Title: The sterile insect technique in agricultural crops in South Africa: a metamorphosis ... but will it fly?
By: B.N. Barnes, J.H. Hofmeyr, S. Groenewald, D.E. Conlong & M. Wohlfarter
Source: African Entomology Vol. 23, No. 1, 2015

Abstract: Since its humble beginnings in the late 1990s, use of the sterile insect technique (SIT) in South African crop agriculture evolved from an underfunded ‘rag and bones’ operation in Stellenbosch for a single pest, Mediterranean fruit fly (Medfly), Ceratitis capitata (Wiedemann), on deciduous fruit and table grapes, to privatized programmes for three fruit pests, viz. Medfly, false codling moth (Thaumatotibia leucotreta (Meyrick)) on citrus, and codling moth (Cydia pomonella (Linnaeus)) on apples and pears. A fourth SIT programme, for the sugarcane stalk borers, Eldana saccharina Walker and Chilo sacchariphagus Bojer, is well under development. This review focuses mainly on the Medfly SIT programme, but gives brief summaries of the development and current status of SIT for the other pests mentioned. However, many of the hardships experienced by the Medfly SIT programme have also been experienced by those people that developed, or are still developing SIT for the other pests. During the last 15 years the Medfly programme has passed through many phases and evoked many emotions, including hope, despair, misunderstanding and mistrust; but it also bred perseverance, determination, empowerment and, later, confidence. It has also included an international DNA investigation to identify the origin of a Medfly outbreak in the SIT area. The Medfly SIT programme started at Agricultural Research Council (ARC) Infruitec-Nietvoorbij in Stellenbosch in the Western Cape Province with a feasibility study over some 5000 ha of table grapes in the Hex River Valley area, releasing by air 5 million sterile male Medflies per week, produced in a run-down outbuilding with questionable equipment. Fungal rot, ant invasions, severe rust, lack of funding, inexperience and ignorance were among the challenges. The feasibility project subsequently metamorphosed into a fully-fledged, privatized programme which now produces 25 million sterile male Medflies per week in a modern, state-of-the-art facility with high-specification equipment and highly qualified technicians, distributed weekly to three
different production areas and released on the ground. The current objective of the Medfly SIT programme is population suppression, but this is merely a means to an end. Medfly is regarded as a pest of international quarantine importance, and a number of countries impose strict phytosanitary measures against this pest. The ultimate goal, therefore, is the creation of Medfly-free areas, leading to sustained and expanded international fruit markets without trade restrictions due to Medfly. Many challenges still remain, but there is a fierce determination by those involved that it will succeed. In the meantime, the false codling moth SIT programme, based in Citrusdal in the Western Cape Province, is very successful and has improved and expanded significantly. The pilot release phase of the sugarcane borer SIT programme is expected to be fast-tracked after the likely procurement of an irradiator in KwaZulu-Natal in 2015. However, for economic and other reasons the codling moth SIT programme had to be terminated in 2014. ‘Will SIT in South Africa fly?’ It is already flying, but it needs to fly much higher. With the necessity to export fruit from pest-free areas, to minimize crop losses of commercial and small-scale farmers, and considering the large investments already made in SIT in South Africa, there should be no going back.

**Record 2 of 78**

**By:** Rempoulakis, P (Rempoulakis, Polychronis); Castro, R (Castro, Rossana); Nemny-Lavy, E (Nemny-Lavy, Esther); Nestel, D (Nestel, David)

**Title:** Effects of radiation on the fertility of the Ethiopian fruit fly, Dacus ciliatus

**Source:** ENTOMOLOGIA EXPERIMENTALIS ET APPLICATA

**Volume:** 155

**Issue:** 2

**Pages:** 117-122

**DOI:** 10.1111/eea.12289

**Published:** MAY 2015

**Abstract:** The Ethiopian fruit fly, Dacus ciliatus (Loew) (Diptera: Tephritidae), is a significant pest of cucurbit crops in Asia and Africa and is currently controlled with insecticides. The sterilizing effect of gamma radiation on D. ciliatus adults was investigated to assess the suitability of sterile insect technique (SIT) for use as an alternative, non-chemical strategy for the control of this pest. Late pupae (48h before emergence) were irradiated with 60, 80, 100, 120, and 140Gy of gamma rays emitted by a Co-60 source. Following emergence, the biological characteristics of the experimental cohorts (including all possible male-female combinations of irradiated and untreated flies) were recorded. No significant negative effects of irradiation on pupal eclosion or the ability of newly emerged flies to fly were observed. Samples of eggs at reproductive fly-ages (12-, 15-, and 17-day-old pairs) were collected and their hatch rates were assessed. At 60Gy, females were completely sterilized, whereas complete sterilization of the males was observed only at 140Gy (a small amount of fertility persisted even at 120Gy). In addition to the above experiments, three fruit infestation trials were conducted with zucchini [Cucurbita pepo L. (Cucurbitaceae)] as the plant host and the pupae produced in those trials were collected and recorded. We observed significant (ca. 10%) infestation following treatment with up to 120Gy and zero progeny only at 140Gy, mirroring the egg-hatch results. Our findings support the feasibility of SIT for the control of D. ciliatus.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0
Sperm competition (SC) occurs when the sperm of two or more males compete for the same set of ova. Theoretical models and experimental observations indicate that the presence of rival males causes focal males to adjust sperm allocation in a given copulation. Males allocate more sperm when they perceive the presence of one rival male (SC risk), either before or during mating, or when they perceive the presence of multiple rival males before mating (previous SC intensity). Conversely, males are expected to allocate fewer sperm when they perceive the presence of rival males during mating (current SC intensity).

Here, we varied male perception of SC by manipulating the number of rival males, both before mating (from emergence to mating) and during mating (at the time of mating) to examine their effects on mating latency, copulation duration, and sperm allocation in the South American fruit fly Anastrepha fraterculus. We showed that exposure to rival males at the time of mating decreased mating latency. However, in contrast to the theory, exposure to multiple rivals at the time of mating increased sperm allocation. Female and male size were significant predictors of mating latency, copulation duration, and sperm allocation. Our results showed that there is a plastic response of males to the level of perceived SC through the number of rival males. Current levels of SC intensity are important in shaping male responses to SC, although the patterns in this species are opposite to predictions from the existing theory. We propose that female preference for males forming leks could explain lower sperm counts when encountering only one or two males.
Title: Effect of plant oils on quality parameters of Bactrocera tryoni (Froggatt) reared on liquid larval diet

Source: JOURNAL OF APPLIED ENTOMOLOGY
Volume: 139
Issue: 4
Pages: 280-288
Published: MAY 2015

Abstract: Liquid larval diets have been developed for several tephritid fruit flies including Queensland fruit fly, Bactrocera tryoni (Froggatt) (Q-fly). In liquid diets, wheat germ oil (WGO) is usually added to improve performance in some quality parameters of reared flies, especially flight ability. However, for some flies, other plant oils may be more readily available, cheaper or produce flies of superior performance. In the present study, four alternative types of plant oils - rice bran, canola, vegetable, and sesame - were incorporated into a fruit fly liquid larval diet to replace the currently used wheat germ oil and their efficacy on the quality parameters of reared Q-fly was compared to diets containing wheat germ oil or no oil. The quality parameters included: total pupal yield (N), pupal recovery (%), larval duration (days), pupal weight (mg), adult emergence (%), adult fliers (%), rate of fliers (%), sex ratio (%), F-1 egg/female/day and egg hatching (%). There were significant differences among treatments in performance of Q-fly. Vegetable oil appeared better in terms of total pupal yield, percentage of pupal recovery, percentage of adult emergence, percentage of fliers, mean egg/female/day and % F-1 egg hatch compared with other oil treatments, especially from that of WGO treated diet. The result suggests that WGO can be substituted with rice bran and vegetable oil to improve the liquid larval diet for rearing of B.tryoni, with vegetable oil being the best replacement.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 0931-2048
Accession Number: CCC:000352725800005

Record 5 of 78

By: Yee, WL (Yee, W. L.)

Title: Commercial Yellow Sticky Strips more attractive than yellow boards to western cherry fruit fly (Dipt., Tephritidae)

Source: JOURNAL OF APPLIED ENTOMOLOGY
Volume: 139
Issue: 4
Pages: 289-301
Published: MAY 2015

Abstract: Bright yellow sticky rectangles made of paper boards were previously identified as the most effective traps for capturing western cherry fruit fly, Rhagoletis indifferens Curran (Dipt., Tephritidae). However, no data on the effectiveness of commercial sticky yellow plastic traps against R.indifferens have been reported. In tests conducted in sweet
cherry trees [Prunus avium (L.) L.] in Washington state (USA) using ammonium carbonate as the chemical lure, commercial plastic Yellow Sticky Strips' made of translucent high-impact polystyrene captured two or three times more flies than commercial sticky yellow-folded Pherocon((R)) AM and Alpha Scents boards. Yellow Sticky Strips also minimized captures of non-target flies and bees per surface area compared with Pherocon((R))AM and/or Alpha Scents boards. Trap size and adhesive type were not factors for greater catches of R.indifferens. However, more flies were caught on the shade-facing side of Yellow Sticky Strips, which was brightly illuminated, than on the shade-facing side of boards, which was darker, suggesting differential light passage was a factor. The Yellow Sticky Strips could be very useful for monitoring R.indifferens in detection programmes and based on the results of this study can replace yellow boards. They are also useful because they are relatively unattractive to non-target insects.
The oriental fruit fly, Bactrocera dorsalis, is a serious pest of fruits and vegetables. Methyl eugenol (ME), a male attractant, is used to against this fly by mass trapping. Control effect may be influenced by learning, which could modify the olfactory response of the fly to this attractant. To collect the behavioral evidence, studies on the capability of this fly for olfactory learning are necessary. We investigated olfactory learning in male flies with a classical olfactory conditioning procedure using restrained individuals under laboratory conditions. The acquisition of the proboscis extension reflex was used as the criterion for conditioning. A high conditioned response level was found in oriental fruit flies when an odor was presented in paired association with a sucrose reward but not when the odor and sucrose were presented unpaired. We also found that the conditioning performance was influenced by the odor concentration, intertrial interval, and starvation time. A slight sensitization elicited by imbibing sucrose was observed. These results indicate that oriental fruit flies have a high capacity to form an olfactory memory as a result of classical conditioning.
Title: Biology and Host Range of Digitivalva delaireae (Lepidoptera: Glyphipterigidae), a Candidate Agent for Biological Control of Cape-ivy (Delairea odorata) in California and Oregon

Source: ENVIRONMENTAL ENTOMOLOGY

Volume: 44
Issue: 2
Pages: 260-276
Published: APR 2015

Abstract: Cape-ivy (Delairea odorata Lemaire) is an ornamental vine native to South Africa that has escaped into natural areas in coastal California and Oregon, displacing native vegetation. Surveys in South Africa led to the discovery of the leaf-and stem-mining moth Digitivalva delaireae Gaedike and Kruger (Lepidoptera: Glyphipterigidae: Acrolepiinae) as one of several common and damaging native herbivores on Cape-ivy. In greenhouse studies, adult female life span averaged 16 d (46 d maximum). Most (72%) mated females began laying eggs within 72 h of emergence. Females had an average lifetime fecundity of 52 eggs, with >70% laid on leaf laminae, and 89% of eggs were laid by the 15th day postemergence. Lifetime fertility (adult production) averaged three to four offspring per female. At 25 degrees C, egg hatch required 10 d, pupal formation 26 d, and adult emergence 41 d, while under variable greenhouse and laboratory conditions development to adult required 54-60 d. In four-way choice tests, involving 100 plant species other than Cape-ivy, including 11 genera and 37 species in the Asteraceae, subtribe Senecioninae from both native and invaded ranges, D. delaireae inflicted damage and produced pupae only on Cape-ivy. Leaf mining damage occurred on 30% of leaves of native Senecio hydrophilus in no-choice tests and on 2% of leaves in dual-choice tests, but no pupation occurred. If approved for field release in the continental United States, the moth D. delaireae is expected to produce multiple generations per year on Cape-ivy, and to pose little risk of damage to native plants.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 0046-225X
Accession Number: CCC:000352646700009

Record 9 of 78

By: Virgilio, M (Virgilio, Massimiliano); Jordaens, K (Jordaens, Kurt); Verwimp, C (Verwimp, Christophe); White, IM (White, Ian M.); De Meyer, M (De Meyer, Marc)

Title: Higher phylogeny of frugivorous flies (Diptera, Tephritidae, Dacini): Localised partition conflicts and a novel generic classification

Source: MOLECULAR PHYLOGENETICS AND EVOLUTION

Volume: 85
Pages: 171-179
Published: APR 2015

Abstract: The phylogenetic relationships within and among subtribes of the fruit fly tribe Dacini (Ceratitidina, Dacina, Gastrozonina) were investigated by sequencing four
mitochondrial and one nuclear gene fragment. Bayesian, maximum likelihood and maximum parsimony analyses were implemented on two datasets. The first, aiming at obtaining the strongest phylogenetic signal (yet, having lower taxon coverage), consisted of 98 vouchers and 2338 concatenated base pairs (bp). The second, aiming at obtaining the largest taxonomic coverage (yet, providing lower resolution), included 159 vouchers and 1200 concatenated bp. Phylogenetic relationships inferred by different tree reconstruction methods were largely congruent and showed a general agreement between concatenated tree topologies. Yet, local conflicts in phylogenetic signals evidenced a number of critical sectors in the phylogeny of Dacini fruit flies. All three Dacini subtribes were recovered as monophyletic. Yet, within the subtribe Ceratitidina only Perilampsis and Capparimyia formed well-resolved monophyletic groups while Ceratitis and Trirhithrum did not. Carpophthoromyia was paraphyletic because it included Trirhithrum demeyeri and Ceratitis connexa. Complex phylogenetic relationships and localised conflict in phylogenetic signals were observed within subtribe Dacina with (a) Dacus, (b) Bactrocera (Zeugodacus) and (c) all other Bactrocera species forming separate clades. The subgenus Bactrocera (Zeugodacus) is therefore raised to generic rank (Zeugodacus Hendel stat. nov.). Additionally, Bactrocera subgenera grouped under the Zeugodacus group should be considered under new generic combinations. Although there are indications that Zeugodacus and Dacus are sister groups, the exact relationship between Zeugodacus stat. nov., Dacus and Bactrocera still needs to be properly resolved. (C) 2015 Elsevier Inc. All rights reserved.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 1055-7903
Accession Number: CCC:000352825700017
PubMed ID: 25681676

