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IPM and Biological Control of Plant Diseases and Pests: Horticultural Crops
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IPM AND BIOLOGICAL CONTROL OF PLANT DISEASES AND PESTS: HORTICULTURAL CROPS

JANUARY 1994 - JUNE 1996
219 citations from AGRICOLA
by Mary V. Gold

(This bibliography updates Quick Bibliography 94-12 which covers the above topic from 1992 through 1993.)

1. NAL Call No.: S605.5.O74
10 pests and their natural enemies.
Poncavage, J. Org-gard v.43(5): p.41-46. (1996 May-1996 June)
Descriptors: horticultural-crops; plant-pests; pest-control; biological-control; biological-control-agents

2. NAL Call No.: S544.3.N6N62
1994 Peanuts.
Sullivan, G. A.; Ferguson, J. M.; Linker, H. M.; Mueller, J. P.; York, A. C.; Yelverton, F. H.; Brandenburg, R. L.; Brown, A. B.; Bailey, J. E.; Perry, K. B.; Roberson, G. T.
AG-NC-Agric-Ext-Serv. Raleigh : North Carolina Agricultural Extension Service v.331, rev.p.110 (1994 Jan.)
Descriptors: arachis-hypogaea; crop-production; world-markets; federal-programs; production-costs; weather-data; sustainability-; integrated-pest- management; weed-control; plant-disease-control; water-quality; pesticides-; north-carolina

3. NAL Call No.: 275.29-W27P
1994 Pest Management Guide for commercial small fruits.
Ext-bull-Wash-State-Univ,-Coop-Ext. Pullman, Wash. : The Extension v.149, rev.p.48 (1994)
Descriptors: vaccinium-; rubus-idaeus; fragaria-; pests-; pesticides-; integrated-pest-management; safety-; hazards-; poisoning-; symptoms-; regulations- ; handling-; transport-; storage-; disposal-; application-; application-date; guidelines-; plant-disease-control; environmental-protection

4. NAL Call No.: S67.P82
1995 Insect control guide.
Pub-La-Coop-Ext-Serv. [Baton Rouge, La.?] : Cooperative Extension Service, Center for Agricultural Sciences and Rural Development, Louisiana State University & Agricultural & Mechanical College v.1838, rev.p.186 (1995 Apr.)
Descriptors: insect-pests; rodents-; chemical-control; field-crops; ornamental-plants; trees-; livestock-; stored-products; insecticides-; application- methods; application-rates; biological-control-agents; insect-traps; application-date; greenhouses-; domestic-gardens; identification-; safety-at- work; economic-thresholds; toxicity-; louisiana-

5. NAL Call No.: 420-K13
Abundance and seasonal activity of ground beetles (Coleoptera: Carabidae) in a raspberry plantation and adjacent sites in southern Quebec (Canada).
Levesque, C.; Levesque, G. Y. J-Kans-Entomol-Soc v.67(1): p.73-101. (1994 Jan.)
Includes references.
Descriptors: rubus-idaeus; carabidae-; population-density; seasonality-; predators-of-insect-pests

6. NAL Call No.: 80-Ac82
Accumulation of phytoalexins scoparone and scopoletin in citrus fruits subjected to various postharvest treatments.
Rodov, V.; D'hallewin, G.; Castia, T. Acta-hortic (381): p.517-523. (1994 Dec.)
Paper presented at the International Symposium on Natural Phenols in Plant Resistance, Volume II, September 13-17, 1993, Weihenstephan, Germany.
Descriptors: citrus-; postharvest-decay; postharvest-treatment; heat-treatment; ultraviolet-radiation; biological-control-agents; phytoalexins-; concentration-; plant-diseases

7. NAL Call No.: 421-An72
Acremonium endophyte interactions with enhanced plant resistance to insects.
Breen, J. P. Annu-rev-entomol. Palo Alto, Calif. : Annual Reviews, Inc. v.39p.401-423 (1994)
Includes references.
Descriptors: acremonium-; endophytes-; host-plants; mutualism-; pathogenicity-; geographical-distribution; taxonomy-; infection-; pest-resistance; insect-pests; allelochemicals-; disease-resistance; strain-differences; grasses-; lawns-and-turf; cultivars-; biological-control; insect-control; pastures-; livestock-; poisoning-; literature-reviews

8. NAL Call No.: SB945.F8F79-1996
Action programs against fruit flies of economic importance: session overview.
Hendrichs, J. Fruit fly pests a world assessment of their biology and management / p.513-519. (1996)

Paper presented at the Fourth International Symposium on Fruit Flies of Economic Importance held June 5-10, 1994, Sand Key, Florida.
Descriptors: tephritidae-; insect-pests; insect-control; control-programs; orchards-; integrated-control; integrated-pest-management; disinfestation-; quarantine-; sterile-insect-release

9. NAL Call No.: HD101.S6
The adoption of IPM techniques by vegetable growers in Florida, Michigan and Texas.
Fernandez Cornejo, J.; Beach, E. D.; Huang, W. Y. J-agric-appl-econ v.26(1): p.158-172. (1994 July)
Includes references.
Descriptors: vegetables-; integrated-pest-management; innovation-adoption; farm-management; risk-; florida-; michigan-; texas-

Abstract: Abstract: Factors influencing the adoption of Integrated Pest Management (IP) techniques are studied using survey data from individual vegetable producers from Florida, Michigan, and Texas. Farmers who adopt IPM tend to be less risk averse and use more managerial time on farm activities than nonadopters. Adopters are also more likely to operate large, irrigated farms and use more family labor. Locational factors and the type of crop grown are also influential in IPM adoption. The analysis uses a logit framework and introduces adopter categories first conceptualized by rural sociologists.

10. NAL Call No.: 100-C12Cag
Almond growers reduce pesticide use in Merced County field trials.
Hendricks, L. C. Calif-agric v.49(1): p.5-10. (1995 Jan.-1995 Feb.)
Descriptors: orchards-; pest-management; prunus-dulcis; insecticides-; insect-pests; beneficial-insects; soil-organic-matter; soil-fertility; oligochaeta-; parasites-of-insect-pests; crop-yield; california-

11. NAL Call No.: 275.29-M381Fr
Apple integrated pest management in 1993: Insects and mites in second-level orchard blocks.
Mason, J.; Prokopy, R.; Wright, S.; Goodall, S.; Jones, K.; Ma, Y.; Mohr, V.; Nogaki, M. Fruit-notes v.59(1): p.1-7. (1994 Winter)
Descriptors: integrated-pest-management; meadow-orchards; crop-damage; insect-pests; acari-; insecticides-; acaricides-; natural-enemies; massachusetts-

12. NAL Call No.: 275.29-M381Fr
Apple integrated pest management in 1994: insects and mites in second-level orchard blocks.
Mason, J.; Prokopy, R.; Wright, S.; Black, J.; Chang, C.; Cook, J.; Goodall, S.; Ma, Y. Fruit-notes v.60(1): p.1-7. (1995 Winter)
Descriptors: malus-pumila; integrated-pest-management; pesticides-; insect-pests; mites-; natural-enemies; beneficial-insects; parasitoids-; massachusetts-

13. NAL Call No.: 275.29-M381Fr
Apple orchards in Switzerland: differences small and large.
Weber, D. C. Fruit-notes v.59(3): p.22-25. (1994 Summer)
Descriptors: orchards-; crop-production; varieties-; cultivars-; fruit-trees; subsidies-; insect-growth-regulators; tortricidae-; dysaphis-; integrated-pest- management; switzerland-

14. NAL Call No.: 1.9-P69P
Application of antitranspirant and reduced rate fungicide combinations for fruit rot management in cranberries.
Sandler, H. A. Plant-dis. [St. Paul, Minn., American Phytopathological Society] v.79 (9)p.956-961 (1995 Sept.)
Includes references.
Descriptors: vaccinium-macrocarpon; phyllosticta-; physalospora-; deuteromycotina-; helotiales-; phomopsis-; glomerella-cingulata; fungal-diseases; plant-disease-control; chlorothalonil-; antitranspirants-; adjuvants-; mixtures-; integrated-pest-management; phyllosticta-vaccinii; physalospora-vaccinii; phomopsis-vaccinii; coleophoma-empetri; godronia-cassandrae

Abstract: Studies were conducted over a 3-year period to evaluate the efficacy of reduced rate combinations of chlorothalonil and an antitranspirant (AT), Wilt-Pruf, for control of fruit rot in cranberries. Several reduced rate combinations provided control comparable to that with the fungicide used alone at suggested label rates of 0.76 to 1.34 liters/ha (4 to 7 pt/A) in field trials. In two trials, higher concentrations of the AT (3 to 5%) had a detrimental effect on total and

usable yield at higher fungicide rates. The lowest rate of chlorothalonil that can be effectively used in combination with any tested rate of Wilt-Pruf is 0.76 liters/ha (4 pt/A). Using 0 or 0.38 liters/ha (0 or 2 pt/A) with any tested rate of the AT inadequately protected the berries against fruit rot infection. The incorporation of reduced rate combinations may offer the management advantage of lowered environmental risk per fungicide application in certain situations.

15. NAL Call No.: SB925.B5
Application of Candida guilliermondii in commercial citrus coatings for biocontrol of Penicillium digitatum on grapefruits.
McGuire, R. G. Biol-control v.4(1): p.1-7. (1994 Mar.)
Includes references.
Descriptors: grapefruits-; citrus-paradisi; penicillium-digitatum; plant-disease-control; biological-control; candida-guilliermondii; protective-coatings; mixtures-; biological-control-agents; fungal-antagonists; storage-decay; postharvest-treatment

16. NAL Call No.: S542.A8A34
Application of Candida guilliermondii in commercial citrus waxes for biocontrol of Pencillium on grapefruit.
McGuire, R. G. ACIAR-proc (50): p.464-468. (1994)
In the series analytic: Postharvest handling of tropical fruits / edited by B.R. Champ, E. Highley, and G.I. Johnson.
Descriptors: grapefruits-; penicillium-; candida-guilliermondii; fungal-antagonists; fungus-control; biological-control; efficacy-; postharvest-decay; postharvest-treatment; wax-coatings

17. NAL Call No.: SB925.B5
Bacillus thuringiensis strain Buibui for control of cupreous chafer, Anomala cuprea (Coleoptera: Scarabaeidae), in turfgrass and sweet potato.
Suzuki, N.; Hori, H.; Tachibana, M.; Asano, S. Biol-control. Orlando, Fla. : Academic Press, Inc. v.4 (4)p.361-365 (1994 Dec.)
Includes references.
Descriptors: lawns-and-turf; grasses-; ipomoea-batatas; insect-pests; anomala-cuprea; insect-control; larvae-; biological-control; biological-control- agents; bacillus-thuringiensis; strains-; bacterial-toxins; efficacy-; developmental-stages

Abstract: The efficacy of the toxin from Bacillus thuringiensis serovar japonensis (strain Buibui), which is specific to scarabaeid larvae, was evaluated in turfgrass pots. The toxin controlled first and second instars of the cupreous chafer, Anomala cuprea, at 2 mg protein/pot and the greenness of the turfgrass did not deteriorate. On the other hand, the efficacy against the third instar was less than that against the first and second instars, and the greenness and dry weight of the turfgrass were reduced. However, the mortality against the third instar was 48% compared with 8% for the control. In the field, the effectiveness of the Buibui toxin was evaluated in sweet potato plots. The ratio of damaged potatoes in the treated plots with the Buibui toxin was 31% compared with 69% for the control plots. The index of damage to sweet potato in the treated and untreated plots was 23 and 55, respectively. These results suggest that the toxin at 100 mg/m2 effectively controlled the cupreous chafer in the sweet potato fields.

18. NAL Call No.: SB945.F8F79-1996
Behavioral control of apple maggot flies.
Prokopy, R. J.; Mason, J. Fruit fly pests a world assessment of their biology and management / p.555-559. (1996)
Paper presented at the Fourth International Symposium on Fruit Flies of Economic Importance held June 5-10, 1994, Sand Key, Florida.
Descriptors: rhagoletis-pomonella; insect-control; integrated-pest-management; colored-sticky-traps; insect-attractants; orchards-; malus-pumila; massachusetts-; butyl-hexanoate

19. NAL Call No.: QL461.E532
Behaviors of female Eretmocerus sp. nr. californicus (Hymenoptera: Aphelinidae) attacking Bemisia argentifolii (Homoptera: Aleyrodidae) on sweet potato.
Headrick, D. H.; Bellows, T. S. Jr.; Perring, T. M. Environ-entomol v.24(2): p.412-422. (1995 Apr.)
Includes references.
Descriptors: eretmocerus-; females-; biological-control-agents; parasitoids-; searching-behavior; locomotion-; behavior-patterns; bemisia-; nymphs-; oviposition-; feeding-behavior; ipomoea-batatas

Abstract: Behaviors of Eretmocerus sp. nr. californicus Howard females on Bemisia argentifolii Bellows & Perring infesting sweet potato, Ipomoea batatas (L.) Lam, were described and quantified. Waling speeds of up to 1.3 mm/s were calculated for females searching for host whitefly nymphs on sweet potato leaves. Females encountered all host stages during searching with approximately the same relative frequency as their relative abundance (average of 17.03% of hosts available were encountered). Females also arrested and antennated all of the host stages with the same relative frequency as their encounter rate (62.8%). Females showed a clear and significant preference for probing second instars over all other stages. Of the hosts probed, females chose all stages for oviposition with the same relative frequency. Successful exsertion of the ovipositor under a host nymph occurred after initial probes 12 times and after repeated probing attempts 15 times. Oviposition occurred under 13.5% of the hosts assessed by antennation; however, 20 of the 27 (74%) nymphs under which the ovipositor was exserted received an egg. Females spent 41% of the total time in searching, host assessment, probing, and oviposition; the remainder of the time (59%) was spent host feeding, grooming, and resting.

20. NAL Call No.: S544.3.N6N62
Bermudagrass, Centipedegrass, Zoysiagrass, and St. Augustinegrass.
Lucas, L. T.; Bruneau, A. H. AG-NC-Agric-Ext-Serv. Raleigh : North Carolina Agricultural Extension Service v.360, rev.p.4 (1994 Apr.)
Descriptors: zoysia-japonica; stenotaphrum-secundatum; lawns-and-turf; plant-diseases; symptoms-; plant-disease-control; integrated-pest-management

21. NAL Call No.: S544.3.N6N62
Bermudagrass: lawn and maintenance calendar.
Bruneau, A. H.; Lucas, L. T.; Lewis, W. M.; Brandenburg, R. L.; Peacock, C. H.
AG-NC-Agric-Ext-Serv. Raleigh : North Carolina Agricultural Extension Service v.431, rev.p.4 (1994 Jan.)
Descriptors: cynodon-dactylon; mowing-; fertilizers-; irrigation-; soil-types-textural; integrated-pest-management; weed-control; insect-control; application-date

22. NAL Call No.: 1.98-Ag84
Beyond methyl bromide.
Wood, M.; Stelljes, K. B.; Senft, D. Agric-res v.43(1): p.14-18. (1995 Jan.)
Descriptors: methyl-bromide; ozone-depletion; temperate-fruits; plodia-interpunctella; amyelois-transitella; cydia-pomonella; soil-fumigation; controlled-atmosphere-storage; biological-control-agents; habrobrachon-hebetor

23. NAL Call No.: QD415.A1J6
A bioassay system for collecting volatiles while simultaneously attracting tephritid fruit flies.
Heath, R. R.; Manukian, A.; Epsky, N. D.; Sivinski, J.; Calkins, C. O.; Landolt, P. J. J-chem-ecol v.19(10): p.2395-2410. (1994 Oct.)
Includes references.
Descriptors: anastrepha-suspensa; monitoring-; volatile-compounds; insect-attractants; pheromones-; wind-tunnels; insect-control; biological-control

Abstract: A bioassay system was developed that permits the testing of various substrates for biological activity in a flight tunnel, while simultaneously collecting a portion of the volatiles from the attractive source for subsequent chemical identification and quantification. Bioassays of the response of virgin female Caribbean fruit flies, Anastrepha suspensa (Loew) (Diptera: Tephritidae), to volatiles released by calling males were conducted in a greenhouse under natural light cycles and fluctuating environmental conditions, similar to those in the field. Using this system, the periodicity of response of the female flies between 1300 and 1845 hr (EST) was tested. Fifty to 75% response occurred between 1700 and 1845 hr. Male pheromone release was greatest between 1500 and 1800 hr. Videotaped records of insects, taken between 1700 and 1800 hr as flies approached and entered the traps, were analyzed to interpret the communicative role of the volatiles released. Significantly more flies landed on and entered the pheromone-emitting trap than the control trap. There was no difference in the amount of time spent on the trap face, an indication that volatiles were attractants. The system described should be of general utility in determination of the attraction of pest fruit flies to suspected attractants.

24. NAL Call No.: S592.7.A1S6
Bioautography shows antibiotic production by soil bacterial isolates antagonistic to fungal dry rot of potatoes.
Burkhead, K. D.; Schisler, D. A.; Slininger, P. J. Soil-biol-biochem v.27(12): p.1611-1616. (1995 Dec.)

Includes references.
Descriptors: gibberella-pulicaris; biological-control; biological-control-agents; soil-bacteria; strains-; antagonists-; biosynthesis-; antibiotics-; detection- ; antifungal-properties; screening-; mode-of-action

Abstract: Twenty bacterial antagonists of postharvest dry rot of potatoes (caused by Fusarium sambucinum) were screened for the production of antibiotics by bioautography. Samples of liquid cultures of bacterial strains harvested at three growth times and extracted with three solvents at three pHs were used to directly detect antibiotics inhibitory to F. sambucinum grown on the surface of thin-layer chromatography plates. All of the bacterial isolates tested produced one or more antifungal compounds. Knowledge of the role of the antibiotics in biological control mechanisms is expected to influence the design of successful methods of mass production and formulation of these bacterial strains as biocontrol agents.

25. NAL Call No.: QL461.E532
Biological control of apple mites by a phytoseiid mite complex and Zetzellia mali (Acari: Stigmaeidae): long-term effects and impact of azinphosmethyl on colonization by Amblyseius andersoni (Acari: Phytoseiidae).
Croft, B. A. Environ-entomol v.23(5): p.1317-1325. (1994 Oct.)
Includes references.
Descriptors: typhlodromus-pyri; metaseiulus-occidentalis; zetzellia-mali; amblyseius-; panonychus-ulmi; eotetranychus-; aculus-schlechtendali; azinphos-methyl-; colonizing-ability; predators-of-insect-pests; interspecific-competition; insect-control; biological-control; chemical-control; malus-pumila; orchards-; integrated-pest-management

Abstract: Long-established populations of Typhlodromus pyri Scheuten were less common in plots in 1993 with dense Zetzellia mali (Ewing) than in plots with sparse Z. mali. Also, newly released T. pyri had more difficulty colonizing plots with Z. mali than without, but less difficulty than Metaseiulus occidentalis (Nesbitt) had had in 1992. Newly released Z. mali did not establish well in a plot that had T. pyri only, but Z. mali seemed to be displacing T. pyri after 4 yr in some mixed-species release plots of M. occidentalis and T. pyri. After immigration from nearby vegetation to apple, colonization by Amblyseius andersoni (Chant) was less in azinphosmethyl-treated plots than in similar untreated plots. Colonization by A. andersoni was greatest in plots with few T. pyri or Z. mali or both but some occurred in all plots not sprayed in 1993 (those originally receiving no releases, single or mixed-species releases of T. pyri, and M. occidentalis in 1990). Colonization by A. andersoni was greatest where M. occidentalis had been displaced in 1991 or 1992 by Z. mali. Results are discussed in relation to long-term biological control and more biologically based integrated pest management.

26. NAL Call No.: 390.9-Am33
Biological control of grape crown gall with non-tumorigenic Agrobacterium vitis strain F275.
Burr, T. J.; Reid, C. L. Am-j-enol-vitic. Davis, Calif. : American Society of Enologists v.45 (2) p.213-219 (1994)
Includes references.
Descriptors: vitis-vinifera; agrobacterium-tumefaciens; crown-gall; agrobacterium-; biological-control

27. NAL Call No.: SB599.C8
Biological control of grape grey mould by Trichoderma harzianum.
Elad, Y. Crop-prot v.13(1): p.35-38. (1994 Feb.)
Includes references.
Descriptors: vitis-vinifera; botrytis-cinerea; plant-pathogenic-fungi; trichoderma-harzianum; biological-control-agents; vinclozolin-; iprodione-; carbamate-pesticides; carbendazim-; biological-control; chemical-control; fungus-control; plant-disease-control; integrated-pest-management; diethofencarb-

28. NAL Call No.: SB608.F8B56--1994
Biological control of postharvest diseases : theory and practice.
Wilson, C. L.; Wisniewski, M. E. 182 p. (CRC Press, Boca Raton FL, 1994)
Includes bibliographical references and index.
Descriptors: Fruit-Postharvest-diseases-and-injuries-Biological-control; Vegetables-Postharvest-diseases-and-injuries-Biological-control

29. NAL Call No.: 421-C16
Biological control of the Colorado potato beetle Leptinotarsa decemlineata (Coleoptera: Chrysomelidae) in Quebec by augmentative releases of the two-spotted stinkbug Perillus

bioculatus (Hemiptera: Pentatomidae).
Cloutier, C.; Bauduin, F. Can-entomol v.127(2): p.195-212. (1995 Mar.-1995 Apr.)
Includes references.
Descriptors: leptinotarsa-decemlineata; perillus-bioculatus; predators-of-insect-pests; predator-augmentation; predatory-insects; comparisons-; bacillus- thuringiensis; predation-; ova-; larvae-; fields-; solanum-tuberosum; quebec-

30. NAL Call No.: 420-F662
Biological control of the two-spotted spider mite (Acarina: Tetranychidae) on commercial strawberries in Florida with Phytoseiulus persimilis (Acarina: Phytoseiidae).
Decou, G. C. Fla-entomol v.77(1): p.33-41. (1994 Mar.)
Symposium: Insect Behavioral Ecology--'93.
Descriptors: fragaria-; tetranychus-urticae; arthropod-pests; phytoseiulus-persimilis; biological-control; mite-control; chemical-control; acaricides-; efficacy-; crop-yield; florida-

31. NAL Call No.: SB476.G7
Biological controls.
Rogers, M. Grounds-maint v.29(3): p.90-94. (1994 Mar.)
Descriptors: lawns-and-turf; plant-disease-control; pest-control; biological-control; microbial-pesticides

32. NAL Call No.: SB317.5.H68
Biological seed treatments using Trichoderma harzianum for horticultural crops.
Taylor, A. G.; Harman, G. E.; Nielsen, P. A. HortTechnology v.4(2): p.105-108. (1994 Apr.-1994 June)
Paper presented at the "Workshop on New Chemical and Biological Treatments for Horticultural Seeds," July 26, 1993, Nashville, Tennessee.
Descriptors: horticultural-crops; seed-dressings; seed-treatment; biological-control-agents; trichoderma-harzianum; plant-disease-control; biological- control; fungal-diseases; chemical-control; zea-mays

33. NAL Call No.: 60.18-UN33
Black cutworms: where are they coming from.
Williamson, R. C.; Shetlar, D. J. USGA-Green-Sect-rec v.32(5): p.5-7. (1994 Sept.-1994 Oct.)
Descriptors: lawns-and-turf; agrotis-ipsilon; larvae-; ova-; crop-damage; injuries-; monitoring-; insect-control; chemical-control; biological-control

