

РЕЗЮМЕТА НА ПУБЛИКАЦИИТЕ НА ДОЦ. Д-Р ХРИСТИНА КУТИНКОВА

- 1. Kutinkova, H., R. Andreev. 2000. Possibilities to determine the species complex of the beneficial entomofauna in apple agrocenose by using pheromone traps for the leaf miner *Leucoptera scitella* Zell. (Lepidoptera: Lyonetiidae). Yearbook for Plant Protection (Skopje, Macedonia) 11: 121-128.**

The objective of this study was to determine if the pheromone traps for *L. scitella*, made in Hungary, can be used for monitoring of the species complex of the beneficial insects in the orchards and if they affect their density, besides the study for their selectivity. The trials are conducted in the region of the Fruit-growing institute – Plovdiv, in the experimental apple orchard in the period of 1997-1999. It was detected that the Hungarian pheromone traps have very good selectivity with respect to the pest entomofauna. By means of pheromone traps, the species complex and the flight dynamic of the entomophages can be determined in the corresponding plantation. The pheromone traps have limited reduction influence on the population density of the beneficial entomofauna in the apple orchards.

- 2. Kutinkova, H., R. Andreev. 2001. Entomophages of the apple leafminers, *Phyllonorycter (Lithocolletis) blancardella* F. and *Phyllonorycter (Lithocolletis) corylifoliella* Hw. /Lepidoptera; Gracillaridae/. Proceedings 9th International Conference of Horticulture (September 3-6, 2001, Lednice, Czech Republic) 3: 659-664.**

In the period of 1997-1999, a study was conducted to establish the entomophagous complex, regulating the population density of the leafminer moths *Phyllonorycter blancardella* F. and *Phyllonorycter corylifoliella* Hb. in the regions of Plovdiv and Assenovgrad - Bulgaria. On the larvae and pupae of two moths, there were found 46 parasite insects and 19 species of hyperparasites of order Hymenoptera, referring to 3 families, 4 subfamilies and 13 genera. Of them, the most important for regulation of *Ph. blancardella* and *Ph. corylifoliella* population density are *Sympiesis sericeicornis* Nees., *Pediobius pyrgo* Walk. and *Apanteles circumscriptus* Nees. From the predator insects - polyphagous - 24 species were found, belonging to 3 orders and 6 families.

- 3. Andreev, R., H. Kutinkova., Arnaudov V. 2001. Forecast and signalization of pear leaf blister moth *Leucoptera scitella* Zell. /Lepidoptera; Lyonetidae/ in Bulgaria. Proceedings 9th International Conference of Horticulture (Lednice, Czech Republic, September 3-6, 2001) 3: 633-641.**

The paper makes a review of the methods applied in Bulgaria for forecasting and signalization of the pear leaf blister moth: cage method /isolation/, visual, pheromone traps, phenological forecast and models. Their effectiveness, applicability and importance for the plant protection practice have been assessed. The study is conducted in the period of 1994-2000 in the Institute of Fruit-growing, Plovdiv and in the Agricultural University, Plovdiv. There has been used data from the prognosis stations of the Regional Service for Plant protection, Quarantine and Agrochemistry, Plovdiv. The better part of the data is obtained from personal observations.

4. **Arnaudov, V., H. Kutinkova. 2001. Efficacy of some pesticides for control of pear psylla, *Psylla pyri* L. in Bulgaria. Proceedings 9th International Conference of Horticulture (Lednice, Czech Republic, September 3-6, 2001) 3: 15-19.**

From a range of pesticides tested for their efficacy on *Psylla pyri* L. in field trial, amitraz and pyridaben, as well as all of the group of synthetic pyrethroids showed the most effective control on the young larvae. From the tested organophosphorous insecticides only dimethoat reduced pear psylla populations substantially, whereas all the others showed bad control on *P. pyri*. It turned out that several of the chitin synthesis inhibitors, such as teflubenzuron and flufenoxuron are vary toxic to *P. pyri*, as well as to many Lepidoptera pests and so, they are potentially useful for inclusion in IPM programs.

5. **Arnaudov, V., H. Kutinkova. 2001. Evaluation of side effects of some pesticides on predacious mite, *Zetzellia mali* (Acarina: Stigmeidae) Proceeding International Conference of Fruticulture and Horticulture (Gorki, Belarus, August 21-23, 2001): 196-199.**

The predatory mite, *Zetzellia mali* Ewing appears one of the primary natural enemies of the noxious phytopagous mites in fruit orchards. The side effects of some insecticides on *Z. mali* are evaluated. Toxicity of the studied insecticides increased as following: chlorpyrifos < fenitrothion < carbaril < methidation < methylparation < phosalon < phosmet < pyrol. It is concluded that in the population of *Z. mali* a resistance to some organophosphates and carbamate insecticides is developing.

6. **Kutinkova, H., R. Arnaudov. 2001. On the parameters of application of pheromone traps for leafminer *L. scitella* (Lepidoptera; Lyonetiidae). Proceedings of International Conference of Fruticulture and Horticulture (Gorki, Belarus, August 21-23, 2001): 200-204.**

The experiments have been carried out in 1998 – 2000 on the fields of the Fruit Growing Institute, Plovdiv. It was found out that the effectivity of pheromone traps increased in increasing the height of their place in the tree crown; in the low-stemmed density plantations there was highest catch at 2.20 till 2.80, while in the high-stemmed plantations it was at 4 to 5 m from the soil surface. For the purposes of prognostication the optimal area per trap is 1.5-2.0 ha in order to follow the flight dynamics of the leafminer *L. scitella* Zell. For the actual estimation of the leafminer population number in different apple plantations we must take into account their situation.

7. **Kutinkova, H., R. Andreev. 2002. Attractiveness and selectivity of pheromone dispensers with different origin for the leaf miners *Leucoptera scitella* Zell., *Phyllonorycter blancardella* F. and *Phyllonorycter corylifoliella* Hw. Journal of Environmental Protection and Ecology B.EN.A. 3 (4): 874-877.**

The pheromone traps are environmental friendly means for monitoring and pest control of the harmful insects. Their use may lead to decrease of the chemical treatments in plant protection systems. Their selectivity and attractiveness have a practical significance for the plant protection. In 1998 and 1999, comparative studies were conducted to determine the selectivity and attractiveness of Hungarian, Romanian and Italian pheromone dispensers, for the leaf miners *Leucoptera scitella* Zell., *Phyllonorycter blancardella* F. and *Phyllonorycter corylifoliella* Hb. The observations were carried out in the experimental apple orchard in the region of the Fruit Growing Institute – Plovdiv, Bulgaria. It was detected that the examined pheromone dispensers have good selectivity and attractiveness. The selectivity of the pheromone dispensers is high, so other species of miner moths get into the traps accidentally

only during the mass flight. The Hungarian and Romanian traps are the most attractive for *L. scitella*, and the Italian dispensers are the most attractive for *Ph. blancardella* and *Ph. corylifoliella*. Dispensers, with higher attractive capacity should be preferred to determine the flight dynamics.

8. **Andreev, R., H. Kutinkova. 2002. Phenological model for forecasting of pear leaf blister moth *Leucoptera (Cemiostoma) scitella* Zell. /Lepidoptera: Lionetiidae/. Scientific Works of the Lithuanian Institute of Horticulture and Lithuanian University of Agriculture / Sodininkystė ir Daržininkystė 21 (3): 183-191.**

The pear leaf blister moth, *Leucoptera scitella* Zell is economically the most important pest of the group of leafminer moths in Bulgaria. The aim of the conducted study was to develop not complicated, but accurate enough phenological model for forecasting of this pest, based on the accumulated temperature amounts. Based on the data from laboratory experiments, it was found that the dependence between the temperature and the duration of the three phenological development stages of the pear leaf blister moth - egg, larva and pupa, is described by the hyperbolic equation of the type $Y = a+b/X$, and the dependence between the temperature and the velocity of development is described with a linear equation of the type $Y = a+b.X$. Each stage of the phenological development of the species has a different lower temperature threshold - 6,5⁰C for eggs, 1,5⁰C for larvae and 7.5⁰C for pupae. The egg stage completes its development by 136-162 degree-days, the larval stage by 298 - 315 degree-days, and the pupa stage by 161 - 202 degree-days. Modifying the method by using the probit analysis in a wide range and field observations' data of many years, the lower temperature threshold of 7,5⁰C and the degree-days accumulations for some other points of the seasonal appearance of the pear leaf blister moth were found.