Record 10 of 78
By: Shi, Z (Shi, Z.); Lin, Y (Lin, Y.); Hou, Y (Hou, Y.); Zhang, H (Zhang, H.)
Title: Humoral immunocompetence shifts in response to developmental stage change and mating access in Bactrocera dorsalis Hendel (Diptera: Tephritidae)
Source: BULLETIN OF ENTOMOLOGICAL RESEARCH
Volume: 105
Issue: 2
Pages: 166-172
DOI: 10.1017/S0007485314000911
Published: APR 2015
Abstract: Because immune defenses are often costly employed, insect immunocompetence cannot be always maintained at its maximum level. Here, the oriental fruit fly, Bactrocera dorsalis (Hendel), was used as a study object to investigate how its immune defenses varied with the developmental stage change and mating access. Our data indicated that both phenoloxidase (PO) activity and antibacterial activity significantly increased from new larvae to pupae but decreased in adults after emergence. Furthermore, both the PO activity and antibacterial activity in the hemolymph of copulated male and female adults were
dramatically higher than that of virgin male and female ones, respectively. It provided the evidence that copulation could increase the magnitude of immune defense in hemolymph of B. dorsalis. Together, these results suggest that B. dorsalis possess a flexible investment strategy in immunity to meet its specific needs based on the endo-and exogenous factors, such as their distinct food source and living environments.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 0007-4853

**Accession Number:** WOS:000352714100003

**PubMed ID:** 25611211

---

**Record 11 of 78**

**By:** Wendt, LD (Wendt, Lisiane D.); Ale-Rocha, R (Ale-Rocha, Rosaly)

**Title:** Antlered richardiid flies: new species of Richardia (Tephritoidea: Richardiidae) with antler-like genal processes

**Source:** ENTOMOLOGICAL SCIENCE

**Volume:** 18

**Issue:** 2

**Pages:** 153-166

**DOI:** 10.1111/ens.12122

**Published:** APR 2015

**Abstract:** Within Richardiidae, Richardia infestans, from Colombia, is the only known species to have genal processes, which are structures formed by the extension of the cuticle on the lateral margin of the gena. In the present work, six new species, with different patterns of antler-like genal processes, are described. An identification key and illustrations are provided. Richardia bellasp. nov., R.modestasp. nov. and R.vittasp. nov. are recorded from Costa Rica; R.advenasp. nov. is recorded from Costa Rica and Panama; R.simplexsp. nov. is recorded from Panama; and R.ornatellasp. nov. is recorded from Ecuador.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 1343-8786

**Accession Number:** WOS:000352625500003

---

**Record 12 of 78**

**By:** Cabrera-Marin, NV (Cabrera-Marin, N. V.); Liedo, P (Liedo, P.); Vandame, R (Vandame, R.); Sanchez, D (Sanchez, D.)

**Title:** Foraging Allocation in the Honey Bee, Apis mellifera L. (Hymenoptera, Apidae), Tuned by the Presence of the Spinosad-Based Pesticide GF-120
Agroecosystem management commonly involves the use of pesticides. As a result, a heterogeneous landscape is created, in which suitable and unsuitable spaces are defined by the absence/presence of pesticides. In this study, we explored how foragers of the honey bee, *Apis mellifera* L., adapt to such context. We specifically evaluated the effect of GF-120, a spinosad-based fruit fly toxic bait, on the allocation of foragers between food sources under the hypothesis that foragers will move from food sources with GF-120 to food sources without it. We thus carried out three experiments: in experiment 1, a group of foragers was trained to collect honey solution from a feeder; next, this feeder offered a GF-120/honey solution. A minority of foragers continued collecting the GF-120/honey solution. In experiment 2, we trained two groups of foragers from a colony to two food sources equally rewarding. Next, GF-120 was added to one of the food sources. We found that the majority of foragers moved from the GF-120-treated feeder to the feeder without GF-120 and that the minority that continued visiting the GF-120-treated feeder did not collect the GF-120/honey solution. In a third experiment, we wanted to know if foragers in an experimental setup as in experiment 1 would perform waggle dances: none of the foragers that collected GF-120/honey were observed dancing. Our results emphasize the importance of "food refuges" for non-target species, since they minimize the impact of agrochemicals upon them.
B. papayae, and B cucurbitae. We sequenced and characterized a dual-band target detected on Opiinae DNA fragments by using two combination pairs of universal primers on two molecular markers, namely cytochrome oxidase subunit I (COI) and cytochrome b. Additionally, each Bactrocera species was identified by amplifying the COI region. Sequence data obtained from multiplex PCR seemed very effective in confirming species-level distinction that has been shown in tree topology. We conducted phylogenetic analyses prior to clarification of the interaction among three taxa levels. Interestingly, the sequences obtained from the simultaneous PCR successfully differentiated between six closely related Opiinae species in three genera, which could potentially be mass-reared as biocontrol agents of bactroceran fruit flies that infest several species of fruit. We discovered, proved, and added molecular data to clarify the interaction between Opiinae parasitoids, their host (Bactrocera spp.), and associated plants species. Psyttalia fletcheri parasitizing Bactrocera cucurbitae, which infests the ridge gourd fruit, has been added as a new record from Malaysia. This information would be extremely useful in taxonomic identification of species as part of an effective method in biological control program of the targeted fruit fly pests and their associated crops.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 1872-8855
Accession Number: WOS:000351514300002

Record 14 of 78
By: Chen, AE (Chen, Aie); Zheng, WW (Zheng, Weiwei); Zheng, WP (Zheng, Wenping); Zhang, HY (Zhang, Hongyu)
Title: The effects of RNA interference targeting Bactrocera dorsalis ds-Bdrpl19 on the gene expression of rpl19 in non-target insects
Source: ECOTOXICOLOGY
Volume: 24
Issue: 3
Pages: 595-603
DOI: 10.1007/s10646-014-1407-3
Published: APR 2015
Abstract: Double-stranded RNA (dsRNA) designed to target pest genes emerges as a promising strategy for improving pest control. Therefore, it is necessary to assess the effects of dsRNA on non-target insects, such as native enemies and beneficial insects, to determine the environmental safety of such treatments. In this paper, we investigated the effects of dsRNA targeting rpl19 from Bactrocera dorsalis on non-target insects in citrus ecological systems by feeding the dsRNA to Bactrocera minax, Apis mellifera and Diachasmimorpha longicaudata. The results showed that when B. dorsalis were fed rpl19 CDS dsRNA or 3'UTR dsRNA, the expression of rpl19 was dramatically decreased. Feeding the Bdrpl19 CDS dsRNA to adult B. minax and D. longicaudata caused their respective rpl19 genes to be knocked down over 50-70 and 40 %, respectively, but it had no effect on the expression of the rpl19 gene in A. mellifera. The Bdrpl19 3'UTR dsRNA did not have any silencing effects
on the expression levels of rpl19 in non-target insects. This study provides evidence that
dsRNA can impact non-target organisms, but the 3'UTR dsRNA may not have effects in non-
target organisms.

**Times Cited in Web of Science Core Collection:** 0
**Times Cited in BIOSIS Citation Index:** 0
**Times Cited in Chinese Science Citation Database:** 0
**Times Cited in SciELO Citation Index:** 0
**Total Times Cited:** 0
**ISSN:** 0963-9292
**Accession Number:** WOS:000351160300012
**PubMed ID:** 25567188

---

**Record 15 of 78**

**By:** Xu, J (Xu, J.); Bi, H (Bi, H.); Chen, R (Chen, R.); Aslam, AFM (Aslam, A. F. M.); Li, Z (Li, Z.); Ling, L (Ling, L.); Zeng, B (Zeng, B.); Huang, Y (Huang, Y.); Tan, A (Tan, A.)
**Title:** Transgenic characterization of two testis-specific promoters in the silkworm, Bombyx mori
**Source:** INSECT MOLECULAR BIOLOGY
**Volume:** 24
**Issue:** 2
**Pages:** 183-190
**DOI:** 10.1111/imb.12144
**Published:** APR 2015

**Abstract:** Sex-specific regulatory elements are key components for developing insect
genetic sexing systems. The current insect genetic sexing system mainly uses a female-
specific modification system whereas little success was reported on male-specific genetic
modification. In the silkworm Bombyx mori, a lepidopteran model insect with economic
importance, a transgene-based, female-specific lethality system has been established based
on sex-specific alternative splicing factors and a female-specific promoter BmVgp
(vitellogenin promoter) has been identified. However, no male-specific regulatory elements
have yet been identified. Here we report the transgenic identification of two promoters that
drive reporter gene expression in a testis-specific manner in B.mori. Putative promoter
sequences from the B.mori Radial spoke head 1 gene (BmR1) and beta-tubulin 4 gene (Bm4)
were introduced using piggybac-based germline transformation. In transgenic silkworms,
expression of the reporter gene enhanced green fluorescent protein (EGFP) directed by either
BmR1 promoter (BmR1p) or Bm4p showed precisely testis-specific manners from the larval
to adult stage. Furthermore, EGFP expression of these two transgenic lines showed different
localization in the testis, indicating that BmR1p or Bm4p might be used as distinct regulatory
elements in directing testis-specific gene expression. Identification of these testis-specific
promoters not only contributes to a better understanding of testis-specific gene function in
insects, but also has potential applications in sterile insect techniques for pest management.

**Times Cited in Web of Science Core Collection:** 0
**Times Cited in BIOSIS Citation Index:** 0
**Times Cited in Chinese Science Citation Database:** 0
**Times Cited in SciELO Citation Index:** 0
Selection of non-target tephritids for risk evaluation in classical biocontrol programmes against the olive fruit fly

Abstract: The olive fruit fly, Bactrocera oleae (Rossi) (Diptera: Tephritidae), is the key pest of olives (Olea europaea L.). Classical biological control against this insect was previously attempted in Spain with Psyttalia concolor (Szépligeti) (Hymenoptera: Braconidae), with very limited success. Other parasitoids are now available for new classical biological control programmes. Before release of exotic parasitoids, an assessment of their potential impact on non-target species is required. Surveys were conducted in different olive groves in southeastern Madrid to study wild tephritids associated with Asteraceae plants. We recorded plant species and their abundance and collected flower heads to identify and quantify tephritid species. Fruits from Rosa canina L. were also collected. After a multicriteria analysis (MCA), we propose Urophora hispanica Strobl, U. stylata (Fabricius) and Carpomya schineri (Loew) as candidates for further risk assessment experiments. Additional information on new associations between tephritid flies and Asteraceae plants and on autochthonous Hymenoptera parasitizing tephritids is provided.
Synonymization of key pest species within the Bactrocera dorsalis species complex (Diptera: Tephritidae): taxonomic changes based on a review of 20 years of integrative morphological, molecular, cytogenetic, behavioural and chemoecological data

Bactrocera papayae Drew & Hancock, Bactrocera philippinensis Drew & Hancock, Bactrocera carambolae Drew & Hancock, and Bactrocera invadens Drew, Tsuruta & White are four horticultural pest tephritid fruit fly species that are highly similar, morphologically and genetically, to the destructive pest, the Oriental fruit fly, Bactrocera dorsalis (Hendel) (Diptera: Tephritidae). This similarity has rendered the discovery of reliable diagnostic characters problematic, which, in view of the economic importance of these taxa and the international trade implications, has resulted in ongoing difficulties for many areas of plant protection and food security. Consequently, a major international collaborative and integrated multidisciplinary research effort was initiated in 2009 to build upon existing literature with the specific aim of resolving biological species limits among B. papayae, B. philippinensis, B. carambolae, B. invadens and B. dorsalis to overcome constraints to pest management and international trade. Bactrocera philippinensis has recently been synonymized with B. papayae as a result of this initiative and this review corroborates that finding; however, the other names remain in use. While consistent characters have been found to reliably distinguish B. carambolae from B. dorsalis, B. invadens and B. papayae, no such characters have been found to differentiate the latter three putative species. We conclude that B. carambolae is a valid species and that the remaining taxa, B. dorsalis, B. invadens and B. papayae, represent the same species. Thus, we consider B. dorsalis (Hendel) as the senior synonym of B. papayae Drew and Hancock syn.n. and B. invadens Drew, Tsuruta & White syn.n. A redescription of B. dorsalis is provided. Given the agricultural importance of B. dorsalis, this taxonomic decision will have significant global plant biosecurity implications, affecting pest management, quarantine, international trade, postharvest treatment and basic research. Throughout the paper, we emphasize the value of independent
and multidisciplinary tools in delimiting species, particularly in complicated cases involving morphologically cryptic taxa.