34. NAL Call No.: 275.29-M58B
Bluegrass billbug.
Smitley, D. Ext-bull-Coop-Ext-Serv,-Mich-State-Univ. East Lansing : Michigan State University, Cooperative Extension Service v.E- 2497, rev.p.2 (1994 Oct.)
In the subseries: Turf tips for the homeowner.
Descriptors: lawns-and-turf; sphenophorus-parvulus; crop-damage; host-plants; symptoms-; characteristics-; life-cycle; insect-control; insecticides-; biological-control-agents

35. NAL Call No.: S544.3.N6N62
Cabbage, broccoli, cauliflower, and greens production in North Carolina.
Sanders, D. C. ed.; Davis, J. M.; Baird, J. V.; Sneed, R. E.; Walgenbach, J. F.; Sorensen, K. A.; Duncan, H. E.; Shoemaker, P. B.; Monks, D. W.; Wilson, L. G. AG-NC-Agric-Ext-Serv. Raleigh : North Carolina Agricultural Extension Service v.487p.26 (1995 Apr.)
Descriptors: brassica-oleracea; leafy-vegetables; cultivars-; crop-production; edaphic-factors; insect-pests; plant-diseases; plant-disorders; weeds-; plant-pathogens; integrated-pest-management; plant-disease-control; harvesting-; food-storage; marketing-; production-costs; returns-; acreage-; north-carolina

36. NAL Call No.: 23-Au792
Chemical and biological control of Rhizoctonia solani on potato seed tubers.
Wicks, T. J.; Morgan, B.; Hall, B. Aust-j-exp-agric v.35(5): p.661-664. (1995)
Includes references.
Descriptors: potatoes-; rhizoctonia-solani; plant-pathogenic-fungi; postharvest-treatment; dipping-; formaldehyde-; dusting-; tolclofos-methyl-; spraying-; fungicides-; pencycuron-; sodium-hypochlorite; verticillium-; bacillus-; gliocladium-; trichoderma-; biological-control-agents; fungus- control; chemical-control; biological-control; efficacy-; fenpiclonil-; verticillium-biguttatum

37. NAL Call No.: SB950.A1I66

Chinese IPM for citrus leafminer.
Zhang, A.; O'Leary, C.; Quarles, W. IPM-pract v.16(8): p.10-13. (1994 Aug.)
Includes references.
Descriptors: citrus-; phyllocnistis-; phyllocnistis-citrella; integrated-pest-management; insect-control; predators-of-insect-pests; parasites-of-insect- pests; biological-control; biological-control-agents; bacillus-thuringiensis; chemical-control; monitoring-; pest-resistance; china-

38. NAL Call No.: 421-J822
Colonization of newly planted coffee fields: dominance of Mediterranean fruit fly over oriental fruit fly (Diptera: Tephritidae).
Vargas, R. I.; Walsh, W. A.; Nishida, T. J-econ-entomol v.88(3): p.650-627. (1995 June)
Includes references.
Descriptors: coffea-arabica; ceratitis-capitata; bactrocera-dorsalis; biosteres-arisanus; parasitoids-; colonizing-ability; colonization-; populations-; population-ecology; dominance-; parasitism-; parasites-of-insect-pests; plantations-; hawaii-

Abstract: Previous studies in Hawaii indicated that Ceratitis capitata (Wiedemann), Mediterranean fruit fly, became scarce at low elevations subsequent to accidental introduction of Bactrocera dorsalis (Hendel), oriental fruit fly. The conclusion was that competitive displacement, elevation, and parasites were major determinants in the ranges of these two fruit flies. Recently, commercial coffee, Coffea arabica L. was planted in former sugarcane, Saccharum officinarum L., fields at an elevation of 122 m on Kauai Island, HI. During a 3-yr period we studied colonization of fruits by C. capitata, B. dorsalis, and Biosteres arisanus (Sonan), a beneficial solitary wasp that attacks both species of fruit flies. During seasons 1 and 2, mean numbers of C. capitata were greater than those of B. dorsalis. Lack of an inverse correlation between numbers of the two tephritids emerging from fruits suggested that these species were not competitors. B. arisanus parasitization rates on the basis of live and dead parasitoids recovered from C. capitata and B. dorsalis pupae were modest. Studies during season 3 indicated B. arisanus parasitization rates were higher for C. capitata than those for B. dorsalis. Numbers of C. capitata and B. arisanus were correlated during both seasons, suggesting a density-dependent relationship between the most abundant host and the parasitoid. Fruit infestation data demonstrated that C. capitata exploits fruits at an earlier ripeness stage and emerges sooner from fruits than B. dorsalis. Analysis of three annual coffee crops indicated that C. capitata was the dominant fruit fly species in the coffee agroecosystem by the end of the season. This finding differs from.

39. NAL Call No.: SB317.5.H68
Comparing integrated pest management and protectant stategies for control of apple scab and codling moth in an Iowa apple orchard.
Gleason, M. L.; Ali, M. K.; Domoto, P. A.; Lewis, D. R.; Duffy, M. D. HortTechnology v.4(2): p.136-141. (1994 Apr.-1994 June)
Includes references.
Descriptors: malus-pumila; integrated-pest-management; plant-disease-control; venturia-inaequalis; insect-control; cydia-pomonella; orchards-; integrated-control; cost-benefit-analysis; chemical-control; low-input-agriculture; insecticides-; fungicides-; iowa-

40. NAL Call No.: S494.5.S86S8
Comparison of corn and fescue rotations on pathogenic nematodes, nematode biocontrol agents, and soil structure and fertility on an apple replant site.
Biggs, A. R.; Kotcon, J. B.; Baugher, T. A.; Collins, A. R.; Glenn, D. M.; Hogmire, H. W.; Byers, R. E.; Sexstone, A. J.; Lightner, G. W. J-sustain-agric v.4(4): p.39-56. (1994)
Includes references.
Descriptors: nematoda-; malus-pumila; zea-mays; festuca-arundinacea; rotations-; orchard-soils; biological-control-agents; soil-fertility; soil-structure; economic-analysis; farm-management; soil-management; comparisons-; west-virginia

41. NAL Call No.: 421-C16
A comparison of epigaeic Coleoptera assemblages in organic, conventional, and abandoned orchards in Nova Scotia, Canada.
Pearsall, I. A.; Walde, S. J. Can-entomol v.127(5): p.641-658. (1995 Sept.-1995 Oct.)
Includes references.
Descriptors: coleoptera-; carabidae-; malus-pumila; orchards-; species-diversity; population-ecology; community-ecology; predatory-insects; organic- farming; comparisons-; feeding-behavior; seasonal-abundance; predators-of-insect-pests; nova-scotia; species-abundance; conventional-orchards; nonpredaceous-beetles

42. NAL Call No.: SB945.F8F79-1996
Comparison of the biology of Anastrepha obliqua reared in mango (Mangifera indica L.) and in mombin (Spondias mombin) infested under field conditions.
Toledo, J.; Lara, J. R. Fruit fly pests a world assessment of their biology and management / p.359-362. (1996)
Paper presented at the Fourth International Symposium on Fruit Flies of Economic Importance held June 5-10, 1994, Sand Key, Florida.
Descriptors: anastrepha-obliqua; mangifera-indica; spondias-mombin; fruits-; infestation-; fecundity-; female-fertility; pupae-; larvae-; biological- development; weight-; parasites-of-insect-pests; parasitism-

43. NAL Call No.: QL391.N4J62
Comparison of two steinernematid species for control of the root weevil Diaprepes abbreviatus.
Schroeder, W. J. J-nematol v.26(3): p.360-362. (1994 Sept.)
Includes references.
Descriptors: diaprepes-abbreviatus; steinernema-; entomophilic-nematodes; biological-control; larvae-; biological-control-agents; citrus-aurantium; helminth-insecticides; steinernema-carpocapsae; steinernema-riobravis

Abstract: Steinernema carpocapsae Weiser All strain was compared to Steinernema riobravis Cabanillas, Poinar, and Raulston for control of the root weevil, Diaprepes abbreviatus (L.), in the laboratory and in potted citrus. In the laboratory bioassay, D. abbreviatus larvae were exposed to 30, 60, and 120 nematodes/cm3 in sand. Insect mortality 1 week after application was greater (P less than or equal to 0.05) for S. riobravis than for S. carpocapsae in the laboratory bioassay. In the greenhouse bioassay, D. abbreviatus larvae were exposed to 3 and 9 nematodes per cm3 of soil in potted citrus. Again, at each rate, mortality was greater (P less than or equal to 0.05) in pots treated with S. riobravis than in pots treated with S. carpocapsae. The results of this study suggest that S. riobravis is a better biological control agent against D. abbreviatus larvae in potted plants than S. carpocapsae.

44. NAL Call No.: 421-C16
Control of oriental fruit moth by mating disruption using sex pheromone in the Niagara Peninsula, Ontario.
Pree, D. J.; Trimble, R. M.; Whitty, K. J.; Vickers, P. M. Can-entomol v.126(6): p.1287-1299. (1994 Nov.-1994 Dec.)
Includes references.
Descriptors: prunus-persica; cydia-molesta; mating-disruption; sex-pheromones; insecticides-; crop-damage; population-density; efficacy-; biological- control; ontario-

45. NAL Call No.: SB951.P47
Control of Phytophthora crown and root rot of apple trees with fosetyl-aluminium in new plantings.
Utkhede, R.; Smith, E. Pestic-sci v.45(2): p.117-122. (1995 Oct.)
Includes references.
Descriptors: malus-pumila; phytophthora-cactorum; plant-pathogenic-fungi; fosetyl-; monoammonium-phosphate; enterobacter-aerogenes; biological- control-agents; infectivity-; crown-; roots-; growth-; crop-yield; fungal-diseases; fungus-control; chemical-control; biological-control; efficacy-; british-columbia; disease-severity

Abstract: Fosetyl-aluminium applied as a foliar spray, monoammonium phosphate (MAP) as a planting hole treatment, and a combination of MAP and Enterobacter aerogenes (Kruse) Hornaeche & Edwards (B8) were evaluated for eight years for control of Phytophthora cactorum (Lebert & Cohn) Schroet. crown and root rot in newly planted and artificially infected Macspur apple trees on MM.106 rootstock in the Okanagan valley of British Columbia. Fosetyl-aluminium completely controlled the disease, and increased growth and fruit yield. The combination of planting hole treatment with MAP plus annual drench applications of strain B8 significantly increased trunk cross-sectional area for the first three years after planting. The application of MAP alone did not have any effect on the disease, growth, or fruit yield of apple trees.

46. NAL Call No.: 275.29-Or32c
Controlling diseases and insects in home orchards.
Pscheidt, J. W.; DeAngelis, J. D.; Morgan, S.; Reisinger, R. Ext-circ-Or-State-Univ-Ext-Serv. Corvallis : The Service v.631, rev.p.2 (1994 Feb.)
Descriptors: home-gardens; orchards-; plant-disease-control; insect-control; tree-fruits;

insect-pests; insecticides-; fungicides-; cultural-control; biological-control; bactericides-; oregon-

47. NAL Call No.: SB950.2.C8H67
Controlling insects and other common pests of lawns.
Marrotte, E. L. Hortic-fact-sheet. [Storrs, CT] : The System v.94-7p.2 (1994)
Descriptors: lawns-and-turf; pests-; chemical-control; pesticides-; biological-control; physical-control; habitats-

48. NAL Call No.: S544.3.N6N62
Controlling white grubs in turf.
Brandenburg, R. L. AG-NC-Agric-Ext-Serv. Raleigh : North Carolina Agricultural Extension Service v.366, rev.p.4 (1995 Mar.)
Descriptors: lawns-and-turf; popillia-japonica; insect-pests; life-cycle; chemical-control; biological-control; insecticides-; bacterial-insecticides; formulations-; application-rates; application-date; identification-; north-carolina

49. NAL Call No.: S544.3.A2C47
Controlling whiteflies on ornamentals.
Cobb, P. Circ-ANR. [Auburn] Ala. : Alabama Cooperative Extension Service, Auburn University v.272p.2 (1994 Feb.)
In subseries: Pest management.
Descriptors: aleyrodidae-; biological-control; chemical-control; insecticides-; natural-enemies; life-cycle; ornamental-plants; alabama-

50. NAL Call No.: 448.3-Ap5
Derivation of mutants of Erwinia carotovora subsp. betavasculorum deficient in export of pectolytic enzymes with potential for biological control of potato soft rot.
Costa, J. M.; Loper, J. E. Appl-environ-microbiol v.60(7): p.2278-2285. (1994 July)
Includes references.
Descriptors: solanum-tuberosum; erwinia-carotovora-subsp; -carotovora; plant-diseases; tubers-; plant-disease-control; antagonism-; erwinia-carotovora- subsp; -betavasculorum; mutants-; induced-mutations; secretion-; pectate-lyase; antibiotics-; antibacterial-properties; out-genes

Abstract: Erwinia carotovora subsp. betavasculorum Ecb168 produces an antibiotic(s) that suppresses growth of the related bacterium Erwinia carotovora subsp. carotovora in culture and in wounds of potato tubers. Strain Ecb168 also produces and secretes pectolytic enzymes and causes a vascular necrosis and root rot of sugar beet. Genes (out) involved in secretion of pectolytic enzymes by Ecb168 were localized to two HindIII fragments (8.5 and 10.5 kb) of Ecb168 genomic DNA by hybridization to the cloned out region of E. carotovora subsp. carotovora and by complementation of Out- mutants of E. carotovora subsp. carotovora. Out- mutants of Ecb168, which did not secrete pectate lyase into the culture medium, were obtained when deletions internal to either HindIII fragment were introduced into the genome of Ecb168 through marker exchange mutagenesis. Out- mutants of Ecb168 were complemented to the Out+ phenotype by introduction of the corresponding cloned HindIII fragment. Out- mutants of Ecb168 were less virulent than the Out+ parental strain on potato tubers. Strain Ecb168 and Out- derivatives inhibited the growth of E. carotovora subsp. carotovora in culture, indicating that the uncharacterized antibiotic(s) responsible for antagonism was exported through an out-independent mechanism. Strain Ecb168 and Out- derivatives reduced the establishment of large populations of E. carotovora subsp. carotovora in wounds of potato tubers and suppressed tuber soft rot caused by E. carotovora subsp. carotovora.

51. NAL Call No.: 421-J829
Development of a botanical fungicide against blue mould of mandarins.
Dixit, S. N.; Chandra, H.; Tiwari, R.; Dixit, V. J-stored-prod-res v.31(2): p.165-172. (1995 Apr.)
Includes references.
Descriptors: penicillium-italicum; plant-pathogenic-fungi; growth-; inhibition-; ageratum-conyzoides; plant-extracts; leaves-; essential-oils; temperature- ; dipping-; fumigation-; mandarins-; food-quality; postharvest-treatment; fungus-control; biological-control; storage-temperature; fruit-quality

Abstract: During screening of vapours emitted by leaf extracts of 30 species of higher plants against Penicillium italicum causing blue mould rot of mandarins, the vapours of Ageratum conyzoides exhibited the strongest toxicity inhibiting the mycelial growth of the test fungus completely. Fungitoxicity in leaves stored at ambient room temperature persisted up to 8 days. The volatile fungitoxic constituent from leaves was isolated in the form of essential oil which was standardized by its various physicochemical properties. The minimum inhibitory

concentration (MIC) of the oil was found to be 0.2% at which the oil exhibited fungistatic nature and showed broad fungitoxic spectrum, inhibiting 32 storage fungi out of 35 tested. The efficacy of the oil on storage at ambient room temperature persisted for 330 days and remained unaltered even on heating up to 100 degrees C. The oil by dipping and fumigation successfully controlled blue mould rot of mandarins and imparted no adverse effect on the quality of treated fruits.

52. NAL Call No.: 448.3-Ap5
Development of a microbial community of bacterial and yeast antagonists to control wound-invading postharvest pathogens of fruits.
Janisiewicz, W. J.; Bors, B. Appl-environ-microbiol v.61(9): p.3261-3267. (1995 Sept.)
Includes references.
Descriptors: pseudomonas-syringae; sporobolomyces-; fungal-antagonists; mixtures-; biological-control; biological-control-agents; antagonism-; penicillium-expansum; postharvest-decay; apples-; asparagine-; population-dynamics; nitrogen-metabolism; carbohydrates-; organic-nitrogen- compounds; sporobolomyces-roseus

Abstract: Two antagonists, the bacterium Pseudomonas syringae and the pink yeast Sporobolomyces roseus, against blue mold (caused by Penicillium expansum) on apple controlled this disease more effectively when combined at approximately equal biomass (50:50 of the same turbidity) than in individual applications. Addition of L-asparagine enhanced the biocontrol effectiveness of P. syringae but decreased that of S. roseus and had no significant effect when the antagonists were combined. Populations of both antagonists increased in apple wounds and were further stimulated by the addition of L-asparagine. The carrying capacity of wounds for P. syringae was not affected by S. roseus. Populations of P. syringae in wounds inoculated individually or in a 50:50 mixture with S. roseus reached the same level after 3 days at 22 degrees C. However, populations of S. roseus recovered after applications of the mixture were consistently lower than those recovered after individual applications. Similar effects were observed in in vitro tests in which populations of S. roseus grown in mixtures with P. syringae were consistently lower than those grown alone, while the populations of P. syringae were not affected by the presence of S. roseus. A total of 36 carbon and 35 nitrogen compounds were tested for utilization by both antagonists. Fourteen nitrogenous compounds were utilized by both P. syringae and S. roseus, and an additional nine compounds were utilized by P. syringae. S. roseus and P. syringae utilized 17 and 13 carbon sources, respectively; 9 sources were common to both antagonists. Populations of these antagonists in apple wounds appear to form a relatively stable community. limiting growth factor in carbon-rich apple wounds.

53. NAL Call No.: 421-B87
The development of suppression tactics for Biprorulus bibax (Heteroptera: Pentatomidae) as part of an integrated pest management programme in citrus in inland south-eastern Australia.
James, D. G. Bull-entomol-res v.84(1): p.31-37. (1994 Mar.)
Includes references.
Descriptors: citrus-limon; pentatomidae-; insect-control; trissolcus-; parasitoids-; endosulfan-; integrated-pest-management; biological-control-agents; new-south-wales; trissolcus-oenone

54. NAL Call No.: 420-F662
Discovery of the male of Ageniaspis citricola (Hymenoptera: Encyrtidae), Parasitoid of the citrus leafminer Phyllocnistis Citrella
Evans, G. A. Fla-entomol v.78(1): p.134-136. (1995 Mar.)
Symposium: Insect Behavioral Ecology 1994.
Descriptors: phyllocnistis-citrella; ageniaspis-; introduced-species; parasitoids-; males-; descriptions-; biological-control; insect-control

55. NAL Call No.: QL461.E532
Disruption of pheromone communication in three sympatric leafroller (Lepidoptera: Tortricidae) pests of apple in British Columbia.
Deland, J. P.; Judd, G. J. R.; Roitberg, B. D. Environ-entomol v.23(5): p.1084-1090. (1994 Oct.)
Includes references.
Descriptors: choristoneura-rosaceana; mating-disruption; pheromones-; chemical-composition; application-rates; pheromone-traps; biological-control; orchards-; british-columbia

Abstract: Fruittree leafroller, Archips argyrospila (Walker), oblique banded leafroller, Choristoneura rosaceana (Harris), and European leafroller Archips rosana (Robinson), all use Z11-14:OAc and E11-14:OAc as components of their species-specific pheromone blends. Small-plot experiments (0.09 ha) were conducted in the Okanagan Valley of British Columbia to evaluate the effects of atmospheric permeation with different concentrations of Z11-14:OAc and E11-14:OAc, applied in a ratio of 93:7, on pheromone communication of these sympatric species. The relative response of male moths to synthetic and natural pheromone-baited traps in pheromone-treated and untreated plots was used to measure disruption of pheromone communication. The pheromone-disruption blend was released by polyethylene tube-type dispensers applied at various densities. Catches of A. argyrospila in synthetic pheromone traps decreased by >92 and 97% when pheromone was applied at rates of 5-10 mg/h/ha and 20-40 mg/h/ha, respectively. Catches of A. argyrospila in virgin female-baited traps were reduced by 99% at pheromone application rates of 20-40 mg/h/ha. Catches of C. rosaceana and A. rosana in synthetic pheromone-baited traps decreased by 88-96% when the pheromone disruptant was applied at rates of 20-40 mg/h/ha. In pheromone-disrupted plots, more male A. argyrospila were caught in traps baited with pheromone blends of C. rosaceana and A. rosana containing a higher percentage of Z11-14:OAc than the reported pheromone blend of A. argyrospila. These results suggest an alteration of the normal pheromonal response of A. argyrospila on exposure to a high concentration of Z11-14:OAc for a sustained time.

56. NAL Call No.: 421-J822
Distance, rotation, and border crops affect Colorado potato beetle (Coleoptera: Chrysomelidae) colonization and population density and early blight (Alternaria solani) severity in rotated potato fields.
Weisz, R.; Smilowitz, Z.; Christ, B. J-econ-entomol v.87(3): p.723-729. (1994 June)
Includes references.
Descriptors: solanum-tuberosum; leptinotarsa-decemlineata; alternaria-solani; rotations-; population-density; insecticides-; integrated-pest-management

Abstract: The effect of distance between rotated potato fields on Colorado potato beetle, Leptinotarsa decemlineata (Say), and early blight, Alternaria solani, incidence was evaluated for 2 yr. In eight newly established potato fields, the timing of adult beetle colonization, population densities, and early-season defoliation were related closely to how isolated the fields were from the previous year's planting. Even short distances between rotated locations resulted in significant reductions of Colorado potato beetle densities. An integrated pest management program resulted in an inverse relationship between distance and the number of insecticides applied for the Colorado potato beetle. Compared with a nonrotated field, a distance of 0.3 to 0.9 km was sufficient to reduce insecticide requirements by 50%. Winter wheat and hay buffers significantly delayed overwintered adult colonization compared with fallow corn stubble. Early blight severity decreased as the distance between the rotated locations increased. Colorado potato beetle population densities, defoliation, and early blight severity followed a similar exponential decline with distance. The effects of winter wheat and hay buffer crops on beetle infestations and early blight severity were also similar. Factors that reduced early-season Colorado potato beetle immigration also lowered the early blight severity.

