGER-FLY AS BIOLOGICAL CONTROL AGENT IN PROTECTED CROPS

P42

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Adults and larvae of the tiger-fly *Coenosia attenuata*, present throughout Portugal and worldwide, are generalist predators of other insect adults in the aerial part of plants and of different organisms in the soil, respectively. For studying this predator, a research project was initiated in 2010. The adults preyed 11 from the 12 potential prey species tested, preferred the pest species over the beneficial arthropods, and their predatory behaviour varied with the prey. In laboratory, tiger-fly preyed non-winged insects, contradicting literature; cannibalism among adults was lower when other prey were present; cannibalism among larvae was not confirmed. The presence of fungus gnats or of earthworm mucous lead to higher oviposition; the larvae could not feed on intact earthworms. It was also observed that tiger-fly adults were more attracted to white surfaces than to yellow, blue, green or red ones. Phylogeographical studies revealed a recent dispersion, being the Mediterranean a possible centre of origin.

Keywords: behaviour, cannibalism, *Coenosia attenuata*, phylogeography, predator

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THRIPS AND THEIR NATURAL ENEMIES IN STRAWBERRY CROP AND NEARBY WEEDS

P43

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Thrips (Thysanoptera) present in the strawberry crop are still poorly known, except for *Frankliniella occidentalis* (Pergande), an important pest in that crop. The presence of thrips and their natural enemies was analyzed in three strawberry fields and in the weeds nearby, during the crop flowering period, in the Oeste region, using the beating technique. *Thrips* sp. were the most abundant, specially *T. angusticeps* Uzel and *T. tabaci* Lindeman. *Aeolothrips* sp. were also abundant. Less represented genus: *Frankliniella* sp., *Anaphothrips* sp., *Ceratohrips* sp., *Chirothrips* sp., *Isoneurothrips* sp., *Limothrips* sp., *Melanthrips* sp., *Neohydatohrips* sp., *Odontohrips* sp, *Tenothrips* sp., and also specimens from Tubulifera suborder. The objective is to contribute to a more efficient crop protection, through the study of crop-weeds interaction in terms of noxious thrips and their natural enemies. In relation to these last ones, a special attention is given to *Aeolothrips* sp. and *Orius* sp. (Heteroptera: Anthocoridae).

Keywords: *Fragaria x ananassa*, IPM, natural vegetation, Thysanoptera.

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SUSCEPTIBILITY OF *Epitrix similaris* TO ENTOMOPATHOGENIC NEMATODES

P44

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The environmental impacts and limited efficacy of insecticides applied in Portugal early in spring to prevent oviposition in the new potato crops by the overwintered adults of *Epitrix similaris* and *Epitrix cucumeris*, can be avoided by alternative novel methods, such as entomopathogenic nematodes. To investigate the possibilities of this approach, the susceptibility of larvae, pre-pupae, pupae and adults of *Epitrix similaris* to commercial formulations of *Steinernema carpocapsae*, *Steinernema feltiae* and *Heterorhabditis bacteriophora* applied at a dosis of 50 IJ/cm² were tested under laboratory conditions. In complement, a higher nematode dosis (300 IJ/cm²) was tested on larvae. Insect mortality varied according to stage, nematode species and dosis. Larvae, pre-pupae and pupae were susceptible to the three nematode species, while adults were only susceptible to *S. carpocapsae*. Overall, the most effective species against the pre-imaginal stages were *S. feltiae* and *H. bacteriophora*.

Keywords: *Epitrix similares*, *Heterorhabditis bacteriophora*, Potato, *Steinernema carpocapsae*, *Steinernema feltiae*.

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BIOLOGICAL CONTROL – CONSERVATION STRATEGIES AND RELEASE MANAGEMENT OF COMMERCIAL BENEFICIAL INSECTS IN PROTECTED CROPS

P45

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The species complexes of parasitoids and predators which control populations of the main pests of vegetable protected crops have been studied in the Oeste region for 25 years. Species richness is high. Some of the identified species are commercialized for biological control releases. These releases can affect populations of the naturally occurring biological control agents, regarding species composition of the complexes, species abundance and representativeness of the genotypes present in the populations. A PRODER - measure 4.1 operation/project promoted by enterprises and R&D institutions is ongoing. The aim of this project is to define decision rules to control pests of protected crops taking into account pest attack severity, beneficial arthropod present and their abundance, and through this to define rules for performing eventually a commercial release of beneficial arthropods and to analyse their consequences. This will lead to the use of more adequate plant protection technologies, strategies, and control measures.