9. **Kutinkova, H., R. Andreev 2002. Parameters of application of pheromone traps for leaf miners *Lithocolletis blancardella* F. and *Lithocolletis corylifoliella* Hb. /Lepidoptera; Lithocolletidae/. Scientific Works of the Lithuanian Institute of Horticulture and Lithuanian University of Agriculture / Sodininkystė ir Daržininkystė 21 (3): 192-201.**

The experiments have been carried out in 1998 –2000 on the fields of the Fruit Growing Institute, Plovdiv. It was found out that the effectivity of pheromone traps increased in increasing the height of their place in the tree crown; in the low-stemmed density plantations there was highest catch at 2.20 till 2.80 m for *L. blancardella*, at 2.80 till 3.20 m for *L. corylifoliella*, while in the high-stemmed plantations it was at 4 to 5 m from the soil surface. For the purposes of prognostication the optimal area per trap is 2. 0 ha –3. 0 in order to follow the flight dynamics of the leafminers *L. blancardella* and *L. corylifoliella*. For the actual estimation of the leafminer population number in different apple plantations we must take into account their situation. In orchard located closely to additional sources of contagion (abandoned plantations), a larger number of traps have to be placed at the side towards those sources – at proportion 2:1 in favor of the outer traps.

10. **Kutinkova, H., R. Andreev. 2003. Possibilities for monitoring of apple clearwing moth *Synanthedon myopaeformis* Borkh. (Lepidoptera: Sesiidae) by sex pheromone in Bulgaria. Journal of Environmental Protection and Ecology B.EN.A. 3 (4): 636-642.**

The apple clearwing moth, *Synanthedon myopaeformis* Borkh. (Lepidoptera: Sesiidae) that had been regarded until the 1960-ies in Europe as one of the secondary pest of apple trees, weakened by other factors, became a significant pest in Bulgaria during the last few years. This can be attributed to changes in apple production technology. Intensive plantations were established, rootstocks with low growing capacity introduced and these may result in the early

death of young trees under unfavorable environmental conditions. In 2001 and 2002, a study was conducted to determine possibilities for monitoring of apple clearwing moth by sex pheromones in Bulgaria. The observations were carried out in the experimental apple orchards in the region of the Fruit Growing Institute and Agricultural University – Plovdiv, Bulgaria. Two types of pheromone traps were used: RAG (trap with sticky changeable bottom) and VAR (funnel trap with insecticide) with the same pheromone dispensers, products of CSALOMON (Plant Protection Institute of the Hungarian Academy of Science) – Hungary. It was detected that the investigated pheromone dispensers for apple clearwing moth have good selectivity and high attracting. The RAG – traps caught the earlier flight of butterflies, but in the mass flight, the VAR – traps have higher catching capacity. Both types of traps can be successfully applied in the systems for monitoring of apple clearwing moth, *S. myopaeformis*. By implementation of purposeful observations, the most appropriate time for the chemical control can be established.

11. Dzhuvinov, V., H. Kutinkova, R. Penev. 2003 Possibilities for ecological production of apple fruits. Journal of Environmental Protection and Ecology B.EN.A 4 (1): 59-64.

Twenty four apple cultivars resistant to scab (*Venturia inaequalis* / Cooke/Wint) and budded on EMLA 9 rootstock, were planted 1991 in an experimental orchards with spacing 4.0 x 2.0 m. The Golden delicious cultivar was used as control. The susceptibility to major diseases scab and mildew was observed during the period 1996-2000. The scab resistant cultivars have the Vf, Vr and Vf + poly genes. Other 34 cultivars, without resistance to scab, were investigated in a second treatment. During the investigation period, the two main apple diseases were controlled by conventional plant protection means each year 7 to 9 fungicide treatments. Our conclusion is that, if resistant to scab apple cultivars are grown according to the integrated fruit production (IFP) requirements, the control on diseases can be realised with 4-5 treatments only, using fungicides of the group of the ergosterol- biosynthesis inhibitors.

12. Dzhuvinov, V., H. Kutinkova. 2003. Integrated plant protection of apple in Bulgaria. Scientific Works of the Lithuanian Institute of Horticulture and Lithuanian University of Agriculture / Sodininkystė ir Daržininkystė 22 (1): 55-61.

The revised general principles, minimum standards and guidelines for Integrated Production of pome fruits in Europe started from 1994 as agreed by the joint group of the IOBC/WPRS and ISHS at its meeting in Bologna, Italy, in May 1993 and accepted in Oeschberg, Switzerland in October 1994. The most important elements of IFP technology for pome fruits had been worked out by Pelov et al. in Bulgaria. Plant Protection occupies central place in fruit production. Its basic principle is to be both economically advantageous and ecologically safe. Integrated plant protection of apples is based on : using practically resistant to scab and powdery mildew varieties; using light toxic pesticides, but ones having a longer post effect during first months of vegetation period in view of protecting beneficial fauna; using pheromone traps for monitoring of important pests; using the pesticides of “green” and “yellow” list. Using the integrated plant protection of apple will bring the control to a modern level as regards obtaining ecological products and achieving environment preservation in accordance with the requirements of the European standards for integrated fruit production.

13. Andreev, R., H. Kutinkova, D. Ivanova 2003. Integrated pest management – basic element of ecologically friendly technologies in the agriculture in Bulgaria. Journal of Environmental Protection and Ecology B.EN.A. 4 (2): 496-504.

After the discovery of chemical pesticides and their global use, without any control, the human race was confronted with a new problem – total pollution of the agricultural production and environment. Historical, Integrated Pest Management (IPM) is the first attempt to introduce an ecological-friendly approach of plant protection in orchards, available today. Every country has its own rules and standards for IPM. In Bulgaria they are set up from 70th years of the last century. During 1995 the principles, rules and standards of the integrated fruit production were developed. In the present paper, the main elements and problems, for IPM systems in Bulgaria, are described.

14. **Kutinkova, H., R. Andreev. 2003. Possibilities of using sexual pheromones for apple pests in ecological production. Scientific Works of the Lithuanian Institute of Horticulture and Lithuanian University of Agriculture / Sodininkystė ir Daržininkystė 22 (4): 27-35.**

Apple is the main fruit of the moderate climate zone. Since the middle of the last century it has been determining the crop structure in Bulgaria and it takes the first place for occupied area and total production. The main apple pests are: codling moth, leaf miners, apple sawfly, San Jose scale and other scales, apple blossom weevil, aphids, red spider mite and in the last few years sawing caterpillars and apple red-belted clearwing. The world trend is the ecological approach to the control of agricultural pests. Application of pheromone traps for monitoring of the important pests of apple may reduce pesticide use in chemical treatments and the received production is less polluted. The perspective direction is the control by mass trapping and mating disruption technique. In the paper there are presented the results of using pheromone traps against pests of apple in the last 10 years by two largest scientific organizations in South Bulgaria – Fruit Growing Institute and Agricultural University in Plovdiv. For monitoring pheromone traps from different companies from the USA, Hungary, Italy and Romania have been used. The results showed application of pheromone traps to be a method, which may give an extremely exact information about flight dynamics of the pests and that it may be used as a subsidiary means for timing of the insecticide treatments. German pheromones “RAK 3+4” were used for control of codling moth and leafrollers by mating disruption methods. The results were unsatisfactory and it was concluded that the mating disruption technique might be used only in the orchards with low populations of codling moth or should not be used independently but have to be combined with other methods.

15. **Kutinkova H., I. Slavov, R. Andreev. 2003. Integrated Plant protection on quince (*Cydonia oblonga* Mill.) in Bulgaria. Scientific Works of the Lithuanian Institute of Horticulture and Lithuanian University of Agriculture / Sodininkystė ir Daržininkystė 22 (3): 63-71.**

The quince is a pome fruit crop is attacked by a huge number of pests and diseases. The most important pests on the quince in the Plovdiv region are: the Codling moth - *Laspeyresia (Carpocapsa) pomonella* L. and Oriental fruit moth - *Grapholitha (Cydia) molesta* Busck. /Lepidoptera: Tortricidae/. The most important diseases on quince in the Plovdiv region are: the Fire blight, caused by the *Erwinia amylovora* bacteria (Burrill) Winslow et al, Monilia leaf blotch- *Monilia cydoniae* (Schell) and Brown rot blossom and twig blight - *Monilia fructigena* (Person) Schroter. High quality and profitability of fruit production can be achieved only by applying a complex technology for an integrated fruit production (IFP). Until now, no specific technology of IFP has been developed for quince. In the paper is presented an Integrated plant protection /pest management/ (IPM) system for control the pests of quince as the base of IFP. Observe the requirements of IPM for ensuring effective

protection of fruit production from pests with simultaneous avoiding pollution. The plant protection methods are split generally into four groups: during the tree dormancy known as “winter dormancy”, pre-bloom, bloom and post-bloom activities.