**Title:** One and the same: integrative taxonomic evidence that Bactrocera invadens (Diptera: Tephritidae) is the same species as the Oriental fruit fly Bactrocera dorsalis

**Source:** SYSTEMATIC ENTOMOLOGY

**Volume:** 40

**Issue:** 2

**Pages:** 472-486

**DOI:** 10.1111/syen.12114

**Published:** APR 2015

**Abstract:** The invasive fruit fly Bactrocera invadens Drew, Tsuruta & White, and the Oriental fruit fly Bactrocera dorsalis (Hendel) are highly destructive horticultural pests of global significance. Bactrocera invadens originates from the Indian subcontinent and has recently invaded all of sub-Saharan Africa, while B. dorsalis principally occurs from the Indian subcontinent towards southern China and South-east Asia. High morphological and genetic similarity has cast doubt over whether B. invadens is a distinct species from B. dorsalis. Addressing this issue within an integrative taxonomic framework, we sampled from across the geographic distribution of both taxa and: (i) analysed morphological variation, including those characters considered diagnostic (scutum colour, length of aedeagus, width of postsutural lateral vittae, wing size, and wing shape); (ii) sequenced four loci (ITS1, ITS2, cox1 and nad4) for phylogenetic inference; and (iii) generated a cox1 haplotype network to examine population structure. Molecular analyses included the closely related species, Bactrocera kandiensis Drew & Hancock. Scutum colour varies from red-brown to fully black for individuals from Africa and the Indian subcontinent. All individuals east of the Indian subcontinent are black except for a few red-brown individuals from China. The postsutural lateral vittae width of B. invadens is narrower than B. dorsalis from eastern Asia, but the variation is clinal, with subcontinent B. dorsalis populations intermediate in size. Aedeagus length, wing shape and wing size cannot discriminate between the two taxa. Phylogenetic analyses failed to resolve B. invadens from B. dorsalis, but did resolve B. kandiensis. Bactrocera dorsalis and B. invadens shared cox1 haplotypes, yet the haplotype network pattern does not reflect current taxonomy or patterns in thoracic colour. Some individuals of
B. dorsalis/B. invadens possessed haplotypes more closely related to B. kandiensis than to conspecifics, suggestive of mitochondrial introgression between these species. The combined evidence fails to support the delimitation of B. dorsalis and B. invadens as separate biological species. Consequently, existing biological data for B. dorsalis may be applied to the invasive population in Africa. Our recommendation, in line with other recent publications, is that B. invadens be synonymized with B. dorsalis.

**Times Cited in Web of Science Core Collection:** 1
**Times Cited in BIOSIS Citation Index:** 1
**Times Cited in Chinese Science Citation Database:** 0
**Times Cited in SciELO Citation Index:** 0
**Total Times Cited:** 1
**ISSN:** 0307-6970
**Accession Number:** WOS:000350982700011

**Record 19 of 78**

**By:** Andongma, AA (Andongma, Awawing A.); Wan, L (Wan, Lun); Dong, YC (Dong, Yong-Cheng); Li, P (Li, Ping); Desneux, N (Desneux, Nicolas); White, JA (White, Jennifer A.); Niu, CY (Niu, Chang-Ying)

**Title:** Pyrosequencing reveals a shift in symbiotic bacteria populations across life stages of Bactrocera dorsalis

**Source:** SCIENTIFIC REPORTS

**Volume:** 5

**Article Number:** 9470

**DOI:** 10.1038/srep09470

**Published:** MAR 30 2015

**Abstract:** Bactrocera dorsalis is one of the most economically important fruit flies around the world. In this study, 454 pyrosequencing was used to identify the bacteria associated with different developmental stages of B. dorsalis. At >= 97% nucleotide similarity, total reads could be assigned to 172 Operational Taxonomic Units belonging to six phyla. Proteobacteria dominated in immature stages while Firmicutes dominated in adult stages. The most abundant families were Enterococcaceae and Comamonaceae. The genus Comamonas was most abundant in pupae whereas completely absent in adults. Some identified species had low sequence similarity to reported species indicating the possibility of novel taxa. However, a majority sequence reads were similar to sequences previously identified to be associated with Bactrocera correcta, suggesting a characteristic microbial fauna for this insect genus. The type and abundance of different bacterial groups varied across the life stages of B. dorsalis. Selection pressure exerted by the host insect as a result of its habitat and diet choices could be the reason for the observed shift in the bacteria groups. These findings increase our understanding of the intricate symbiotic relationships between bacteria and B. dorsalis and provide clues to develop potential biocontrol techniques against this fruit fly.

**Times Cited in Web of Science Core Collection:** 0
**Times Cited in BIOSIS Citation Index:** 0
**Times Cited in Chinese Science Citation Database:** 0
**Times Cited in SciELO Citation Index:** 0
Histopathological Changes in Third-Instar and Adult Anastrepha ludens (Diptera: Tephritidae) After in vitro Heat Treatment

The Mexican fruit fly, Anastrepha ludens Loew (Diptera: Tephritidae), is one of the most harmful pests of mango causing direct damage by oviposition on the fruit pulp. Mango for export is subjected to hydrothermal treatment as a quarantine method for the control of this pest, but exposure to heat for long periods of time reduces considerably the quality and shelf-life of treated fruit. The aim of this work was to study morphological changes of third-instar larvae and adults of A. ludens after in vitro exposure to high temperature at sublethal times. A heating block system was used to expose larvae at 46.1 degrees C for 19.6 and 12.9 min, producing 94.6 and 70% mortality, respectively. Treated larvae were processed for optical microscopy. A fraction of surviving treated larvae was separated into containers with artificial diet to allow development into adults. Adult sexual organs were dissected and processed for transmission electron microscopy analysis. Results showed that 94.6% of the treated larvae died at 46.1 degrees C for 19.6 min and none of the surviving larvae eclosed to adulthood, as they developed as malformed puparia. For the in vitro treatment at 46.1 degrees C during 12.9 min, 70% of the treated larvae died and only 3.75% reached the adult stage, but ultrastructural damage in the male testes and in the female ovaries was observed. Additionally, 11.1% of the adult flies from the in vitro treatment also showed wing malformation and were incapable of flying. The analysis showed that surviving flies were unable to reproduce.

Published: MAR 22 2015

Abstract: The Mexican fruit fly, Anastrepha ludens Loew (Diptera: Tephritidae), is one of the most harmful pests of mango causing direct damage by oviposition on the fruit pulp. Mango for export is subjected to hydrothermal treatment as a quarantine method for the control of this pest, but exposure to heat for long periods of time reduces considerably the quality and shelf-life of treated fruit. The aim of this work was to study morphological changes of third-instar larvae and adults of A. ludens after in vitro exposure to high temperature at sublethal times. A heating block system was used to expose larvae at 46.1 degrees C for 19.6 and 12.9 min, producing 94.6 and 70% mortality, respectively. Treated larvae were processed for optical microscopy. A fraction of surviving treated larvae was separated into containers with artificial diet to allow development into adults. Adult sexual organs were dissected and processed for transmission electron microscopy analysis. Results showed that 94.6% of the treated larvae died at 46.1 degrees C for 19.6 min and none of the surviving larvae eclosed to adulthood, as they developed as malformed puparia. For the in vitro treatment at 46.1 degrees C during 12.9 min, 70% of the treated larvae died and only 3.75% reached the adult stage, but ultrastructural damage in the male testes and in the female ovaries was observed. Additionally, 11.1% of the adult flies from the in vitro treatment also showed wing malformation and were incapable of flying. The analysis showed that surviving flies were unable to reproduce.
By: Benelli, G (Benelli, Giovanni); Desneux, N (Desneux, Nicolas); Romano, D (Romano, Donato); Conte, G (Conte, Giuseppe); Messing, RH (Messing, Russell H.); Canale, A (Canale, Angelo)

Title: Contest experience enhances aggressive behaviour in a fly: when losers learn to win

Source: SCIENTIFIC REPORTS

Volume: 5

Article Number: 9347

DOI: 10.1038/srep09347

Published: MAR 20 2015

Abstract: In several animal species, aggressive experience influences the characteristics and outcomes of subsequent conflicts, such that winners are more likely to win again (the winner effect) and losers more likely to lose again (the loser effect). We tested the olive fruit fly, Bactrocera oleae (Diptera: Tephritidae), as a model system to evaluate the role of the winner and loser effects in male-male territorial contests. Further, we conducted experiments to test if winning and losing probabilities are affected only by the outcome of the previous contests, or whether the fighting experience itself is sufficient to induce an effect. Both winners and losers of two consecutive encounters displayed higher intensity of aggression and fought longer in subsequent contests. In both cases, they achieved higher fighting success than naive males. The enhanced fighting performance of both winners and losers was stimulated by merely experiencing a contest, not necessarily by the relative outcome of previous fights. Overall, this study highlights the fact that previous victories and defeats both enhance aggressive behaviour in olive fruit flies, allowing them to achieve higher fighting success in subsequent contests against inexperienced males.

Times Cited in Web of Science Core Collection: 0

Times Cited in BIOSIS Citation Index: 0

Times Cited in Chinese Science Citation Database: 0

Times Cited in SciELO Citation Index: 0

Total Times Cited: 0

ISSN: 2045-2322

Accession Number: WOS:000351290700006

PubMed ID: 25792294

Record 22 of 78

By: Paladino, LC (Carabajal Paladino, Leonela); Muntaabaksi, I (Muntaabaksi, Irina); Lanzavecchia, S (Lanzavecchia, Silvia); Le Bagousse-Pinguet, Y (Le Bagousse-Pinguet, Yoann); Viscarret, M (Viscarret, Mariana); Jurí, M (Jurí, Marianela); Fueyo-Sanchez, L (Fueyo-Sanchez, Luciana); Papeschi, A (Papeschi, Alba); Cladera, J (Cladera, Jorge); Bressa, MJ (Jose Bressa, Maria)

Title: Complementary Sex Determination in the Parasitic Wasp Diachasmimorpha longicaudata

Source: PLOS ONE

Volume: 10

Issue: 3

Article Number: e0119619

DOI: 10.1371/journal.pone.0119619
Abstract: We studied the sex determination in Diachasmimorpha longicaudata, a parasitoid braconid wasp widely used as biological control agent of fruit pest tephritid flies. We tested the complementary sex determination hypothesis (CSD) known in at least 60 species of Hymenoptera. According to CSD, male or female development depends on the allelic composition of one sex locus (single-locus CSD) or multiple sex loci (multiple-locus CSD). Hemizygote individuals are normal haploid males, and heterozygotes for at least one sex locus are normal diploid females, but homozygotes for all the sex loci are diploid males. In order to force the occurrence of diploid males in D. longicaudata, we established highly inbred lines and examined their offspring using chromosome counting, flow cytometry, and sex ratio analysis. We found that when mother-son crosses were studied, this wasp produced about 20% of diploid males out of the total male progeny. Our results suggest that this parasitoid may represent the second genus with multiple-locus CSD in Hymenoptera. Knowledge about the sex determination system in D. longicaudata is relevant for the improvement of mass rearing protocols of this species. This information also provides the necessary background for further investigations on the underlying molecular mechanisms of sex determination in this species, and a better insight into the evolution of this pathway in Hymenoptera in particular and insects in general.
management systems. Hilly orchards showed significantly higher seasonal total arthropod diversity and evenness. Abundance of functional arthropods followed a similar trend as total abundance and was seasonally significantly higher in hilly orchards. Agroecological zones and organic management explained the biggest fraction of arthropod variability; however, the total variability explained was rather low. Management systems were the least decisive factors determining arthropod community composition. Less intensive olive production systems appeared to favor soil arthropod diversity.

**Times Cited in Web of Science Core Collection:** 0
**Times Cited in BIOSIS Citation Index:** 0
**Times Cited in Chinese Science Citation Database:** 0
**Times Cited in SciELO Citation Index:** 0
**Total Times Cited:** 0
**ISSN:** 2168-3565
**Accession Number:** WOS:000348653800003

---

**Record 24 of 78**

**By:** Rabea, EI (Rabea, E. I.); Nasr, HM (Nasr, H. M.); Badawy, MEI (Badawy, M. E. I.); El-Gendy, IR (El-Gendy, I. R.)

**Title:** Toxicity of naturally occurring Bio-fly and chitosan compounds to control the Mediterranean fruit fly Ceratitis capitata (Wiedemann)

**Source:** NATURAL PRODUCT RESEARCH

**Volume:** 29
**Issue:** 5
**Pages:** 460-465
**DOI:** 10.1080/14786419.2014.948873

**Published:** MAR 4 2015

**Abstract:** The efficacy of five compounds of a biopolymer chitosan and Bio-fly (Beauveria bassiana fungus) as biopesticide was evaluated on Ceratitis capitata under laboratory conditions. The inhibitory effects on acetylcholinesterase (AChE) and adenosinetriphosphatase (ATPase) as biochemical indicators were also determined in vivo. The results indicated that B. bassiana based Bio-fly exhibited significant toxicity against C. capitata (LC50=3008 and 3126mg/L after 48h in females and males, respectively) followed by the derivatives of chitosan, N-(4-propylbenzyl)chitosan and N-(2-nitrobenzyl)chitosan.

Bio-fly displayed remarkable inhibition of AChE activity (IC50=2220mg/L) while N-(2-chloro,6-flourobenzyl)chitosan, N-(4-propylbenzyl)chitosan and N-(3,4-methylenedioxybenzyl) chitosan had no significant difference in inhibitory action. In adult males, N-(2-nitrobenzyl)chitosan exhibited the highest inhibitory action (IC50=6569mg/L). In addition, the toxic effects of the tested compounds on the activity of ATPase indicated that highly significant inhibition was found with N-(4-propylbenzyl)chitosan with an IC50 of 8194 and 8035mg/L, in females and males, respectively.