KEYWORDS: biological control releases, biological control risks, functional biodiversity, genetic diversity, natural control

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Topic III

**THE PHYTOSANITAIRE PROBLEM OF OTHER AGRICULTURAL CROP OR
FORESTRY**

ASSESSMENT OF THE INTENSITY OF ATTACK BY FLY HESSE (*Mayetiola destructor* Say) ON WHEAT GROWN AFTER A GREEN MANURE

P46

José A. Ferro Palma¹ e Fernando L. Cid²

The Hessian Fly (*Mayetiola destructor* Say) is a Dipterous which sometimes causes damage in wheat and other cereals, more severe when the infestation occurs soon after emergence. In a study performed in ESA Beja, it was evaluated the intensity of the attack of the fly on a wheat crop held after two green manures (triticale and vetch), buried by distinct processes (plowing, cultivator and unburied). The intensity of the infestation was assessed on a decimal scale of 0 (no damage) to 10 (complete loss of plants). It was noted that the greatest damage was caused soon after emergence, during the tillering of wheat. The wheat grown after the vetch green manure wasn't attacked by the fly; on the wheat grown after the triticale green manure an attack was observed with an intensity of 2,8 which corresponds to a plant mortality rate of 28% . In the plots with triticale green manure the infestation was lower when the green manure was plowed.

Keywords: Hesse Fly, Green Manure, Wheat.

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IMPACT OF *Cosmopolites sordidus* GERMAR (COLEOPTERA: DRYOPHTHORIDAE) ON PRODUCTION OF BANANA (*Musa acuminata* Colla, AAA)

P47

Reinaldo M. S. Pimentel¹, David J. H. Lopes¹ e António Mexia²

The objective of this study is to evaluate the impact of the banana weevil borer on the final weight of the bunch. A random selection of 32 plants in a banana orchard from where an essay of mass capture, as a control/limitation of this pest using 32 pitfall traps with sordidina aggregation pheromone, was already in progress. The results show that the greatest impact of the larval stage of the banana weevil borer in the fruit-filling was from the proximity of the damage to the plant center in cross section. There is a significant logarithmic relationship between the distances of the closest damage to the center of the plant with the final weight of the bunch. According to the GWR analysis results, it appears that there is a high and significant relationship from the final weight of a bunch with the catches in traps registered in the neighborhood in function of distance to these.

Keywords: banana weevil borer, Biomusa, Bunch damages, *Cosmopolites sordidus*, Dwarf cavendish.

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CAPTURING SPOTTED WING DROSOPHILA IN BERRIES USING FOOD TRAPS

P48

Diogo Bruno¹, Elisabete Figueiredo¹ e Maria Céu Godinho²

Several devices and baits are described in literature to attract *Drosophila suzukii*; in some case results are inconsistent. Some of these devices and baits are used by berry producers in Southwest Alentejo, mainly for monitoring purposes. For studying the attractiveness of different traps (devices and baits), three devices (transparent cup, red cup from Biobest, and a device built with water plastic bottles), and four food baits (yeast, white vinegar, food bait from Biobest, and season ripe fruit) were tested in “Herdade da Fataca” and in a commercial producer company, in the municipality of Odemira, from April to August 2013, in mulberry and raspberry crops. Flies were highly captured in the red cup, independently of the bait. Yeast captured more flies than vinegar when temperature was higher and the opposite happened when temperature was lower.

Keywords: bait, chromatic attractiveness, *Drosophila suzukii*, vinegar, yeast.