- 16. Kutinkova, H., Andreev R. 2004. Integrated plant protection system for control of pest insects and mites of pear. Scientific Works of the Lithuanian Institute of Horticulture and Lithuanian University of Agriculture / Sodininkystė ir Daržininkystė 23 (3): 33-43.**

The pear is a pome fruit crop is attacked by a large number of pests. Key pests in Bulgaria are: the pear psylla, *Psylla (Cacopsylla), pyri* L. /Hemiptera: Psyllidae/ and the codling moth, *Laspeyresia (Cydia; Carpocapsa) pomonella* L. /Lepidoptera: Tortricidae/. Basic pests widely spread in the country with the ability to cause significant damage are: oriental fruit moth - *Grapholitha (Cydia) molesta* Busck and pear fruit moth, *Cydia pyrivora* Dan. /Lepidoptera: Tortricidae/; San Jose scale - *Quadrispidiotus (Diaspidiotus; Aspidiotus) perniciosus* Comstock, /Hemiptera: Diaspididae/ and other scale insects; pear bedstraw aphid - *Dysaphis pyri* B.de F. /Hemiptera: Aphididae/; pear fruit sawfly - *Hoplocampa brevis* Klug. /Hymenoptera: Tenthredinidae/; pear leaf sawfly - *Neurotoma flaviventris* Retz. /Hymenoptera: Pamphilidae/; apple bud weevil - *Anthonomus pyri* Kollar /Coleoptera: Curculionidae/; pear sucker - *Psylla (Cacopsylla) pyrisuga* Forster /Hemiptera: Psyllidae/; *Stephanitis pyri* F. /Hemiptera: Tingitidae/; European red spider mite - *Panonychus ulmi* Koch. /Acarina: Tetranychidae/ and some other mites; *Epicometis (Tropinota) hirta* Poda. /Coleoptera: Scarabaeidae/; leopard moth - *Zeuzera pyrina* /Lepidoptera: Cossidae/; ambrosia beetle - *Xyleborus dispar* Fabr. /Coleoptera: Ipidae/; loopers /Lepidoptera: Geometridae/ and other sawing caterpillars (brown-tail moth - *Euproctis chrisorrhoea* L. /Liparidae/, common lackey - *Malacosoma neustria* L. /Lasiocampidae/ etc). In the paper is presented an Integrated plant protection system for control the pests of pear available in Bulgaria. The plant protection methods are split generally into four groups: during the tree dormancy known as “winter dormancy”, pre-bloom, bloom and post-bloom activities. Introduction of IPM on the pear is only the way for increasing the quality of the fruit production by combining an effective and ecologically-friendly technology of plant protection in orchards.

- 17. Andreev, R., H. Kutinkova. 2004. Plum pests in middle-southern Bulgaria and their control. Progress in Plant Protection / Postępy w Ochronie Roślin (Poznan, Poland) 44 (2): 577-579.**

Primary pests in Bulgarian plum orchards are plum sawflies, *Hoplocampa minuta* and *H. flava*, damaging >50-80% of fruitlets. Red plum maggot, *Grapholitha funebrana* has two generations and makes wormy >20-30% fruits. The aphid *Hyalopterus pruni* and scale insects *Parthenolecanium corni* and *Diaspidiotus perniciosus* are also important. Chewing caterpillars, *Euproctis chrisorrhoea*, *Hyponomeuta padellus*, *Operophtera brumata* may cause significant leaf damage. Other aphids, mites, leaf weevils, tortricide moths and plant bugs occur occasionally. Branches may be infested by gall mite *Acalitus phloeocoptes*. Effective control measures, considering IPM principles, are suggested.

- 18. Kutinkova, H., Andreev R. 2004. Integrated pest management in sweet cherry (*Prunus avium* L.) orchards in Bulgaria. Journal of Fruit and Ornamental Plant Research (Skierniewice, Poland) 12 (Special Edition): 41-47.**

Sweet cherry is one of the major fruit crops in Bulgaria. Proper protection from insect and mite pests is necessary for high yield and fruit quality. At the same time, pollution of the products and of environment should be avoided. A system of integrated pest management for sour cherry orchards in Bulgaria is proposed. Treatments against major cherry pests are

suggested, with regard to phenological phases and threshold values of incidence of particular species of insects and mites.

19. **Andreev, R., H. Kutinkova. 2004. Resistance to aphids and scale insects in nine apple cultivars. Journal of Fruit and Ornamental Plant Research (Skierniewice, Poland), 12 (Special Edition): 215-221.**

During the period 2001–2004 the varietal susceptibility of apple to homopterous sucking pest insects from families *Aphididae* (*Aphis pomi* De Geer.; *Dysaphis plantaginea* Pas.; *Dysaphis devecta* Walk.), *Diaspididae* (*Diaspidiotus perniciosus* Comst.; *Lepidosaphes ulmi* L.) and *Coccidae* (*Eulecanium mali* Schr.) was studied. The investigation was carried out in the experimental field of Agricultural University – Plovdiv in a 14-year-old apple orchard, with cultivars Vista Bella, Mutsu, Melrose, Starkrimson, Primrouge, Bell Golden, Morspur Golden Delicious, Cooper Sel. 4 and Granny Smith. Susceptibility of the cultivars was assessed by the degree of insect infestation on shoots. In winter dormancy period it was found that all cultivars were infested by scale insects but their susceptibility was different. The maximum degree of infestation was found in 'Vista Bella', 'Mutsu', 'Primrouge' and 'Cooper Sel. 4'. 'Granny Smith', 'Melrose' and 'Bell Golden' were medium infested. The cultivars Starkrimson and Morspur Golden Delicious showed the lowest susceptibility. The examined cultivars can be divided into three categories, according to the infestation by aphids. The most susceptible (with the highest infestation) were Primrouge, Vista Bella and Granny Smith. A moderate susceptibility was established for 'Melrose', 'Mutsu', 'Cooper Sel. 4' and 'Morspur Golden Delicious'. 'Starkrimson' and 'Belgolden' showed the lowest susceptibility.

20. **Slavov, I., V. Dzhuvinov, H. Kutinkova. 2004. Possibilities for biological control of blue mold during the postharvest storage of apple fruit. «Проблемы экологизации современного садоводства и пути их решения» Материалы международной конференции (Краснодар, Русия, септември 7-10, 2004): 104-108.**

Blue mold (*P. expansum*) is the major disease causing significant losses during the post-harvest fruit storage. As far as the active substances of the major fungicides used for post-harvest treatment are considered potentially cancerogenic, the aim of the present study was to find out alternatives such as the biological control. Here its essence means discovering microorganisms of strongly expressed antagonism to the pathogen. Using standard phytopathological methods, the potential antagonists were isolated in the pre-harvest period. Apple leaves and fruits, collected from untreated in the last 3 years single trees or orchards, were used as a material for isolation. The screening for antagonism was conducted on wounded and inoculated fruits of Golden Delicious. The infection had been achieved with a suspension containing 6×10^4 CFU/ml. The antagonist concentration was of density 31-33 % (E=0,5) at 430 nm wavelength by the scale of the spectrophotometer. In four of the isolates (3 yeasts and 1 bacterium) a high degree of pathogen suppression was detected when reporting the results (7 days later at 22°C). Their antagonistic effect was confirmed by a bio-test on fruits of Starkrimson at a pathogen concentration of 1×10^5 CFU/ml.

21. **Kutinkova, H., Subchev M., Light, D. and Lingren B. 2005. Interactive effects on ethyl (2E,4Z)-2,4-decadienoate and sex pheromone lures to codling moth: apple orchard investigations in Bulgaria. J. Plant Protection Research (Poznan, Poland) 45 (1): 51-54.**

The kairomone, ethyl (2E,4Z)-2,4-decadienoate, a potent attractant of both males and females of *Cydia pomonella* in regions of the USA, was tested alone and together with the synthetic sex pheromone in apple orchards of Bulgaria in 2002 and 2003. No female moths were caught

in any trap containing kairomone as a lure or lure component. Furthermore, traps baited with kairomone caught only low numbers of males. Greatest numbers of male moths were caught in traps baited with the “combined-lure,” comprised of pheromone and kairomone together.