57. NAL Call No.: SB599.E97
Dynamics of Rhizoctonia solani (black scurf) in successive potato crops.
Jager, G.; Velvis, H. Eur-j-plant-pathol v.101(4): p.467-478. (1995 July)
Includes references.
Descriptors: solanum-tuberosum; continuous-cropping; rotations-; plant-pathogenic-fungi; population-dynamics; rhizoctonia-solani; anastomosis-; groups-; biological-control-agents; verticillium-; fungal-antagonists; incidence-; netherlands-; verticillium-biguttatum

58. NAL Call No.: 421-J822
Economic analysis of a Bacillus thuringiensis-based integrated pest-management program in fresh-market tomatoes.
Trumble, J. T.; Carson, W. G.; White, K. K. J-econ-entomol v.87(6): p.1463-1469. (1994 Dec.)
Includes references.
Descriptors: lycopersicon-esculentum; insect-pests; bacillus-thuringiensis; integrated-pest-management; methomyl-; permethrin-; chemical-control; insect-control; crop-damage; crop-yield; costs-; profitability-; economic-analysis; california-

Abstract: Economic analyses were conducted on fresh-market tomato plantings in 1992 and 1993 that compared the benefit of an integrated pest- management (IPM) program based on a registered Bacillus thuringiensis preparation with the current chemical-standard pesticide practices and an untreated control. The IPM program used three or four applications of B. thuringiensis as needed. The chemical-standard treatment consisted of seven to nine applications of methomyl and permethrin. The effect of each pesticide-use program on insect populations, fruit damage, yield, crop value, cost of control, and net profit was determined. The chemical-standard and IPM treatments reduced pest populations and damage, resulting in better yield and net profits as compared with the control treatment. In 1992, net profits were higher by approximately $500-1,000/ha in the IPM program as compared with the chemical-standard treatment. In 1993, the chemical-standard program performed slightly better by approximately $300/ha. However, given shipping prices over the past 5-yr period, the IPM approach would outperform the chemical-standard treatment in terms of net profit > 80% of the time. In addition, the economic results from the IPM program are conservative because some significant benefits, such as a potential reduction in development of pesticide resistance, reduced soil compaction, less potential for damage to the environment, and less possibility of human health concerns, were not included.

59. NAL Call No.: 80-Ac82
Economic analysis of three tomato production systems.
Brumfield, R. G.; Adelaja, F. E.; Reiners, S. Acta-hortic (340): p.255-260. (1995 Jan.)
Paper presented at the XII International Symposium on Horticultural Economics / edited by J.-C Montigaud, L.M. Albisu, U. Avermaete, L. Ekelund, D. Meijaard, and E. de Kleijn.
Descriptors: lycopersicon-esculentum; crop-production; cropping-systems; organic-farming; organic-culture; integrated-pest-management; crop-yield; production-costs; returns-; production-costs; economic-viability; new-jersey; conventional-farming; gross-returns; net-returns

60. NAL Call No.: QL391.N4J62
Effect of Hirsutella rhossiliensis on infection of potato by Pratylenchus penetrans.
Timper, P.; Brodie, B. B. J-nematol v.26(3): p.304-307. (1994 Sept.)
Includes references.
Descriptors: solanum-tuberosum; pratylenchus-penetrans; hirsutella-; fungal-antagonists; biological-control-agents; pathogens-; biological-control; nematophagous-fungi; roots-; infections-

Abstract: We evaluated the ability of the nematode-pathogenic fungus Hirsutella rhossiliensis (Deuteromycotina: Hyphomycetes) to reduce root penetration and population increase of Pratylenchus penetrans on potato. Experiments were conducted at 24 C in a growth chamber. When nematodes were placed on the soil surface 8 cm from a 14-day-old potato cutting, the fungus decreased the number entering roots by 25%. To determine the effect of the fungus on population increase after the nematodes entered roots, we transplanted potato cuttings infected with P. penetrans into Hirsutella-infested and uninfested soil. After 60 days, the total number of nematodes (roots and soil) was 20 +/- 4% lower in Hirsutella-infested than in uninfested soil.

61. NAL Call No.: 23-Au792
Effect of inoculating fungi into compost on growth of tomato and compost microflora.
Sivapalan, A.; Morgan, W. C.; Franz, P. R. Aust-j-exp-agric v.34(4): p.541-548. (1994)
Includes references.
Descriptors: lycopersicon-esculentum; growth-rate; plant-height; dry-matter; weight-; leaf-area; flowers-; fruits-; composts-; growing-media; acremonium-; chaetomium-globosum; gliocladium-roseum; trichoderma-hamatum; biological-control-agents; population-density; microbial- flora; acremonium-butyri; zygorrhynchus-moelleri

62. NAL Call No.: QL391.N4J62
Effect of lime on Criconemella xenoplax and bacterial canker in two California orchards.
Underwood, T.; Jaffee, B. A.; Verdegaal, P.; Norton, M. V. K.; Asai, W. K.; Muldoon, A. E.; McKenry, M. V.; Ferris, H. J-nematol v.26(4,suppl.): p.606-611. (1994 Dec.)
Includes references.
Descriptors: prunus-persica; prunus-dulcis; liming-; application-rates; soil-treatment; criconemella-; plant-parasitic-nematodes; population-density; soil- ph; cankers-; hirsutella-; nematophagous-fungi; nematode-control; biological-control; cultural-control; california-; hirsutella-rhossiliensis

Abstract: In a peach orchard with an initial soil pH of 4.9, preplant application of 0, 13.2, 18.2, 27.3, or 54.2 kg lime/tree site altered soil pH (range after 1 year = 4.8-7.3) but did not affect numbers of Criconemella xenoplax or tree circumference. Liming also failed to reduce the incidence of bacterial canker, which affected 17% of the trees by the sixth year after planting. Four years after planting, numbers of C. xenoplax exceeded 400/100 cm3 soil, regardless of treatment. Trees with higher densities of C. xenoplax had a higher incidence of canker. The nematophagous fungus Hirsutella rhossiliensis was not detected until the fourth year. Thereafter, the incidence of H. rhossiliensis and percentage C. xenoplax parasitized by H. rhossiliensis increased, but the increases lagged behind increases in numbers of nematodes. In an almond orchard with an initial soil pH of 4.6, preplant application of 0, 6.4, 12.8, or 25.0 kg lime/tree site altered soil pH (range after 1 year = 4.7-7.1). Numbers of C. xenoplax remained low (< 20/100 cm3 soil), whereas numbers of Paratylenchus sp. increased to high levels (> 500/100 cm3

soil), regardless of treatment. Low levels (< 20/100 cm3 soil) of H. rhossiliensis-parasitized Paratylenchus sp. were detected. No bacterial canker occurred, but tree circumference was greater after 6 years if soil pH was intermediate (6.0-7.0).

63. NAL Call No.: QL461.E532
Effect of second-stage IPM practices on parasitism of apple blotch leafminer (Lepidoptera: Gracillariidae) larvae in Massachusetts apple orchards.
Van Driesche, R. G.; Prokopy, R. J.; Christie, M. Environ-entomol v.23(1): p.140-146. (1994 Feb.)
Includes references.
Descriptors: malus-pumila; phyllonorycter-crataegella; sympiesis-marylandensis; parasitoids-; rhagoletis-pomonella; integrated-pest-management; orchards-; massachusetts-

Abstract: In 1989 and 1990, parasitism of the apple blotch leafminer, Phyllonorycter crataegella (Clemens), was assessed in 17 and 16 apple orchards, respectively, in Massachusetts to determine the effect of integrated pest management (IPM) practices that reduced pesticide use between early June and late August. In test blocks on each farm, broadcast pesticide applications for control of the apple maggot, Rhagoletis pomonella (Walsh), were replaced by use of either red spherical sticky traps on perimeter apple trees to intercept immigrating apple maggot flies or by applications of pesticides to perimeter apple trees. In either case, no insecticides or miticides were applied to the interior of test blocks after early June. Use of these methods was designed as second-stage IPM, and apple blotch leafminer parasitism under such management was compared with an adjacent block in each orchard using conventional pesticide tactics. Average parasitism of tissue-feeding apple blotch leafminer larvae across all orchards was slightly greater in the second and third host generations in blocks in which second-stage IPM practices were used than in conventionally managed blocks on the same farms. Most enhancement of apple blotch leafminer parasitism occurred in orchards in which traps were used to control apple maggot flies. Orchards in which perimeter-pesticide applications were made showed little or no difference in parasitism levels from those of full spray blocks. None of six orchard or insect variables examined (block size, ratio of interior trees to edge trees, nature of surrounding vegetation, number of pesticide applications per leafminer generation, density of tissue-feeding stage apple blotch leafminer mines, or. seen among orchards and blocks in correlation analyses. Suppression of first generation apple blotch leafminer densities in 1990 was followed by lower average parasitism across orchards compared with 1989.

64. NAL Call No.: 421-J822
Effects of cyromazine on larval survival, pupation, and adult emergence of Colorado potato beetle (Coleoptera: Chrysomelidae).
Sirota, J. M.; Grafius, E. J-econ-entomol v.87(3): p.577-582. (1994 June)
Includes references.
Descriptors: solanum-tuberosum; leptinotarsa-decemlineata; cyromazine-; insect-control; integrated-pest-management; crop-yield; yield-increases; michigan-

Abstract: Results of laboratory and field experiments to test the effects of the insect growth regulator cyromazine on Colorado potato beetle, Leptinotarsa decemlineata (Say), are reported. We describe symptoms of cyromazine poisoning of larvae. When second instars were fed cyromazine-treated potato foliage in laboratory bioassays, all larvae died within 10 d. Second instars of the insecticide-resistant Long Island strain survived longer than those of the susceptible Vestaburg strain when fed a low concentration, but survival between strains fed at a higher concentration did not differ. Survival to pupation of fourth instars fed cyromazine--treated foliage was 12-16% lower than that of controls, but the differences were not significant. Treated larvae pupated later and were less likely to develop into adults than untreated larvae. In the field, cyromazine sprays reduced the number of first and second instars and affected third and fourth instars by inhibiting feeding and lowering rates of pupation. Cyromazine treatment reduced adult emergence 63-fold and increased yield of size-A potatoes 2- to 4.5-fold compared with results from untreated plots. The effectiveness of cyromazine at low rates and on all stages of insect development makes it a valuable addition to integrated pest management programs for Colorado potato beetle.

65. NAL Call No.: QL391.N4J62
Effects of pesta-pelletized Steinernema carpocapsae (All) on Western corn rootworms and Colorado potato beetles.
Nickle, W. R.; Connick, W. J. Jr.; Cantelo, W. W. J-nematol v.26(2): p.249-250. (1994 June)
Includes references.
Descriptors: leptinotarsa-decemlineata; diabrotica-virgifera; steinernema-; helminth-insecticides; biological-control-agents; entomophilic-nematodes; formulations-; wheat-flour; pellets-;

biological-control

Abstract: Pesta-pelletized Steinernema carpocapsae (All) nematodes were used in soil treatments in the greenhouse against larvae of Western corn rootworm and prepupae of Colorado potato beetle. The pesta-pellets delivered 100,000 living nematodes/g. Infective-stage nematodes and their associated bacteria survived the pesta-pellet process, emerged from the pellets in large numbers in the soil, and reduced adult emergence of both pest insects by more than 90%.

66. NAL Call No.: 421-En895
The effects of weed strips on aphids and aphidophagous predators in an apple orchard.
Wyss, E. Entomol-exp-appl v.75(1): p.43-49. (1995 Apr.)
Includes references.
Descriptors: aphis-pomi; dysaphis-plantaginea; predators-of-insect-pests; predatory-insects; predatory-arthropods; weeds-; habitats-; orchards-; malus- pumila; strip-cropping; natural-enemies; population-density; population-dynamics; seasonal-abundance; food-plants; host-plants; switzerland-

67. NAL Call No.: QL391.N4J62
Efficacy of Paecilomyces lilacinus in suppressing Rotylenchulus reniformis on tomato.
Walters, S. A.; Barker, K. R. J-nematol v.26(4,suppl.): p.600-605. (1994 Dec.)
Includes references.
Descriptors: lycopersicon-esculentum; rotylenchulus-reniformis; plant-parasitic-nematodes; population-density; paecilomyces-lilacinus; biological- control-agents; shoots-; fruits-; weight-; biomass-production; biological-control; nematode-control; greenhouse-culture; field-experimentation; north-carolina

Abstract: Effects of rice-cultured Paecilomyces lilacinus on Rotylenchulus reniformis were studied in both greenhouse and field microplot tests with 'Rutgers' tomato. Numbers of R. reniformis were reduced (P less than or equal to 0.05) by P. lilacinus, with suppression in the initial greenhouse test ranging from 46 to 48% for two rice + P. lilacinus treatments; the rice-only treatment caused a nonsignificant reduction of 25%. In the second greenhouse test, total R. reniformis numbers were restricted (P less than or equal to 0.05) by 41% by the rice + P. lilacinus treatment, whereas the rice-only treatment had a slight negative effect (16% inhibition, NS). Total numbers of R. reniformis were suppressed 59 and 36% at midseason and harvest, respectively, in microplots infested with P. lilacinus. The fungus was recovered from egg masses via isolations in the second greenhouse test. Shoot and fruit growth of Rutgers tomato were restricted by R. reniformis in the initial greenhouse test irrespective of P. lilacinus treatment, but this nematode did not affect fresh shoot weights in the second greenhouse test. The nematode also limited shoot growth of Rutgers tomato in microplots, and P. lilacinus suppressed R. reniformis numbers sufficiently to prevent related impairment of shoot and fruit growth. This study indicated that P. lilacinus has detrimental effects on R. reniformis population development under both greenhouse and field microplot conditions.

68. NAL Call No.: SB950.A1I66
ESA's 1993 Annual Meeting. IV. Turf management.
Grossman, J. IPM-pract v.16(7): p.14-18. (1994 July)
Descriptors: lawns-and-turf; insect-control; endophytes-; biological-control-agents; biological-control

69. NAL Call No.: QH545.A1E52
Estimating the risks and benefits of pesticides: considering the agroecosystem and integrated pest management in the use of EBDC fungicides on apples.
Cooley, D. R.; Manning, W. J. Environ-pollut v.88(3): p.315-320. (1995)
Includes references.
Descriptors: fungicides-; fungicide-residues; malus-pumila; integrated-pest-management; apples-; food-safety; risk-; environmental-policy; risk-assessment

70. NAL Call No.: 275.29-M58B
European chafer.
Smitley, D. Ext-bull-Coop-Ext-Serv,-Mich-State-Univ. East Lansing : Michigan State University, Cooperative Extension Service v.E-2500p.2 (1994 Oct.)
In the subseries: Turf tips for the homeowner.
Descriptors: lawns-and-turf; insect-pests; origin-; geographical-distribution; crop-damage; life-cycle; insect-control; irrigation-; insecticides-; biological- control-agents; rhizotrogus-majalis

71. NAL Call No.: SB599.C8

Evaluation of a Pasteuria penetrans alone and in combination with oxamyl, plant resistance and solarization for control of Meloidogyne spp. on vegetables grown in greenhouses in Crete.
Tzortzakakis, E. A.; Gowen, S. R. Crop-prot v.13(6): p.455-462. (1994 Sept.)
Includes references.
Descriptors: cucumis-sativus; lycopersicon-esculentum; hybrids-; pest-resistance; meloidogyne-incognita; meloidogyne-javanica; plant-parasitic- nematodes; bacillus-penetrans; biological-control-agents; oxamyl-; soil-solarization; crop-yield; roots-; galls-; population-density; efficacy-; nematode-control; biological-control; chemical-control; integrated-pest-management; nematode-egg-production

72. NAL Call No.: SB599.E97
Evaluation of antagonistic bacteria for suppression of bacterial ring rot of potato.
Gamard, P.; De Boer, S. H. Eur-j-plant-pathol v.101(5): p.519-525. (1995 Sept.)
Includes references.
Descriptors: solanum-tuberosum; clavibacter-michiganensis; clavibacter-michiganensis-subsp; -sepedonicus; bacterial-diseases; plant-disease-control; biological-control; screening-; biological-control-agents; bacteria-; antagonism-

73. NAL Call No.: 1.9-P69P
Evaluation of bacterial epiphytes isolated from avocado leaf and fruit surfaces for biocontrol of avocado postharvest diseases.
Korsten, L.; De Jager, E. S.; De Villers, E. E.; Lourens, A.; Kotze, J. M.; Wehner, F. C.
Plant-dis. [St. Paul, Minn., American Phytopathological Society] v.79 (11)p.1149-1156 (1995 Nov.)
Includes references.
Descriptors: persea-americana; avocados-; plant-pathogenic-fungi; postharvest-decay; disease-control; biological-control; epiphytes-; isolation-; fungal- antagonists; screening-; bacillus-subtilis; biological-control-agents; efficacy-; bacterial-epiphytes

Abstract: Bacteria isolaled from Fuerte avocado leaf and fruit surfaces were evaluated for in vitro antagonism toward Dothiorella aromatica. Thirty- three bacteria exhibiting pronounced growth inhibition were further tested for antibiosis against Collelotrichum gloeosporioides, Thyronectria pseudotrichia, Phomopsis perseae, Pestalotiopsis versicolor, and Fusarium solani. Optimum disease-reducing concentrations of Bacillus subtilis (isolate B246) exhibiting the highest degree of antibiosis were determined according to a checkerboard-type titration assay, by artificial inoculations on Fuerte and Edranol avocado fruit in the laboratory. Various concentrations (10(5), 10(6), 10(7), and 10(8) cells ml-1) of B. subtilis were also incorporated into commercial Tag-wax and applied to Hass avocado fruit in the packinghouse for control of anthracnose, Dothiorella/Colletotrichum fruit rot complex (DCC), and stem-end rot (SE). In the artificial inoculation study, increasing concentrations of B. subtilis were effective against increasing concentrations of C. gloeosporioides, F. solani, and T. pseudotrichia. Control of D. aromatica was significant at the lower (10(3) and 10(4) cells ml-1) pathogen concentrations, whereas inhibition of P. perseae and P. versicolor was more readily achieved at the lower (10(5) and 10(6) cells ml-1) antagonist concentrations. In the packinghouse, a B. subtilis concentration of 10(7) cells ml-1 significantly reduced anthracnose and SE externally and internally, while the lower B. subtilis concentrations (10(5) and 10(6) cells ml-1) were effective against internal DCC. Based on treatment means of all external and internal postharvest disease data, all B. subtilis concentrations performed.

74. NAL Call No.: S587.T47
Evaluation of fungicides against potato late blight.
Platt, H. W.; Reddin, R. D. Tests-agrochem-cultiv v.124(15): p.30-31. (1994 June)
Supplement to Annals of applied biology, volume 124.
Descriptors: solanum-tuberosum; phytophthora-infestans; blight-; plant-disease-control; efficacy-; chemical-control; biological-control; fungicides-; pesticide-mixtures; bacillus-thuringiensis; incidence-; crop-yield; tubers-

75. NAL Call No.: 464.8-P56
Evaluation of Pythium nunn as a potential biocontrol agent against Phytophthora root rots of azalea and sweet orange.
Fang, J. G.; Tsao, P. H. Phytopathology v.85(1): p.29-36. (1995 Jan.)
Includes references.
Descriptors: rhododendron-; citrus-sinensis; phytophthora-cinnamomi; phytophthora-citrophthora; phytophthora-nicotianae-var; -parasitica; plant- disease-control; biological-control; pythium-; root-rots; pathogenicity-; inoculum-density; hyperparasitism-

Abstract: Pythium nunn parasitized the hyphae, sporangia, chlamydospores, and sexual organs of five isolates of P. cinnamomi, P. citrophthora, and P. parasitica in vitro, and caused inhibition of mycelial growth of these isolates. Population densities of P. nunn in a peat/sand mix, monitored up to 8 wk, declined gradually unless 1% ground rolled oats were added to the mix at 2 wk. Population densities of all three Phytophthora spp. also increased after 1% ground rolled oats were added. Population densities of P. cinnamomi, P. citrophthora and one isolate of P. parasitica in oat-amended treatments were reduced in the presence of P. nunn, but no reduction in population densities of the other isolate of P. parasitica occurred in the presence of P. nunn, with or without oats. The effectiveness of P. nunn in suppressing root rot of azalea (Rhododendron spp.) caused by P. cinnamomi or P. parasitica, and root rot of sweet orange (Citrus sinensis) caused by P. parasitica, was evaluated in the peat/sand mix amended with 1% ground rolled oats in greenhouse tests. P. nunn at 300 propagules per gram did not suppress azalea or sweet orange root rot. At 1,000 propagules per gram, it significantly suppressed sweet orange root rot caused by P. parasitica P. nunn did not affect the growth of azalea but slightly reduced sweet orange seedling growth.

76. NAL Call No.: 1.9-P69P
Evaluation of rhizosphere bacteria for biological control of pythium root rot of greenhouse cucumbers in hydroponic culture.
Rankin, L.; Paulitz, T. C. Plant-dis. [St. Paul, Minn., American Phytopathological Society] v.78 (5) p.447-451 (1994 May)
Includes references.
Descriptors: cucumis-sativus; pythium-; root-rots; plant-disease-control; biological-control; pseudomonas-corrugata; pseudomonas-fluorescens; strains-; biological-control-agents; fungal-antagonists; hydroponics-; dry-matter-accumulation; crop-yield; fruits-; pythium-aphanidermatum

77. NAL Call No.: 421-J822
Evaluation of steinernematid nematodes against Popillia japonica (Coleoptera: Scarabaeidae) larvae: species, strains, and rinse after application.
Selvan, S.; Grewal, P. S.; Gaugler, R.; Tomalak, M. J-econ-entomol v.87(3): p.605-609. (1994 June)
Includes references.
Descriptors: lawns-and-turf; popillia-japonica; neoaplectana-glaseri; steinernema-; entomophilic-nematodes; biological-control-agents; steinernema-anomali

Abstract: We evaluated the efficacy of Steinernema glaseri Steiner (strains NC, NJ-43, and a strain genetically selected for improved efficacy, SI- 12), Steinernema anomali Kozodai (Ryazan strain), and Steinernema sp. (RGV strain) for the control of Japanese beetle, Popillia japonica Newman, larvae in the laboratory and field. Virulence of nematodes was assessed by the mortality of the host larvae and by the number of nematodes established per host. In laboratory tests, NJ-43 and SI-12 strains of S. glaseri were significantly more virulent to larvae than the NC strain, S. anomali or Steinernema sp. Similar results were obtained in field tests, where the NJ-43 and SI-12 strains produced 66 and 65% reductions of japanese beetle larval population as compared with the NC strain that produced a 44% reduction. Steinernema anomali and Steinernema sp. were as effective as the NC strain of S. glaseri. Nematodes could be successfully applied during midday, if washed from the grass surface with a rinse after application. We conclude that the choice of nematode strain and rinsing of nematodes after application are important factors in obtaining control of japanese beetle populations in turfgrass.