**Times Cited in Web of Science Core Collection:** 0
**Times Cited in BIOSIS Citation Index:** 0
**Times Cited in Chinese Science Citation Database:** 0
**Times Cited in SciELO Citation Index:** 0
**Total Times Cited:** 0
Comparative proteomic analysis of Bactrocera dorsalis (Hendel) in response to thermal stress

By: Wei, D (Wei, Dong); Jia, FX (Jia, Fu-Xian); Tian, CB (Tian, Chuan-Bei); Tian, Y (Tian, Yi); Smagghe, G (Smagghe, Guy); Dou, W (Dou, Wei); Wang, JJ (Wang, Jin-Jun)

Title: Comparative proteomic analysis of Bactrocera dorsalis (Hendel) in response to thermal stress

Source: JOURNAL OF INSECT PHYSIOLOGY

Volume: 74
Pages: 16-24
DOI: 10.1016/j.jinsphys.2015.01.012
Published: MAR 2015

Abstract: Temperature is one of the most important environmental variables affecting growth, reproduction and distribution of insects. The rise of comparative proteomics provides a powerful tool to explore the response in proteins to thermal stress. As an important worldwide pest, the oriental fruit fly Bactrocera dorsalis causes severe economic losses to crops. To understand the response of B. dorsalis to thermal stress, we performed a comparative proteome analysis of this insect after exposure to extreme low and high temperatures using two-dimensional electrophoresis. Among the separated proteins, 51 diverse protein spots were present differently in response to extreme temperatures. Using tandem mass spectrometry sequencing analysis 39 proteins were successfully identified, which included 13 oxidoreductases, 10 binding proteins, 5 transferases, and 2 each of lyases, isomerases, ligases, and developmental proteins. Subsequently, the expression of these protein transcripts was studied by RT-qPCR to validate the proteomic results. In conclusion, this study provides a first look into the thermal stress response of B. dorsalis at the protein level, and thus it paves the way for further functional studies in the physiological mechanism related to thermal stress. (C) 2015 Elsevier Ltd. All rights reserved.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
Abstract: The lethal and sub-lethal effects of sporulated cultures of a novel Bacillus cereus sensu lato strain lacking detectable cry genes and identified through morphological and genetic analyses, have been studied on the Mediterranean fruit fly Ceratitis capitata. The lethal effects on young larvae were concentration dependent, with a median lethal concentration (LC50) of 4.48 x 10(8) spores/g of diet. Sporulated cultures of this strain significantly extended development time and reduced immature survival, and the size of emerging fly adults. Besides spores, the toxicity has been associated to the insoluble extra-sporule fraction characterized through a proteomic approach. The profile of the extra-sporule protein fraction (ES) showed major protein bands within the 35-65 kDa range. The results of mass spectrometry analysis highlighted the presence of putative virulence factors, including members of protein families previously associated to the insecticidal action of other microbial entomopathogens. These proteins include metalloproteases, peptidases and other enzymes. (C) 2015 Elsevier Inc. All rights reserved.

Record 27 of 78

By: Dowell, RV (Dowell, Robert V.)

Title: Attraction of non-target insects to three male fruit fly lures in California

Source: PAN-PACIFIC ENTOMOLOGIST

Volume: 91

Issue: 1

Pages: 1-19

Published: MAR 2015

Abstract: The attraction of non-target insects to the male fruit fly lures methyl eugenol (1,2-Dimethoxy-4-prop-2-en-1-ylbenzene), cue-lure (4-[4-(acetyloxy) phenyl]-2-butanone), and trimedlure (t-Butyl-2-methyl-4-chlorocyclohexanecarboxylate) was examined in the main plant communities in California, except the desert, in 2012 and 2013. A total of 39,166 non-target insects were trapped during the study. Of these, 27 species or morphospecies in five orders and 20 families were deemed as attracted to one of the male lures. The most common of these were in the Syrphidae (Diptera) genera: Platycerus Le Peletier & Serville, 1828, Melanostoma Schiner, 1860, Meliscaeva Zetterstadt, 1843, Ferdinandea Latreille, 1802, Hadromyia Verrall, 1901, Blera Billberg, 1820, and Melangyna Williston, 1882, as well as the genus Empis Linnaeus, 1758 (Diptera: Empididae) and the genus Orchesia Latreille, 1807 (Coleoptera: Melandryidae). The low capture rate of these non-target insects (<4/day maximum), combined with the discrete nature of the California Department of Food and
Little information exists concerning the distribution of fruit flies in the genus Rhagoletis Loew, 1862 (Diptera: Tephritidae) in Montana, western U.S.A. Here, the presence of and host plant use by Rhagoletis spp. are documented in northwestern Montana. The western cherry fruit fly, Rhagoletis indifferens Curran, 1932, was abundant in the state and infested sweet cherry, Prunus avium (L.) L.; mahaleb cherry, P. mahaleb L.; tart cherry, P. cerasus L.; and bitter cherry, P. emarginata (Douglas ex Hook.) D. Dietr. (Rosaceae). Black cherry fruit fly, R. fausta (Osten-Sacken, 1877), was rare and detected only in bitter cherry. Rhagoletis berberis Curran, 1932, R. basiola (Osten-Sacken, 1873), R. tabellaria (Fitch, 1855), and apple maggot, R. pomonella (Walsh, 1867), were all recorded for the first time in Montana. Flies in Montana were mainly reared from previously reported species of host plants, but new host records also documented include R. indifferens from black hawthorn, Crataegus douglasii Lindl. (Rosaceae), a new Montana record; R. berberis from sweet cherry; R. basiola from baldhip rose, Rosa gymnocarpa Nutt. (Rosaceae); and R. tabellaria from Hooker's fairy bells, Prosartes hookeri Torr. (Liliaceae). Rhagoletis pomonella, likely introduced into the western U.S., was reared from C. douglasii but not from the relatively few domesticated apple trees, Malus domestica Borkh., (Rosaceae) sampled. The findings extend the known geographic ranges of four Rhagoletis species and indicate that some flies in northwestern Montana have the ability to survive and develop in alternative and novel hosts, consistent with findings for populations in other areas of the western U.S.
Female remating inhibition and fitness of Bactrocera dorsalis (Diptera: Tephritidae) associated with male accessory glands

Source: FLORIDA ENTOMOLOGIST
Volume: 98
Issue: 1
Pages: 52-58
Published: MAR 2015

Abstract: Polyandry is widespread among insects but male accessory gland products can influence the propensity of former mates to copulate later with other males. In addition, females may receive nutritional supplements in accessory gland fluids that substantially increase fitness regardless of whether remating has been inhibited. In this study, we investigated polyandry in female Bactrocera dorsalis (Hendel) (Diptera: Tephritidae) and the relationship between remating and male accessory gland contents. Similar to other fruit flies, 2 kinds of accessory glands were observed in male B. dorsalis. Male mesodermal accessory glands expanded significantly in length and area when copulation finished. A remating refractory period occurred in B. dorsalis females, but it did not differ in duration following copulations with either virgin or non-virgin males. Besides, we found that virgin females lived longer, but produced much fewer eggs than mated females. Remating with a refractory period resulted in more eggs being laid and offspring produced than continuous exposure to 2 mates. In addition, females in the continuous presence of 2 males produced significantly more offspring than females with only 1 male present. We also observed that increases in male and female age reduced the rate of fertilization. These results indicated that multiple matings increased the fitness of B. dorsalis females, although remating inhibition existed in B. dorsalis fruit flies. It is the great reproductive ability of B. dorsalis that enable flourishing populations to occur in wild.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 0031-0603
Accession Number: WOS:000352486900004

Phylogeny of the genus Paramyiolia Shiraki (Diptera: Tephritidae: Trypetini) with descriptions of five Chinese species

Source: FLORIDA ENTOMOLOGIST
Volume: 98

By: Han, HY (Han, Ho-Yeon); Chen, XL (Chen, Xiao-Lin)

Title: Phylogeny of the genus Paramyiolia Shiraki (Diptera: Tephritidae: Trypetini) with descriptions of five Chinese species

Source: FLORIDA ENTOMOLOGIST
Volume: 98
We recognize the following 5 species of Paramyiolia Shiraki (Diptera: Tephritidae: Trypetini) in China: P. atra, sp. nov., P. atrifasciata, sp. nov., P. melanogaster, sp. nov., P. nigrihumera, sp. nov., and P. yunnana (Wang), comb. nov. These species have almost identical wing patterns as Japanese P. cornuta (Ito), and, thus, here we refer to them jointly as the P. cornuta species group. Monophyly of this species group is supported by a cladistic analysis using morphological characters of all the 9 Paramyiolia species known in the world. Our earlier assumption about the disjunct occurrence of East Asian and North American Paramyiolia as a typical Arcto-Tertiary relict distribution is also strengthened by the discovery of the 5 Chinese species. In addition, we provide a revised key to the world Paramyiolia species and descriptions of all 5 Chinese species supplemented by their photographs including genitalic structures. We also made DNA barcoding analyses using 13 specimens representing 4 outgroup and 3 Paramyiolia species (P. atra, P. nigricornis (Doane), and P. rhino (Steyskal)). The DNA barcoding result only topologically supports the monophyly of Old and New World Paramyiolia together, but statistically supports the monophyly of the New World Paramyiolia. Interestingly, it rather clearly suggests possible existence of 2 cryptic species from the samples we identified as P. rhino based on the current taxonomic concept of this nominal species. Furthermore, one of these cryptic species appears to be more closely related genetically to the morphologically distinct P. nigricornis than to the other cryptic species.
0.24 g a.i. L-1 of spinosad, and to compare its performance to a few other formulations with spinosad and malathion mixed either in hydrolyzed corn protein (Biofruit (R) 3%) or in sugarcane molasses (7%) on adults Anastrepha fraterculus (Wiedemann) (Diptera: Tephritidae) in the laboratory, greenhouse and field conditions. In the laboratory, formulations with spinosad caused mortality equivalent to malathion-based toxic baits 96 h after exposure of the insects, regardless of the attractive substance used. In the greenhouse, Success* 0.02 CB (R), resulted in mortality of 81.9% of A. fraterculus adults 7 days after application of treatment; being significantly superior to either standard spinosad or malathion treatments (mortality between 44.1 to 62.1%) in the same evaluation period. In field, in the absence of rain, Success* 0.02 CB (R) and spinosad formulations with Biofruit (R) 3% or sugarcane molasses (7%) caused mortalities from 70.0 to 83.0% up to 7 DAT, not differing statistically from the malathion treatments (mortality of 100%) during this time. However, at 10 DAT only malathion formulations with Biofruit (R) 3% or sugarcane molasses (7%) substantial mortalities, i.e., 73.3% and 76.7%, respectively, which were superior to formulations with spinosad (mortality < 45%). However, at 14 DAT all tested formulations caused less than 40% mortality of A. fraterculus adults. One day after a rain (3.8 mm), the formulations with malathion caused mortalities between 56.7 and 81.8%, which were statistically superior to the formulations with spinosad (mortality < 20%). However, after the occurrence of an additional 0.4 mm of rain, all formulations caused mortality lower than 15%. Biofruit (R) 3% can be used as a replacement for sugarcane molasses (7%) in formulating toxic baits and Success* 0.02 CB (R) and other formulations with spinosad may be used to replace malathion to manage populations of A. fraterculus. In practical field operations, the effectiveness of toxic bait formulations may be extended by applying them to the lower canopy where they are partially protected from rain.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 0015-4040

**Accession Number:** WOS:000352087500034
sexing strains are an economical and efficient improvement for SIT, the Moscafrut Program in Mexico developed the Tapachula-7 (Tap-7) strain of Anastrepha ludens (Loew) from which the female flies emerge from black pupae and can be separated mechanically allowing release of predominantly male flies. This study compared the field dispersal and survival of Tap-7 adult males with those of standard mass-reared adult males (SMR strain) after irradiation, packaging, and an aerial release of chilled adults. The Tap-7 strain exhibited a statistically larger dispersal pattern and slightly lower, although not statistically significant, survival compared with the SMR strain. These results show that both strains should perform similarly in the field and suggest that the Tap-7 strain could replace the standard one for field release of sterile flies against A. ludens wild populations in the near future, reducing costs in the use of the SIT.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 0015-4040

**Accession Number:** WOS:000352087500035

---

**Record 33 of 78**

**By:** Molina-Nery, MC (Molina-Nery, Mayra C.); Ruiz-Montoya, L (Ruiz-Montoya, Lorena); Zepeda-Cisneros, CS (Silvia Zepeda-Cisneros, C.); Liedo, P (Liedo, Pablo)

**Title:** Genetic Structure of Populations of Anastrepha ludens (Diptera: Tephritidae) in Mexico (vol 97, pg 1648, 2014)

**Source:** FLORIDA ENTOMOLOGIST

**Volume:** 98

**Issue:** 1

**Pages:** 398-398

**Published:** MAR 2015

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 0015-4040

**Accession Number:** WOS:000352087500069

---

**Record 34 of 78**

**By:** Buentello-Wong, S (Buentello-Wong, S.); Galan-Wong, L (Galan-Wong, L.); Arevalo-Nino, K (Arevalo-Nino, K.); Almaguer-Cantu, V (Almaguer-Cantu, V.); Rojas-Verde, G (Rojas-Verde, G.)

**Title:** Characterization of Cry Proteins in Native Strains of Bacillus thuringiensis and Activity against Anastrepha ludens

**Source:** SOUTHWESTERN ENTOMOLOGIST
Bacillus thuringiensis (Berliner) strains isolated from soil of citrus orchards were tested for insecticidal activity against the Mexican fruit fly, Anastrepha ludens (Loew), a key citrus pest in Mexico. From a total of 55 soil samples, 201 isolates were selected, for a total B. thuringiensis index of 0.66. The collection was characterized through light microscopy, polyacrylamide gel electrophoresis (SDS-PAGE), and PCR analysis detecting cry2, cry4, cry10, cry11, and cry19 genes. Of the 201 isolates, 51% produced ovoid crystals, 28% adhered to the spore, 15% were pleomorphic, 3% were bipyramidal, 2% cubic, and 1% was pyramidal type. Six colonies were positive for the cry10 gene and one for the cry19 gene. SDS-PAGE of spore-crystal preparations revealed seven electrophoresis patterns. These were bioassayed against Mexican fruit fly adults, obtaining maximum mortality of 28%.
Niche breadth and interspecific competition between Doryctobracon crawfordi and Diachasmimorpha longicaudata (Hymenoptera: Braconidae), native and introduced parasitoids of Anastrepha spp. fruit flies (Diptera: Tephritidae)

Source: BIOLOGICAL CONTROL

Volume: 82
Pages: 86-95
DOI: 10.1016/j.biocontrol.2014.12.008
Published: MAR 2015

Abstract: Interactions among multiple natural enemies can enhance or interfere with their impacts on host/prey populations. Such could be the case with two species of Braconidae that are currently considered for augmentative biological control of pestiferous tephritid fruit flies in Mexico: the exotic Diachasmimorpha longicaudata (Ashmead) and the native Doryctobracon crawfordi (Viereck). Since niche overlap and competition could influence the range and effectiveness of these parasitoids were they to be released together, we compared behaviors and morphologies that might influence their access to hosts. These included ovipositor length, diel pattern of oviposition, effect of host instar on development, host range, host-depth, foraging success in different sized host patches, and effects of super- and multi-parasitism. Intra- and interspecific adult interactions on host patches were also observed. There were significant overlaps in ovipositor length, diel patterns of oviposition, preferred host age, and host depth and size. Doryctobracon crawfordi failed to exploit Anastrepha obliqua and Ceratitis capitata, while Doryctobracon longicaudata parasitized four tephritid species. Doryctobracon longicaudata dominated Doryctobracon crawfordi in multi-parasitism tests and was also better able to survive superparasitism than its competitor. Our results suggest that simultaneous augmentative release of these two species would result in substantial competition. However, because Doryctobracon crawfordi is naturally found at greater densities than Diachasmimorpha longicaudata at high elevations, perhaps because of greater tolerance for cold temperatures, releases in such areas might yield better results than releases of its otherwise superior competitor. (C) 2015 Elsevier Inc. All rights reserved.
**Record 37 of 78**

**By:** Phillips, CB (Phillips, C. B.); Iline, II (Iline, I. I.); Novoselov, M (Novoselov, M.); McNeill, MR (McNeill, M. R.); Richards, NK (Richards, N. K.); van Koten, C (van Koten, C.); Stephenson, BP (Stephenson, B. P.)