22. Subchev, M., H. Kutinkova, G. Szöcs, M. Tóth. 2006. Seasonal monitoring of *Synanthedon myopaeformis* (Borkhausen) by sticky and funnel pheromone traps in Bulgaria and Hungary. Proceedings International Conference on Biopesticides 4 “Phytochemicals and Natural Products for the Progress of Mankind” (Chang Mai, Thailand, February 12-18, 2005): 10-13.

The apple clearwing, *Synanthedon myopaeformis* (Borkhausen) was monitored in two apple orchards in the region of the Institute of Fruit-growing, Plovdiv, Bulgaria in 2001-2004 and in one apple orchard in the region of Pest county (central Hungary) in 2001-2002. Two kinds of traps – sticky and dry ones, baited with commercial pheromone dispensers produced by Csalomon[®] (Institute of Plant Protection, Hungarian Academy of Sciences, Budapest) were compared. The flight of apple clearwing moth started in the middle of May and lasted till the middle or end of August. The most numerous catches were recorded from the middle of June till the middle of July. In Hungary flight patterns showed a similar picture as in Bulgaria, usually the flight started somewhat later. Our results suggest that for detection purposes sticky traps are more sensitive, while the high-capacity dry traps are better suited in high population situations. The pheromone baits, produced by CSALOMON[®] are very species specific and effective for monitoring of the pest in apple orchards.

23. Andreev R., Olszak R., Kutinkova H. 2006. Harmful and beneficial entomofauna in apple orchards grown under different management systems. IOBC/wprs Bull. 29 (10): 13-19.

During the period 1996-2004, the harmful and beneficial insects were observed in apple orchards of the Agricultural University – Plovdiv, Bulgaria, grown under different management systems: biological, integrated and conventional (chemical). A total of 43 pests, belonging to 27 families and 5 orders were recorded in the orchard under biological pest management (BPM). In the orchards under IPM and chemical pest management (CPM) 35 and 26 species were found, respectively. The codling moth, *Cydia pomonella*, is the main pest of all apple orchards in Bulgaria. Other pests with a high population density in the BPM-orchard were the apple sawfly *Hoplocampa testudinea*, the pear lace bug *Stephanitis pyri*, tortricid-moths, the apple clearwing *Synanthedon myopaeformis*, the leopard moth *Zeuzera pyrina* and the weevils: *Phyllobius oblongus*, *Rhynchites bacchus* and *R. aequatus*. The populations of aphids, leafminers, *Epicometis hirta* and leaf-eating caterpillars increased occasionally. The populations of harmful insects in the IPM-orchard (aphids, leafminers, leopard moth and apple clearwing) increased occasionally. A high population density of harmful insects in the CPM-orchard (leafminers, aphids, *Epicometis hirta*, leopard moth and apple clearwing) was periodically observed. Beneficial insects were very abundant in the BPM-orchard. A total of 30 predators were found, belonging to 4 orders and 7 families. The ladybirds presented the highest population density and were significant as natural regulators of the small pests. Parasitoids from 7 families of *Hymenoptera* were important natural regulators of aphids, scale insects, leafminers, and tortricids. The population density of beneficial insects was lower in the IPM-orchard, but their importance as natural regulators of pests was still significant. In the CPM-orchard they were found occasionally.

24. Arnaoudov V., Olszak R., Kutinkova H. 2006. Natural enemies of plum brown scale *Parthenolecanium corni* Bouche (Homoptera: Coccidae) in plum orchards in the region of Plovdiv. IOBC/wprs Bull. 29 (10): 105-109.

Parthenolecanium corni Bouche (Homoptera: Coccidae) is considered a serious pest on stone fruits and some ornamental plants in Bulgaria. A survey was conducted in the region of Plovdiv, Bulgaria between 2002 and 2004 to determine the species and abundance of the parasitoid and predatory insects associated with *P. corni*. Seven species of hymenopterous parasitoid were found in association with *P. corni* including 4 primary parasitoides - *Coccophagus licimnia* Walk., *Blastothrix confusa* Erd., *Metaphycus insidiosus* Merc., *Metaphycus punctipes* Palm. and 3 secondary - *Pachyneuron concolor* Forst., *Pachyneuron solitarium* Andre and *Marietta picta* Andre. From predatory insect attacking *P. corni* were found 10 species predators, belonging to 3 orders: *Coleoptera*, *Heteroptera* and *Neuroptera*. In the region investigated *C. licimnia* and *B. confusa* are parasites of greatest importance for regulating the population density of *P. corni*. *C. licimnia* is more important as a parasite of over-wintering larvae and *B. confusa* is the most important parasite of adult females.

25. Kutinkova, H., V. Dzhuvinov. 2006. Study on some aspects of the interrelations between *Malus x domestica* Borkh. and the aphids *Dysaphis plantaginea* Pass. and *Aphis pomi* De Geer. Jugoslavsko Vočarstvo 40 /154/: 181-186.

In 2004 nineteen hybrid progenies were studied for resistance to aphids. They also manifested a resistance to scab and resistance or weak susceptibility to powdery mildew in 1998-2003. Golden EMLA was used as a control cultivar. Artificial infection was conducted with *Dysaphis plantaginea* Pass. and with *Aphis pomi* de Geer. – under field conditions and additionally with *Aphis pomi* on maiden trees budded on M.26 stock and grown in 4-dm³ pots. The selected hybrids of Starkrimson x Prima, Mollie's Delicious x Florina, Mollie's Delicious x Prima, Gloster x Prima, Winter Rambour x Priscilla and some hybrids of Florina (o.p.) and Liberty (o.p.) showed resistance to *Dysaphis plantaginea*. Other hybrids of Florina (o.p.), Liberty (o.p.) and Gloster x Prima proved to be resistant to *Aphis pomi*. Combined resistance to *Dysaphis plantaginea* and to *Aphis pomi* has been revealed only in one combination of Liberty (o.p.). It was confirmed that Florina is a donor of resistance to the aphids studied.

26. Kutinkova, H., Andreev R., Subchev M. Szöcs G., Tóth M. 2006. Seasonal flight dynamics of apple clearwing moth, *Synanthedon myopaeformis* Borkh. (Lepidoptera: Sesiidae), based on the catches in pheromone traps. Journal of Fruit and Ornamental Plant Research (Skierniewice, Poland) 14 (Supplement 3): 39-48.

Recently, the apple clearwing moth, *Synanthedon myopaeformis* Borkh. (Lepidoptera: Sesiidae), proved to be an economically important pest in Bulgaria. Possibilities for monitoring of the pest by pheromone traps were studied in the years 2003-2005. The investigations were carried out in experimental apple orchards of the Fruit Growing Institute and Agricultural University in Plovdiv. The effectiveness of Delta sticky traps and dry funnel traps were tested. Dry traps and pheromone dispensers were products of Csalomon® (Institute of Plant Protection, Hungarian Academy of Sciences, Budapest) while Delta sticky traps were home-made in Bulgaria. The pheromone traps showed a satisfactory effectiveness and selectivity. The flight of apple clearwing moth began in the middle of May and lasted from three to three and half months. Mass flight occurred between the middle of June and the end of July. Sticky and funnel traps may be successfully used for monitoring flight activity of apple clearwing moth.

27. **Arnaoudov, V., H. Kutinkova. 2006. Susceptibility of some apple cultivars to infestation by the rosy apple aphid (*Dysaphis plantaginea* Pass. (Homoptera: Aphididae). Journal of Fruit and Ornamental Plant Research (Skierniewice, Poland) 14 (Supplement 3): 139-144.**

The rosy apple aphid (*Dysaphis plantaginea* Pass.) is one of the most widely spread and harmful types of leaf aphids of apple in Bulgaria. The study was carried out in the experimental apple orchard of the Fruit Growing Institute - Plovdiv, aimed at establishing the degree of susceptibility of some apple cultivars to infestation by *D. plantaginea* in the years 2000-2005. Depending on the recorded index of infestation of leaf rosettes, different cultivars were classified into 4 groups. The cultivars 'Golden Delicious', 'Jonagold' and 'Melrose' were defined as very susceptible; 'Prima', 'Gloster', 'Granny Smith', 'Charden', 'Chadel' and 'Fuji' as moderately susceptible and 'Vista Bella', 'Mollie's Delicious' and 'Aivanija' as less susceptible to infestation by *D. plantaginea*. 'Florina' and 'Liberty' were non-infested by *D. plantaginea*, apparently showing antibiosis.