78. NAL Call No.: 75.8-P842
Evaluation of yeasts for biological control of Fusarium dry rot of potatoes.
Schisler, D. A.; Kurtzman, C. P.; Bothast, R. J.; Slininger, P. J. Am-potato-j v.72(6): p.339-353. (1995 June)
Includes references.
Descriptors: potatoes-; potato-stores; storage-decay; dry-rot; gibberella-pulicaris; fusarium-solani-var; -coeruleum; fungicide-tolerance; strains-; biological-control; cryptococcus-laurentii; pseudomonas-fluorescens; pichia-; debaryomyces-; antagonists-; biological-control-agents; pichia-farinosa; debaryomyces-; robertsiae-

79. NAL Call No.: SB379.A9A9
An evolving program of integrated pest management.
Morse, J. G.; Klonsky, K. Calif-grow v.18(4): p.XXI-XXVI. (1994 Apr.)
Descriptors: citrus-; citrus-fruits; insect-control; mite-control; mollusc-control; chemical-control; cost-benefit-analysis; integrated-pest-management; california-

80. NAL Call No.: S544.3.N7A4
Expectations for IPM in 1994.
Ullrich, M. Agfocus p.2. (1994 Mar.)
Descriptors: integrated-pest-management; crops-

81. NAL Call No.: QL461.A52
Extension and evaluation of a simplified monitoring program in New York apples.
Agnello, A. M.; Kovach, J.; Nyrop, J. P.; Reissig, W. H.; Breth, D. I.; Wilcox, W. F.
Am-entomol v.40(1): p.37-49. (1994 Spring)
Includes references.
Descriptors: malus-; orchards-; integrated-pest-management; control-programs; insect-control; project-implementation; new-york

82. NAL Call No.: 80-Ac82
The fertilization efficiency increase in integrated vegetable field production.
Nowosielski, O. Acta-hortic (371): p.371-379. (1994 July)
Paper presented at the Seventh International Symposium on Timing Field Production of Vegetables held August 23-27, 1993, Skierniewice, Poland.
Descriptors: vegetables-; fertilizer-requirement-determination; plant-analysis; soil-analysis; application-methods; integrated-control; crop-production

83. NAL Call No.: 421-J822
Field electroantennogram and behavioral responses of Epiphyas postvittana (Lepidoptera: Tortricidae) under low pheromone and inhibitor concentrations.
Suckling, D. M.; Karg, G.; Bradley, S. J.; Howard, C. R. J-econ-entomol v.87(6): p.1477-1487. (1994 Dec.)
Includes references.
Descriptors: epiphyas-postvittana; mating-disruption; pheromones-; mating-disrupters; biological-control; efficacy-; orchards-; malus-pumila; new- zealand

Abstract: Mating disruption of Epiphyas postvittana (Walker) was studied in two 0.1-ha plots at a 10.6-ha apple orchard each with either 0, 100, 200, or 400 dispensers per hectare; the dispensers released an attractive blend of pheromone (54.9 mg [E]-11-tetradecenyl acetate and 2.5 mg of [E,E]-9,11-tetradecadienyl acetate) and inhibitor (19.7 mg of [Z]-11-tetradecenyl acetate). The incidence of mating of tethered females placed in treated or untreated plots significantly increased with the increased numbers of males released. Mating was reduced with estimated pheromone release rates at dusk from 1.1-4.4 mg/ha/h. In the control plots, trap catch (mean +/- SEM) over 173 d was 0.207 +/- 0.074 males per trap per day. In the pheromone and inhibitor treatments, 0.004 +/- 0.003 males per trap per day were caught in the 100-dispensers-per- hectare plots and 0.001 +/- 0.001 males per trap per day in the 200-dispensers-per-hectare plots. No moths were caught at 400-dispensers-per- ha level. Mating frequency averaged 12.9% of the control level at 173 d after treatment, with release rates from 0.15-0.51 mg/ha/h. Electroantennogram signals recorded in treated apple-orchard plots showed a significant effect from increasing the rate of dispenser application after 83 d. Pheromone and inhibitor levels had higher variance in the grass between rows of trees than within the tree rows. By 140 d after treatment, no electroantennogram response to pheromone and inhibitor was distinguishable above the orchard background volatiles. However, the standard error of electroantennogram responses was negatively correlated with release rate. Time series of continuous electroantennogram recordings over 30-60 s also showed significant. grass rows.

84. NAL Call No.: 421-J822
Field evaluation of insecticide application strategies on development of insecticide resistance by Colorado potato beetle (Coleoptera: Chrysomelidae).
Huang, H.; Smilowitz, Z.; Saunders, M. C.; Weisz, R. J-econ-entomol v.87(4): p.847-857. (1994 Aug.)
Includes references.
Descriptors: leptinotarsa-decemlineata; fenvalerate-; endosulfan-; azinphos-methyl-; oxamyl-; bacillus-thuringiensis; application-methods; insecticide- resistance; integrated-pest-management; pennsylvania-; esfenvalerate-; bacillus-thuringiensis-subsp; -tenebrionis

Abstract: Five insecticide application regimes were evaluated to investigate their influence on development of insecticide resistance in field populations of Colorado potato beetle, Leptinotarsa decemlineata (Say). These regimes included season-long sequential esfenvalerate applications; two alternate uses of esfenvalerate, azinphosmethyl, endosulfan, oxamyl, and Bacillus thuringiensis ssp. tenebrionis; an integrated pest management (IPM) program; and one early season esfenvalerate application. Response of Colorado potato beetle from each treatment

to four insecticides was determined at the beginning and end of the growing season. A filter-paper technique was used to estimate the concentration-response relationship for first instars, and a topical application bioassay was used to measure response of adults. Differences in esfenvalerate susceptibility existed among treatments in the early season; these differences were correlated with frequency of esfenvalerate applications during the previous season. Populations from all field treatments at the end of season showed an increase in resistance to esfenvalerate and endosulfan but not to azinphosmethyl or oxamyl. Increases in resistance generally were related to the frequency that a specific chemical was applied. We observed significant correlations between increase in esfenvalerate resistance and number of esfenvalerate applications in a given regime; 10 applications resulted in a 3.6-fold increase. Direct selection by esfenvalerate appeared to be the primary factor in development of resistance in these populations. Consequently, we suggest that reduction of repeated pyrethroid use is critical for limiting resistance development. The lowest increase in. development.

85. NAL Call No.: 75.8-P842
Field selection for esfenvalerate resistance by the Colorado potato beetle.
Huang, H.; Smilowitz, Z.; Saunders, M. C.; Weisz, R. Am-potato-j v.72(1): p.1-12. (1995 Jan.)
Includes references.
Descriptors: solanum-tuberosum; leptinotarsa-decemlineata; insecticide-resistance; pyrethroid-insecticides; azinphos-methyl-; endosulfan-; oxamyl-; bacillus-thuringiensis; cryolite-; integrated-pest-management; chemical-control; insecticide-application; regimes-; sequential-application

86. NAL Call No.: S544.3.N7A4
Fighting fungi provide biocontrol of grape diseases.
Bernard, L. Agfocus p.16. (1994 July)
Descriptors: fungal-diseases; biological-control; vitis-vinifera; vitis-labrusca; mildews-; fusarium-proliferatum; new-york

87. NAL Call No.: SB945.F8F75--1994
Fruit flies and the sterile insect technique.
Calkins, C. O.; Klassen, W.; Liedo, P.; International Congress of Entomology (1992 : Peking, C. 258p. (CRC Press, Boca Raton, FL , 1994)
Papers from the International Congress of Entomology, held in Beijing, China, June 27-July 4, 1992.
Descriptors: Fruit-flies-Biological-control-Congresses; Insect-sterilization-Congresses

88. NAL Call No.: 80-Ac82
Fruit set and yield of papaya (Carica papaya L.) under integrated management to reduce ringspot viruses effects.
Perez, E. G.; Hernandez, A. Y. L.; Ortiz, D. T.; Angel, D. N. Acta-hortic (370): p.145-150. (1995 Sept.)
Paper presented at the International Symposium on Tropical Fruits: Improving the Quality of Tropical Fruits, November 7-12, 1993, Vitoria, Espirito Santo State, Brazil.
Descriptors: carica-papaya; papaw-ringspot-virus; fruiting-; crop-quality; crop-yield; crop-management; integrated-control; mexico-

89. NAL Call No.: QH540.E23
Fundamental differences between conventional and organic tomato agroecosystems in California.
Drinkwater, L. E.; Letourneau, D. K.; Workneh, F.; Van Bruggen, A. H.; Shennan, C. Ecol-appl v.5(4): p.1098-1112. (1995 Nov.)
Includes references.
Descriptors: lycopersicon-esculentum; organic-farming; farming-; fertilizers-; pesticides-; organic-amendments; biological-control; soil-chemistry; soil- biology; soil-flora; soil-insects; soil-arthropods; insect-communities; community-ecology; biological-activity-in-soil; pyrenochaeta-lycopersici; fungal-diseases; crop-yield; insect-pests; nitrogen-; mineralization-; low-input-agriculture; california-; conventional-farming

90. NAL Call No.: SB945.F8F79-1996
Future trends in fruit fly management.
Aluja, M. Fruit fly pests a world assessment of their biology and management / p.309-320. (1996)
Paper presented at the Fourth International Symposium on Fruit Flies of Economic Importance held June 5-10, 1994, Sand Key, Florida.
Descriptors: tephritidae-; insect-pests; insect-control; integrated-pest-management; habitats-; sterile-insect-release; biological-control; parasites-of- insect-pests

91. NAL Call No.: S605.5.O74
Get beneficials to protect your garden.
Poncavage, J. Org-gard v.43(5): p.36-40. (1996 May-1996 June)
Descriptors: horticultural-crops; insect-control; biological-control; beneficial-organisms; domestic-gardens

92. NAL Call No.: 80-Am329
Growing orchids the organic way.
Kapuler, A. M. Am-Orchid-Soc-bull v.63(7): p.774-779. (1994 July)
Descriptors: orchidaceae-; greenhouse-culture; organic-farming; integrated-pest-management

93. NAL Call No.: SB608.T87H35--1994
Handbook of integrated pest management for turfgrass and ornamentals. Integrated pest management for turfgrass and ornamentals.
Leslie, A. R. 1. 660 p. (Lewis Publishers, Boca Raton FL, 1994)
Rev. ed. of: Integrated pest management for turfgrass and ornamentals. 1989.
Descriptors: Turfgrasses-Diseases-and-pests-Integrated-control-Handbooks,-manuals,-etc; Landscape-plants-Diseases-and-pests-Integrated-control- Handbooks,-manuals,-etc; Turf-management-Handbooks,-manuals,-etc

94. NAL Call No.: SB599.J69
Host plant resistance to insects in integrated pest management in vegetable crops.
Eigenbrode, S. D.; Trumble, J. T. J-agric-entomol v.11(3): p.201-224. (1994 July)
Includes references.
Descriptors: vegetables-; insect-pests; pest-resistance; varietal-resistance; integrated-pest-management; integrated-control; plant-breeding

95. NAL Call No.: 421-J822
Host preference and suitability of two aphelinid parasitoids (Hymenoptera: Aphelinidae) for aphids (Homoptera: Aphididae) on citrus.
Yokomi, R. K.; Tang, T. Q. J-econ-entomol v.88(4): p.840-845. (1995 Aug.)
Includes references.
Descriptors: aphis-gossypii; aphis-spiraecola; toxoptera-aurantii; aphelinus-; parasitoids-; host-preferences; parasitism-; sex-ratio; body-weight; parasites-of-insect-pests; biological-control-agents; species-differences; citrus-; aphelinus-spiraecolae; aphelinus-gossypii; host-suitability

Abstract: Laboratory tests were conducted to estimate the host preference and suitability of the aphelinid parasitoids, Aphelinus spiraecolae Evans & Schauff and Aphelinus gossypii Timberlake, for the melon aphid, Aphis gossypii Glover; the spirea aphid, Aphis spiraecola Patch; and the black citrus aphid, Toxoptera aurantii (Boyer de Fonscolombe). Both parasitoids attacked all 3 host aphids in choice tests, but A. spiraecolae showed a preference for the spirea aphid; whereas Aphelinus gossypii preferred the melon aphid. Results were similar in no-choice tests. Adult emergence rate of A. spiraecolae was substantially higher when the spirea aphid and the black citrus aphid were hosts compared with when the host was the melon aphid. A. spiraecolae female sex ratios were higher when the host was the spirea aphid than with the black citrus aphid or the melon aphid. Aphelinus gossypii adult emergence rates were higher on the melon aphid than on the spirea aphid or the black citrus aphid. Female sex ratios of Aphelinus gossypii were 70.2, 54.5, and 62.3% when reared on the melon aphid, spirea aphid, and the black citrus aphid, respectively, but these differences were not statistically significant. Development times of the aphelinids reared on the 3 aphid hosts were not significantly different. Adult biomass of A. spiraecolae was higher when reared on the spirea aphid (30.3 and 22.2 micrograms for females and males, respectively) than on the melon aphid (23.1 and 17.9 micrograms) or the black citrus aphid (28.8 and 22.0 micrograms). Biomass of Aphelinus gossypii were higher when reared on the melon aphid (33.6 and 22.1 micrograms for females and males, respectively) and the black citrus aphid (32.6. preferred and suitable host for A. spiraecolae, whereas the melon aphid was a preferred host of Aphelinus gossypii under our test conditions. These aphelinids, therefore, may have potential to act in concert as natural enemies of aphids on citrus.

96. NAL Call No.: SB599.C8
Hot pepper (Capsicum spp.) production on Java, Indonesia: toward integrated crop management.
Vos, J. G. M.; Duriat, A. S. Crop-prot v.14(3): p.205-213. (1995 May)
Includes references.
Descriptors: capsicum-; crop-production; crop-management; integrated-control; plant-diseases; plant-protection; crop-yield; tropics-; indonesia-

Abstract: In Indonesia, hot pepper (Cupsicum spp.) is the most important low elevation vegetable commodity in terms of production area and value. The yield levels are low (2.8 t ha (-1) in 1989). Poor crop health, low quality of seed material, high production costs, fluctuating market prices. and farmers' lack of knowledge are major production constraints. Integrated crop management (ICM) is proposed to overcome major problems with crop health. ICM focuses on crop health by optimizing crop conditions. ICM seems to be a suitable approach for vegetable production under tropical lowland conditions, and should lead to ecologically. toxicologically and socio-economically sound practices.

97. NAL Call No.: 448.3-Ap5
Hrp- mutants of Pseudomonas solanacearum as potential biocontrol agents of tomato bacterial wilt.
Frey, P.; Prior, P.; Marie, C.; Kotoujansky, A.; Trigalet Demery, D.; Trigalet, A.
Appl-environ-microbiol v.60(9): p.3175-3181. (1994 Sept.)
Includes references.
Descriptors: lycopersicon-esculentum; pseudomonas-solanacearum; wilts-; mutants-; antagonism-; biological-competition; plant-disease-control; colonizing-ability; roots-; stems-; fruits-; bacteriocins-; antibacterial-properties

Abstract: There have been many attempts to control bacterial wilt with antagonistic bacteria or spontaneous nonpathogenic mutants of Pseudomonas solanacearum that lack the ability to colonize the host, but they have met with limited success. Since a large gene cluster (hrp) is involved in the pathogenicity of P. solanacearum, we developed a biological control strategy using genetically engineered Hrp- mutants of P. solanacearum. Three pathogenic strains collected in Guadeloupe (French West Indies) were rendered nonpathogenic by insertion of an omega-Km interposon within the hrp gene cluster of each strain. The resulting Hrp- mutants were tested for their ability to control bacterial wilt in challenge inoculation experiments conducted either under growth chamber conditions or under greenhouse conditions in Guadeloupe. Compared with the colonization by a pathogenic strain which spread throughout the tomato plant, colonization by the mutants was restricted to the roots and the lower part of the stems. The mutants did not reach the fruit. Moreover, the presence of the mutants did not affect fruit production. When the plants were challenge inoculated with a pathogenic strain, the presence of Hrp- mutants within the plants was correlated with a reduction in disease severity, although pathogenic bacteria colonized the stem tissue at a higher density than the nonpathogenic bacteria. Challenge inoculation experiments conducted under growth chamber conditions led, in some cases, to exclusion of the pathogenic strain from the aerial part of the plant, resulting in high protection rates. Furthermore, there was evidence that one of the pathogenic strains used for the challenge inoculations produced a bacteriocin that.

98. NAL Call No.: 420-H312
Increased green onion yields associated with abamectin treatments for Liriomyza sativae (Diptera: Agromyzidae) and Thrips tabaci
Kawate, M. K.; Coughlin, J. A. Proc-Hawaii-Entomol-Soc. Honolulu : Hawaiian Entomological Society v.32p.103-112 (1995 Aug.)
Includes references.
Descriptors: allium-cepa; liriomyza-sativae; thrips-tabaci; abamectin-; application-rates; parasitoids-; mortality-; crop-damage; crop-yield; economic- analysis; integrated-pest-management; hawaii-

99. NAL Call No.: 421-J822
Indirect effect of insecticides on convergent lady beetle (Coleoptera: Coccinellidae) in pecan orchards.
Hurej, M.; Dutcher, J. D. J-econ-entomol v.87(6): p.1632-1635. (1994 Dec.)
Includes references.
Descriptors: hippodamia-convergens; larvae-; developmental-stages; beneficial-insects; biological-control-agents; monelliopsis-pecanis; endosulfan-; carbaryl-; phosmet-; methomyl-; fenvalerate-; feeding-; mortality-; adult-insects; esfenvalerate-

Abstract: Indirect toxicity through feeding on insecticide-treated prey was determined for five insecticides at two concentrations each to larvae and adults of convergent lady beetle, Hippodamia convergens Guerin-Meneville. Endosulfan (0.375 and 0.75 g [AI]/liter), carbaryl (1.2 and 2.4 g [AI]/liter), phosmet (0.375 and 0.75 g [AI]/liter), methomyl (0.225 and 0.45 g [AI]/liter), and esfenvalerate (0.015 and 0.03 g [AI]/liter) were toxic to larvae and adults when convergent lady beetles were fed insecticide-treated yellow pecan aphids, Monelliopsis pecanis Bissell. Esfenvalerate was a fast-acting insecticide, killing all tested convergent lady beetle life

stages 1 h after feeding on treated yellow pecan aphids. Carbaryl and phosmet were slow-acting insecticides, causing the greatest mortality after 48 h. Methomyl was the only insecticide that did not cause 100% mortality to adult convergent lady beetles 48 h after feeding on insecticide-treated yellow pecan aphids, at both rates tested.

100. NAL Call No.: 1.9-P69P
Induced tolerance to mal secco disease in Etrog citron and Rangpur lime by infection with the citrus exocortis viroid.
Solel, Z.; Mogilner, N.; Gafny, R.; Bar Joseph, M. Plant-dis. [St. Paul, Minn., American Phytopathological Society] v.79 (1)p.60-62 (1995 Jan.)
Includes references.
Descriptors: citrus-limonia; citrus-medica; citrus-volkameriana; rootstocks-; deuterophoma-tracheiphila; fungal-diseases; citrus-exocortis-viroid; strains-; infections-; induced-resistance; symptoms-; incidence-; biological-control; plant-disease-control

101. NAL Call No.: SB925.B5
Influence of guava ripening on parasitism of the oriental fruit fly, Bactrocera dorsalis (Hendel)(Diptera: Tephritidae), by Diachasmimorpha longicaudata (Ashmead) (Hymenoptera: Braconidae) and other parasitoids.
Purcell, M. F.; Jackson, C. G.; Long, J. P.; Batchelor, M. A. Biol-control v.4(4): p.396-403. (1994 Dec.)
Includes references.
Descriptors: psidium-guajava; insect-pests; bactrocera-dorsalis; insect-control; biological-control; biological-control-agents; braconidae-; parasitoids-; parasites-of-insect-pests; ripening-; parasitism-; biosteres-arisanus; tetrastichus-; biosteres-; population-density-cabt; estimation-cabt; parasitoid- augmentation-cabt; hawaii-; tetrastichus-giffardianus; biosteres-vandenboschi; psyttalia-incisi

Abstract: The effects of guava ripening on abundance and parasitism rates of parasitoids of oriental fruit fly, Bactrocera dorsalis (Hendel), were determined in three guava (Psidium guajava L.) orchards. Diachasmimorpha longicaudata (Ashmead) was released in Kilauea, Kauai, and Waiakea, Hawaii. Natural densities of this parasitoid were measured in a third orchard in Panaewa, Hawaii. Fruits ripening on the tree and the ground after abscission of fruit were classified into four categories, ranging from to mature-green to rotten fruit. The egg parasitoid, Biosteres arisanus (Sonan) was the dominant parasitoid emerging from tree-harvested guavas at all sites and composed 90-98% of all parasitoids recovered but decreased in abundance as guava fruit aged on the ground. In all three orchards, D. Longicaudata increased in abundance and parasitism rates were highest in guavas that remained on the ground for 6-10 days. Consequently, the impact of this parasitoid is usually underestimated by sampling commercially ripe guava fruit from the tree or freshly fallen fruit on the ground. The eulophid parasitoid, Tetrastichus giffardianus (Silvestri), was more abundant in 4- to 9-day-old ground fruit. We discuss modified sampling methods for population estimation and augmentative release studies of parasitoids of oriental fruit fly.

102. NAL Call No.: 1.9-P69P
Influence of isolates of Gliocladium virens and delivery systems on biological control of southern blight on carrot and tomato in the field.
Ristaino, J. B.; Lewis, J. A.; Lumsden, R. D. Plant-dis. [St. Paul, Minn., American Phytopathological Society] v. 78 (2)p.153-156 (1994 Feb.)
Includes references.
Descriptors: daucus-carota; lycopersicon-esculentum; corticium-rolfsii; blight-; gliocladium-virens; strains-; biological-control-agents; biological- control; plant-disease-control; comparisons-; quintozene-; flutolanil-; incidence-; crop-yield; north-carolina; disease-incidence

103. NAL Call No.: 80-Ac82
Influence of soilless cultivation on soilborne diseases.
Gullino, M. L.; Garibaldi, A. Acta-hortic (361): p.341-354. (1994 June)
Paper presented at the International Symposium on New Cultivation Systems in Greenhouse held April 26-30, 1993, Cagliari, Italy.
Descriptors: soilless-culture; greenhouse-crops; fungal-diseases; plant-diseases; plant-pathogens; plant-disease-control; biological-control; disease- transmission; horticultural-crops; soilborne-pathogens

104. NAL Call No.: 275.29-M381Fr
Influence of understory growth and quantity of drops on the establishment of voles in apple orchards.

Prokopy, R.; Mason, J. Fruit-notes v.59(4): p.10-11. (1994 Fall)
Descriptors: orchards-; roles-; integrated-pest-management

105. NAL Call No.: QL461.E532
Inoculative release of Steinernema scapterisci (Rhabditida: Steinernematidae) to suppress pest mole crickets (Orthoptera: Gryllotalpidae) on golf courses.
Parkman, J. P.; Frank, J. H.; Nguyen, K. B.; Smart, G. C. Jr. Environ-entomol v.23(5): p.1331-1337. (1994 Oct.)
Includes references.
Descriptors: lawns-and-turf; scapteriscus-; steinernema-; entomophilic-nematodes; biological-control; insect-control; golf-courses; florida-

Abstract: Single inoculative applications of Steinernema scapterisci were made on golf courses in north central (Alachua County) and southeastern (Broward County) Florida. Nematode-infected Scapteriscus spp. mole crickets were collected from eight of nine treated plots and from five of six treated plots in Alachua and Broward counties, respectively. However, infected individuals were collected with regularity from only two courses in Alachua County where level of infection was greatest during the spring (March-June). Weekly infection levels for weeks 1-12 after treatment ranged from 0-100%. Infection of Scapteriscus spp. adults from treated plots in Alachua County, 25.2%, was significantly greater than that for nymphs, 1.2%; and infection of Scapteriscus borellii, 25.0%, was significantly greater than that of S. vicinus, 11.0%. Nematode- infected mole crickets were collected from four control plots in Alachua County and from one in Broward County during the 2nd yr after treatment. Significantly fewer mole crickets were collected in 24-h trap catches the 2nd yr after treatment on all treated plots combined and control plots combined in both counties. Mean trap catch was reduced 68, 62, and 41% the 2nd yr on treated plots where the nematode persisted; on control plots where infected crickets were collected; and on control plots where the nematode was not detected, respectively. Damage ratings and number of mole crickets soap-flushed from treated plots were significantly reduced the 2nd yr after treatment. Results indicate S. scapterisci can serve as an inoculative biological control agent for Scapteriscus of pest populations.