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IDENTIFICATION OF RISK AREAS FOR DEFOLIATING PESTS

P49

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The plant health of the cork and holm oak forests has worsened progressively, putting at risk the productivity and viability of this characteristic Mediterranean ecosystem. One of the causes associated with this problem is the presence of populations of defoliating pests, which threatens the foliage of the trees, and therefore stops many vital physiological processes such as photosynthesis, respiration and transpiration. The definition of appropriate management strategies of this important phytosanitary problem presupposes a knowledge of the biology of pests, *Lymantria dispar*, *Tortrix viridana* and *Xylosteana archips*, mainly on their population dynamics and its temporal and spatial variability. This work took place from 2011 to 2013 (March-September). 10 settlements (Beja, Canhestros, Boavista - Beja and Vila de Frades) located in different soil and climatic conditions were selected. In each settlement, there was a monitoring system for the main defoliating species, using trap systems of sexual attraction: Delta trap and Funnel. *Lymantria dispar* was captured in all settlements, while *Archips* and *Tortrix* only in some settlements and irregularly. The largest catches were recorded in 2012, in the settlements of the municipality of Odemira.

Key words: *Archips xylosteana*, *Lymantria dispar*, *Tortrix viridana*, Montado.

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CONTRIBUTION TO THE STUDY OF *Pseudomonas syringae* pv. *actinidiae* ON KIWIFRUIT IN THE ENTRE DOURO E MINHO REGION

P50

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Bacterial canker of kiwi caused by *Pseudomonas syringae* pv. *actinidiae* (PSA) is the most serious disease of this crop, causing significant economic losses in several countries. In Portugal the disease was detected in 2010 in the region of Entre Douro e Minho (EDM), currently referenced in several municipalities of the major producing regions of Portugal. Samples of leaves, stems, flower buds and bacterial exudates presenting the symptoms of this disease, and obtained from male and female plants of different cultivars of *Actinidia* spp. (Hayward, Matua, Chieftain ften, Tomuri, Tschelides e Soreli) harvested in kiwifruit orchards located in EDM were analyzed during 2012 and 2013. The isolates were characterized by colony morphology, phenotypic and molecular characteristics, and by pathogenicity tests. The results allowed us to identify the bacteria and know the genetic structure of Portuguese Psa populations studied, by comparing it with the type strain (Japanese) and an Italian strain.

Keywords: bacterial canker; BOX-PCR; haplotype; identification

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CHESTNUT BLIGHT IN THE MINHO REGION. IMPORTANCE OF DISEASE AND STRUCTURE POPULATION OF *Cryphonectria parasitica*

P51

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The chestnut blight disease, caused by the fungus *Cryphonectria parasitica*, infects seriously the chestnut, causing heavy losses. Hypovirulence is a decrease in the virulence of the pathogenic fungus resulting from a hypovirus infection of the fungus. The spread of the hypovirus is directly related to the number of vegetative compatibility groups (VCG) present in the fungal population. In order to determine the structure population of *Cryphonectria parasitica* in the Minho region, two populations located in Felgueiras and Vila Verde were studied. The vast majority of isolates obtained is compatible with the VCG EU- 11. The EU- 66 VCG shows little representation. Additionally four GCV, different of the previous, were detected. Of the isolates, 22 were hypovirulent strains. Considering the diversity of GCV found in the populations studied, we discuss the possibility of using biological control through the application in the field of compatible hypovirulent strains.

Keywords: canker, *Cryphonectria parasitica*, chestnut, hypovirulence.

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AlertCast: ADVICE NETWORKS ABOUT THE DISEASES AND PESTS INCIDENCE ON CHESTNUT TREES

P52

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Paula Oliveira¹, Paula S. Arnaldo¹ e Teresa Pinto¹

The chestnut is affected by a different pests and diseases with significant economic impact. Losses occur in production and in the value of the chestnuts. In order to reduce losses in the DOP – “Soutos da Lapa” (Viseu and Guarda districts), an application was developed for a network alerts of biotic agent’s occurrence. The application relates the meteorological data, the phenology of trees and cycles of biotic agents. The best localization for a network of weather stations was identified, as well as the data processing systems and the management information to generate warnings. The data allowed to develop a decision matrix that determines the risk index. Depending on this index and the field information, the producers will be informed about the risk of the biotic agent’s incidence.

Keywords: *Castanea sativa*, biotical agents, network warnings.