**Title:** Methyl bromide fumigation and delayed mortality: safe trade of live pests?

**Source:** JOURNAL OF PEST SCIENCE

**Volume:** 88

**Issue:** 1

**Pages:** 121-134

**DOI:** 10.1007/s10340-014-0573-7

**Published:** MAR 2015

**Abstract:** Live organisms intercepted from treated commodities during phytosanitary inspections usually arouse suspicions of treatment failure, sub-standard treatment application, or post-treatment infestation. The additional possibility that some treatments could kill slowly, meaning commodities might be inspected before pests have succumbed, is seldom considered for treatments other than irradiation. We used a novel biochemical viability assay to measure delays between methyl bromide fumigation and mortality of dipteran eggs, and evaluated the correspondence between egg viability and egg morphological features. Our experimental conditions simulated shipping of rock melons from Australia to New Zealand by sea and air. No eggs survived fumigation, but they took 3-20 days to die, whereas phytosanitary inspections of rock melons occur within 2-7 days. Delays were not influenced by methyl bromide concentration, but were significantly lengthened by cooler storage temperatures. Methyl bromide's preservative effects delayed degradation of egg morphology, so the biochemical assay detected mortality long before morphological signs of egg death appeared. The results show that commodities subjected to effective methyl bromide treatments are at risk of being inspected before all pests have either died, or started to exhibit morphological signs of death. This could cause commodities to be unnecessarily rejected by quarantine authorities. Better methods than inspection for live pests are needed to assist authorities to gain assurance that treated commodities have been effectively disinfested. These could be developed by exploiting biochemical responses of pests and commodities to treatments.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 1612-4758

**Accession Number:** WOS:000350039000014

---

**Record 38 of 78**

**By:** Hsu, JC (Hsu, Ju-Chun); Huang, LH (Huang, Li-Hsin); Feng, HT (Feng, Hai-Tung); Su, WY (Su, Wen-Yin)

**Title:** Do organophosphate-based traps reduce control efficiency of resistant tephritid flies?

**Source:** JOURNAL OF PEST SCIENCE
Abstract: Organophosphate (OP) insecticides have been an effective control of several tephritid pests. Recently, OP resistance has been observed in various fly species from different localities. However, in cases where resistance to an OP is exhibited in the field, evaluations of the efficiency of trapping with lures mixed with the same OP toxicants have not been carried out. To address this, the trapping and killing efficiency of lures with OP toxicants was assessed for flies from lines of Bactrocera dorsalis exhibiting resistance and susceptibility to OP insecticides. Specifically, bioassays were conducted with males from susceptible, resistant, and revertant lines (derived by relaxation of selection in the resistant line). The trapping and killing efficiencies of traps containing concentrations of 5 or 2.5 % naled were assayed at different exposure times. For the susceptible line, the number of dead flies found inside and outside of the trap was significantly lower than that of the other two tested lines. The number of dead flies found outside was significantly lower for the 2.5 % naled concentration compared to that of the 5 % concentration. Additionally, an analysis of genotypes showed that in trapped males, the frequencies of alleles of the acetylcholinesterase gene associated with resistance were lower compared to males of the field population collected from the same localities. In conclusion, for cases where fly lines exhibit insecticide resistance, the use of toxicant lures laced with the same insecticides may severely impact trapping effectiveness and may result in further increases of the frequency of resistant genotypes in the population.
Abstract: Hypotheses exploring the influence of dietary conditions on the life-history trade-off between survival and reproductive success are extensively tested in female insects but only rarely explored in males. The present study examines the impact of dietary quality and female access on age-specific reproduction and survival of the male Mexican fruit fly Anastrepha ludens Loew (Diptera: Tephritidae). There is a clear cost of female access for males with access to dietary protein, measurable as a decrease in life expectancy, which is further influenced by the age when females are introduced. A protein deficient diet reduces the lifespan benefit of virginity and masks the detrimental effect of female access on male life expectancy. Dietary protein is not necessary for reproductive success, although access to protein at eclosion improves the lifetime reproductive success of males compared to when it is delayed. Overall, reproductive success diminishes as the male flies age, regardless of the dietary conditions, providing evidence for reproductive senescence in males. Delaying the males' access to a protein source fails to influence the negative effect of age on reproductive ability. Because age-specific reproductive rates decline with age, regardless of diet, male fitness does not benefit from lifespan extension. Therefore, males can be expected to allocate available resources towards reproductive effort in favour of an extended lifespan, regardless of mate and protein availability.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 0307-6962
Accession Number: WOS:000349993900008

Record 40 of 78
By: Cha, DH (Cha, Dong H.); Hesler, SP (Hesler, Stephen P.); Park, S (Park, Shinyoung); Adams, TB (Adams, Todd B.); Zack, RS (Zack, Richard S.); Rogg, H (Rogg, Helmuth); Loeb, GM (Loeb, Gregory M.); Landolt, PJ (Landolt, Peter J.)
Title: Simpler is better: fewer non-target insects trapped with a four-component chemical lure vs. a chemically more complex food-type bait for Drosophila suzukii
Source: ENTOMOLOGIA EXPERIMENTALIS ET APPLICATA
Volume: 154
Issue: 3
Pages: 251-260
DOI: 10.1111/eea.12276
Published: MAR 2015
Abstract: Baits - fermented food products - are generally attractive to many types of insects, which makes it difficult to sort through non-target insects to monitor a pest species of interest. We test the hypothesis that a chemically simpler and more defined attractant developed for a target insect is more specific and attracts fewer non-target insects than a chemically more complex food-type bait. A four-component chemical lure isolated from a food bait and optimized for the spotted wing drosophila (SWD), Drosophila suzukii (Matsumura) (Diptera: Drosophilidae), was compared to the original wine/vinegar bait to assess the relative responses of non-target insects. In several field experiments in Washington State, USA, it was shown that numbers of pest muscid flies, cutworm and
armyworm moths, and pest yellowjackets were reduced in traps baited with the chemical lure compared to the wine/vinegar bait. In other field experiments in the states of Washington, Oregon, and New York, numbers of non-target drosophilid flies were also reduced in traps baited with the chemical lure relative to wine/vinegar bait. In Washington, numbers of Drosophila melanogaster Meigen and Drosophila obscura Fallen species groups and Drosophila immigrans Sturtevant were reduced in the chemical lure traps, whereas in New York, D.melanogaster and D.obscura species groups, D.immigrans, Drosophila putrida Sturtevant, Drosophila simulans Sturtevant, Drosophila tripunctata Loew, and Chymomyza spp. numbers were reduced. In Oregon, this same effect was observed with the D.melanogaster species group. Taken together, these results indicate that the four-component SWD chemical lure will be more selective for SWD compared to fermentation baits, which should reduce time and cost involved in trapping in order to monitor SWD.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 0013-8703

**Accession Number:** WOS:000349625800009
By: Awad, AA (Awad, Azza A.); Mohamed, HO (Mohamed, Hend O.); Ali, NA (Ali, Nashat A.)

Title: Differences in Antennal Sensillae of Male and Female Peach Fruit Flies in Relation to Hosts

Source: JOURNAL OF INSECT SCIENCE

Volume: 15

DOI: 10.1093/jisesa/ieu178

Published: FEB 16 2015

Abstract: Antennal sensillae of male and female peach fruit flies, Bactrocera zonata (Saunders) (Diptera: Tephritidae), obtained from three different host fruit species (guava, Psidium guajava L. (Myrtales: Myrtaceae); peach, Prunus persica (L.) Stokes (Rosales: Rosaceae); and orange, Citrus sinensis (L.) Osbeck (Sapindales: Rutaceae)), were studied with scanning electron microscopy. This study was carried out to describe the different types of sensillae present on the three antennal segments (scape, pedicel, and flagellum or funiculus) of both sexes of B. zonata on different host fruit. The antennal segments of females tended to be larger than those of males feeding on peach and guava fruit. On orange, both sexes were similar (no significant differences were found). The first two antennal segments, scape and pedicel, are reinforced by some bristles and have different types of sensillae, including trichoid I, II, S; basiconic II; and sensilla chaetica in different numbers on different host fruit species. Numerous microtrichia, as well as trichoid (I, II), basiconic (I), clavate, and coeloconic (I, II) sensillae were observed on the funiculus with a great variation in number and length. As a result of feeding on different hosts, differences were found between sexes and some plasticity in size, number, distribution, and position of some sensillae, including trichoid, basiconic, chaetica, and clavate on the antennae of the female B. zonata. These sensillae were significantly larger in females. Also, some morphological and morphemetric differences have been found according to their feeding on different host fruit.
Title: Implementing a Spinosad-Based Local Bait Station to Control Bactrocera cucurbitae (Diptera: Tephritidae) in High Rainfall Areas of Reunion Island

Source: JOURNAL OF INSECT SCIENCE

Volume: 15
DOI: 10.1093/jisesa/ieu178
Published: FEB 16 2015

Abstract: Three species of fruit flies cause serious damage to cucurbit crops on Reunion Island: Bactrocera cucurbitae (Diptera: Tephritidae) (Coquillett 1899), Dacus ciliatus (Loew 1901), and Dacus demmerezi (Bezzi 1917). To control them, a program of agroecological management of cucurbit flies has been implemented based on the application of Syneis-appat, especially spot sprays on corn borders. However, the high rainfall on Reunion Island limits the long-term efficiency of the bait; in addition, this method cannot be used for large chayote trellises, because corn borders cannot be planted around them. The aim of this study was to design a bait station adapted to prevailing conditions on Reunion Island. An 'umbrella trap' tested in Taiwan was used as a reference to compare its efficacy with our local bait station. Experiments were conducted in field cages on B. cucurbitae to test different characteristics of bait stations and to construct one using local materials. Results were validated in the field. The attractiveness of the bait station was related mainly to the color of the external surface, yellow being the most attractive color. The efficacy of the bait station with respect to fly mortality was found to be linked to the accessibility of the bait, and direct application of Syneis-appat on the bait station was found to be the most efficient. In the field, B. cucurbitae were more attracted to the local bait station than to the umbrella trap, while the two other fly species displayed equal attraction to both trap types. Our local bait station is a useful alternative to spot sprays of Syneis-appat and is now included in a local pest management program and is well accepted by farmers.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 1536-2442
Accession Number: WOS:000350845700006

By: Gantz, JD (Gantz, J. D.); Lee, RE (Lee, Richard E., Jr.)

Title: The limits of drought-induced rapid cold-hardening: Extremely brief, mild desiccation triggers enhanced freeze-tolerance in Eurosta solidaginis larvae

Source: JOURNAL OF INSECT PHYSIOLOGY

Volume: 73
Pages: 30-36
Published: FEB 2015

Abstract: Rapid cold-hardening (RCH) is a highly conserved response in insects that induces physiological changes within minutes to hours of exposure to low temperature and provides protection from chilling injury. Recently, a similar response, termed drought-induced RCH, was described following as little as 6 h of desiccation, producing a loss of less than 10% of fresh mass. In this study, we investigated the limits and mechanisms of this
response in larvae of the goldenrod gall fly Eurosta solidaginis (Diptera, Tephritidae). The cold-hardiness of larvae increased markedly after as few as 2 h of desiccation and a loss of less than 1% fresh mass, as organismal survival increased from 8% to 41% following exposure to -18 degrees C. Tissue-level effects of desiccation were observed within 1 h, as 87% of midgut cells from desiccated larvae remained viable following freezing compared to 57% of controls. We also demonstrated that drought-induced RCH occurs independently of neuroendocrine input, as midgut tissue desiccated ex vivo displayed improved freeze-tolerance relative to control tissue (78-11% survival, respectively). Finally, though there was an increase in hemolymph osmolality beyond the expected effects of the osmo-concentration of solutes during dehydration, we determined that this increase was not due to the synthesis of glycerol, glucose, sorbitol, or trehalose. Our results indicate that E. solidaginis larvae are extremely sensitive to desiccation, which is a triggering mechanism for one or more physiological pathways that confer enhanced freeze-tolerance. (C) 2015 Elsevier Ltd. All rights reserved.
polyphagous Heteroptera species are identified as main taxa feeding on inflorescences and seeds of J. cyanoides, with a potential to reduce the plant's sexual reproduction. The impact of phytophagous insects is, however, considered only a secondary reason for the decline of the Czech populations of J. cyanoides on which a fairly low number of insect species were recorded in comparison with Ukraine and Germany; habitat loss and inbreeding effect are probably major negative factors. Several new host plant-insect and host-parasitoid associations are reported for insects on J. cyanoides.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 0006-3088

**Accession Number:** WOS:000351932000013

---

**Record 46 of 78**

**By:** Wise, JC (Wise, J. C.); Vanderpoppen, R (Vanderpoppen, R.); Vandervoort, C (Vandervoort, C.); O'Donnell, C (O'Donnell, C.); Isaacs, R (Isaacs, R.)