106. NAL Call No.: 420-B77
Insect pest and natural enemy populations in paired organic and conventional apple orchards in the Yakima Valley, Washington.
Knight, A. J-Entomol-Soc-BC. Vancouver : The Society v.91p.27-36 (1994 Dec.)
Includes references.
Descriptors: malus-pumila; mites-; insect-pests; orchards-; organic-farming; natural-enemies; predators-of-insect-pests; parasites-of-insect-pests; insect- control; mite-control; chemical-control; carbamate-pesticides; organophosphorus-insecticides; biological-control-agents; population-density; crop-damage; low-input-agriculture; washington-; fruit-injury

107. NAL Call No.: HD1476.U52C27
Insectary plants.
Long, R. Small-farm-news. Davis, Calif. : U.C.D. Small Farm Center p. 4 (1995 Sept.-1995 Oct.)
Descriptors: host-plants; attractants-; predators-of-insect-pests; flowering-date; insect-pests; biological-control; flowering-plants

108. NAL Call No.: 100-C12Cag
Integrated citrus thrips control reduces secondary pests.
Grafton Cardwell, B.; Eller, A.; O'Connell, N. Calif-agric v.49(2): p.23-28. (1995 Mar.-1995 Apr.)
Descriptors: integrated-pest-management; citrus-fruits; thrips-; crop-damage; insecticides-; california-

109. NAL Call No.: S3.N672--Suppl.-no.17
Integrated control of pome fruit diseases : proceedings of the 3rd workshop held 1993 at Lofthus, Norway.
Butt, D. J.; Integrated Control of Pome Fruit Diseases Workshop (3rd : 1992 : Lufthus, N. 441p. (Agricultural University of Norway, Advisory Service , [As, Norway] , 1994)
Includes bibliographical references.

110. NAL Call No.: 80-Ac82
Integrated management of papaya in Mexico.

Flores Revilla, C.; Garcia, C.; Nieto Angel, E.; Teliz Ortiz, A. D.; Villanueva Jimenez, J. A.
Acta-hortic (370): p.151-158. (1995 Sept.)
Paper presented at the International Symposium on Tropical Fruits: Improving the Quality of Tropical Fruits, November 7-12, 1993, Vitoria, Espirito Santo State, Brazil.
Descriptors: carica-papaya; papaw-ringspot-virus; crop-management; disease-vectors; crop-density; crop-yield; integrated-control; integrated-pest- management; mexico-

111. NAL Call No.: SB608.P8B63--1994
Integrated pest management for Idaho : potatoes : pocket manual. Potatoes : integrated pest management for Idaho.
Bohl, W.; Bechinski, E.; University of Idaho. Cooperative Extension System. 43p. (College of Agriculture, University of Idaho, Cooperative Extension System , Moscow, Idaho , [1994])
Cover title.
Descriptors: Potatoes-Diseases-and-pests-Integrated-control-Idaho-Handbooks,-manuals,-etc; Pests-Integrated-control-Idaho-Handbooks,-manuals,-etc

112. NAL Call No.: 421-An72
Integrated pest management in European apple orchards.
Blommers, L. H. M. Annu-rev-entomol. Palo Alto, Calif. : Annual Reviews, inc. v.39p.213-241 (1994)
Includes references.
Descriptors: integrated-pest-management; apples-; orchards-; malus-pumila; insect-pests; dysaphis-plantaginea; insect-control; mite-control; biological- control; chemical-control; natural-enemies; biological-control-agents; typhlodromus-pyri; pesticide-resistance; predators-of-insect-pests; literature-reviews; europe-

113. NAL Call No.: TX341.F662
Integrated pest management in tree fruit crops.
Brunner, J. F. Food-rev-int v.10(2): p.135-157. (1994)
Special issue on Integrated pest management.
Descriptors: fruit-trees; integrated-pest-management; history-; pesticide-resistance; literature-reviews

114. NAL Call No.: 80-Ac82
Integrated pest management in vegetable production.
Sastrosiswojo, S. Acta-hortic (369): p.85-100. (1994 Sept.)
Paper presented at the Joint Symposium on Small Scale Vegetable Production and Horticultural Economics in Developing Countries, June 23-26, 1992, Bogor, Indonesia.
Descriptors: vegetables-; cultivation-; plant-pests; plant-diseases; chemical-control; pesticides-; adverse-effects; integrated-pest-management; biological-control; indonesia-

115. NAL Call No.: TX341.F662
Integrated pest management in vegetables.
Zehnder, G. Food-rev-int v.10(2): p.119-134. (1994)
Special issue on Integrated pest management.
Descriptors: vegetables-; integrated-pest-management; food-acceptability; food-safety; literature-reviews

116. NAL Call No.: TP248.27.P55P54
Integrated pest management (IPM) in fruit orchards.
Edland, T. Plant-microb-biotechnol-res-ser. Cambridge [England] ; New York, NY, USA : Cambridge University Press v.4p.44-50 (1995)
In the series analytic: Biological control: Benefits and risks / edited by H.M.T. Hokkanen and J.M. Lynch.
Descriptors: orchards-; fruit-trees; insect-pests; integrated-pest-management; integrated-control; insecticides-; acaricides-; biological-control-agents; biological-control; introduced-species; natural-enemies; predatory-mites; parasites-of-insect-pests; predators-of-insect-pests; literature-reviews

117. NAL Call No.: S95.E24
Integrated pest management on grapes in Ontario.
McFadden, W. Spec-rep-N-Y-State-Agric-Exp-Stn (68): p.108. (1994 Jan.)
Proceedings of the First International Workshop on Grapevine Downy Mildew Modeling, held Aug 26-30, 1991, Cornell University, Geneva, New York.
Descriptors: vitis-; integrated-pest-management; plant-diseases; plant-disorders; fungicides-; ontario-; endopiza-vitieana

118.   NAL Call No.: SB1.H6
Integrating biological control into postharvest disease management strategies.
Roberts, R. G. HortScience v.29(7): p.758-762. (1994 July)
Paper presented at the colloquium "Management of Postharvest Disease Resistance in Horticultural Crops" held at the 88th American Society for Horticultural Science Annual Meeting, July 23, 1991, University Park, Pennsylvania.
Descriptors: postharvest-decay; fruit-; apples-; vegetables-; biological-control; fungal-antagonists; biological-control-agents

119.   NAL Call No.: 1.9-P69P
Integration of cultural methods with yeast treatment for control of postharvest fruit decay in pear.
Sugar, D.; Roberts, R. G.; Hilton, R. J.; Righetti, T. L.; Sanchez, E. E. Plant-dis. [St. Paul, Minn., American Phytopathological Society] v.78 (8)p.791-795 (1994 Aug.)
Includes references.
Descriptors: pyrus-communis; penicillium-; phialophora-; postharvest-decay; cryptococcus-deuteromycotina; cryptococcus-laurentii; biological-control- agents; biological-control; integrated-control; thiabendazole-; controlled-atmosphere-storage; harvesting-date; calcium-; nitrogen-content; fruits- ; cryptococcus-flavus

120.   NAL Call No.: 450-P5622
Interactions between the glycoalkaloids solasonine and solamargine in relation to inhibition of fungal growth.
Fewell, A. M.; Roddick, J. G.; Weissenberg, M. Phytochemistry-Oxford v.37(4): p.1007-1011. (1994 Nov.)
Includes references.
Descriptors: solanum-khasianum; fruits-; plant-extracts; antifungal-properties; glycoalkaloids-; phoma-medicaginis; alternaria-brassicicola; rhizoctonia- solani; plant-pathogenic-fungi; plant-disease-control; biological-control; synergism-; mycelium-; growth-; inhibition-

Abstract: Inhibition of mycelium development in Phoma medicaginis and Rhizoctonia solani by solamargine and solasonine generally increased with increasing pH. P. medicaginis was the more susceptible species and solamargine the more potent compound. Solasonine was inactive against R. solani over the tested pH range (5-8). Dose-response curves confirmed these differential effects. Solamargine caused 50% growth inhibition in P. medicaginis at 60 micromolar (at pH 7) whereas no other treatment achieved this effect at 100 micromolar. Combinations of 50 micromolar of each glycoalkaloid produced synergistic effects against both fungi, especially R. solani which was essentially unaffected by either compound, but significantly inhibited by a 1:1 mixture of the two. The magnitude of the synergism was not affected by a pH change between 6 and 7. Spore germination in Alternaria brassicicola was markedly inhibited by 100 micromolar solamargine but unaffected by 100 micromolar solasonine or either compound at 50 micromolar. In P. medicaginis, neither glycoalkaloid was inhibitory up to 150 micromolar. In combination, the two compounds caused synergistic effects in both species, but to a much greater extent in A. brassicicola.

121.   NAL Call No.: SB945.F8F79-1996
Inundative release of the parasitoid Diachasmimorpha longicaudata for the control of the Caribbean fruit fly, Anastrepha suspensa.
Burns, R. E.; Diaz, J. D.; Holler, T. C. Fruit fly pests a world assessment of their biology and management / p.377-381. (1996)
Paper presented at the Fourth International Symposium on Fruit Flies of Economic Importance held June 5-10, 1994, Sand Key, Florida.
Descriptors: anastrepha-suspensa; braconidae-; parasitoids-; parasites-of-insect-pests; parasitoid-augmentation; insect-control; florida-

122.   NAL Call No.: aZ5071.N3
IPM and biological control of plant pests: horticultural crops, January 1992-December 1993.
Gates, J. P. Quick-bibliogr-ser. Beltsville, Md., National Agricultural Library v.94-12p.84 (1994 Mar.)
Updates QB 92-41.
Descriptors: horticultural-crops; integrated-pest-management; plant-pests; biological-control-agents; natural-enemies; bibliographies-

123.   NAL Call No.: 60.18-UN33
IPM, monitoring, and management plans--a mandate for the future.
Peacock, C. H.; Smart, M. M. USGA-Green-Sect-rec v.33(3): p.10-14. (1995 May-1995 June)

Includes references.
Descriptors: integrated-pest-management; golf-courses; insect-pests; lawns-and-turf; pesticides-; monitoring-; environmental-management; sustainability-

124. NAL Call No.: QH301.N32
IPM of Thrips palmi in vegetables.
Johnson, M. W. NATO-ASI-ser,-Ser-A,-Life-sci. New York : Plenum v.276p.381-387 (1995)
In the series analytic: Thrips biology and management / edited by B. L. Parker, M. Skinner and T. Lewis. 28-30, 1993, Burlington, Vermont.
Descriptors: citrullus-lanatus; cucumis-sativus; thrips-palmi; infestation-; integrated-pest-management; oxamyl-; avermectins-; chemical-control; low- input-agriculture; frankliniella-occidentalis; damage-; leaves-; population-density; crop-yield; hawaii-

125. NAL Call No.: 81-M384
IPM systems for orchard soils: groundcover management vs. weed control.
Merwin, I. N-Engl-fruit-meet. North Amherst, Mass. : Massachusetts Fruit Growers' Association v.101p.43-49 (1995)
Meeting held January 18-19, 1995, Sturbridge, Massachusetts.
Descriptors: integrated-pest-management; orchards-; ground-cover-plants; weed-control; cover-crops; mulches-; herbicides-; new-york

126. NAL Call No.: QL461.E532
Is the Oriental fruit fly (Diptera: Tephritidae) a natural host for the opiine parasitoid Diachasmimorpha tryoni (Hymenoptera: Braconidae).
Ramadan, M. M.; Wong, T. T. Y.; Herr, J. C. Environ-entomol v.23(3): p.761-769. (1994 June)
Includes references.
Descriptors: bactrocera-dorsalis; braconidae-; parasitoids-; biological-control-agents; host-preferences; diachasmimorpha-longicaudata; superparasitism-

Abstract: Laboratory and field experiments were conducted to determine the suitability of the oriental fruit fly, Bactrocera dorsalis (Hendel), for the development of Diachasmimorpha tryoni (Cameron). In the laboratory, parasitism of individual B. dorsalis larvae by 6-10 D. tryoni eggs killed and prevented the pupation of 8.0 +/- 3.7% of the parasitized hosts and the emergence of 50.0 +/- 7.1% of the puparia. Mortality of immature B. dorsalis increased significantly as the rate of superparasitism increased. A mean of 68.0 +/- 6.6% of B. dorsalis that received 1-5 D. tryoni eggs per larva pupated and eclosed to morphologically normal flies. These flies contained melanized eggs of the parasitoid in their abdomens. In uneclosed hosts which received 6-10 parasitoid eggs per larva, melanized eggs along with 1-6 melanized first-instar parasitoids were recorded. Parasitism of B. dorsalis by D. tryoni alone never results in parasitoid development beyond the first instar. However, in a heterospecific parasitism test involving D. tryoni and Diachasmimorpha longicaudata (Ashmead), approximately equal to 1/10 of the parasitized puparia eclosed to adult D. tryoni. Average percentage of D. tryoni females emerging from such neutralized B. dorsalis (parasitized by D. longicaudata before or after exposure to D. tryoni to block host immunity) was 81 to 92%. Emergence of D. tryoni from field collected B. dorsalis was also very low (0.35% emergence; 8 D. tryoni adults out of 2,279 B. dorsalis puparia). We conclude that contrary to the published host-range lists, neither laboratory-reared nor wild B. dorsalis are natural hosts for the opiine parasitoid D. tryoni.

127. NAL Call No.: 421-J822
Knowledge-based reasoning in integrated resistance management: the Colorado potato beetle (Coleoptera: Chrysomelidae).
Weisz, R.; Saunders, M.; Smilowitz, Z.; Huang, H.; Christ, B. J-econ-entomol v.87(6): p.1384-1399. (1994 Dec.)
Includes references.
Descriptors: leptinotarsa-decemlineata; insect-pests; insecticide-resistance; integrated-pest-management; crop-yield; production-; economics-; expert- systems

Abstract: The Colorado potato beetle, Leptinotarsa decemlineata (Say), is one of 13 insect and mite species in which development of insecticide resistance has become "critical." In this paper, we review methods for controlling this important agricultural pest while managing insecticide resistance. Many of these strategies were incorporated into an integrated pest management (IPM) program for northeastern potato growers and encapsulated in a knowledge-based expert system (PotatoES). Three years of field trails evaluating the IPM expert system's ability to act as a surrogate for a human specialist, its capability to manage Colorado potato beetle resistance development in experimental and commercial fields, and its impact on crop yields and production economics were conducted. Comparison of management recommendations made by

PotatoES with those of a human IPM specialist demonstrated a high degree of agreement. Under experimental field conditions Colorado potato beetle insecticide resistance development was always best managed in populations controlled with the IPM program. In commercial production settings, the expert system resulted in similar (under low insect pressure) or superior (under higher insect pressure) control of resistance development compared with grower practices. Implementation of the IPM program in commercial production was more expensive than standard practices, but resulted in higher crop yields and greater net profits. These results demonstrate the potential utility of knowledge-based approaches to integrated resistance management by showing that these systems can capture and faithfully represent the specialized crop, insect, and disease management knowledge of. practically used as a treatment in a field trial and, as such, be validated in terms of their worth in agricultural decision support.

128. NAL Call No.: 420-F662
Laboratory and field olfactory attraction of the Mexican fruit fly (Diptera: Tephritidae) to metabolites of bacterial species.
Martinez, A. J.; Robacker, D. C.; Garcia, J. A.; Esau, K. L. Fla-entomol v.77(1): p.117-126. (1994 Mar.)
Includes references.
Descriptors: anastrepha-ludens; insect-pests; bacteria-; metabolites-; insect-attractants; trapping-; insect-control; biological-control; biological-control- agents

129. NAL Call No.: 421-J822
Laboratory evaluation of mineral oils for control of codling moth (Lepidoptera: Tortricidae).
Riedl, H.; Halaj, J.; Kreowski, W. B.; Hilton, R. J.; Westigard, P. H. J-econ-entomol v.88(1): p.140-147. (1995 Feb.)
Includes references.
Descriptors: cydia-pomonella; mineral-oils; application-rates; ova-; topical-application; larvae-; developmental-stages; mortality-; fruits-; behavior- patterns; insect-control; biological-control; efficacy-; adult-insects; avoidance-behavior

Abstract: Horticultural mineral oils are ovicides against the codling moth, Cydia pomonella (L.), when applied directly to the eggs. The susceptibility of eggs to the oil varied depending on the substrate on which eggs were laid. On an inert surface such as waxed paper, young eggs were three times as susceptible as eggs laid on apples. Susceptibility to oil changed little throughout the incubation period except just before hatch when egg susceptibility dropped markedly. There was no difference in ovicidal activity among three commercial horticultural mineral oils. Eggs laid on top of oil residue were not affected at labeled rates. Topical treatment of neonates caused no mortality at concentrations equivalent to field rates. Oil residue on the fruit surface did not inhibit neonates from entering fruit tissue. Moths suffered no mortality from direct oil treatments. Although the total number of eggs deposited by oil-treated and untreated moths was the same (107.5 and 90.3 eggs per female, respectively), treated moths discharged their egg supply at a faster rate. Female moths avoided fruit surface with oil residue for oviposition. Results suggest that dilute applications of 1% horticultural mineral oil may not be adequate for reducing codling moth egg hatch in the field.

130. NAL Call No.: 421-J822
Lack of efficacy of in vivo- and putatively in vitro-produced Bacillus popilliae against field populations of Japanese beetle (Coleoptera: Scarabaeidae) grubs in Kentucky.
Redmond, C. T.; Potter, D. A. J-econ-entomol v.88(4): p.846-854. (1995 Aug.)
Includes references.
Descriptors: popillia-japonica; bacillus-popilliae; efficacy-; bacterial-spores; formulations-; in-vitro; comparisons-; infectivity-; larvae-; entomopathogenic-bacteria; bacterial-diseases; feeding-behavior; lawns-and-turf; biological-control; biological-control-agents; kentucky-; milky-disease

Abstract: Use of Bacillus popilliae Dutky, causal agent of milky disease in Japanese beetle grubs, has been limited because of its inability to produce infective spores in vitro. Recently, putative milky disease products produced by a patented in vitro process were marketed. We evaluated in vivo- and putatively in vitro-produced commercial spore formulations for efficacy against Japanese beetle grubs in laboratory and field trials. In soil confinement assays, infectivity by feeding (per os) was greater for the traditional spore powder made by maceration of diseased grubs than for the putative in vitro formulation. However, in multi-year field trials on 2 golf courses, neither product was effective in inducing higher levels of milky disease or in reducing grub populations. Application of a full dose (2 g) of spore powder, the amount normally applied every 1.2 m in a grid pattern, within 0.1-m2 field enclosures failed to induce milky disease in grub populations in soil directly beneath the treated turf. Laboratory-infected 3rd

instars in late phases of milky disease continued to feed on grass roots. Putatively in vitro-produced formulations were recalled from the market in 1991 because of questions about the identity of the bacterial spores they contained. We challenge the evidence that commercially available spore powder, applied according to conventional methods, is effective for suppressing localized grub populations in turfgrass, and suggest that standard recommended practices for use of milky disease bacteria should be reevaluated.

131. NAL Call No.: 421-J822
Larviposition response of Myiopharus doryphorae (Diptera: Tachinidae) to Colorado potato beetle (Coleoptera: Chrysomelidae) larvae treated with lethal and sublethal doses of Bacillus thuringiensis Berliner subsp. tenebrionis.
Lopez, R.; Ferro, D. N. J-econ-entomol v.88(4): p.870-874. (1995 Aug.)
Includes references.
Descriptors: leptinotarsa-decemlineata; myiopharus-doryphorae; larvae-; bacillus-thuringiensis; bacterial-insecticides; lethal-dose; parasitoids-; parasitism-; sexual-reproduction; host-preferences; parasites-of-insect-pests; biological-control-agents

Abstract: Larviposition response of Myiopharus doryphorae (Riley) toward Colorado potato beetle. Leptinotarsa decemlineata (Say), host larvae fed for periods of 1 or 24 h on lethal and sublethal doses of Bacillus thuringiensis Berliner subsp. tenebrionis was studied under greenhouse conditions. A significantly shorter delay occurred before the 1st larviposition in hosts fed for 1 h on lethal and sublethal doses of B. thuringiensis compared with the time before larviposition in hosts fed untreated foliage (control). Time before 1st larviposition in hosts fed for 24 h on sublethal doses of B. thuringiensis was also significantly shorter than that for hosts fed lethal doses and control. A substantially lower total number of parasitoid larvae were deposited in hosts fed foliage treated with lethal doses of B. thuringiensis for 24 h than in those fed for 1 h; the lowest rate of parasitization occurred in the hosts fed for 24 h at the lethal dose level. Parasitoid acceptance of sublethally intoxicated Colorado potato beetle larvae and their ability to overcome weaker defensive reactions of these hosts, together with their rejection of lethally infected hosts, indicated that host selection may be based more on manifestations of host vigor and defense than a direct reaction to the presence or absence of B. thuringiensis toxin.

132. NAL Call No.: S451.M6M582
Lawn care practices to reduce the need for fertilizers and pesticides.
Mugaas, R. J. [Minnesota Extension Service folders]. St. Paul, Minn. : The Service v.FO-5890-Bp.4 (1995)
In the subseries: Clean Air.
Descriptors: lawns-and-turf; lawn-soils; organic-amendments; irrigation-; mowing-; cutting-height; thatch-; cultural-control; pest-control; integrated- pest-management; chemical-control; agricultural-chemicals

133. NAL Call No.: S441.S855
A 'living laboratory/classroom' for the integration of research and education efforts on alternative vegetable production systems.
Steffen, K. L. Sustainable Agriculture Research and Education SARE research projects Northeast Region. p. 47 (1995)
SARE Project Number: LNE92-32. Record includes floppy disk and Common Ground for sustaining agriculture. Reporting period for this report is January 1995 to December 1995.
Descriptors: lycopersicon-esculentum; zea-mays; phaseolus-vulgaris; cucumis-sativus; brassica-oleracea-var; -capitata; crop-yield; soil-properties; plant- disease-control; integrated-pest-management; sustainability-; plant-analysis; nutrient-content; shoots-; fruits-; weed-control; pennsylvania-

134. NAL Call No.: 1.9-P69P
Locally established botrytis fruit rot of Myrica faya, a noxious weed in Hawaii.
Duffy, B. K.; Gardner, D. E. Plant-dis. [St. Paul, Minn., American Phytopathological Society] v.78 (9)p.919-923 (1994 Sept.)
Includes references.
Descriptors: myrica-faya; weeds-; botrytis-cinerea; fungal-diseases; weed-control; biological-control; disease-surveys; disease-distribution; disease- transmission; disease-vectors; seeds-; viability-; hawaii-

135. NAL Call No.: SB599.C8
Management of arthropods on columnar apple trees using exclusionary cages.
Lawson, D. S.; Reissig, W. H.; Nyrop, J. P.; Brown, S. K. Crop-prot v.13(5): p.346-356. (1994 Aug.)