28. **Dinkova, H., T. Stoyanova, K. Dragoyski, O. Minkov, T. Bozhanska, H. Kutinkova. 2006. Possibilities of improving methods of vegetative propagation for currants. Agronomijas Vēstis / Latvian Journal of Agronomy 9: 16-19.**

The revived interest in currant (*Ribes*) species in Bulgaria has imposed the need of assortment enrichment as well as of mass production of planting material. From 2002 to 2005, through import of certified planting material from Germany, basic stoolbeds were established in the Research Institute at Troyan, located in the Central region of the Balkan Mountains, and experiments on rooting of green, semi-hardwood and hardwood cuttings were carried out. The stoolbeds used initial (VF) imported plants of the following cultivars: black currants – Ometa, Silvergieters Schwarze, Titania, Hedda, Tisel, Ben Lomond, Ben Tirran, Ben Moor, Ben Sarek; red currants – Rovada and Jonker van Tets, as well as selected, virus tested forms of 'Biryulevskaya' 'Neosipayushchiyskaya' and 'Bogatir' black currants. From rooting experiments the best results were obtained with hardwood cuttings. Rooting of green cuttings was rather long lasting and hence this method proved ineffective.

29. **Dragoyski, K., H. Dinkova, T. Stoyanova, P. Minkov, H. Kutinkova. 2006. Experience in establishing a scionwood orchard in the Central Balkan Mountains in Bulgaria. Agronomijas Vēstis / Latvian Journal of Agronomy 9: 20-23.**

Over a 15-year period the research team of RIMSA – Troyan has conducted experiments focused on possibilities of establishing and maintaining vf scionwood orchards, comprising samples of the main fruit species of our country. The first attempts were aimed at setting up plum scionwood orchards. For that purpose main parameters of technology were elaborated, related to space isolation, vector control and re-testing systems. As a result, a scionwood orchard was established and managed, providing vf scions of plum cultivars of practical value. On the grounds of these preliminary studies and in connection with the need for introducing European directives and certification schemes in production of planting material, in the year 2000 the Research Institute of Mountain Stockbreeding and Agriculture (RIMSA) launched a large scale Bulgarian-German project for establishing scionwood orchards for vf and vt scions of seven fruit tree species, regarded as promising in our country. The orchard has been utilised ever since and it has provided scions for nursery owners in Northern Bulgaria. The paper summarises the results concerning effectiveness of the implemented technologies.

30. **Kutinkova H., R. Andreev, V. Arnaudov. 2006. The leopard moth borer, *Zeuzera pyrina* L. (Lepidoptera: Cossidae) – important pest in Bulgaria. Journal of Plant Protection Research (Poznan, Poland) 46 (2): 111-115.**

The leopard moth borer, *Zeuzera pyrina* L. is a cossid moth whose larvae bore into twigs, branches and trunks of several trees and shrubs weakening and sometimes killing them. It caused serious damages to apple trees in Bulgaria in the last several years. In the Plovdiv region was observed more than 30% perished 3 years-old apple trees in the orchard without plant protection. In the nursery and commercial orchards the pest damage up to 5% of the branches. Most damages were observed in August-September. Both cossids *Z. pyrina* and *Cossus cossus* damaged 15-20% of the stems of the old commercial orchards and more than 60-70% in the orchards without regular plant protection. The flight dynamic of *Z. pyrina* was monitored by two types of pheromone traps: Pherocon (Trécé, USA) – traps with sticky changeable bottom and Mastrap (Isagro, Italy) – dry funnel traps. The second type was more effective. The terms for spraying can be signalized by them in IPM systems. The species fly from the middle of June to the beginning of September. Correlation between the catches in pheromone traps and damages of the trees is possible to be found by additional observations and the risk of injury on the wood can be foreseen.

31. **Andreev, R., D. Rasheva, H. Kutinkova. 2007. Aphids in apple orchards in Central-South Bulgaria. Journal of Plant Protection Research (Poznan, Poland) 47 (1): 109-112.**

Observations were carried out in apple orchards and nurseries of the Plovdiv region (Central-South Bulgaria), aimed at determining specific composition, population density and economic importance of particular species of aphids, in the years 2004-2006. In the course of surveys, conducted at 15-day intervals, the appearing species were identified and the degree of damage determined. Six species of aphids were found: *Aphis spiraecola* Patch., *A. pomi* Deg., *Dysaphis plantaginea* Pass., *D. devector* Wlk. *Rhopalosiphum insertum* Wlk. and *Eriosoma lanigerum* Hsm. *A. spiraecola*, a polyphagous pest, was probably brought to Bulgaria with the plant material from Greece and was identified in our country for the first time. It is similar to *A. pomi* and may be distinguished only at the microscopic investigation. In fact, *A. spiraecola* replaced almost completely *A. pomi* in the region under study; its incidence was recorded in 95% of the samples studied. Its population was particularly high in nurseries. In the bearing orchards *D. plantaginea* was the most important aphid. Some tendency to an increase of population and damage caused by *D. devector* was also noted. The other species had not any economic importance. *E. lanigerum* was present only in the orchards where no chemical control was applied.

32. **Kutinkova H., V. Dzhuvinov, P.-J. Charmillot, J. Samietz, A. Giambelli. 2007. Control of codling moth, *Cydia pomonella* L., in apple orchards of Bulgaria by use of Ecodian CP-dispensers: preliminary results. XVI Plant Protection Congress 2007 (Glasgow, Scotland, UK, 15-18 October, 2007), Proceeding, Paper P8B-7, p. 584-585.**

Sustainable production systems in agriculture require a wider use of methods for pest control, which could replace or reduce chemicals, polluting environment. Besides, many pests have developed resistance to insecticides and hence conventional control measures become ineffective. A new technology – mating disruption with Ecodian CP dispensers of the Italian Isagro company – was tested against codling moth (CM), *L. pomonella* L., in two consecutive years. In the conventionally treated orchard, nineteen treatments (31 active ingredients) were applied per season to control CM, leaf miners, leafrollers, aphids and mites. Seventeen of them (27 a.i.) were designed against CM; in spite of that, damage reached there 5.3%. CM population in the conventionally treated orchard was apparently resistant. Percentage of damage in plots treated with Ecodian was between 0.05 and 0.2%, i.e. below the economical threshold. Ecodian CP dispensers proved to be suitable means of control. Their application

may result in reducing the use of chemical insecticides and thus reducing environmental pollution, improving fruit quality and finally favouring a better human health condition. This new technology was tested for the first time in Bulgaria. The studies are being continued.

33. Charmillot P-J., D. Pasquier, Ch. Salamin, F. Briand, A. Azizian, A. Ter-Hovanesyan, H. Kutinkova, P. Peeva, N. Velcheva. 2007. **Détection de la résistance du carpocapse *Cydia pomonella*. Tests d'insecticides sur des chenilles diapausantes de Suisse, d'Arménie et de Bulgarie. Revue Suisse Vitic. Arboric. Hortic. 39 (6): 385-389.**

Resistance detection tests were carried out by the topical application of discriminating insecticide doses on diapausing larvae of the codling moth *C. pomonella* collected in Swiss, Armenian and Bulgarian orchards. The level of resistance varied according to the origin of the populations and their history of pesticide treatment. Swiss strains were, in the worst cases, highly resistant to the insect growth regulators fenoxycarb, tebufenozide, methoxyfenozide and diflubenzuron, to deltamethrin as well as to the organophosphates phosalone and azinphos-methyl. They were a little less resistant to chlorpyrifos-methyl and chlorpyrifos-ethyl. Resistance to more recent products such as indoxacarb, imidacloprid, thiacloprid and spinosad was also very pronounced. The two strains coming from Armenia and Bulgaria were highly resistant to the organophosphates and pyrethroids whereas the efficacy of insect growth regulators and of the more recent products was clearly less affected. Only Emamectin, a new insecticide still in development, showed no signs of cross-resistance. The recommended strategy for resistance management, consisting of a combination of mating disruption technique and granulosis virus, improved efficacy of the majority of the products after few years.