**Title:** Curative activity contributes to control of spotted-wing drosophila (Diptera: Drosophilidae) and blueberry maggot (Diptera: Tephritidae) in highbush blueberry

**Source:** CANADIAN ENTOMOLOGIST

**Volume:** 147

**Issue:** 1

**Pages:** 109-117

**DOI:** 10.4039/tce.2014.36

**Published:** FEB 2015

**Abstract:** Semi-field experiments were used to compare the curative activity of insecticides on spotted-wing drosophila (Drosophila suzukii (Matsumura) (Diptera: Drosophilidae)) and blueberry maggot (Rhagoletis mendax Curran (Diptera: Tephritidae)) in blueberry fruit. The organophosphate phosmet, the spinosyn spinetoram, and neonicotinoids imidacloprid, acetamiprid, and thiamethoxam showed significant lethality on spotted-wing drosophila and blueberry maggot larvae and eggs, when applied topically to blueberry fruit post-infestation. The pyrethroids fenpropathrin and zeta-cypermethrin showed high levels of post-infestation activity on spotted-wing drosophila larvae or eggs, and indoxacarb showed statistically weaker activity. Curative activity is a previously unrecognised contributor to the overall means by which blueberry growers may achieve control of spotted-wing drosophila and blueberry maggot with the use of insecticides in blueberries.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 0008-347X

**Accession Number:** WOS:000350874700010
In the present study, susceptibility of field-collected adult Bactocera dorsalis to the insecticides, malathion, trichlorofon and lambda-cyhalothrin, at field-recommended use rates was investigated in the laboratory. Adult fly mortality was assessed at predetermined post-treatment time intervals. The exposed B. dorsalis population was found to be susceptible to all tested insecticides. There was no difference in mortality among male and female flies exposed to malathion or trichlorofon; however, lambda-cyhalothrin-treated males died, in significantly less time, than the females. The calculated LD50 and LT50 values suggested that malathion was more toxic than trichlorofon and lambda-cyhalothrin. The toxicity data suggests that the tested insecticides are effective against B. dorsalis in the field-collected sites and could be economically used in the field for population management of the fruit fly.
reared on each of these diets were also quantified. The diet with the highest nutrient and energy content was Xal2 followed by Met2 and Met1, but larval recovery and percent pupation was significantly higher in flies reared on either the Met1 or Met2 diets. A. ludens reared on Xal2 exhibited the highest proportion of adults capable of flight. No other response variable differed significantly among the three diets tested. This suggests that a high content of nutrients and multiple sources of protein (dried yeast and wheat germ in the case of the Xal2 diet) do not necessarily improve overall performance or fly quality. We conclude that nutritious diets for A. ludens can be modified to reduce their cost without compromising the performance of artificially reared flies.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 0022-0493
Accession Number: WOS:000350033700008

Record 49 of 78
By: Arredondo, J (Arredondo, Jose); Ruiz, L (Ruiz, Lia); Lopez, G (Lopez, Gladis); Diaz-Fleischer, F (Diaz-Fleischer, Francisco)
Title: Determination of the Host Status of the 'Persian' Lime (Citrus latifolia Tanaka) for Anastrepha ludens (Loew) (Diptera: Tephritidae)
Source: JOURNAL OF ECONOMIC ENTOMOLOGY
Volume: 108
Issue: 1
Pages: 77-87
DOI: 10.1093/jee/tou014
Published: FEB 2015
Abstract: Field and laboratory no-choice oviposition tests were performed to determine whether the 'Persian' lime (Citrus latifolia Tanaka) is a host of Anastrepha ludens Loew (Diptera: Tephritidae). Trapping and fruit sampling were performed to determine adult population densities and the level of infestation in the two lime orchards. Additionally, unharvested and harvested limes were exposed to sexually mature flies and the number of eggs laid and the immature developmental rates were determined. As a control, parthenocarpic 'Ataulfo' mangoes (Mangifera indica L.), a suitable host for A. ludens, were exposed to similar experimental procedures. The fecundity and fertility of adults obtained from limes and mangoes were compared. Our results demonstrate that A. ludens, under forced infestation conditions, oviposit on limes and also on control fruit. However, differences were detected in unharvested and harvested fruit, as unharvested limes were not infested. In the case of harvested fruit, the numbers of eggs laid and survival rates of immatures were significantly lower for 'Persian' limes compared with mangoes. Egg clutches were larger in limes than in mangoes, and most were deposited in the albedo rather than in the pulp. Moreover, oviposition rates were much higher in limes than in mangoes. Despite the fact that few of the immatures reached adulthood, the females obtained from limes were as fecund and fertile as those obtained from mangoes. Although adult A. ludens flies were captured in the two orchards, fruit sampling showed a complete absence of natural
infestation among 'Persian' limes. We discuss the importance of our findings for determining the host status for 'Persian' limes.

**Record 50 of 78**

**By:** Zhan, GP (Zhan Guoping); Ren, LL (Ren Lili); Shao, Y (Shao Ying); Wang, QL (Wang Qiaoling); Yu, DJ (Yu Daojian); Wang, YJ (Wang Yuejin); Li, TX (Li Tianxiu)

**Title:** Gamma Irradiation as a Phytosanitary Treatment of Bactrocera tau (Diptera: Tephritidae) in Pumpkin Fruits

**Source:** JOURNAL OF ECONOMIC ENTOMOLOGY

**Volume:** 108

**Issue:** 1

**Pages:** 88-94

**DOI:** 10.1093/jee/tou013

**Published:** FEB 2015

**Abstract:** The fruit fly Bactrocera tau (Walker) is an important quarantine pest that damages fruits and vegetables throughout Asian regions. Host commodities shipped from infested areas should undergo phytosanitary measures to reduce the risk of shipping viable flies. The dose-response tests with 1-d-old eggs and 3-, 5-, 7-, 8-d-old larvae were initiated to determine the most resistant stages in fruits, and the minimum dose for 99.9968% prevention of adult eclosion at 95% confidence level was validated in the confirmatory tests. The results showed that 1) the pupariation rate was not affected by gamma radiation except for eggs and first instars, while the percent of eclosion was reduced significantly in all instars at all radiation dose; 2) the tolerance to radiation increased with increasing age and developmental stage; 3) the estimated dose to 99.9968% preventing adult eclosion from late third instars was 70.9 Gy (95% CL: 65.6-78.2, probit model) and 71.8 Gy (95% CL: 63.0-87.3, logit model); and iv) in total, 107,135 late third instars cage infested in pumpkin fruits were irradiated at the target dose of 70 Gy (62.5-85.0, Gy measured), which resulted in no adult emergence in the two confirmatory tests. Therefore, a minimum dose of 85 and 72 Gy, which could prevent adult emergence at the efficacy of 99.9972 and 99.9938% at the 95% confidence level, respectively, can be recommended as a minimum dose for phytosanitary treatment of B. tau in any host fruits and vegetables under ambient atmospheres.
Anastrepha fraterculus (Wiedemann, 1830) is the main pest of temperate climate orcharding. The study investigated the development of A. fraterculus related to phenological stage of blueberry, blackberry, strawberry guava, and Surinam cherry trees. The phenological stages I (green fruits), II (intermediate ripening stage of fruits), and III (fruits close to harvesting) were determined, and they are from 8th, 10th, and 11th week; 6th, 8th, and 9th week; 8th, 13th, and 16th week; and 5th, 6th, and 7th week after the first flowering of blueberry, blackberry, strawberry guava, and Surinam cherry trees, respectively. We collected fruits from orchards to determine the infestation index using the formula: number of pupa/fruit weight. To investigate the development of A. fraterculus, we determined the following biological parameters: egg-to-adult period, weight of pupae, oviposition period, fecundity, number of pupae, and number of infested fruits. The infestation index for the fruits collected in the field was greater in strawberry guava and Surinam cherry fruits. In the laboratory, the development of A. fraterculus occurred in stage III of blueberry. In blackberry, besides stage III, we also observed the development in stage II, however, at lower infestation. In strawberry guava, the development of A. fraterculus occurred in stages II and III, and the development in both stages was similar. For Surinam cherry, the development occurred in the three phenological stages with similar values for biological parameters. Overall, of the four hosts studied, the strawberry guava and Surinam cherry fruits allowed a better biological development of A. fraterculus, corroborating its preference for fruits native to Brazil.
Title: Mitochondrial Single Nucleotide Polymorphisms in Ceratitis capitata (Diptera: Tephritidae) Can Distinguish Sterile, Released Flies from Wild Flies in Various Regions of the World

Source: JOURNAL OF ECONOMIC ENTOMOLOGY

Volume: 108
Issue: 1
Pages: 301-306
DOI: 10.1093/jee/tou027
Published: FEB 2015

Abstract: In areas infested with pest species such as the Mediterranean fruit fly, Ceratitis capitata (Wiedemann) (Diptera: Tephritidae), many programs rely heavily on the sterile insect technique (SIT) as a form of biological control. However, when SIT treatments are used both for control of established infestations and for occasional outbreaks, for several reasons, programs are often unable to adequately quantify the success of this approach. Chief among these are difficulties associated with reliably and rapidly determining the strain of origin of males recaptured during and after the SIT program. In this study, we describe the use of a DNA-based marker that can be used to rapidly and reliably distinguish males originating from the two sterile strains that are most widely used in SIT rearing facilities from males originating from wild strains of various regions of the world. This method uses polymerase chain reaction amplification of material from individual specimens to directly analyze DNA sequence variants found within a portion of the mitochondrial ND4 subunit 4 (ND4) gene to identify single nucleotide polymorphisms (SNPs) that are diagnostic of different strains. Specifically, the SNPs described here reliably distinguish individual flies originating from the Vienna 7 and Vienna 8 strains used for sterile release from wild flies infesting various areas including Western Australia, Guatemala, and Hawaii. The availability of such markers for determination of the strain of origin of specimens, either from whole specimens or body parts (including their sperm), has great potential to improve the ability to monitor and quantify the success of any sterile release program.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 0022-0493
Accession Number: WOS:000350033700039

Record 53 of 78
By: Benelli, G (Benelli, Giovanni); Donati, E (Donati, Elisa); Romano, D (Romano, Donato); Stefanini, C (Stefanini, Cesare); Messing, RH (Messing, Russell H.); Canale, A (Canale, Angelo)
Title: Lateralisation of aggressive displays in a tephritid fly
Source: SCIENCE OF NATURE
Volume: 102
Issue: 1-2
Article Number: 1
Abstract: Lateralisation (i.e. different functional and/or structural specialisations of the left and right sides of the brain) of aggression has been examined in several vertebrate species, while evidence for invertebrates is scarce. In this study, we investigated lateralisation of aggressive displays (boxing with forelegs and wing strikes) in the Mediterranean fruit fly, Ceratitis capitata. We attempted to answer the following questions: (1) do medflies show lateralisation of aggressive displays at the population-level; (2) are there sex differences in lateralisation of aggressive displays; and (3) does lateralisation of aggression enhance fighting success? Results showed left-biased population-level lateralisation of aggressive displays, with no consistent differences among sexes. In both male-male and female-female conflicts, aggressive behaviours performed with left body parts led to greater fighting success than those performed with right body parts. As we found left-biased preferential use of body parts for both wing strikes and boxing, we predicted that the left foreleg/wing is quicker in exploring/striking than the right one. We characterised wing strike and boxing using high-speed videos, calculating mean velocity of aggressive displays. For both sexes, aggressive displays that led to success were faster than unsuccessful ones. However, left wing/legs were not faster than right ones while performing aggressive acts. Further research is needed on proximate causes allowing enhanced fighting success of lateralised aggressive behaviour. This is the first report supporting the adaptive role of lateralisation of aggressive displays in insects.