Includes references.
Descriptors: malus-; arthropod-pests; population-density; cultural-control; mite-control; insect-control; biological-control; biological-control; predatory- mites; panonychus-ulmi; tetranychus-urticae; aculus-schlechtendali; zetzellia-mali; predator-prey-relationships; protected-cultivation; crop- damage; mesh-cages; typhodromus-pyri

136.   NAL Call No.: SB415.C625
Management of fungus gnats and shore flies.
Lindquist, R. K. Conn-greenh-newsl (183): p.18-22. (1994 Dec.-1995 Jan.)
Descriptors: greenhouse-crops; sciaridae-; ephydridae-; crop-damage; disease-transmission; life-cycle; cultural-control; chemical-control; biological- control

137.   NAL Call No.: 100-Id14
Managing benzimidazole resistance in the potato dry rot fungus.
Nolte, P. Bull-Univ-Ida,-Coll-Agric. Moscow : Idaho Agricultural Experiment Station v.EXT 769p.7 (1994 Oct.)
Includes references.
Descriptors: solanum-tuberosum; potatoes-; seed-potatoes; gibberella-pulicaris; fungicide-tolerance; etiology-; benzimidazole-; fungicides-; integrated- pest-management; diagnostic-techniques; usa-; fungicide-combinations; fungicide-alternation

138.   NAL Call No.: S67.P82
Managing nematodes in the home garden.
Oversteet, C.; Whitam, K.; McGawley, E. Pub-La-Coop-Ext-Serv. [Baton Rouge, La.?] : Cooperative Extension Service, Center for Agricultural Sciences and Rural Development, Louisiana State University & Agricultural & Mechanical College v.1606, rev.p.16 (1994 July)
Descriptors: nematode-control; domestic-gardens; meloidogyne-incognita; horticultural-crops; rotylenchulus-reniformis; control-programs; integrated- pest-management; disease-resistance; varieties-; louisiana-

139.   NAL Call No.: QH301.N32
Manipulation of the predacious mite, Euseius tularensis (Acari: Phytoseiidae), with pruning for citrus thrips control.
Grafton Cardwell, E. E.; Ouyang, Y. NATO-ASI-ser,-Ser-A,-Life-sci. New York : Plenum . v.276 p.251-254 (1995)
In the series analytic: Thrips biology and management / edited by B. L. Parker, M. Skinner and T. Lewis. 28-30, 1993, Burlington, Vermont.
Descriptors: euseius-; predatory-mites; predators-of-insect-pests; scirtothrips-citri; biological-control-agents; biological-control; encouragement-; shoot- pruning; population-density; citrus-sinensis

140.   NAL Call No.: SB599.J69
Mating disruption of codling moth (Lepidoptera: Tortricidae) with polyethylene tube dispensers: determining emission rates and the distribution of fruit injuries.
Knight, A. L.; Howell, J. F.; McDonough, L. M.; Weiss, M. J-agric-entomol v.12(2/3): p.85-100. (1995 Apr.-1995 July)
Includes references.
Descriptors: malus-pumila; cydia-pomonella; larvae-; population-density; mating-disruption; sex-pheromones; tubes-; crop-damage; biological-control; efficacy-; washington-

141.   NAL Call No.: QL750.O3
Mechanisms of interspecific competition that result in successful control of Pacific mites following inoculations of willamette mites on grapevines.
Hougen Eitzman, D.; Karban, R. Oecologia v.103(2): p.157-161. (1995)
Includes references.
Descriptors: vitis-; vineyards-; tetranychus-pacificus; eotetranychus-willamettei; interspecific-competition; shoots-; crop-damage; induced-resistance; mite-control; biological-control; california-

142.   NAL Call No.: SB415.C625
Melon aphids.
Pundt, L. S. Conn-greenh-newsl (179): p.11-14. (1994 Apr.-1994 May)
Includes references.
Descriptors: horticultural-crops; aphis-gossypii; characteristics-; life-cycle; crop-damage; biological-control; chemical-control; insecticides-; weed- control

143. NAL Call No.: 100-C12Cag
Minimizing the hazards of dormant sprays to wildlife.
Calif-agric v.49(3): p.4-5. (1995 May-1995 June)
Descriptors: organophosphorus-insecticides; oils-; hawks-; wildlife-; spraying-; orchards-; drift-; risk-; cholinesterase-; inhibition-; application-rates; integrated-pest-management; california-; red-tailed-hawks

144. NAL Call No.: QL461.E532
Mortality of Helicoverpa zea (Lepidoptera: Noctuidae) eggs in cotton as a function of oviposition sites, predator species, and desiccation.
Nuessly, G. S.; Sterling, W. L. Environ-entomol v.23(5): p.1189-1202. (1994 Oct.)
Includes references.
Descriptors: gossypium-hirsutum; helicoverpa-zea; ova-; fruits-; flowers-; leaves-; predation-; predators-of-insect-pests; mortality-; soil-temperature; desiccation-

Abstract: Predation rates of Helicoverpa zea (Boddie) eggs on cotton plants were determined by placing 32P-labeled moth eggs on different types of plant structures throughout the vertical strata of cotton plants. There was a slight trend for predation rates to be greater toward the top of the plants. Egg predation rates were higher on mainstem and fruiting branch terminals, and on blooms than on other plant parts. Similar predation rates (= 75%) were observed on abaxial and adaxial leaf surfaces. Seasonal predation rates averaged 81.7 and 81.4 in 1982 and 1983, respectively. Rates began high each year (81.8-100%) and slowly decreased toward the end of the growing season when rates ranged from 55 to 80%. Predation by sucking predators ranged from 14.2-37.0%; Orius tristicolor (White), O. insidiosus (Say), Geocoris punctipes (Say), and Pseudatomoscelis seriatus (Reuter) were the most important. Chewing predators accounted for 0.8-22.9% of the predation. Solenopsis invicta (Buren) was observed removing more eggs from plants than any other predator species. Ground based predators added significantly to egg predation. Mortality rates of eggs dislodged to the soil surface were also investigated. Nearly 90% of eggs placed on the soil surface were predated in < 48 h. Eggs that escaped predation but that were exposed to high midday soil temperatures (e.g., 45.5 degrees C) died of exposure. Larvae safely enclosed from eggs placed in shaded locations near the plant bases.

145. NAL Call No.: QL461.E532
Native Hawaiian insects attracted to the semiochemical methyl eugenol, used for male annihilation of the Oriental fruit fly (Diptera: Tephritidae).
Asquith, A.; Kido, M. Environ-entomol v.23(6): p.1397-1408. (1994 Dec.)
Includes references.
Descriptors: drosophila-; muscidae-; phoridae-; nontarget-organisms; susceptibility-; methyl-eugenol; bait-traps; height-; bactrocera-dorsalis; insect- control; biological-control; hawaii-; malaise-traps

Abstract: This study addressed the potential susceptibility of native Hawaiian insects to the semiochemical methyl eugenol used for male annihilation of the oriental fruit fly, Bactrocera dorsalis (Hendel). The effects of trap type (methyl eugenol, methyl eugenol + toxin, toxin only, and control) and trap height (0, 1, 2, or 4 m above ground) were studied in native forest on the island of Kauai. A malaise trap was used to determine the relative abundance of insects in the immediate vicinity of the methyl eugenol traps. Seven species of native Hawaiian Drosophilidae, two species of Muscidae, and one species of Phoridae were found to be attracted to methyl eugenol. For four other taxa, including species of Miridae, Anobiidae, and Proctotrupidae, attraction to methyl eugenol is suggested but equivocal. For all species except Drosophila villosipedis (Drosophilidae) and Brachyserphus hawaiiensis (Proctotrupidae) both males and females were attracted to methyl eugenol. For Drosophila perissopoda, Drosophila basimacula, Scaptomyza varipicta, and Scaptomyza rostrata, ground level traps caught significantly more individuals than traps above ground, and for all drosophilids, 4-m high traps caught the fewest individuals. Among non- Drosophilidae, trap height was not a significant factor in captures for only the Anobiidae and Sarona species (Miridae). Megaselia sp. (Phoridae) was similar to Scaptomyza tantalia (Drosophilidae) in that almost all individuals were captured in ground level traps. Orthotylus sp. (Miridae) was the only species in which 4-m high traps caught the greatest number of individuals. For Lispocephala species (Muscidae) and B. hawaiiensis, 1-2-m high traps tended to catch more individuals than the ground-level or 4-m. (D. villosipedis, D. basimacula) or they captured only a portion of the local pool of individuals (S. varipicta, D. perissopoda, D. kokeensis, Lispocephala spp.). Because of the low level of attraction displayed by the native insects and the potential to mitigate the impact by placement of baits in the forest canopy, it is suggested that an environmentally acceptable application of methyl eugenol can be devised for use in the Hawaiian Islands.

146. NAL Call No.: QH301.N32
Native predators of western flower thrips in horticultural crops.
Riudavets, J.; Castane, C.; Gabarra, R. NATO-ASI-ser,-Ser-A,-Life-sci. New York : Plenum v.276p.255-258 (1995)
In the series analytic: Thrips biology and management / edited by B. L. Parker, M. Skinner and T. Lewis. 28-30, 1993, Burlington, Vermont.
Descriptors: orius-; orius-albidipennis; orius-niger; miridae-; predatory-insects; predators-of-insect-pests; natural-enemies; biological-control-agents; biological-control; predation-; frankliniella-occidentalis; biological-development; life-cycle; horticultural-crops; spain-; dicyphus-tamaninii; macrolophus-caliginosus; orius-majusculus; orius-laevigatus; orius-laticollis

147. NAL Call No.: SB925.B5
Natural enemies in straw-mulch reduce Colorado potato beetle populations and damage in potato.
Brust, G. E. Biol-control v.4(2): p.163-169. (1994 June)
Includes references.
Descriptors: solanum-tuberosum; insect-pests; leptinotarsa-decemlineata; insect-control; biological-control; natural-enemies; wheat-straw; straw- mulches; population-density; efficacy-; biological-control-agents; cultural-methods; mulching-; indiana-

Abstract: The effects of mulching on Colorado potato beetle (Leptinotarsa decemlineata) populations and damage to potato are reported. Potato plots were established in 1991 and wheat straw was placed in half the treatments after potato emergence. Quadrat samples were taken of soil predators and plants were visually searched for all Colorado potato beetle stages and foliar predators. In both 1991 and 1992, mark-release- recapture experiments were conducted on adult populations of the Colorado potato beetle. Mulching had no significant effect on beetle migration. The number of second, third, and fourth instars of first-generation Colorado potato beetle and all instars of second-generation Colorado potato beetle was significantly lower in mulch than in nonmulch plots. A significant increase in number of soil predators began in mulch plots approximately 2-3 weeks after straw was placed in the field. Many of the soil predators climbed potato plants and fed on second and third instars of the Colorado potato beetle. Eggs and first and second instars of the Colorado potato beetle were heavily fed on by coccinelids and chrysopids. Significantly more Colorado potato beetle eggs and larvae experienced mortality in mulch plots than nonmulch plots. Nonmulch plots suffered 2.5 times more defoliation than mulch plots. Tuber yields were 35 and 32% greater in mulch plots than in nonmulch plots in 1992 and 1992, respectively. Higher populations of natural enemies in mulch plots than in nonmulch plots probably accounted for the increase in yield by reducing Colorado potato beetle foliage feeding.

148. NAL Call No.: SB945.F8F79-1996
The natural host plants of Anastrepha in the state of Amazonas, Brazil.
Da Silva, N. M.; Neto, S. S.; Zucchi, R. A. Fruit fly pests a world assessment of their biology and management / p.353-357. (1996)
Paper presented at the Fourth International Symposium on Fruit Flies of Economic Importance held June 5-10, 1994, Sand Key, Florida.
Descriptors: anastrepha-; infestation-; insect-pests; host-plants; food-plants; neosilba-; surveys-; fruits-; parasitoids-; parasites-of-insect-pests; amazonas-

149. NAL Call No.: 448.39-So12
Natural wine yeasts as biocontrol agents.
Suzzi, G.; Romano, P.; Ponti, I.; Montuschi, C. J-appl-bacteriol v.78(3): p.304-308. (1995 Mar.)
Includes references.
Descriptors: saccharomyces-cerevisiae; endomycetales-; yeasts-; biological-control-agents; plant-pathogenic-bacteria; grapes-; biological-control; fungal-antagonists; zygosaccharomyces-

Abstract: A total of 586 natural wine yeasts, belonging to different genera, were tested for their antagonistic effect on fungal pathogens. A low percentage of yeast strains completely inhibited the pathogens and the biocontrol activity was found to be a strain characteristic and did not solely depend on species or genus. Among the antagonists, two strains of Saccharomyces cerevisiae and one of Zygosaccharomyces showed a broad spectrum of antagonistic activity against 10 fungal pathogens.

150. NAL Call No.: 1.98-Ag84
Nematode takes on Japanese beetle grubs.
Lyons Johnson, D. Agric-res v.44(2): p.12-13. (1996 Feb.)

Descriptors: golf-courses; lawns-and-turf; popillia-japonica; larvae-; insect-control; biological-control; neoaplectana-glaseri; biological-control-agents; agricultural-research

151.   NAL Call No.: 275.29-M381Fr
O'say can you see mite predators in apple orchards.
Prokopy, R. J.; Hu, X.; Mason, J. Fruit-notes v.59(3): p.20-21. (1994 Summer)
Descriptors: integrated-pest-management; microscopy-; orchards-; leaves-; fruit-trees; neoseiulus-fallacis; typhlodromus-pyri; zetzellia-mali; massachusetts-

152.   NAL Call No.: QL750.O3
Odour-mediated foraging by yellowjacket wasps (Hymentopera: Vespidae): predation on leks of pheromone-calling Mediterranean fruit fly males (Diptera: Tephritidae).
Hendrichs, J.; Katsoyannos, B. I.; Wornoayporn, V.; Hendrichs, M. A. Oecologia v.99(1/2): p.88-94. (1994)
Includes references.
Descriptors: ceratitis-capitata; vespula-germanica; predation-; predators-of-insect-pests; foraging-; animal-behavior; mating-behavior; sex-pheromones; odors-; smell-; kairomones-; orchards-; canopy-; foliage-; greece-

153.   NAL Call No.: 421-C16
Orthosia hibisci guenee (Lepidoptera: Noctuidae): indigenous parasitoids and the impact of Earinus limitarus (Say) (Hymenoptera: Ichneumonidae) on its host feeding activity.
Cossentine, J. E.; Jensen, L. B. Can-entomol v.127(4): p.473-477. (1995 July-1995 Aug.)
Includes references.
Descriptors: malus-pumila; prunus-; orchards-; orthosia-; orthosia-hibisci; parasitoids-; biological-control-agents; feeding-behavior; biological-control; insect-control; efficacy-; british-columbia; earinus-limitarus

154.   NAL Call No.: QL461.S65
Oviposition rate in tires by Toxorhynchites theobaldi females released in a pecan orchard in northeastern Mexico. Tasa de oviposition en llantas de hembras de Toxorhynchites theobaldi liberadas en una huerta de nogal en el noreste de Mexico.
Alvarado Castro, J. A.; Reyes Villanueva, F. Southwest-entomol v.20(2): p.215-221. (1995 June)
Includes references.
Descriptors: toxorhynchites-theobaldi; oviposition-; tires-; fecundity-; ova-; female-animals; release-; carya-illinoinensis; orchards-; biological-control- agents; aedes-aegypti; mexico-

155.   NAL Call No.: QL461.M5
Parasitism of cranberry fruitworm (Acrobasis vaccinii; Lepidoptera: Pyralidae) by endemic or released Trichogramma pretiosum
Simser, D. Great-Lakes-entomol v.27(4): p.189-196. (1995 Winter)
Includes references.
Descriptors: vaccinium-macrocarpon; acrobasis-; damage-; trichogramma-pretiosum; parasitism-; biological-control; massachusetts-

156.   NAL Call No.: QL391.N4J62
Parasitism of nematodes by the fungus Hirsutella rhossiliensis as affected by certain organic amendments.
Jaffee, B. A.; Ferris, H.; Stapleton, J. J.; Norton, M. V. K.; Muldoon, A. E. J-nematol v.26(2): p.152-161. (1994 June)
Includes references.
Descriptors: macroposthonia-xenoplax; hirsutella-; nematophagous-fungi; parasitism-; microbial-pesticides; biological-control-agents; biological- control; poultry-manure; wheat-straw; cattle-manure; peach-orchard-soils

Abstract: Experiments were conducted to determine whether the addition of organic matter to soil increased numbers of bacteriovorous nematodes and parasitic activity of the nematophagous fungus Hirsutella rhossiliensis. In a peach orchard on loams sand parasitism of the plant-parasitic nematode Criconemella xenoplax by H. rhossiliensis was slightly suppressed and numbers of C. xenoplax were not affected by addition of 73 metric tons of composted chicken manure/ha. In the laboratory, numbers of bacterivorous nematodes (especially Acrobeloides spp) and fungivorous nematodes increased but parasitism of nematodes by H. rhossiliensis usually decreased with addition of wheat straw or composted cow manure to a loamy sand naturally infested with H. rhossiliensis. These results do not support the hypothesis that organic amendments will enhance parasitism of nematodes by H. rhossiliensis.

157.   NAL Call No.: QL461.E532
Parasitism of tufted apple bud moth (Lepidoptera: Tortricidae) in conventional insecticide and pheromone-treated Pennsylvania apple orchards.
Biddinger, D. J.; Felland, C. M.; Hull, L. A. Environ-entomol v.23(6): p.1568-1579. (1994 Dec.)
Includes references.
Descriptors: malus-pumila; platynota-idaeusalis; parasitoids-; parasitism-; insecticides-; mating-behavior; integrated-pest-management; pennsylvania-

Abstract: A faunistic study was conducted over a four year period in apple orchards utilizing different pesticide management strategies to determine the parasitoid complex of the tufted apple bud moth, Platynota idaeusalis (Walker). The relative effectiveness of these parasitoids as control agents in conventional orchards using broad-spectrum insecticides was compared to those using pheromone-mediated mating disruption to control P. idaeusalis. Limited samples were also taken of other tortricids found in these orchards to determine if they were serving as alternate hosts for P. idaeusalis parasitoids. Thiry-one parasitoid and two hyperparasitoid species were recovered during this study which, when combined with other records, present a total parasitoid complex of 41 species for P. idaeusalis. Total parasitism was higher for summer brood P. idaeusalis larvae in mating disruption orchards than in conventional orchards. Total parasitism of the overwintering brood of P. idaeusalis was higher than the summer brood in conventional orchards. Rates of parasitism were comparable in mating distruption during both broods. The ichneumon Exochus atriceps Walsh. was the most common parasitoid species, and it attacked both broods of P. idaeusalis. The braconids Meteorus trachynotus Viereck, Bassus anulipes (Cresson), B. cinctus (Cresson), Apanteles polychrosidis Viereck, and an Apanteles sp. near edwardsii Riley were also common but the attacked only the overwintering brood. Four undescribed species of braconids were found during this study.

158.   NAL Call No.: 1.9-P69P
Partial control of grape powdery mildew by the mycoparasite Ampelomyces quisqualis.
Falk, S. P.; Gadoury, D. M.; Pearson, R. C.; Seem, R. C. Plant-dis. [St. Paul, Minn., American Phytopathological Society] v.79 (5)p.483-490 (1995 May)
Includes references.
Descriptors: vitis-; uncinula-necator; strains-; fungal-diseases; plant-disease-control; biological-control; ampelomyces-quisqualis; hyperparasitism-; screening-; host-range; virulence-; inoculation-methods; culture-techniques; dispersal-; viability-; efficacy-; wick-culture

Abstract: Ampelomyces quisqualis normally infects senescent colonies of Uncinula necator in late summer. Our objective was to introduce the mycoparasite at the start of an epidemic, and thereby reduce the rate of disease increase. Prior to establishing field trials, isolates of A. quisqualis were evaluated for pathogenicity, virulence, and host range in greenhouse and laboratory assays. Infection of powdery mildew colonies only occurred when plants were kept wet and resulted in sporulation of A. quisqualis within 10 days. Two isolates of A. quisqualis (G5 and G273) were evaluated for pathogenicity and virulence against 18 monoconidial isolates of U. necator on grape seedlings and showed little evidence of pathogenic specialization. Three isolates (G273, SF419, and SF423) were equally pathogenic to Sphaerotheca fuliginea on cucurbit, S. macularis on strawberry, and U. necator on grape seedlings. All A. quisqualis isolates appear to have a broad host range and cause significant damage to powdery mildew colonies. Pycnidia of A. quisqualis G273 were produced on cotton wicks saturated with malt extract agar or wheat bran malt extract agar. Wicks were suspended above grapevines of Vitis vinifera 'Riesling' and Vitis interspecific hybrid Aurore. Conidia were dispersed during rain to infect powdery mildew colonies while leaf surfaces were wet. Conidia were released for 3 months in 1990 from a single deployment of wicks. Higher numbers of conidia were released during the entire growing season in 1992 and 1993 due to replenishment of colonized wicks at monthly intervals. Wicks released conidia for 1 to 2 months in 1992 and 1993 before becoming depleted. Powdery mildew development was reduced on Riesling vines in 1990 following. quisqualis-colonized wicks. High rainfall in 1992 provided ample opportunities for dispersal of inoculum of the mycoparasite and the wet conditions were conducive to parasitism. Disease development was late and much reduced in 1993, which was a drier season than 1992. Consequently, no differences were observed in A. quisqualis-treated and untreated plots in the same vineyard that year.

159.   NAL Call No.: SB945.F8F79-1996
The past and potential of biological control of fruit flies.
Sivinski, J. M. Fruit fly pests a world assessment of their biology and management / p.369-375. (1996)
Paper presented at the Fourth International Symposium on Fruit Flies of Economic Importance held June 5-10, 1994, Sand Key, Florida.

Descriptors: tephritidae-; biological-control; biological-control-agents; parasitoids-; parasites-of-insect-pests; parasitoid-augmentation; sterile-insect- release; predators-of-insect-pests; literature-reviews

160. NAL Call No.: 80-Ac82
Pear production in Washington State: a system overview.
Willet, M. J. Acta-hortic (367): p.201-206. (1994 June)
Paper presented at the Sixth International Symposium on Pear Growing, July 12-14, 1993, Medford, Oregon.
Descriptors: pyrus-; fruit-trees; crop-production; integrated-pest-management; washington-

161. NAL Call No.: SB321.G85
Pepper integrated pest management (IPM)--introduction.
Boucher, T. J.; Ashely, R. A. Grower. Storrs, Conn. : Cooperative Extension Service, U.S. Department of Agriculture, College of Agriculture and Natural Resources, The University of Connecticut . v.94 (11) p.1-4 (1994 Nov.)
Descriptors: capsicum-; sowing-; transplanting-; seedlings-; plant-diseases; soil-types; irrigation-; fertilizers-; spacing-; weed-control; temperature-; returns-; integrated-pest-management; newfoundland-

162. NAL Call No.: SB950.A1P3
The pest status of Phenacoccus parvus Morrison (Homoptera: Pseudococcidae).
Marohasy, J. Int-j-pest-manag v.40(4): p.337-340. (1994 Oct.-1994 Dec.)
Includes references.
Descriptors: phenacoccus-; host-range; horticultural-crops; geographical-distribution; weed-control; lantana-camara; biological-control; beneficial- insects; insect-pests

163. NAL Call No.: SB379.A9A9
Pesticide use on California citrus: a baseline to measure progress in adoption of IPM.
Morse, J. G.; Klonsky, K. Calif-grow v.18(4): p.XVI, IXX-XX. (1994 Apr.)
Descriptors: citrus-; citrus-fruits; integrated-pest-management; insect-control; mite-control; mollusc-control; chemical-control; california-

164. NAL Call No.: 421-J822
Physiological and behavioral characteristics of Chilocorus spp. (Coleoptera: Coccinellidae) in the laboratory relative to effectiveness in the field as biocontrol agents.
Hattingh, V.; Samways, M. J. J-econ-entomol v.87(1): p.31-38. (1994 Feb.)
Includes references.
Descriptors: citrus-; aphididae-; chilocorus-; laboratory-rearing; predators-of-insect-pests; biological-control-agents; south-africa; chilocorus-nigritus

Abstract: Differences between six Chilocorus spp. in their usefulness as biocontrol agents in southern Africa were reflected in aspects of physiological and behavioral measurements derived from a quality monitoring program in the laboratory. natural climatic adaptations and distributions of Chilocorus bipustulatus (L.), C. cacti L., C. distigma (Klug), C. infernalis (Mulsant), C. nigritus (Fabricius), and C. simoni Sicard were not as accurately reflected in the relationship between feeding rate and temperature as in mortality as a function of time of exposure to high temperature. The effects of various rearing and handling procedures were evaluated focusing on C. nigritus. The vigor of C. nigritus was not improved by maintenance under fluctuating temperatures. Feeding rates of this species were lower during the scotophase than during the photophase and increased as a function of duration of starvation. The weights of adult Chilocorus spp. at eclosion was a function of larval diet and increased with adult feeding for variable lengths of time depending on species and larval diet before plateauing. These results have implications for the rearing of, experimentation with, and use in biocontrol of these Chilocorus spp.