34. Kutinkova H., V. Dzhuvinov (Djouvinov). 2008. **Evaluation of different apple hybrids for resistance to aphids (*Dysaphis plantaginea* Pass. and *Aphis pomi* De Geer) in Bulgaria: preliminary results. Acta Hort. (ISHS) 767: 403-409.**

Infestation by green apple aphid, *Aphis pomi* De Geer (Homoptera: Aphididae) and rosy apple aphid, *Dysaphis plantaginea* Pass., has caused serious damage to apple trees in Bulgaria during the past several years. Resistance to major pests and diseases has been considered one of the most important goals for the apple breeding programme. In the years 2004 and 2005, experiments were conducted in the orchard of apple hybrids where no pesticides had been applied. Nineteen hybrid combinations were previously selected for their high resistance to scab and low susceptibility to powdery mildew in the years 1998-2003. 'Golden Delicious' was used as a susceptible reference cultivar and 'Florina' as a resistant one. Artificial infection, under field conditions, was carried out in two trials (under field conditions and on hybrids planted in the pots budded on M 26 rootstock). The results relating to the susceptibility of the hybrids to *D. plantaginea* Pass. and *A. pomi* De Geer are reported. It was established that the hybrids from 'Mollie's Delicious' x 'Florina', 'Mollie's Delicious' x 'Prima', 'Gloster' x 'Prima' and some of the seedlings of 'Florina' open pollination (o.p.) and 'Liberty' o.p. manifested resistance to *D. plantaginea* Pass. Other hybrids of 'Starkrimson' x 'Prima', 'Mollie's Delicious' x 'Florina', 'Mollie's Delicious x Prima', 'Winter Rambur' x 'Priscilla', as well as some hybrids of 'Florina' o.p. and 'Liberty' o.p. showed resistance to *A. pomi* De Geer. Combined resistance to both aphids has been registered in the hybrids 'Mollie's Delicious' x 'Florina', 'Mollie's Delicious' x 'Prima' and in two hybrids of the combination 'Liberty' o.p. It was confirmed that cultivars 'Florina' and 'Prima' are good donors for resistance to the aphids under study. The investigations are being continued.

35. **Kutinkova H., M. Subchev, M. Tóth, G. Szöcs, F. Rama. 2008. Seasonal monitoring of two xylophagous orchard pests by pheromone traps in Bulgaria. Acta Hort. (ISHS) 767: 411-415.**

Seasonal monitoring of the flight of apple clearwing moth, *Synanthedon myopaeformis* Borkh. and leopard moth borer, *Zeuzera pyrina* L., was conducted, by pheromone traps, in the experimental apple orchards of the Fruit Growing Institute, Plovdiv, in the years 2003-2005. The baits for *S. myopaeformis* were a product of Csalomon® (Institute of Plant Protection, Budapest, Hungary) and those for *Z. pyrina* of Isagro (Novara, Italy). The sticky Delta and dry funnel traps for *S. myopaeformis* and Pherocon 1C and dry funnel for *Z. pyrina* were installed in May each year. The flight of apple clearwing moth began in the middle of May and lasted from 3 to 3 1/2 months until the middle or end of August. Mass flight occurred between the middle of June and the end of July. Both, sticky and funnel traps may be used in monitoring systems of apple clearwing moth, but for detection purposes sticky traps are apparently more sensitive while the dry traps are better suited in high population situations. The pheromone bait showed a satisfactory effectiveness and selectivity. In 2002 and 2003 the earliest catches of leopard moths were recorded in the 3rd week of June, but in 2004 the first catch was registered on June 10. In 2002 the last catches were recorded on August 4, while in 2003 and 2004 at the beginning of September. The sticky and dry traps showed similar effectiveness in 2003, while in 2004 catches in dry traps were significantly higher than in sticky traps. Only single catches were recorded in 2005. The pheromone dispensers for leopard moth have shown a good selectivity, however, the catches were relatively low, in contrast to a rather high level of injuries.

36. **Kutinkova H., V. Dzhuvinov. 2008. Ecological approach for control of codling moth in the mountain region of Bulgaria. The International Workshop on Sustainable Fruit Growing and use of Urban Sludge as Fertilizer for Fruit Trees. Pitesti-Maraceni. Romania, 15-16 May, 2008, Proceedings: 97-100.**

In the experiment conducted in an apple orchard in the Central Balkan Mountains of Bulgaria, an alternative method of insect control, applied from post-bloom till harvest, was evaluated against codling moth *Cydia pomonella* L., in the years 2006 and 2007. Mating disruption using Ecodian CP (Isagro) pheromone dispensers was used to control the pest. It was effectively controlled and no important outbreak was observed. The total number of insecticides applied in the conventionally treated orchard during the season to control CM, leaf miners, leafrollers, aphids and mites were fifteen. Twelve of them were aimed at control of CM. In spite of that, the fruit damage reached 2.6%. Percentage of damage in plots treated with Ecodian was between 0.5 and 0.7%, i.e. below the economical threshold. So, the Ecodian CP dispensers proved to be effective means of control. The results obtained may open the possibilities of practical use of the method of mating disruption in Bulgaria. This method may should favour preservation of the natural environment and enable production of healthy fruits, not polluted by chemicals.

37. **Kutinkova H., J. Samietz, V. Dzhuvinov, Y. Tallot. 2008. Use of Carpovirusine for control of codling moth, *Cydia pomonella* L. (Lepidoptera: Tortricidae), in Bulgaria – Progress report. Journal of Biopesticides 1: 38-40.**

The trials were carried out in Central-South Bulgaria in 2006 and 2007. In a conventionally managed reference orchard, sixteen chemical treatments were applied during the season. Fifteen of them could act against codling moth larvae. In spite of that, fruit damage by CM reached at harvest 6.8 in 2006 and 18.7 in 2007. At the same time damage in the plot, treated twelve times with GpGV, was only 0.05% in 2006 and 0.4% in 2007. The overwintering population in the plot treated with GpGV was 0.125 larvae per tree in autumn 2006 and 0.175 larvae per tree in 2007, whereas in the reference orchard 3.32 larvae per tree in autumn 2006

and 7.97 in 2007. The high fruit damage and overwintering CM indicate the population to be resistant to the organophosphates used. Positive results obtained with Carpovirusine show that it may be effective as a means of biocontrol of CM in Bulgaria.

38. Andreev R., H. Kutinkova, K. Baltas. 2008. Non-chemical control of some important pests of sweet cherry. Journal of Plant Protection Research (Poznan, Poland) 48 (4): 503-508.

The efficacy of some non-chemical insecticides was evaluated against three important pests on sweet cherry in Bulgaria – black cherry aphid, *Myzus cerasi* (Fabr.); fall webworm, *Hyphantria cunea* (Drury) and cherry weevil, *Rhynchites auratus* (Scop.). The experiments with *H. cunea* and *R. auratus* were carried out under laboratory conditions and those with *M. cerasi* under field conditions. The efficacy was evaluated by Hendreson & Tilton formula. The botanical insecticide NeemAzal T/S (azadirachtin) in concentration 0.5% and microbial insecticide Naturalis (*Beauveria bassiana*) in concentrations 0.2% and 0.3% have shown the best results against black cherry aphid; the efficacy exceeded 95%. Good results (efficacy 80-90%) were also obtained with the botanical insecticide Pyrethrum FS (pyrethrin + sesame oil + soft potassium soap) used in concentrations 0.05% and 0.1%, with NeemAzal T/S at 0.3%, microbial insecticide Preferal WG (*Paecilomyces fumosoroseus*) at 0.2% and with Naturalis at 0.1%. Unsatisfactory effect showed Preferal WG, applied at 0.1%. Against the fourth instar larvae of fall webworm, excellent results (100% efficacy) were noted for Pyrethrum (0.05% and 0.1%) and Naturalis (0.1% and 0.2%). Very good effects (efficacy up to 96.4%) were also obtained with the microbial insecticide BMP 123WP (*Bacillus thuringiensis*) in concentration 0.1%. NeemAzal T/S – 0.5% had still good, albeit lower efficacy (82.1%). Against the cherry weevil only Pyrethrum FS was tested. This insecticide resulted in a very good efficacy (96.6%), when used at the concentration 0.1% and still good (89.3%) at 0.05%.

39. Kutinkova H., J. Samietz , V. Dzhuvinov. 2008. Combination of mating disruption and granulosis virus for control of codling moth in Bulgaria. Journal of Plant Protection Research (Poznan, Poland) 48 (4): 509-513.