Times Cited in Web of Science Core Collection: 2
Times Cited in BIOSIS Citation Index: 1
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 2
ISSN: 0028-1042
Accession Number: WOS:000350307000001
if left unchecked in a mass-rearing setting. The males of the ANO IPCL1 have been shown to be equally competitive as lab-reared males of the wild-type Dongola strain, but competitiveness decreased by half when irradiated with 75 Gy - a dose conferring >98% sterility. More controversial issues surround the use of dieldrin - a highly persistent organochlorine that is known to bioaccumulate in the food chain. The prospective use of large volumes of dieldrin in a mass-rearing facility and the retention of its residues by the male mosquitoes makes the use of the strain in the context of the sterile insect technique against this vector highly questionable, and therefore its implementation at a large scale cannot be recommended. (C) 2014 The Authors. Published by Elsevier B.V.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 0001-706X
Accession Number: WOS:000349197200021
PubMed ID: 25438257

Record 55 of 78
By: Gregorio, PLF (Gregorio, Patricia L. F.); Sant'Ana, J (Sant'Ana, Josue); Pires, PD (Pires, Patricia D.)
Title: Behavioral analysis of learning and memory in Anastrepha fraterculus
Source: ENTOMOLOGIA EXPERIMENTALIS ET APPLICATA
Volume: 154
Issue: 2
Pages: 146-153
DOI: 10.1111/eea.12265
Published: FEB 2015

Abstract: We evaluate the influence of prior exposure to artificial substrate for oviposition on learning and memory in the fruit fly Anastrepha fraterculus (Wiedemann) (Diptera: Tephritidae). Some females were previously exposed to artificial fruits made of water, agar, and blackberry [Rubus spec. (Rosaceae)] or guava [Psidium guajava L. (Myrtaceae)] pulp for 48 and 72h. We also studied adult flies exposed for 72h to essential oil of lemongrass [Cymbopogon citratus (DC) Stapf, Poaceae] and adult flies from larvae exposed to the oil. Control females were naive with respect to these experimental substrates. Prior experience with blackberry-based artificial fruits resulted in an increase in the number of punctures and deposited eggs by A.fraterculus, and memory lasted for up to 72h. On the other hand, fly behavior was independent of exposure to guava-based substrate. Prior exposure of 1- or 15-day-old females to artificial substrate with lemongrass oil modified innate substrate selection behavior. The scent of lemongrass oil during the larval stage modified innate oviposition responses of adult A.fraterculus. The study shows that A.fraterculus females are able to learn and retain information through chemical stimuli released by both host (blackberry and guava) and non-host (lemongrass) species, and they can use olfactory memory obtained during the larval stage to select oviposition sites.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Residual attractiveness of various bait spray solutions to Bactrocera oleae

Effective insecticidal bait formulations ought to induce high levels of attraction and stimulate flies to ingest a lethal dose of the toxicant upon feeding or contact. The key to the effectiveness of such baits is the amount of time that the bait remains attractive to adult flies after spray application. Solutions of trophical attractants of Bactrocera oleae (two formulations of hydrolysed proteins at 55% and 75% w/w) mixed with various insecticides (alpha-cypermethrin, lambda-cyhalothrin and dimethoate) and a spinosad solution, applied either in McPhail traps or sprayed in olive foliage (except lambda-cyhalothrin), were tested for their attractiveness over time during two periods in successive summers. The results indicated that among all bait spraying solutions tested against B. oleae, the highest catches were recorded with both protein solutions of alpha-cypermethrin; its capture rate ranged from 7.6 to 10.5 olive fruit flies/trap/solution age (seven measurements were made when the trap solution was changed at 3, 7, 10, 14, 17, 20 and 24 days after its preparation). A three-day-old solution of any protein mixed with alphacypermethrin was significantly more attractive to olive fruit flies (at least three times) compared with the solutions at other ages, as indicated by the capture of flies in the McPhail traps. No differences were observed among solution ages for dimethoate solutions or spinosad solutions (less than 6 olive fruit flies/trap/week). When olive foliage was sprayed with the solutions under field conditions, they attracted approximately 0.3-1.5 adults per day for a 10-day period. The highest number of flies was recorded on both proteins combined with or without alpha-cypermethrin solution, as indicated by the catches on sticky transparent panels. Finally, changes in the pH values of the aforementioned solutions over time were associated with increased fly catches. (C) 2014 Elsevier Ltd. All rights reserved.
A reduction in Ceratitis capitata Wiedemann oviposition rate was observed on fruits treated with commercial formulations containing conidia of Beauveria bassiana. In an attempt to identify the main sources of disturbance for ovipositing flies, this study investigated the possible role of different fungal fractions in relation to C. capitata oviposition behavior on treated fruits.

Orange fruit treatments with different B. bassiana (Balsamo) Vuillemin preparations caused an oviposition deterrent effect in terms of reduction in the number of female visits/fruit and of oviposition punctures/fruit, in comparison to the untreated control. The most evident effects were observed for conidia-based preparations, while for the other fungal fractions assayed (mycelium and culture supernatants) these effects were moderate or negligible. These effects were concentration-dependent, and a maximum was achieved at the highest tested concentration of conidia ($10^8$/ml, 10 ml per fruit).

According to our results, we assumed that the physical and biochemical properties of conidia, in particular the rodlet layers of hydrophobins covering conidia surface, may impair the ability of C. capitata to detect orange-derived stimuli, such as orange odors and fruit humidity content. This hypothesis was supported by the significant decrease in the oviposition deterrent effect observed when fruits were treated with conidia deprived of the rodlet layer in comparison to equivalent suspensions of intact conidia. In addition, a suspension containing rodlet proteins alone at a concentration of 5 mg/ml also determined a significant reduction in the number of fruit visits and of oviposition punctures compared to an untreated control. (C) 2014 Elsevier Inc. All rights reserved.
BACKGROUND The oriental fruit fly, Bactrocera dorsalis (Hendel), is one of the most globally important insect pests. Studies were conducted with the novel anthranilic diamide insecticide cyantraniliprole to determine its lethal and sublethal effects on B. dorsalis.

RESULTS An ingestion toxicity bioassay showed that cyantraniliprole was active against B. dorsalis, and the 72 h feeding LC50 was 3.22 μg g(-1) in adult diet for a susceptible strain. Sublethal doses of cyantraniliprole (1.30 μg g(-1) adult diet) induced a hormesis effect on B. dorsalis. The mating competitiveness of B. dorsalis treated with cyantraniliprole at 3.27 μg g(-1) adult diet was significantly lower when compared with the controls. The lower dose (1.30 μg g(-1) adult diet) of cyantraniliprole improved the total mating times of both mating pairs in treated groups and also the mating competitiveness of the treated males when compared with the higher dose and controls. Cyantraniliprole-treated females of the mated pairs with the lower dose laid more eggs. On the fifth day, female receptivity in the treated group was significantly reduced when compared with the controls.

CONCLUSION These results indicate that cyantraniliprole is effective against B. dorsalis. The inhibition and stimulation effect of cyantraniliprole on the adult's mating performance at different concentrations was proved. (c) 2014 Society of Chemical Industry
By: David, KJ (David, K. J.); Singh, SK (Singh, Shakti Kumar)
Title: Two new species of Euphranta Loew (Diptera: Tephritidae: Trypetiane) and an updated key for the species from India
Source: ZOOTAXA
Volume: 3914
Issue: 1
Published: JAN 23 2015
Abstract: Two new species of genus Euphranta Loew, namely E. wrightiae sp. nov. and E. pseudocassiae sp. nov. are described from India. An updated key to Indian species of Euphranta is also provided.

By: Massebo, F (Massebo, Fekadu); Tefera, Z (Tefera, Zenebe)
Title: Status of Bactrocera invadens (Diptera: Tephritidae) in Mango-Producing Areas of Arba Minch, Southwestern Ethiopia
Source: JOURNAL OF INSECT SCIENCE
Volume: 15
DOI: 10.1093/jisesa/ieu166
Published: JAN 22 2015
Abstract: Bactrocera invadens, the Asian fruit fly, was first reported in Kenya in 2003, and it spread fast to most tropical countries in Africa. To our knowledge, there is no detailed data on the fruit damage and status of fruit flies in Arba Minch and elsewhere in Ethiopia. Hence, information on the species composition and pest status of the fruit fly species is urgent to plan management strategies in the area. Fruit flies were captured using male parahermone-baited traps. Matured mango (Mangifera indica) fruits were collected from randomly selected mango trees and incubated individually in cages (15 by 15 by 15 cm) with sandy soil. B. invadens was the predominant (96%; 952 of 992) captured species and the only fruit fly species emerging from mango fruits incubated in the laboratory. The mean number of adult B. invadens emerging per mango fruit was 35.25, indicating that the species is the most
devastating mango fruit fly in the area. The loss due to this species would be serious if no management strategies are implemented.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 1536-2442
Accession Number: WOS:000350847900001

Record 62 of 78
By: Uramoto, K (Uramoto, Keiko); Zucchi, RA (Zucchi, Roberto A.); Norrbom, AL (Norrbom, Allen L.)
Title: Redescription of three species of Anastrepha (Diptera, Tephritidae) rediscovered in Brazil, with the establishment of a new synonym
Source: ZOOTAXA
Volume: 3911
Issue: 3
Pages: 411-423
Published: JAN 20 2015
Abstract: The descriptions of Anastrepha matertela Zucchi and A. tenella Zucchi were based exclusively on the holotypes (female). Based on additional specimens collected in Brazil since their original descriptions, both species are redescribed and illustrated. A lectotype is designated for Anastrepha bivittata (Macquart, 1843), which also is redescribed and considered to be the senior synonym of A. fumipennis Lima, 1934.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 1175-5326
Accession Number: WOS:000347982500007
PubMed ID: 25661621

Record 63 of 78
By: Qin, YJ (Qin, Yujia); Paini, DR (Paini, Dean R.); Wang, C (Wang, Cong); Fang, Y (Fang, Yan); Li, ZH (Li, Zhihong)
Title: Global Establishment Risk of Economically Important Fruit Fly Species (Tephritidae)
Source: PLOS ONE
Volume: 10
Issue: 1
Article Number: e0116424
DOI: 10.1371/journal.pone.0116424
Published: JAN 14 2015

Abstract: The global invasion of Tephritidae (fruit flies) attracts a great deal of attention in the field of plant quarantine and invasion biology because of their economic importance. Predicting which one in hundreds of potential invasive fruit fly species is most likely to establish in a region presents a significant challenge, but can be facilitated using a self-organising map (SOM), which is able to analyse species associations to rank large numbers of species simultaneously with an index of establishment. A global presence/absence dataset including 180 economically significant fruit fly species in 118 countries was analysed using a SOM. We compare and contrast ranked lists from six countries selected from each continent, and also show that those countries geographically close were clustered together by the SOM analysis because they have similar fruit fly assemblages. These closely clustered countries therefore represent greater threats to each other as sources of invasive fruit fly species. Finally, we indicate how this SOM method could be utilized as an initial screen to support prioritizing fruit fly species for further research into their potential to invade a region.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 1932-6203
Accession Number: WOS:000347928300012
PubMed ID: 25588025
Our study investigates the host exploitation strategies of Eurytoma serratulae and E. robusta (Chalcidoidea, Eurytomidae), two parasitoid species that co-occur in gall populations of the tephritid Urophora cardui on Cirsium spp. The endoparasitoid E. serratulae detects the host larvae before an externally visible gall is formed. It profits from large galls, as its parasitization rate increases with increasing numbers of chambers per gall. Oviposition by the ectoparasitoid E. robusta does not occur until a distinct gall with chambers has been formed. Its parasitization rate reaches highest values in medium-sized galls. Eurytoma robusta is the dominant parasitoid in host populations with low and moderate gall densities, whereas E. serratulae is the superior exploiter of host populations with high gall densities. Within single galls E. robusta is an important hyperparasitoid of E. serratulae, but E. serratulae has no adverse influence on E. robusta. Parasitism by E. serratulae induces host larvae to promote gall growth, an effect that is profitable to both the parasitoid and the remaining host larvae in the gall. Parasitism by E. robusta often leads to smaller galls, as cases of unsuccessful parasitization result in empty gall cells.
We investigated the effects of inoculation by Metarhizium guizhouense PSUM02 on mating propensity and mating competitiveness of Bactrocera cucurbitae, with a view on pest management. On day 4 postinoculation, the M. guizhouense-treated male flies had significantly lowered mating propensity and mating competitiveness, while the treated female flies had reduced mating propensity on day 4 and reduced mating competitiveness on day 5. The mating propensity and competitiveness of treated male and female flies then further declined until death. Kaplan-Meier survival analysis of treated male and female flies gave average survival times (AST) of 6.2 +/- 0.2 and 5.4 +/- 0.3 days in the mating propensity assay, and about 5.0 +/- 0.1 and 4.4 +/- 0.2 days in the mating competitiveness assay. The AST of untreated flies ranged from 12.8 +/- 0.1 to 14.7 +/- 0.2 days for comparison (observation up to 15 days). Untreated flies had decreased AST and mating characteristics when exposed to contact with treated male flies, indicating transmission of the fungal infection by such contact also to untreated male flies. Surprisingly, contact with treated female flies did not affect the AST of untreated males or females in the same cage. These results corroborate the potential for pest control by autodissemination with treated male flies, which transmit the fungus to a healthy population better than the treated female flies.
Record 68 of 78
By: Castro, IP (Castro, Isabel Pereira); Van Asch, B (Van Asch, Barbara); Trindade Rei, F (Trindade Rei, Fernando); Teixeira da Costa, L (Teixeira da Costa, Lus)
Title: Bactrocera oleae (Diptera: Tephritidae) organophosphate resistance alleles in Iberia: Recent expansion and variable frequencies
Source: EUROPEAN JOURNAL OF ENTOMOLOGY
Volume: 112
Issue: 1
Pages: 20-26
Published: 2015
Abstract: The olive fly, Bactrocera oleae (Rossi, 1790) (Diptera: Tephritidae), is the most important pest of olive trees globally, causing losses that, in the absence of control measures, can exceed 90% of the crop. In the Mediterranean basin, where the overwhelming majority of production is concentrated (similar to 98%), organophosphate insecticides (OPs) have been the main tool for B. oleae control for the last four decades, leading to the development of resistance to these compounds. Mutations of the Ace gene, which codes for acetylcholinesterase, the target enzyme of OPs and other insecticides, have been identified as the underlying cause, with studies reporting mid to very high frequencies of resistance alleles in several countries. Interestingly, no resistance alleles were detected in Portugal, at the Western end of the Mediterranean basin. As the original study was done almost a decade ago and did not include many samples, we decided to re-evaluate the situation, by analysing a larger number of individuals from multiple locations in Western and Southern Iberia (Portugal and Spain). In our present study, resistance-associated Ace alleles were found to have become widespread in both regions, but with highly varying frequencies. Together with the observed haplotype distributions, this finding is consistent with previous suggestions of a recent, selection-driven spread and has implications for the importance of Ace mutations in organophosphate resistance in the field as well as the importance of gene flow between Mediterranean populations of B. oleae.