165. NAL Call No.: SB599.E97
Plant growth enchancement and disease control by Trichoderma harzianum in vegetable seedlings grown under commercial conditions.
Near, J.; Abramsky, M.; Cohen, D.; Chet, I. Eur-j-plant-pathol v.100(5): p.337-346. (1994 Oct.)
Includes references.
Descriptors: cucumis-sativus; capsicum-annuum; plant-disease-control; damping-off; fungal-diseases; seedlings-; biological-control; trichoderma- harzianum; soil-fumigation; cultural-control; efficacy-; biological-control-agents; growth-rate; incidence-

166. NAL Call No.: SB599.C8

Plants used in controlling the potato tuber moth, Phthorimaea operculella (Zeller).
Das, G. P. Crop-prot v.14(8): p.631-636. (1995 Dec.)
Includes references.
Descriptors: phthorimaea-operculella; plants-; plant-extracts; insect-control; biological-control; literature-reviews

Abstract: A survey of literature (published from 1915 to 1993) on the plants used for the control of the potato tuber moth, Phthorimaea operculella (Zeller) has revealed that the preparations from 35 plant species are effective against the pest either in the storage (non-refrigerated) or in the laboratory. In some studies chopped and dried leaves were used, while in others leaf/seed extracts, fruit peel, bulb, root and rhizome were used. Plant preparations are effective in reducing the pest damage or killing at different stages of the pest.

167. NAL Call No.: 448.39-So12
Population dynamics of Erwinia carotovora subsp. atroseptica on the surface of intact and wounded seed potatoes during storage.
Vuurde, J. W. L. v.; Vries, P. M. de. J-appl-bacteriol v.76(6): p.568-575. (1994 June)
Includes references.
Descriptors: seed-potatoes; erwinia-carotovora-subsp; -atroseptica; surfaces-; injuries-; postharvest-treatment; storage-; population-dynamics; integrated- control; harvest-injuries

Abstract: Population dynamics of Erwinia carotovora subsp. atroseptica (Eca) on the tuber surface during storage (2-4 degrees C) and pregermination, were studied by plating extracts of 6 mm2 point samples on crystal violet pectate medium. To investigate the effect of harvest damage on Eca survival, intact, skinned (epidermis removed), and peeled (complete peel removed) tubers from a dry (pF 3.4) and from a wet (pF 2.0) soil were inoculated either immediately after harvesting or after air drying for 4 h. Eca numbers on intact tuber surface decreased rapidly after inoculation, whereas at the skinned and peeled surface numbers were significantly increased 2 d after harvest. Tubers peeled and inoculated with Eca were rotted by 2 d after harvest while tubers peeled and dried before inoculation did not rot; however, populations were significantly increased 2 d after harvest. For all treatments Eca numbers per point sample decreased to below detection limits 180 d after harvest. Examination of 600 mm2 surface samples of the various treatments 222 d after harvest showed that Eca populations were still present. The number of tubers contaminated with colony-forming units (cfu) of Eca was significantly lower for intact surface inoculated tubers from dry soil than for those of the other treatments. Drying for 4 h before inoculation resulted in a significant reduction of the number of Eca cfu positive tubers compared to all other treatments. The ELISA OD values of the 600 mm2 surface samples at day 222 were almost all positive and showed only a slight difference between the average of the tubers containing culturable Eca cells and those without culturable Eca cells.

168. NAL Call No.: 421-B87
The population dynamics of the white peach scale and its parasitoids in a mulberry orchard in Campania, Italy.
Pedata, P. A.; Hunter, M. S.; Godfray, H. C. J.; Viggiani, G. Bull-entomol-res v.85(4): p.531-539. (1995 Dec.)
Includes references.
Descriptors: pseudaulacaspis-pentagona; aphytis-proclia; encarsia-berlesei; aphelinidae-; parasitoids-; hyperparasitoids-; parasitism-; hyperparasitism-; parasites-of-insect-pests; population-dynamics; population-density; density-dependence; seasonal-abundance; morus-; orchards-; campania-; pteroptrix-orientalis; azotus-perspeciosus; superparasitism-; multiple-parasitism

169. NAL Call No.: QL461.E532
Population dynamics of woolly apple aphid (Homoptera: Aphididae) in West Virginia apple orchards.
Brown, M. W.; Schmitt, J. J. Environ-entomol v.23(5): p.1182-1188. (1994 Oct.)
Includes references.
Descriptors: malus-pumila; orchards-; eriosoma-lanigerum; population-dynamics; microhabitats-; spatial-distribution; pyrethroid-insecticides; chemical- control; aphelinus-mali; parasitoids-; biological-control; insect-control; west-virginia

Abstract: Woolly apple aphid, Eriosoma lanigerum (Hausmann), populations were studied in eastern West Virginia from 1985 to 1989. In an unsprayed orchard, peak abundance of arboreal populations was 22-24 colonies per tree in early June each year. Spraying the orchard with a pyrethroid three times during 1989 had little effect on the population behavior, demonstrating the resilience of the woolly apple aphid and its natural enemy guild. Nearly 20% of the aphid colonies in June had syrphid larvae present and parasitism by Aphelinus mali (Haldeman) was > 50% in July. Age structure of arboreal woolly apple aphid colonies varied through the summer with a significant reduction in first instars in July, signaling a return of aphids to the edaphic from the arboreal environment at that time. Samples of arboreal populations were not useful for predicting year-to-year population abundance or the extent of root infestations in a managed orchard. Microhabitat preference of arboreal colonies during the spring was for wound sites and other protected feeding sites on the tree branches and trunk. Leaf axils were the predominant microhabitat (51% of the colonies observed) from the end of May through August. Cicada oviposition sites were also highly preferred, with one orchard having 98% of the colonies in cicada oviposition scars. Woolly apple aphid colonies were observed more often in wounds and protected sites on branches in sprayed orchards and in high density populations than in unsprayed or low density populations. We suggest that these protected sites act as refugia for woolly apple aphid populations in apple orchards.

170. NAL Call No.: 410-Ec7
Population regulation in theory and practice.
Murdoch, W. W. Ecology v.75(2): p.271-287. (1994 Mar.)
Includes references.
Descriptors: population-dynamics; predator-prey-relationships; host-parasite-relationships; aonidiella-aurantii; aphytis-melinus; feeding-behavior; evolution-; biological-control; citrus-

171. NAL Call No.: 421-J822
Population trends of twospotted spider mite (Acari: Tetranychidae) on four resistant strawberry cultivars and their relationship to fruiting.
MacFarlane, J. R.; Hepworth, G. J-econ-entomol v.87(3): p.817-820. (1994 June)
Includes references.
Descriptors: fragaria-; tetranychus-urticae; population-density; pest-resistance; cultivars-; integrated-pest-management

Abstract: A rapid decline in twospotted spider mite, Tetranychus urticae Koch, populations occurred in late spring on four cultivars of strawberry, Fragaria X ananassa Duchesne, despite differences in mite density between cultivars. The decline occurred on both young and old leaflets and coincided with fruit harvest. Mite numbers dropped sharply 2 wk after the beginning of fruit harvest in November but did not reach zero until near the finish of fruiting in March. The decline in mite populations has important implications for integrated pest management in strawberries because it can lead to an overestimate of the ability of predators to suppress mites.

172. NAL Call No.: SB599.C35
Potato extension activities in the Maritime Provinces.
Perley, S. Can-J-plant-pathol v.16(2): p.143-145. (1994 June)
Paper presented at the "Symposium on Plant Pathology in Action," July, 26-29, 1992, Charlottetown, Prince Edward Island.
Descriptors: solanum-tuberosum; plant-diseases; plant-disorders; storage-disorders; potatoes-; extension-; insect-pests; integrated-pest-management; plant-disease-control; insect-control; canada-

173. NAL Call No.: QH301.A76
Potato pest management.
Cisneros, F.; Gregory, P. Asp-appl-biol (39): p.113-124. (1994)
In the series analytic: The impact of genetic variation on sustainable agriculture / edited by A.N.E. Birch, A.M. Isaac, E.J.P. Marshall, W.T.B. Thomas and A.K. Thompson.
Descriptors: solanum-tuberosum; premnotrypes-; liriomyza-huidobrensis; phthorimaea-operculella; integrated-pest-management; peru-; mexico-

174. NAL Call No.: SB319.2.F6F56
Potential mitigation of the threat of the brown citrus aphid, Toxoptera citricida (Kirkaldy), by integrated pest management.
Yokomi, R. K.; Tang, Y. Q.; Nong, L.; Kok Yokomi, M. L. Proc-annu-meet-Fla-State-Hort-Soc. [S.l.] v.106p.81-85 (1994 May)
Meeting held October 19-21, 1993, Miami Beach, Florida.
Descriptors: citrus-; toxoptera-citricidus; citrus-tristeza-closterovirus; biological-control; parasitoids-; predators-of-insect-pests

175. NAL Call No.: QL461.E532
Potential of adult carabids (Coleoptera: Carabidae) as predators of fifth-instar codling moth (Lepidoptera: Tortricidae) in apple orchards in California.

Riddick, E. W.; Mills, N. J. Environ-entomol v.23(5): p.1338-1345. (1994 Oct.)
Includes references.
Descriptors: cydia-pomonella; carabidae-; predators-of-insect-pests; predation-; feeding-behavior; biological-control-agents; malus-pumila; orchards-

Abstract: This investigation compared the potential of adult carabids (ground beetles) as predators of fifth-instar codling moth, Cydia pomonella (L.). The three objectives of the research were the following: (1) to determine which species could kill C. pomonella, (2) to compare the degree of carnivory and consumption pattern of selected species of carabids, and (3) to estimate carabid predation of C. pomonella in the field. The results indicated that 75% or more of Pterostichus lustrans LeConte, Pterostichus cursitor LeConte, Pterostichus (Hypherpes) spp., Harpalus pensylvanicus DeGeer, or Anisodactylus californicus Dejean individuals were capable of killing C. pomonella in the laboratory. The most effective predators were species of Pterostichus, even when an alternative plant food (rolled oats) was provided. An average of 60% of tethered C. pomonella were consumed each night by carabids in early June, but predation intensity declined June-July. The carabid species seen attacking tethered prey included Agonum punctiforme Say, Calathus ruficollis Dejean, H. pensylvanicus, and P. (Hypherpes) spp. Adults of Pterostichus species appear to be important early-season predators of C. pomonella in orchards.

176. NAL Call No.: QL461.S65
Predation on the soil inhabiting stages of the Mexican fruit fly.
Thomas, D. B. Southwest-entomol v.20(1): p.61-71. (1995 Mar.)
Includes references.
Descriptors: anastrepha-ludens; larvae-; habitats-; predation-; predators-of-insect-pests; life-cycle; solenopsis-

177. NAL Call No.: QL461.E532
Prevalence of natural fungal mortality of green peach aphid (Homoptera: Aphididae) on potatoes and nonsolanaceous hosts in Washington and Idaho.
Kish, L. P.; Majchrowicz, I.; Biever, K. D. Environ-entomol v.23(5): p.1326-1330. (1994 Oct.)
Includes references.
Descriptors: solanum-tuberosum; food-plants; myzus-persicae; mortality-; entomogenous-fungi; biological-control; insect-control; washington-; idaho-

Abstract: Green peach aphid, Myzus persicae (Selzer), populations were monitored and examined for pathogens at Moscow and Troy, ID, in 1991 and near Yakima, WA, in 1991-1992. M. persicae infesting a peach orchard, broadleaf weeds within and around the periphery of the orchard, and nearby potato fields near Yakima were observed from March until November. Potatoes and nonsolanaceous plants in home gardens in Moscow and Troy also were monitored for M. persicae and examined for pathogens during the growing season. In 1991, aphid numbers reached a maximum of 6,070 per 5-15-cm peach twig segments on 29 May but only nine per 15-0.15-m twig segments in 1992. Fungal pathogen activity was barely discernible on tree-borne aphids in the orchard but was observed more frequently from aphids infesting weeds beneath the trees. An epizootic of Entomophthorales occurred on aphids infesting solanaceous (potatoes) and nonsolanaceous hosts in home gardens in Moscow and Troy, (Latah County), Idaho, in 1991. Verticillium lecanii (Zimmerman) Viegas was identified from M. persicae on peach leaves; Beauveria bassiana (Bals.) Vuillemin and Conidiobolus sp. were identified from aphids on potatoes. Aphids collected from weeds growing in and near the peach orchard were infected with Entomophthora chromaphidis Cornu, Conidiobolus coronatus (Constantin) Batko, C. obscurus (Petch) Hall & Dunn, and V. lecanii. Aphids on potatoes and nonsolanaceous hosts at Moscow and Troy were infected with Pandora neoaphidis (Remaudiere & Hennebert) Humber, E. chromaphidis, and Conidiobolus spp. Aphid populations were much lower in 1992 both within the orchard and in potatoes.

178. NAL Call No.: S441.S855
Promoting agricultural sustainability through the use of rhizosphere competent fungi as an alternative to soil fungicide.
Bjorkman, T. Sustainable Agriculture Research and Education SARE research projects Northeast Region. p.19 (1995)
SARE Project Number LNE 94-43. Record includes floppy disk. Reporting period for this report is September 1994 to August 1995.
Descriptors: vegetables-; crop-production; trichoderma-harzianum; biological-control-agents; furrows-; seed-treatment; cover-crops; agricultural-soils; soil-types; economic-impact; new-york

179. NAL Call No.: QH301.N32

Prospects for IPM of citrus thrips in California.
Morse, J. G. NATO-ASI-ser,-Ser-A,-Life-sci. New York : Plenum v.276p.371-379 (1995)
In the series analytic: Thrips biology and management / edited by B. L. Parker, M. Skinner and T. Lewis. 28-30, 1993, Burlington, Vermont.
Descriptors: scirtothrips-citri; citrus-; integrated-pest-management; food-plants; insecticides-; chemical-control; damage-; infestation-; literature- reviews; california-

180. NAL Call No.: 1.98-Ag84
Putting the bite on Caribbean fruit flies.
Adams, S. Agric-res v.42(7): p.14-15. (1994 July)
Includes references.
Descriptors: fruit-trees; anastrepha-suspensa; insect-control; biological-control; parasitoids-; parasites-of-insect-pests; hymenoptera-; florida-

181. NAL Call No.: 448.3-Ap5
Pyrrolnitrin production by biological control agent Pseudomonas cepacia B37w in culture and in colonized wounds of potatoes.
Burkhead, K. D.; Schisler, D. A.; Slininger, P. J. Appl-environ-microbiol v.60(6): p.2031-2039. (1994 June)
Includes references.
Descriptors: potatoes-; pseudomonas-cepacia; fungal-antagonists; antibiotic-fungicides; antifungal-properties; gibberella-pulicaris; postharvest-decay; abiotic-injuries

Abstract: Bacterial strain B37w (= NRRL B-14858), an isolate noteworthy because it inhibits the growth of the bioherbicide fungus Colletotrichum truncatum, was selected for further studies of bacterial antifungal properties. This isolate was identified as a Pseudomonas cepacia strain by performing carbohydrate utilization and fatty acid profile analyses, as well as other biochemical and physiological tests. Petri plate assays revealed that strain B37w exhibited antifungal activity against the potato dry rot fungus Fusarium sambucinum. Using bioautography, we correlated antifungal activity with production of a specific compound. Isolation from strain B37w and identification of the antifungal antibiotic pyrrolnitrin are described. A whole-potato assay revealed B37w's ability to colonize potato wounds. Wounded potatoes were inoculated with B37w, and pyrrolnitrin was detected in these potatoes by thin-layer chromatography-bioautography at a concentration on the order of nanograms per wound. We performed an assay in which we examined efficacy against F. sambucinum-incited potato dry rot and found that B37w inhibited disease development. This is the first report of P. cepacia or pyrrolnitrin activity against the economically important potato pathogen F. sambucinum.

182. NAL Call No.: 421-J826
RAPD-PRC for identification of Zoophthora radicans isolates in biological control of the potato leafhopper.
Hodge, K. T.; Sawyer, A. J.; Humber, R. A. J-invertebr-pathol v.65(1): p.1-9. (1995 Jan.)
Includes references.
Descriptors: erynia-radicans; entomogenous-fungi; fungal-insecticides; genetic-markers; dna-; polymerase-chain-reaction; identification-; genotypes-; biological-control; empoasca-fabae; establishment-; random-amplified-polymorphic-dna

Abstract: Biological control studies require the ability to distinguish released pathogens from locally occurring isolates of the same species. We have developed a technique that differentiates genotypes using random amplified polymorphic DNA (RAPD) for the apomictic species Zoophthora radicans (Zygomycota: Entomophthorales), a pathogen of the potato leafhopper, Empoasca fabae (Homoptera: Cicadellidae). RAPD analysis was performed on Z. radicans isolates released in test plots in 1990 and 1991 for leafhopper control; isolates later recovered from the same plots and diverse other isolates were included in the analysis. RAPD fragment profiles of five recovered isolates proved very similar to those of the released isolates and different from all other isolates tested; they are probable descendants of the released isolates. One of the recovered isolates had RAPD profiles similar to isolates derived from aphids and probably represents a population endemic at the release site. In addition to verifying the successful establishment of our experimental releases, RAPD analysis revealed clear relationships among isolates derived from the same host taxon. We propose that this simple and relatively inexpensive method will be valuable in determining the establishment and spread of organisms released in biological control studies.

183. NAL Call No.: SB599.C8
Rating index as a basis for decision making on pesticide use reduction and for accreditation of fruit produced under integrated pest management.

Penrose, L. J.; Thwaite, W. G.; Bower, C. C. Crop-prot v.13(2): p.146-152. (1994 Mar.)
Includes references.
Descriptors: pesticides-; usage-; pesticide-residues; indexes-; integrated-pest-management; decision-making; low-input-agriculture; new-south-wales

184. NAL Call No.: S544.3.N9C46
Refreshing raspberries.
Smith, R. C. NDSU-Ext-Serv. Fargo, N.D. : The University v.H-38, rev.p.2 (1994 Jan.)
Descriptors: rubus-strigosus; rubus-occidentalis; crop-production; varieties-; planting-; integrated-pest-management; weed-control; pruning-; plant- protection; tetranychus-urticae; viral-diseases; north-dakota; rubus-occidentalis-x-rubus-idaeus

185. NAL Call No.: SB925.B5
Reproductive biology of Biosteres arisanus (Sonan), an egg-larval parasitoid of the oriental fruit fly.
Ramadan, M. M.; Wong, T. T. Y.; McInnis, D. O. Biol-control v.4(2): p.93-100. (1994 June)
Includes references.
Descriptors: plant-pests; insect-pests; bactrocera-dorsalis; insect-control; biological-control; biological-control-agents; laboratory-rearing; insectaries-; mass-rearing; biosteres-arisanus; sex-ratio; oviposition-; sexual-reproduction; females-; age-; parasitoids-; population-density; parasites-of- insect-pests; ova-; larvae-

Abstract: Abstract: Biosteres arisanus (Sonan) is an internal egg-larval parasitoid candidate for biological control programs directed against several fruit fly pests of the family Tephritidae. To facilitate development of mass production methods, basic biological data pertaining to the reproductive activity of B. arisanus were collected. Daily progeny production for the cohort-age interval 6-20 days was found to be optimum, and a discard age of 21 days is recommended. The overall mean progeny production per day (50.4 +/- 4.2 parasitoids) was doubled to 105.4 +/- 23.2 when parasitoids were increased from 50 to 100 female female/cage. In parasitoid cages of 200 female female, mean progeny production per day peaked at 297.1 +/- 43.8 parasitoids at age interval 6-10 days. Mean progeny yield/cage was 1309, 2433, and 3401 parasitoids when the initial cohort density was 50, 100, and 200 female female, respectively. An oviposition exposure period of 6 h was optimum to minimize rates of host mortality or superparasitism. Unparasitized host puparia of Bactrocera dorsalis (Hendel) from parasitoid exposure cages can be efficiently separated by the size of host puparia. Up to 99.5% of the total B. arisanus emerged from pupal size class 1 (maximum width = 1.7 mm, maximum length = 4.1 mm) to size class 4 (maximum width = 2.1 mm, maximum length = 4.9 mm). Most of the unparasitized adult flies (80.6%) emerged from pupal sizes larger than size class 4. Furthermore, 97.6% of B. arisanus that emerged from size class 1 were males. Percentages of male parasitoid progeny declined significantly as the host puparial size increased (approximately 3% male male emerged from class 4 and 5 puparia).