Recently the ecological approach in pest control in the agricultural production has become an universal tendency. It implies a wider spread of the methods for pest control, which decrease or completely exclude chemicals that pollute the environment. The codling moth (CM), *Cydia pomonella* (L.), is the most important pest of apple worldwide. In Bulgaria CM pressure in apple orchards is usually high and its control by conventional methods is often ineffective. The application of mating disruption by use of Ecodian CP dispensers (ISAGRO, Italy) in combination with the granulosis virus product Carpovirusine 2000 (Arysta LifeScience, France) against CM was tested near Plovdiv, Central South Bulgaria. In 2007, the method was applied in an orchard where in the previous year fruit damage reached 18.7% and the CM population was high, as indicated by 3.83 diapausing larvae per tree. Carpovirusine was applied 11 times in the trial plot in combination with Ecodian CP dispensers installed twice during the season. Before harvest, fruit damage amounted there to 0.9% and the overwintering population in autumn 2007 was only 0.46 larvae per tree. At the same time in the reference orchard, where 15 insecticide treatments were applied during the season, fruit damage before harvest reached 12.3% and the hibernating population 7.97 larvae. So, it was confirmed that combination of both methods might be the most effective tool for control of codling moth in the orchards with high population density and resistance to conventional insecticides. This study is being continued.

40. **Kutinkova H., J. Samietz, V. Dzhuvinov, P.-J. Charmillot, V. Veronelli. 2009. Mating disruption of codling moth, *Cydia pomonella* L., using Isomate C plus dispensers in apple orchards of Bulgaria. IOBC/wprs Bulletin 41: 27-32.**

Codling moth, *Cydia pomonella* (L.) (Lepidoptera: Tortricidae), is an important pest of pome fruit and walnut orchards throughout the world. Codling moth resistance to many insecticides has been detected in Bulgaria in 2006 (Charmillot, 2006). A new technology – mating disruption with Isomate C plus dispensers of the Japanese company Shin-Etsu – was tested against codling moth (CM) in two consecutive years. In the conventionally treated plot, eleven treatments (17 active ingredients) were applied during the season to control CM, leafminers, leafrollers and San Jose scale. Eight of them (14 active ingredients) were timed against codling moth; in spite of that, damage reached there 3.4%. CM population in the conventionally treated orchard was apparently resistant. Isomate-C Plus dispensers inhibited completely the CM captures in the pheromone traps installed in the experimental plot. This indicated that mating disruption was very successful. Before harvest, damage stayed there at in a very low level – 0.06%. The over-wintering population in autumn 2006 reached 0.075 larvae per tree. The good results obtained with Isomate-C plus dispensers from Shin-Etsu show that the mating disruption method may work perfectly under conditions of Bulgaria. The results of this investigation, which was carried out for the first time in Bulgaria, will open the possibilities for usage of the pheromone dispensers as an alternative measure of control of codling moth in this country. This should bring the integrated control of this pest to a modern level as regards obtaining ecological production and preserving the natural environment, in accordance with the European standards for integrated fruit production. The studies are being continued.

41. **Kutinkova H., V. Dzhuvinov. 2009. Sustainable control of codling moth with a novel “Attract and kill” method in Bulgaria. Proceedings of the 8th Fruit, Nut and Vegetable Production Engineering Symposium, Concepción, Octava Región Del Bío Bío, Chile, January 5-9, 2009: 321-325.**

Frequent occurrence of resistance of pests to insecticides and increasing concern in risk of pollution of fruit products motivates to search for alternative methods of fruit protection. One of them is “attract and kill”. For control of codling moth (CM), two “attract and kill” products were offered during the last years: Appeal 04 PA and LastCall CM (Sirene CM). Recently only Last Call CM, produced by the American company APTIV (formerly IPM Technologies) has been available. The Last Call is a viscous paste containing codlemone to attract the male moths and permethrin to kill them. It is provided in applicator tubes, with a calibrated pump that deposits metered droplets of the product. The trials with Last Call CM were carried out in an isolated apple orchard in the Central Balkan Mountain region of Bulgaria in the years 2007 and 2008. The product was applied four times per season, at the dosage of 3000 droplets per ha every time. It was found that LastCall CM provided a sufficient protection from CM. The larval infestation in apples was reduced below economical threshold and hibernating larval population level was lowered. LastCall CM was active in the field for about 5 weeks. The trials demonstrated that this semiochemical based strategy may be a promising alternative for codling moth control in integrated fruit production.

42. **Kutinkova H., V. Dzhuvinov, H. Dinkova, B. Stefanova B. 2009. Ecological approach for control of codling moth by the method of mating disruption in the Central Balkan Mountain Region. Proceedings of the 8th Fruit, Nut and Vegetable Production Engineering Symposium, Concepción, Octava Región Del Bío Bío, Chile, January 5-9, 2009: 378-384.**

The most important pest of apple, codling moth (*Cydia pomonella* L.), causes severe damage to fruits in Bulgaria, resulting in serious economic losses. Numerous chemical treatments commonly applied to control codling moth are not quite effective and create a risk of environment and fruit pollution. The main objective of this study was to test possibility of

using mating disruption as an alternative, biological method for control of codling moth (CM). The experiment was carried out in an isolated apple orchard, established in spring 2001 by the Institute of Mountain Stockbreeding and Agriculture at Troyan, in the Central Balkan Mountain region of Bulgaria. In the years 2006-2007 mating disruption (MD) was tested using Ecodian CP (ISAGRO Spa) pheromone dispensers. In the reference, conventionally treated orchard, 12-15 insecticide treatments were applied; 10-12 of them were aimed for controlling CM. The fruit damage reached there from 2.3% in 2006 and 2.6% and in 2007. Percentage of damage in the plot treated with Ecodian CP was 0.8% and 0.9% respectively. So, the MD method, with use of the Ecodian CP dispensers, proved to be a perspective method for control of codling moth in isolated orchards with a relatively low population density of the pest. The results obtained may open the possibilities of practical use of the mating disruption method in Bulgaria. This ecological approach to controlling codling moth should favour preservation of the natural environment and enable production of healthy fruits, not polluted by chemicals.

43. Kutinkova H., V. Dzhuvinov, I. Platon, S. Rosu Mares. 2009. Field monitoring of codling moth, *Cydia pomonella* L. (Lepidoptera: Tortricidae), by pheromone traps in Bulgaria and Romania. Acta Hort. (ISHS) 825: 371-376.

Seasonal monitoring of flight of codling moth, *Laspeyresia pomonella* L., was conducted, by pheromone traps, in the experimental apple orchards of the Fruit Growing Institute – Plovdiv, (Central South Bulgaria) and of the Fruit Research & Development Station Bistrita (North Romania) in the years 2004-2006. One type of pheromone traps was used in Bulgaria: Pherocon (Trécé, USA) – traps with sticky changeable bottom. The dispensers were products of Trécé, USA. In Romania the Romanian pheromone traps and baits Atra – Pom, produced by the Institut of Chemistry "Raluca Ripan" in Cluj-Napoca. The traps were installed every year at the middle of April and removed at the end of October, i.e. about 3-4 weeks after the last recorded catches. Traps were checked twice a week and the caught moths were removed after counting. The pheromone baits were renewed every month. In 2004-2006 the earliest catches of codling moth in Bulgaria were recorded in the third decade of April. In Romania it usually occurred in the third decade of April in the years 2004 and 2005, but in the second decade of May in 2006. The mass flight of the pest in Bulgaria was recorded in both years 2004 and 2005 in the first decade of May and in the second decade of June, whereas in 2006 in the second decade of May and in the third decade of June. In Romania the mass flight was recorded in the second decade of May and in the second decade of June in the years 2004 and 2005; in 2006 the mass flight was noted there at the beginning of June and in the third decade of June. In both countries the codling moth develops two generations per year. The difference consists in that the first generation in Romania is more harmful than the second one, whereas in Bulgaria the second generation is more important. This difference is apparently related to the different climatic conditions. The results of this investigation may be helpful for improvement of the usage of pheromone traps for this pest for prognostic purposes.

44. Kutinkova, H., R. Andreev, M. Subchev, F. Rama. 2009. Seasonal flight of leopard moth borer *Zeuzera pyrina* (Lepidoptera: Cossidae) in Bulgaria. Acta Hort. (ISHS) 825: 377-382.

Seasonal monitoring of flight of leopard moth borer, *Zeuzera pyrina* L., was conducted, by pheromone traps, in the experimental apple orchards of the Fruit Growing Institute and of the Agricultural University in Plovdiv (Central South Bulgaria) in the years 2002-2006. Two types of pheromone traps were used: Pherocon (Trécé, USA) – traps with sticky changeable bottom and Mastrap (Isagro, Italy) – dry funnel traps. The dispensers were products of Isagro, Italy. The traps were installed every year at the end of May and removed at the end of September. As a whole the flight of the leopard moth begins in the middle of June although in some years the first catches were recorded in the first decade of June. The mass flight was

recorded mainly in July in all years of study. The last catches were recorded at the end of August - beginning of September. The pheromone dispensers for *Zeuzera pyrina* L. have shown a good selectivity. No other species were caught in the traps. However, the catches were relatively low, considering that the population level of the pest, as estimated by injuries, was found to be quite high. No significant differences between the catches in sticky and dry traps was found in the orchards of the Fruit Growing Institute for all years of investigations, but the catches on the dry traps were significantly higher than the catches on sticky traps in one of the orchards of the Agricultural University in both 2005 and 2006. The trend of seasonal flight in all orchards, estimated by the same kind of traps – sticky or dry, was very similar every year. The results of this investigation, which was carried out in Bulgaria for the first time, will be used for facilitating the usage of pheromone traps for this pest for the purposes of prognosis.