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CONTRIBUTION TO THE KNOWLEDGE OF THE PHYTOSSANITARY PROBLEMS OF DIFFERENT SPECIES OF CAMELLIA (*Camellia* L.) IN S. MIGUEL ISLAND

P53

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The camellia is an ornamental plant with a long tradition of cultivation in Portugal mainland and the Azores, in particular on the island of São Miguel. As with the most of the plant species, the camellia is also attacked by numerous pests and diseases that negatively affect their phenological development. This study took place in Terra Nostra Park, in order to contribute to a better knowledge of the camellias plants in the island of São Miguel, and it took place between August 2010 and December 2012. The main objective was the exploration of existing pests and diseases in four distinct species of camellias. The identified pests were: the aphid *Toxoptera aurantii*; the mealybugs *Chrysomphalus dictyospermi*, *Fiorinia fioriniae*, *Coccus hesperidum* and *Planococcus citri*; and the thrips *Heliethrips haemorrhoidalis*, *Hercinothrips bicinctus* and *Thrips flavus*. The fungi that were found, with economic interest were: *Glomerella cingulata*, *Glomerella acutata*, *Phomopsis* sp., *Pestalotiopsis heterocornis*, *Pestalotiopsis neglecta*, *Monochaetia camelliae*, *Ciborinia camelliae*, *Exobasidium camelliae*, *Armillaria* sp. and *Botrytis cinerea*.

Keywords: Camellia, Diseases, Fungus, Pests.

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***Solanum sisymbriifolium* HATCHING AGENTS - *Meloidogyne chitwoodi* INTERACTIONS**

P56

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Meloidogyne chitwoodi is a major pest of potato crops and quarantine specie. *Solanum sisymbriifolium* is used as a trap crop for the potato cyst nematodes and it seemed an ideal control for root-knot-nematodes (RKN), *Meloidogyne* spp.. The main goal of this study was to evaluate the hatching effects of root exudates of cv. Sis 6001 on the second-stage juveniles of *M. chitwoodi*. *S. lycopersicum* (cv. Easypeel) root exudates and water were used as controls. The root exudate extracts were obtained from the soil, where plants had grown with one and two months, and placed in distilled water, in the dark, room temperature, during 24 h. The exudates collected in the water were filtered, concentrated and lyophilized. For each treatment it was tested 5 concentrations (0.4, 0.2, 0.1, 0.05 and 0.025 mg/mL). The higher cumulative hatching inhibition percentage (26.41%) was with the extracts with one month for the concentration 0.2 mg/mL.

Keywords: extracts, exudates, hatching, *Meloidogyne chitwoodi*, *Solanum sisymbriifolium*..

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HATCHING AGENTS OF *Solanum nigrum* ON *Meloidogyne chitwoodi* AND *Meloidogyne ethiopica*

P57

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Many species of Root-Knot-Nematodes (RKN), *Meloidogyne* spp., cause reductions in the quantity and quality of agricultural production. Their control is difficult and many of the methods are ineffective. Alternative control strategies should be developed to minimize the risks resulting from the use of nematicides. Some plants release natural phytochemicals with nematicides properties and root exudates may act as stimulators/inhibitors on hatching of second-stage juveniles (J2). The objective of this study was to evaluate the hatching effects of root exudates of *Solanum nigrum* on the second-stage juveniles of *M. chitwoodi* and *M. ethiopica*. The exudates obtained, by successive leaching of soil, were tested with daily counts, during 15 days. The exudate of *S. lycopersicum*, cv. Easy Peel, and water were used as controls. The values of the cumulative hatching inhibition percentage for *S. nigrum* were higher than the values for the controls for both species.

Keywords: biological control, natural phytochemicals, root exudates; Root-Knot-Nematodes, *Solanum nigrum*.