186. NAL Call No.: 420-En82
Reproductive biology of Biosteres vandenboschi (Hymenoptera: Braconidae), a parasitoid of early-instar Oriental fruit fly.
Ramadan, M. M.; Wong, T. T. Y.; Messing, R. H. Ann-Entomol-Soc-Am v.88(2): p.189-195. (1995 Mar.)
Includes references.
Descriptors: biosteres-; ceratitis-capitata; bactrocera-dorsalis; reproductive-performance; survival-; ova-; biological-development; oviposition-; fecundity-; larvae-; parasitoids-; biological-control-agents; parasites-of-insect-pests; ovaries-; maturation-; sex-ratio; hosts-; sexual-reproduction

187. NAL Call No.: S542.A8A34
A review of biological control of postharvest diseases of subtropical fruits.
Korsten, L.; De Villiers, E. E.; Wehner, F. C.; Kotze, J. M. ACIAR-proc (50): p.172-185. (1994)
In the series analytic: Postharvest handling of tropical fruits / edited by B.R. Champ, E. Highley, and G.I. Johnson.
Descriptors: subtropical-fruits; plant-diseases; plant-disease-control; biological-control; integrated-pest-management; agricultural-research; reviews-; south-africa

188. NAL Call No.: 1.98-Ag84
Riobravis: nematode the magnificent.
De Quattro, J. Agric-res v.42(2): p.18-19. (1994 Feb.)
Descriptors: zea-mays; gossypium-hirsutum; citrus-; helicoverpa-zea; spodoptera-frugiperda; pectinophora-gossypiella; insect-pests; animal-parasitic- nematodes; biological-control-agents;

insect-control; biological-control; steinernema-riobravis

189. NAL Call No.: 420-B77
The role to two eulophid parasitoids in populations of the leafminer, Phyllonorycter mespilella (Lepidoptera: Gracillariidae) in British Columbia.
Cossentine, J. E.; Jensen, L. B. J-Entomol-Soc-BC. Vancouver : The Society v.91p.47-54 (1994 Dec.)
Includes references.
Descriptors: phyllonorycter-; pnigalio-; sympiesis-marylandensis; malus-pumila; orchards-; population-density; overwintering-; summer-; parasites-of- insect-pests; biological-control-agents; parasitoids-; biological-control; mortality-; british-columbia; pnigalio-flavipes

190. NAL Call No.: S605.5.A43
Screening cool-season legume cover crops for pecan orchards.
Smith, M. W.; Eikenbary, R. D.; Arnold, D. C.; Landgraf, B. S.; Taylor, G. G.; Barlow, G. E.; Carroll, B. L.; Cheary, B. S.; Rice, N. R.; Knight, R. Am-J-altern-agric. Greenbelt, MD : Henry A. Wallace Institute for Alternative Agriculture v. 9 (3)p.127-134 (1994 Summer)
Includes references.
Descriptors: carya-illinoinensis; orchards-; cover-crops; leguminosae-; screening-; nitrogen-; nutrient-sources; insect-pests; pest-control; biological- control; beneficial-arthropods; populations-; population-density; monitoring-; biomass-production; nitrogen-content

Abstract: We evaluated selected cool-season annual and perennial legumes as potential ground covers to supply nitrogen and to increase beneficial arthropod populations in a pecan orchard Densities of aphids (Homoptera: Aphididae), lady beetles (Coleoptera, Coccinellidae), damsel bug

191. NAL Call No.: QL461.E532
Seasonal activity of carabids (Coleoptera: Carabidae) affected by microbial and oil insecticides in an apple orchard in California.
Riddick, E. W.; Mills, N. J. Environ-entomol v.24(2): p.361-366. (1995 Apr.)
Includes references.
Descriptors: malus-pumila; cydia-pomonella; carabidae-; predatory-insects; population-density; bacillus-thuringiensis-subsp; -kurstaki; oils-; granulosis- viruses; seasonal-variation; biological-control; insect-control; california-; horticultural-oils

Abstract: The objective of this research was to determine if the seasonal activity of carabid ground beetles was affected by microbial or oil insecticides, which were being used to control the codling moth, Cydia pomonella (L.), a major pest of apple. Plots were sprayed with Bacillus thuringiensis plus oil, oil alone, or codling moth granulosis virus at predicted egg hatchout periods in spring and summer 1991. The results of pitfall trapping indicated that Harpalus pensylvanicus DeGeer adults were significantly more active on the soil surface in plots sprayed with granulosis virus in early July, than in plots sprayed with B. thuringiensis plus oil, or controls (no-spray). Chlaenius sp. (probably C. tricolor Dejean) adults were significantly more active in plots sprayed with oil alone, in early June, than in plots sprayed with granulosis virus, B. thuringiensis plus oil, or controls. The other dominant species, Anisodactylus californicus Dejean, Pterostichus (Hypherpes) spp., Agonum punctiforme Say, and Calathus ruficollis Dejean were not significantly more active in any treatment plot at any of the collection dates. The data suggest that the seasonal activity of two species was probably enhanced by granulosis virus or oil insecticides, whereas the activity of the other dominant species was unaffected.

192. NAL Call No.: S605.5.A43
Second-level integrated pest management in commercial apple orchards.
Prokopy, R. J.; Cooley, D. R.; Autio, W. R.; Coli, W. M. Am-J-altern-agric. Greenbelt, MD : Henry A. Wallace Institute for Alternative Agriculture v.9 (4)p.148-156 (1994 Fall)
Includes references.
Descriptors: malus-pumila; orchards-; integrated-pest-management; efficacy-; sustainability-; massachusetts-

Abstract: As historical background helpful to understanding current concepts and practices of apple pest management, we review the origin and rise of key pests of apple in North America and the evolution of approaches to their management, culminating with the concept of integrated pest management (IPM). We propose four levels of integration of orchard pest management practices. First-level IPM integrates chemically based and biologically based management tactics for a single class of pests, such as arthropods, diseases, weeds or vertebrates. Second-level

IPM, the focus of our effort here, integrates multiple management tactics across all classes of pests. We describe components of second-level IPM for Massachusetts apple orchards, which are threatened each year by an exceptionally broad range of injurious pests. We illustrate the tentative advantages and shortcomings of second-level IPM using 1993 data from six commercial orchard test blocks. Our predominant approach was to use chemically based tactics for controlling arthropods, diseases and weeds early in the growing season, and afterwards to rely exclusively (for insects) or largely (for other pests) on biologically based tactics, such as cultural, behavioral, and biological controls. Compared with nearby first-level IPM blocks, insecticide use in 1993 was reduced substantially (about 30%), with only slightly more insect injury to fruit and little difference in populations of foliar insect pests. The results for mite pests and diseases were less encouraging although summer pruning significantly reduced disease injury caused by flyspeck. We discuss how second-level IPM poses special biological or operational challenges to apple pest management practitioners. The concept has. and reliable alternative to first-level IPM.

193. NAL Call No.: 275.29-M381Fr
Second-level IPM in blocks of scab-resistant apple cultivars.
Cooley, D. R.; Mason, J.; Duan, J. J.; Hu, X. P.; Elliott, R.; Prokopy, R. J. Fruit-notes v.59(1): p.8-12. (1994 Winter)
Includes references.
Descriptors: integrated-pest-management; cultivars-; disease-resistance; crop-damage; insect-pests; meadow-orchards; insecticides-; fungicides-; fungal- diseases; massachusetts-

194. NAL Call No.: 1.9-P69P; DLC PAR; PPUSDA x
Selection and performance of bacterial strians for biologically controlling fusarium dry rot of potatoes incited by Gibberella pulicaris.
Schisler, D. A.; Slininger, P. J. Plant-dis. [St. Paul, Minn., American Phytopathological Society] v.78 (3) p.251-255 (1994 Mar.)
Includes references.
Descriptors: solanum-tuberosum; tubers-; gibberella-pulicaris; fungal-diseases; plant-disease-control; biological-control; soil-flora; communities-; biological-control-agents; isolation-; strains-; suppressive-soils; efficacy-; disease-suppression

195. NAL Call No.: 100-C12Cag
Sex scent confuses coastal codling moth.
Calif-agric v.48(6): p.6. (1994 Nov.-1994 Dec.)
Descriptors: orchards-; cydia-pomonella; pheromones-; mating-disruption; integrated-control; cost-benefit-analysis; california-

196. NAL Call No.: 421-J822
Short-range dispersal of mass-reared Diachasmimorpha longicaudata and D. tryoni (Hymenoptera: Braconidae), parasitoids of tephritid fruit flies.
Messing, R. H.; Klungness, L. M.; Purcell, M. F. J-econ-entomol v.87(4): p.975-985. (1994 Aug.)
Includes references.
Descriptors: psidium-guajava; tephritidae-; braconidae-; parasitoids-; mass-rearing; dispersal-; biological-control-agents; hawaii-; diachasmimorpha-tryoni

Abstract: Cohorts of two species of mass-reared opiine braconid parasitoids Diachasmimorpha longicaudata (Ashmead) and D. tryoni (Cameron) were released at two study sites (a mature guava orchard and a large grass field) to study their height of dispersal in the vertical plane and their direction of dispersal in the horizontal plane. A higher percentage of released parasitoids of both sexes and both species was recaptured in the orchard than was recaptured in the grass field. Highest recovery in the orchard canopy for both species coincided with the fruit abscission period. Movement in the vertical plane followed an approximately normal distribution in the grass field, with a mean recapture height of 133.3 cm (+/- 1.9). In the orchard, vertical distribution was negatively skewed with a mean recapture height of 153.9 cm (+/- 1.1). In the orchard, the median height of dispersal of females of both species rose to >200 cm during the period of fruit abscission in the canopy and fell to < 100 cm after most of the fruit had fallen. In the horizontal plane, the mean direction of dispersal in both vegetation types was toward the southwest, presumably in response to prevailing northeasterly trade winds. The relevance of the results to augmentative biological control of tephritid fruit flies in Hawaii is discussed.

197. NAL Call No.: S542.A8A34
Sour rot disease on citrus fruits: importance and control.
Richter, K. ACIAR-proc (50): p.450-452. (1994)

In the series analytic: Postharvest handling of tropical fruits / edited by B.R. Champ, E. Highley, and G.I. Johnson.
Descriptors: citrus-; fruit-; geotrichum-candidum; fungal-diseases; postharvest-decay; integrated-control

198. NAL Call No.: 421-C16
Spatial distribution of Sympiesis marylandensis Girault (Hymenoptera: Eulophidae) in apple orchards infested by its host, the apple blotch leafminer, Phyllonorycter crataegella (Clemens) (Lepidoptera: Gracillariidae).
Maier, C. T.; Weseloh, R. M. Can-entomol v.127(2): p.235-243. (1995 Mar.-1995 Apr.)
Includes references.
Descriptors: sympiesis-marylandensis; phyllonorycter-crataegella; parasitoids-; parasites-of-insect-pests; spatial-distribution; orchards-; malus-pumila; female-animals; parasitism-; connecticut-

199. NAL Call No.: SB945.P68S64--1995
Spiroplasmas as biological control agents of insect pests.
Hackett, K. J.; United States Israel Binational Agricultural Research and Development Fund. 134p. (BARD, [Bet Dagan, Israel] , 1995)
"Final report."
Descriptors: Colorado-potato-beetle-Biological-control; Insect-pests-Biological-control

200. NAL Call No.: 99.8-F7623
Status of cone and seed insect pest management in Canadian seed orchards.
De Groot, P.; Turgeon, J. J.; Miller, G. E. For-chron v.70(6): p.745-761. (1994 Nov.-1994 Dec.)
Includes references.
Descriptors: conifers-; seed-orchards; integrated-pest-management; forest-pests; insect-pests; seed-production; forest-damage; seed-cones; insect- control; chemical-control; insecticides-; biological-control-agents; biological-control; literature-reviews; canada-

Abstract: Many of Canada's conifer seed orchards are entering their productive phase. In most, if not all seed orchards, insect pest management will be required in order to meet the seed production targets. Canadian seed orchard managers will soon need to know the basic requirements and what information is available to implement an insect pest management program. In this review, a synthesis is provided of the major components of an integrated pest management program for cone and seed insects. A list of the insect pests of conifer cones and seeds in Canada as well as features of their life cycles and population dynamics that could influence pest management strategies is presented. Current and future needs for insect damage appraisal and insect monitoring techniques are discussed. Finally, the various strategies and tactics to control insects are reviewed.

201. NAL Call No.: SB599.E97
Suppression of potato cyst nematode root penetration by the endoparasitic nematophagous fungi Hirsutella rhossiliensis.
Velvis, H.; Kamp, P. Eur-j-plant-pathol v.102(2): p.115-122. (1996 Jan.)
Includes references.
Descriptors: solanum-tuberosum; globodera-pallida; plant-parasitic-nematodes; nematode-control; hirsutella-; nematophagous-fungi; biological-control; biological-control-agents; suppression-; efficacy-; population-density

202. NAL Call No.: QL461.M5
Survey of predators associated with European red mite (Panonychus ulmi; Acari: Tetranychidae) in Ohio apple orchards.
Welty, C. Great-Lakes-entomol v.28(2): p.171-184. (1995 Summer)
Includes references.
Descriptors: malus-pumila; panonychus-ulmi; predatory-mites; predatory-insects; population-density; biological-control-agents; surveys-; ohio-

203. NAL Call No.: S544.3.N6N62
Tall fescue: lawn and maintenance calendar.
Bruneau, A. H.; Lewis, W. M.; Peacock, C. H.; Lucas, L. T.; Brandenburg, R. L.
AG-NC-Agric-Ext-Serv. Raleigh : North Carolina Agricultural Extension Service v.367, rev.p.4 (1994 Oct.)
Descriptors: festuca-arundinacea; mowing-; fertilizers-; irrigation-; soil-types-textural; disease-control; weed-control; insect-control; integrated-pest- management

204. NAL Call No.: 1.98-Ag84
Testing diversified orchard ecosystems.
Stanley, D. Agric-res v.44(1): p.18-19. (1996 Jan.)
Descriptors: orchards-; crop-management; pest-control; integrated-pest-management; cover-crops; beneficial-insects; agricultural-research

205. NAL Call No.: 100-T31S-1
Texas guide for controlling insects on commercial vegetable crops.
Sparks, A. N. Jr. Bull-Tex-Agric-Exp-Stn. College Station, Tex. : Texas Agricultural and Mechanical College System v.1305,rev.p.29 (1994 Jan.)
Descriptors: insect-control; vegetables-; commercial-farming; insecticides-; insect-pests; application-rates; biological-control; microbial-pesticides; insecticide-resistance; spraying-precautions; honeybees-; texas-

206. NAL Call No.: 424.8-Am3
Tracheal mites can be suppressed by oil patties.
Sammataro, D. Am-bee-j v.136(4): p.279-282. (1996 Apr.)
Includes references.
Descriptors: apis-mellifera; acarapis-woodi; plant-oils; sugar-; oxytetracycline-; mite-control; biological-control; efficacy-; vegetable-shortening

207. NAL Call No.: SB599.C8
Transplant production techniques in integrated crop management of hot pepper (Capsicum spp.) under tropical lowland conditions.
Vos, J. G. M.; Nurtika, N. Crop-prot v.14(6): p.453-459. (1995 Sept.)
Includes references.
Descriptors: capsicum-; thrips-; polyphagotarsonemus-latus; choanephora-cucurbitarum; cercospora-capsici; corticium-rolfsii; transplanting-; nurseries-; protected-cultivation; crop-yield; plant-disease-control; integrated-control; indonesia-; malaysia-; thrips-parvispinus

Abstract: Effects of different methods of producing tranplants were investigated as a potential contribution to integrated crop management (ICM) of hot pepper (Capsicum spp.) in tropical lowlands. The techniques studied included roofing or screen-covering the nursery, producing transplants in pots and varying the duration of the transplant production period. Crop performance was measured during the nursery phase by variables such as proportion of emerged transplants, number of leaves per transplant and during the field phase by variables such as crop establishment, plant height and mid-fruiting time. Crop health was monitored by following the development of pests and diseases, such as thrips (Thrips parvispinus Karny), yellow tea mite (Polyphagotarsonemus latus Banks), anthraenose fruit rot (Colletotrichum spp.), blossom mould [Choanephora cucurbitarum (Berkeley & Ravenel) Thaxter], cercospora leaf spot (Cercospora capsici Heald & Wolf), southern blight (Sclerotium rolfsii Saccardo), and aphid-transmitted virusus (mainly CMV and CVMV). Crop production in the field was measured through yield of healthy fruits, mean weight per fruit and earliness of harvesting. Screen-covered nurseries protected seedlings from aphids and aphid- transmitted viruses during the nursery phase and enhanced mid-fruiting time and improved crop production during the field phase. Use of screen-covered nurseries could make application of pesticides during the nursery phase superfluous. After planting in the field, potted transplants established better and produced fruits earlier than bare-root transplants. A transplant production period of 1.5 months appeared optimal for plant growth and earliness of harvesting. Production of transplants in pots under a. transplants yielded better only when other elements of ICM, such as mulching, were included.

208. NAL Call No.: 421-J822
Trimedlure: effects of structural modifications on its attractiveness to Mediterranean fruit fly males (Diptera: Tephritidae).
DeMilo, A. B.; Cunningham, R. T.; McGovern, T. P. J-econ-entomol v.87(6): p.1494-1501. (1994 Dec.)
Includes references.
Descriptors: ceratitis-capitata; trimedlure-; analogs-; structure-activity-relationships; persistence-; insect-control; biological-control; efficacy-

Abstract: Sixty-eight structural variants of trimedlure, tert-butyl 4(and 5)-chloro-2-methylcyclohexane-1-carboxylate (TML), the male attractant for the Mediterranean fruit fly, Ceratitis capitata (Wiedemann), were evaluated as attractants to determine the importance of the substituents to the attractiveness of TML. The 1-tert-butyl carboxylate and 4(and 5)-chloro substituents in TML can be replaced selectively with no significant reduction in attractiveness. However, the 2-methyl substituent appears to be very important for high levels of

attraction. Thirteen halogen analogs of TML showed initial attractancy that was not significantly different from that of TML. In addition, nine of the halogen analogs were as persistent or more persistent than TML at high levels of attractiveness. In a longer term (15 d) follow-up test with 14 promising lures, no significant difference was found between the attractiveness of four of the lures and a freshly baited TML wick after 4 d, by which time an aged TML wick had become depleted of lure. Of the four lures, trifluoroethyl 4(and 5)-iodo-trans-2-methylcyclohexane-1-carboxylate was especially attractive through 4 d of the test, during which time it was the top-ranked lure. Ethyl 4(and 5)-bromo-trans-2-methylcyclohexane-1-carboxylate were very persistent lures, continuing to catch moderate number of C. capitata through days 11 and 15, respectively.

209. NAL Call No.: 80-J825
Urban and agricultural wastes for use as mulches on avocado and citrus and for delivery of microbial biocontrol agents.
Casale, W. L.; Minassian, V.; Menge, J. A.; Lovatt, C. J.; Pond, E.; Johnson, E.; Guillement, F.
J-hortic-sci v.70(2): p.315-332. (1995 Mar.)
Includes references.
Descriptors: mangifera-indica; citrus-; crop-production; mulches-; agricultural-wastes; wood-chips; grass-clippings; leaves-; rice-husks; alfalfa-hay; cattle-manure; hay-; poultry-manure; almonds-; hulls-; peanut-husks; orange-peel; composts-; sewage-sludge; mushroom-compost; refuse- compost; orchards-; substrates-; biological-control-agents; trichoderma-harzianum; gliocladium-virens; pseudomonas-fluorescens; growth-; phytotoxicity-; ammonia-; chemical-composition; cellulose-; carbohydrates-; nitrogen-content; california-; sudangrass-hay; chicken-manure; wood-compost

210. NAL Call No.: SB925.B5
The use of vegetable compatibility and heterokaryosis to determine potential asexual gene exchange in Colletotrichum gloeosporioides.
Chacko, R. J.; Weidemann, G. J.; TeBeest, D. O.; Correll, J. C. Biol-control v.4(4): p.328-389. (1994 Dec.)
Includes references.
Descriptors: aeschynomene-indica; aeschynomene-sensitiva; aeschynomene-virginica; ludwigia-; carya-illinoinensis; malva-; stylosanthes-hamata; weeds-; biological-control-agents; glomerella-cingulata; mutants-; heterokaryosis-; mitotic-recombination; phenotypes-; parasexuality-; mycoherbicides-; ludwigia-decurrens; malva-pusilla; risk-assessment; glomerella-cingulata-f; sp; -aeschynomene; glomerella-cingulata-f; sp; -jussiaeae

Abstract: Auxotrophic and nitrate nonutilizing (nit) mutants were used to characterize vegetative compatibility, heterokaryosis, and asexual gene exchange in the fungal biological control agent Colletotrichum gloeosporioides f.sp. aeschynomene (Cga). Several paired auxotrophic strains produced heterokaryotic colonies, but conidia recovered from the colonies comprised only the parent phenotypes. Analysis of mycelial plugs removed from along the colony radius demonstrated that heterokaryosis was limited to the colony center. In host inoculation studies, only parental phenotypes were recovered from cocolonized lesions of the weed host Aeschynomene virginica. Based on pairings with nit mutants, 13 Cga isolates were vegetatively compatible but were vegetatively incompatible with 13 C. gloeosporioides isolates obtained from other hosts. Although heterokaryosis was demonstrated with Cga, no putative diploids or recombinant phenotypes were detected. Host specialization, vegetative compatibility, and lack of a demonstrated parasexual cycle may serve to genetically isolate Cga from other populations of C. gloeosporioides. Evidence of asexual gene exchange can be used to assess potential risks associated with the importation of an exotic biocontrol fungus or release of a genetically modified strain for biological control.

211. NAL Call No.: 424.8-Am3
The use of vegetable oil to control tracheal mites.
Cobey, S. Am-bee-j v.134(4): p.257-258. (1994 Apr.)
Includes references.
Descriptors: apis-mellifera; mites-; plant-oils; mite-control; biological-control; efficacy-

212. NAL Call No.: 275.29-W27P
Weed control in ornamental bulbs (iris, narcissi, tulip).
Al Khatib, K. Ext-bull-Wash-State-Univ,-Coop-Ext. Pullman, Wash. : The Extension v.1791p.6 (1994 July)
Descriptors: tulips-; iris-; narcissus-; perennial-weeds; weeds-; annuals-; crop-weed-competition; environmental-factors; weed-control; integrated- control; herbicides-; application-; guidelines-

213. NAL Call No.: SB319.2.N6G84
Weed management in pecans.
Lee, R. D. Guide-H. Las Cruces, NM : New Mexico State University, Cooperative Extension Service v.632p.7 (1994 July)
Descriptors: orchards-; weeds-; variety-classification; physical-control; chemical-control; biological-control; herbicides-; application-rates; application- date

214. NAL Call No.: 275.29-M381Fr
What species of predaceous mites exist in Massachusetts commercial apple orchards.
Hu, X.; Prokopy, R. Fruit-notes v.59(2): p.10-11. (1994 Spring)
Descriptors: malus-pumila; orchards-; predatory-mites; mite-control; species-; biological-control; massachusetts-

215. NAL Call No.: 1.98-Ag84
Whitefly fungus on its way to growers.
DeQuattro, J. Agric-res v.43(5): p.16-17. (1995 May)
Descriptors: bemisia-tabaci; beauveria-bassiana; biological-control-agents; horticultural-crops

216. NAL Call No.: 100-Id14
Wireworms in potatoes.
Bechinski, E. J.; Sandvol, L. E.; Carpenter, G. P.; Homan, H. W. Bull-Univ-Ida,-Coll-Agric. Moscow : Idaho Agricultural Experiment Station v.EXT 760p.11 (1994 Feb.)
Descriptors: solanum-tuberosum; elateridae-; species-; characteristics-; life-cycle; crop-damage; integrated-pest-management; biological-control; cultural-control; insecticides-; fumigants-; idaho-

217. NAL Call No.: SB317.5.H68
Wisconsin's IPM program for potato: the developmental process.
Stevenson, W. R.; Curwen, D.; Kelling, K. A.; Wyman, J. A.; Binning, L. K.; Connell, T. R. HortTechnology v.4(2): p.90-95. (1994 Apr.-1994 June)
Includes references.
Descriptors: solanum-tuberosum; integrated-pest-management; decision-making; computer-software; farm-inputs; application-date; timing-; agricultural-research; university-research; research-projects; research-support; crop-production; plant-protection; wisconsin-; systems-research

218. NAL Call No.: SB925.B5
Within-tree distribution of Phyllonorycter blancardella (F.) and P. crataegella (Clemens) (Lepidoptera: Gracillariidae) and associated levels of parasitism in commercial apple orchards.
Barrett, B. A. Biol-control v.4(1): p.74-79. (1994 Mar.)
Includes references.
Descriptors: malus-; phyllonorycter-blancardella; phyllonorycter-crataegella; insect-pests; spatial-distribution; canopy-; parasitism-; parasitoids-; insect- control; biological-control; parasites-of-insect-pests; sympiesis-marylandensis; pholetesor-ornigis; missouri-

219. NAL Call No.: 1.98-Ag84
Yeasts and bacteria battle decay.
Stanley, D. Agric-res v.42(5): p.8-9. (1994 May)
Descriptors: fruit-; storage-decay; pest-control; biological-control; agricultural-research

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