Record 69 of 78
By: Eirin-Lopez, JM (Eirin-Lopez, Jose M.); Sanchez, L (Sanchez, Lucas)
Title: The comparative study of five sex-determining proteins across insects unveils high rates of evolution at basal components of the sex determination cascade
Source: DEVELOPMENT GENES AND EVOLUTION
Volume: 225
Issue: 1
Abstract: In insects, the sex determination cascade is composed of genes that interact with each other in a strict hierarchical manner, constituting a coadapted gene complex built in reverse order from bottom to top. Accordingly, ancient elements at the bottom are expected to remain conserved ensuring the correct functionality of the cascade. In the present work, we have studied the levels of variation displayed by five key components of the sex determination cascade across 59 insect species, including Sex-lethal, transformer, transformer-2, fruitless, doublesex, and sister-of-Sex-lethal (a paralog of Sxl encompassing sex-independent functions). Surprisingly, our results reveal that basal components of the cascade (doublesex, fruitless) seem to evolve more rapidly than previously suspected. Indeed, in the case of Drosophila, these proteins evolve more rapidly than the master regulator Sex-lethal. These results agree with the notion suggesting that genes involved in early aspects of development will be more constrained due to the large deleterious pleiotropic effects of mutations, resulting in increased levels of purifying selection at top positions of the cascade. The analyses of the selective episodes involved in the recruitment of Sxl into sex-determining functions further support this idea, suggesting the presence of bursts of adaptive selection in the common ancestor of drosophilids, followed by the onset of purifying selection preserving the master regulatory role of this protein on top of the Drosophila sex determination cascade. Altogether, these results underscore the importance of the position of sex determining genes in the cascade, constituting a major constraint shaping the molecular evolution of the insect sex determination pathway.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 0949-944X
Accession Number: WOS:000349029300003
PubMed ID: 25613749
food availability. Seasonal timing is expected to be particularly important for species that are dependent on resources available during a short time window—so-called phenological specialists—and latitudinal clines in seasonality are expected to favor local adaptation in phenological timing. However, to what degree latitudinal variation in diapause dynamics and post-winter development due to such local adaptation is influenced by the degree of phenological specialization is not well known. We experimentally studied two pierid butterfly species and found that the phenological specialist Anthocharis cardamines had shorter diapause duration than the phenological generalist Pieris napi along a latitudinal gradient in Sweden. Moreover, diapause duration increased with latitude in P. napi but not in A. cardamines. Sensitivity of the two species to winter thermal conditions also differed; additional cold temperature during the winter period shortened diapause duration for P. napi pupae but not for A. cardamines pupae. In both species, post-winter pupal development was faster after longer periods of cold conditions, and more southern populations developed faster than northern populations. Post-winter development was also invariably faster at higher temperatures in both species. We argue that the observed differences in diapause dynamics between the two species might be explained by the difference in phenological specialization that influences the costs of breaking diapause too early in the season.
during early to mid-embryogenesis and Asrpr expression peaking in late embryogenesis. This correlated to acridine orange stained apoptotic cells first appearing at 17 h and increasing over time. However, when irradiated at 16 h post-oviposition embryos exhibited significant levels of apoptosis consistent with strong induction of Asrpr and Ashid transcript levels by gamma-irradiation in young embryos < 24 h post-oviposition. Furthermore, embryos irradiated < 24 h post-oviposition failed to hatch, those irradiated between 24 and 32 h had increased hatching rates, but between 48 and 72 h irradiation had no effect on egg hatching. This indicates a transition of embryos from an irradiation-sensitive to irradiation-resistance stage between 24 and 48 h. Throughout post-embryonic development, the two pro-apoptotic genes share similar patterns of up-regulated gene expression, which correlate to ecdysone-induced developmental events, especially during metamorphosis. Together these results provide the first direct evidence for a conserved molecular mechanism of the programmed cell death pathway in insects.

Times Cited in Web of Science Core Collection: 0
Times Cited in BIOSIS Citation Index: 0
Times Cited in Chinese Science Citation Database: 0
Times Cited in SciELO Citation Index: 0
Total Times Cited: 0
ISSN: 1360-8185
Accession Number: WOS:000347528900001
PubMed ID: 25433919

Record 72 of 78
By: Liu, HQ (Liu, Haoqiang); Jiang, GF (Jiang, Gaofei); Zhang, YF (Zhang, Yunfei); Chen, F (Chen, Fei); Li, XJ (Li, Xiaojiao); Yue, JS (Yue, Jiansu); Ran, C (Ran, Chun); Zhao, ZM (Zhao, Zhimo)
Title: Effect of Six Insecticides on Three Populations of Bactrocera (Tetradacus) minax (Diptera: Tephritidae)
Source: CURRENT PHARMACEUTICAL BIOTECHNOLOGY
Volume: 16
Issue: 1
Pages: 78-83
Published: 2015
Abstract: The Chinese citrus fruit fly, Bactrocera minax is one of the most economically important and aggressive pests threatening the Chinese citrus industry. In order to provide some recommendations for the improvement of integrated pest management of this species, the authors evaluated the toxicity of 6 insecticides on the second stage larvae, fourth stage larvae, and adult flies from multiple geographical B. minax populations. In addition, the influences of each pesticide on pupation and emergence were examined for one population, from Hanzhong. The 6 reagents displayed a wide range of toxicity on various stages of B. minax. Abamectin and Dichlorphos displayed the highest and lowest toxicities, respectively. All of the insecticides had negative effects on pupation and emergence of B. minax from Hanzhong, while Chlorpyrifos had the strongest impact on pupation, and Phoxim had the strongest influence on emergence. Though Phoxim and Chlorpyrifos were both effective, these insecticides belong to the class of organophosphorus pesticides, and their use should be reduced in orchards because of their high toxicity and long residual period.
Olive fly population was monitored weekly on two olive cultivars (Bua and Istarska bjelica), from June until mid October, in Rovinj and Livade (Istria, Croatia). The number of eggs, larvae, and pupae was established and the total and active infestation was calculated. The fruit infestations for early and for late harvesting were obtained based on the calculated regression equation. For the prediction of the changes in the oil quality parameters linear regression slopes, obtained by Koprivnjak et al., were used. We established a strong positive correlation between DD accumulation and cumulative capture of flies, as well as with the total and active fruit infestations. According to obtained results it can be stated that I. bjelica is less sensitive to decrease in total phenols amount, to increase in free fatty acids mass ratio and to increase in peroxide values comparing to Bua. Moreover, the differences in investigated parameters between earlier and late harvesting dates in I. bjelica are lower due to lower infestation predicted for both harvesting dates and due to lower sensitivity to the changes in quality parameters. Therefore, early harvesting date as a model for preventing fruit damage and as a model for preventing negative change in oil quality parameters is a valid tool. However, the effectiveness of this model could also depend on the characteristics of olive cultivar.

Practical applications: Understanding the factors that affect the olive fly attack is the basis of scientific and practical interest in the production of olives and olive oil. Research of monitoring methods allows reliable forecasting and determining protection measures. Knowledge about this topic could contribute to the reduction of insecticides use and to the improvement of quality and food safety concept in olive oil production.
An entomopathogenic fungus and nematode prove ineffective for biocontrol of an invasive leaf miner Profenusa thomsoni in Alaska

By: Progar, RA (Progar, R. A.); Kruse, JJ (Kruse, J. J.); Lundquist, JE (Lundquist, J. E.); Zogas, KP (Zogas, K. P.); Rinella, MJ (Rinella, M. J.)

Title: A non-native invasive sawfly, the amber-marked birch leaf miner Profenusa thomsoni (Konow), was first detected in south-central Alaska in 1996 and is now widely distributed throughout urban and wild birch trees in Alaska. Impacts have been considered primarily aesthetic because leaf miners cause leaves of birch trees (Betula spp.) to senesce prematurely, but the leaf miners likely also reduce birch vigour and thereby increase susceptibility to diseases and other insects. We tested the ability of commercially available biological control agents to control P. thomsoni. The entomopathogenic fungus Beauveria bassiana (Bals.-Criv.) Vuillemin GHA strain and the entomopathogenic nematode Steinernema carpocapsae (Weiser) were applied in aqueous suspension to the soil/litter surface beneath infested birch trees in Alaska at one site in 2007 and 2008 and two sites in 2010. There was no evidence the fungus or nematode controlled P. thomsoni. Instead, there was evidence the fungus increased the density of this pest insect at two sites, likely by reducing its predators. As tested, B. bassiana and S. carpocapsae do not appear effective as biological controls of P. thomsoni.

Infestation of guava by Anastrepha fraterculus (Diptera: Tephritidae): preferred ripening stages and influence of fruit peel coloration

By: De Oliveira, FQ (De Oliveira, Flavia Queiroz); Boica, AL (Boica Junior, Arlindo Leal); Costa, MDZ (Zamboni Costa, Maria de Lourdes); Batista, JD (Batista, Jacinto de Luna); Costa, KZ (Costa, Karen Zamboni); Walder, JMM (Melges Walder, Julio Marcos)

Title: Infestation of guava by Anastrepha fraterculus (Diptera: Tephritidae): preferred ripening stages and influence of fruit peel coloration

Source: TURKISH JOURNAL OF AGRICULTURE AND FORESTRY

Abstract: The current study aimed to verify the preferred guava fruit ripening stage for egg laying by Anastrepha fraterculus (Diptera: Tephritidae) and to determine the influence of peel coloration of the fruits of 2 cultivars on infestation. The cultivars used were Paluma and Seculo XXI. The infestation level was evaluated in cages, considering 2 conditions: multiple-choice and nonchoice tests. The infestation levels of A. fraterculus differed between the green and the green-ripe stages in the multiple-choice test. In Paluma fruits with the nonchoice test, the infestation was highest during the ripe stage. There were no differences in infestation levels of A. fraterculus between the green and the green-ripe stages in Seculo XXI. In general, the green-ripe and the ripe stages were preferred for egg laying by A. fraterculus. In Paluma fruits there were significant correlations of infestation levels of A. fraterculus with luminosity (L) and chromaticity (C) in the nonchoice assay. In Seculo XXI fruits there was a significant correlation of infestation levels of A. fraterculus with color angle (h) in the nonchoice assay. No correlation was found between these parameters in the multiple-choice test.
Heterorhabditis bacteriophora (Ekecik isolate), and H. marelatus (Ankara isolate), were bioassayed against last-instar R. cerasi larvae at different temperatures (10, 15, and 25 degrees C) and nematode concentrations (0, 100, 500, and 1000 IJs/larva). Temperature and nematode concentration had a significant effect on the efficacy of nematode species. S. feltiae was the most virulent species at all temperatures and nematode concentrations. Only S. feltiae showed higher than 40% mortality at low temperatures (10 and 15 degrees C). At 25 degrees C, S. feltiae caused 95% mortality, followed by H. marelatus (82%) and H. bacteriophora (76%), at 1000 IJs/larva concentration. Our results indicate that R. cerasi larvae are highly susceptible to entomopathogenic nematode infection. In particular, S. feltiae has high potential for reducing last-instar larval populations, thus decreasing the adult population in the spring.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 1300-011X

**Accession Number:** WOS:000346850400009

---

**Record 77 of 78**

**By:** Akutse, KS (Akutse, K. S.); Van den Berg, J (Van den Berg, J.); Maniania, NK (Maniania, N. K.); Fiaboe, KKM (Fiaboe, K. K. M.); Ekesi, S (Ekesi, S.)

**Title:** Interactions between Phaedrotoma scabriventris Nixon (Hymenoptera: Braconidae) and Diglyphus isaea Walker (Hymenoptera: Eulophidae), parasitoids of Liriomyza huidobrensis (Blanchard) (Diptera: Agromyzidae)

**Source:** BIOLOGICAL CONTROL

**Volume:** 80

**Pages:** 8-13

**DOI:** 10.1016/j.biocontrol.2014.09.008

**Published:** JAN 2015

**Abstract:** Liriomyza leafminer flies represent a serious threat to horticultural production in East Africa. Total field parasitism rates recorded in Kenya are below 5%, with the indigenous ectoparasitoid Diglyphus isaea Walker being one of the key parasitoid species. The International Centre of Insect Physiology and Ecology (icipe), in collaboration with the International Potato Centre (CIP), imported into Kenya the endoparasitoid Phaedrotoma scabriventris Nixon to improve natural control of leafminers. The objective of this study was to investigate the interactions between D. isaea and P. scabriventris when used together for the biological control of Liriomyza species. These interactions were studied under laboratory conditions, using treatments that involved single, simultaneous and sequential releases of the different parasitoid species onto plants infested by L. huidobrensis larvae. While used separately, parasitism rates of D. isaea and P. scabriventris were 30.4 +/- 10.9% and 63.6 +/- 7.7% respectively. However, when used simultaneously, the total parasitism rate increased to 77.0 +/- 5.3%. Although P. scabriventris had no effect on D. isaea, the presence of D. isaea reduced the specific parasitism rate of P. scabriventris. In addition, both parasitoids induced leafminer mortality through larval-feeding and stinging. However, feeding and stinging mortality induced by D. isaea (41.9 +/- 9.1%) was significantly higher compared to P.
scabriventris (11.9 +/- 8.7). Similarly, pupal mortality due to feeding and stinging activity was 49.1 +/- 6.5% and 21.6 +/- 1.9% when exposed to D. isaea and P. scabriventris respectively. The implication for simultaneous use of both parasitoids in East Africa is discussed. (C) 2014 Elsevier Inc. All rights reserved.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 1049-9644

**Accession Number:** WOS:000345586700002

---

**Record 78 of 78**

**By:** Cook, DC (Cook, David C.); Fraser, RW (Fraser, Rob W.)

**Title:** Eradication versus control of Mediterranean fruit fly in Western Australia

**Source:** AGRICULTURAL AND FOREST ENTOMOLOGY

**Volume:** 17

**Issue:** 2

**Pages:** 173-180

**Published:** MAY 2015

**Abstract:** The primary chemicals used by Western Australia's horticultural industries with respect to field control and post-harvest disinestation procedures for the Mediterranean fruit fly are soon to be withdrawn from use because of public health concerns. When this occurs, the necessary switch to alternative control methods such as bait sprays and intensive fruit fly trapping will involve additional producer costs. The present study demonstrates that these costs are likely to exceed the costs of eradication using the sterile insect technique. Given this result, eradication cost sharing arrangements between government and industry are discussed that could produce mutual benefits in the long term.

**Times Cited in Web of Science Core Collection:** 0

**Times Cited in BIOSIS Citation Index:** 0

**Times Cited in Chinese Science Citation Database:** 0

**Times Cited in SciELO Citation Index:** 0

**Total Times Cited:** 0

**ISSN:** 1461-9555

**Accession Number:** CCC:000352541300008