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IN VITRO PROPAGATION OF ROOT-LESION NEMATODES ON CARROT

P58

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Root-lesion nematodes (RLN), *Pratylenchus* spp., are migratory endoparasites causing necrosis in several plants with agronomical interest. The wide RLN host range limits the use of crop rotation and, therefore, it is crucial to evaluate the present status of RLN species occurring in Portugal and to develop sustainable control strategies which are essential on the management of these phytoparasitic nematodes. The aim of this study was to compare the *in vitro* multiplication of two Portuguese isolates of *P. neglectus* and *P. penetrans* species obtained from potato roots. For each RLN isolate, ten gravid females were transferred to the centre of ten disinfected carrot discs that were incubated at 25°C for 56 and 84 days. After incubation, nematodes were extracted by centrifugation and the population densities were determined. Significant differences were found between the two species of RLN.

Keywords: Carrot discs; potato; *Pratylenchus neglectus*, *Pratylenchus penetrans*.

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MALTING BARLEY - VARIABILITY IN THE RESPONSE TO FUNGICIDE TREATMENT FOR *Helminthosporium* sp. AND *Rynchosporium* sp.

P59

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The increased demand for malting barley in the national market in recent years is intrinsically linked to the excellent response of agricultural and industrial crop varieties. The growing claim in the improvement of the quality of barley for malting, leads to a continuous development of varieties, directed to specific features of technological quality. In this scenario, a PRODER Project Cooperation for Innovation - Null - Lox "Valuing National Production of Malting Barley - Introduction of Differentiated Variety " is intended to select varieties of malting barley Null - Lox, well adapted to climatic Mediterranean conditions, and with high technological quality for malting industry. The beer brewed with malt from these varieties has higher foam stability and consistency of flavor. Two field experiments were carried out, in Beja and Elvas, in the agricultural year 2012/2013, to assess the agronomic potential and the technological quality of the varieties under study, and their response to the fungicide treatment for *Helminthosporium* sp. and *Rynchosporium* sp. The results show the effect of the variety on physiological characteristics, yield and production components, protein content, and grain size, and a distinctive response to the fungicide treatments.

Keywords : malting barley, malt, grain production, grain quality.

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NEMATICIDAL EFFECT OF COMMON NETTLE (*Urtica dioica*) AND DWARF NETTLE (*Urtica urens*) AGAINST PINE-WOOD-NEMATODE (*Bursaphelenchus xylophilus*)

P60

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In organic farming nettle is widely used as plant enemies control and as soil fertilizer. However its effect on pine wood nematode (PWN), *Bursaphelenchus xylophilus*, is still unknown. Then, the aim of this work was to study the nematocidal effect of common nettle and dwarf nettle extracts on PWN. In fact, besides all the numerous studies carried out in order to control PWN there is no viable solution in market. *In vitro* experiments were carried out in glass blocks with five replicates for each different extract concentration and for control. Results were observed at 12, 24, 48, 72, 96 and 168 hours after exposure. Extracts of both plant species had a nematostatic effect on PWN. However, dwarf nettle extracts had a faster and a more persistent effect than common nettle extracts. Therefore, more detailed experiments should be conducted with these plant species.

Keywords: Biocide; *Bursaphelenchus xylophilus*; common nettle (*Urtica dioica*); dwarf nettle (*Urtica urens*); nematostatic.

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CONTRIBUTION TO THE AGRO-ENVIRONMENTAL COMPONENT OF INTEGRATED LAND AREA OF CASTRO VERDE

P61

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The agro-environmental component on Integrated Territorial Intervention (ITI) of Castro Verde includes financial support for "Maintenance of rotation of rainfed cereal – fallow land" and for the "direct seeding", for which were established some normative rules. The traditional rotation should follow the following cultural succession: primary cereal (wheat) - secondary cereal (oat) - fallow - fallow with mobilization in end of winterseason. The Polytechnic Institute of Beja (IPBeja), in collaboration with the Associação de Agricultores do Campo Branco (AACB), started in 2012/2013 the agricultural year the study of alternative crops (species, varieties and technical itineraries) with the aim of providing more information and better support for the farmer decision. Three experiments were carried out with the following study factors: grain cereal production and fertilization, mixtures and feed grain cereals, grass cultivation and fertilization. The results showed productive and qualitative diversity of the variables under study. It was noted by this study better adaptation to soil and climatic conditions of some species or mixtures, and particularly certain varieties.

Keywords : cereal, forage, pasture, productivity, quality..

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