45. **Andreev R., D. Rasheva, H. Kutinkova. 2009. Development of *Aphis spiraecola* Patch (Hemiptera: Aphididae) on apple. Journal of Plant Protection Research (Poznan, Poland) 49 (4): 378-381.**

Aphis spiraecola is a recently found pest on apple in Bulgaria, where it develops in the absence of secondary hosts. The aphid has displaced the native species *Aphis pomi* DeGeer in some regions of the country. Its development, from newborn nymph to adult female takes, in laboratory conditions, 9-10 days at 22-24°C or 6-7 days at 28-30°C. The average fecundity of one female at both temperatures is 9.5-10.5 nymphs. Under field conditions, in May and July of 2007 and 2008, the full development lasted 8.1-8.6 days on average, and the average fecundity of one female was 20.7-21.2 nymphs. About 67% of them became adults, but more than 20% of the females died without having progeny. Theoretically, the species could develop twenty and more generations per the vegetation period of apple.

46. **Kutinkova H., V. Dzhuvinov, R. Kostadinov, V. Arnaudov, I. Terziev, I. Platon, S. Rosu-Mares. 2009. Control of codling moth, *Cydia pomonella* L., by “attract and kill”. Scientific Works of the Lithuanian Institute of Horticulture and Lithuanian University of Agriculture / Sodininkystė ir Daržininkystė 28 (4): 19-26.**

“Attract and kill” method, using LastCall™ CM, in form of a viscous paste containing codlemone to attract male moths and permethrin to kill them, has been recently proposed as a biological method for controlling codling moth, *Cydia pomonella* L. The trials were carried out in a 0.5 ha apple orchard in South-Central Bulgaria, in 2007–2008. LastCall™ CM was applied five times per season, at the dosage of 3000 droplets per ha each time. “Attract and kill” method retained sufficient level of activity for about 30 days. Fruit damage rate in the trial orchard amounted at harvest only 1.0 % in 2007 and 1.9 % in 2008, whereas in the reference, conventionally treated orchard it reached 18.7 % and 33.8 %, respectively. It has been confirmed that LastCall™ CM shows a high efficacy, regardless of the size of treated area. The “attract and kill” strategy may present a solution for small size orchards and orchards of irregular shape.

47. **Arnaudov V., H. Kutinkova. 2009. Controlling pear psylla with abamectin in Bulgaria. Scientific Works of the Lithuanian Institute of Horticulture and Lithuanian University of Agriculture / Sodininkystė ir Daržininkystė 28 (3): 3-9.**

Considering pear psylla (*Cacopsylla pyri* L.) resistance to insecticides routinely used in Bulgaria the study was undertaken aimed at improving the system of this pest control. The experiments were carried out in Plovdiv region, South-Central Bulgaria on ‘Buttira Precoce Morettini’ and ‘Beurre Hardy’ pear trees in 2007–2008. Efficacy of a. i. Abamectin of a pesticide supposed to be more selective, not harmful to beneficial fauna, was tested against the

background of a. i. Amitraz as commonly used insecto-acaricide. Post-bloom applications of Abamectin provide a significant control of summer populations of pear psylla. There are needed two consecutive sprays of Abamectin at the rate of 240 g a. i. per ha applied after bloom on young nymphs of the second generation. These treatments do not kill summer adult forms; however, cause a significant reduction in density of summer pear psylla eggs and nymphs. Abamectin may be recommended for the integrated pest management programmes in pear production.

48. Kutinkova H. 2010. Mating disruption for control of codling moth in apple orchards of Bulgaria. Journal of Biopesticides 3 (1 Special Issue): 382-385.

Codling moth (CM), *Cydia pomonella* L., is the key pest of pome fruits in Bulgaria. It causes severe damage on apple, pear and quince. Considerable infestation has been noted on apricot and walnut as well. Due to regulatory restrictions in use of conventional insecticides after entering of Bulgaria into the EU and to the developing resistance of CM to most commonly used organophosphates and pyrethroids suitable alternative means of control of this pest have been needed. During the three-year period (2006-2008), trials have been carried out in apple orchards in different regions of Bulgaria by means of new methodology, originally called as “disorientation of males” and recently as “mating disruption” (MD). For this purpose different kinds of dispensers were used – Isomate C plus, Ecodian CP, CheckMate® CM XL1000. The careful selection of orchards and the adoption of a pheromone-based IPM approach can minimise the risks and maximize efficacy of the CMMD (codling moth mating disruption). CMMD works best in orchards where the physical characteristics and environmental conditions ensure a uniform distribution of synthetic pheromone dispersed. The pheromone dispensers should be deployed within 1 meter of the top of the canopy prior to the expected first flights of the pest in spring. Borders of pheromone-treated orchards are susceptible to high levels of CM infestation and growers should increase the density of dispensers at these sites. Monitoring of CM adult activity in the orchards treated with CMMD is difficult. Capture of moths in pheromone traps baited with 1 mg of codlemone is an unreliable indicator of efficacy. The sensitivity of pheromone traps can be improved by using traps baited with 20 mg lures and locating them in the uppermost parts of the canopy. Positive results were obtained in all orchards, where CMMD was used. The percentage of damaged fruits in trial plots was below economical threshold. Hibernating population of CM was reduced, as indicated by counts of hibernating larvae in corrugated paper band traps. The consequent adoption of CMMD will depend on how well this method meets the growers’ expectations concerning risk, efficacy and cost.

49. Ivanova L., H. Kutinkova, V. Dzhuvinov. 2010. Flight monitoring of oriental fruit moth, *Cydia molesta* and peach twig borer, *Anarsia lineatella* Zell., by pheromone traps in apricot orchard of North-Eastern Bulgaria. Acta Hort. (ISHS) 862: 465-470.

Seasonal monitoring of flight of oriental fruit moth (OFM), *Cydia molesta* Busck. (Lepidoptera: Tortricidae), and peach twig borer *Anarsia lineatella* Zell. (Lepidoptera: Gelechiidae) was conducted, by pheromone traps, in a commercial orchard with an area 3.5 ha near Tutrakan (North-Eastern Bulgaria) during 2004-2006. One type of pheromone traps was used in this region: Pherocon (Trécé, USA) traps with sticky changeable bottoms. The pheromone is a product of Trécé, USA. The traps were installed every year at the middle of April and removed at the end of October, i.e. 2-4 weeks after the last recorded catches. Traps were checked once a week and the caught moths were removed after counting. The pheromone baits were renewed every month. In the years of study the earliest catches of the overwintering generation of OFM were recorded at the beginning of May, whereas moth of peach twig borer usually appeared in the first decade of May a few days after appearance of OFM. The mass flight of oriental fruit moth was recorded in 2004 during the third decade of

May, in 2005 at the beginning of June and in 2006 in the second decade of May. The first mass flight of peach twig borer, (*A. lineatella* Zell.), was recorded in the third decade of May in all three years of study. *A. lineatella* developed three generations per year and *C. molesta* – four generations. The results of this investigation will be used for perfecting the usage of pheromone traps for these pests for prognostic purposes in North-Eastern Bulgaria. The application of pheromone traps is a modern method with an increasing importance for monitoring of the seasonal dynamics of the flight. The optimal dates for application of hormonal insecticides can be signalled by that. Additional observations will be helpful in prediction of the risk of injury to the shoots and fruits.

50. Kutinkova H., J. Samietz, V. Dzhuvinov, V. Veronelli, A. Iodice. 2010. Control of oriental fruit moth, *Cydia molesta* Busck., by Isomate OFM rosso dispensers in peach orchards of Bulgaria – preliminary results. IOBC/wprs Bulletin 54: 331-336.

Peach is the major fruit in the southeast of Bulgaria. Its main pest is oriental fruit moth (OFM), *Cydia molesta* Busck. For a long time pest management in stone fruit production in Bulgaria relied on organophosphate and pyrethroid insecticides. Although originally quite effective, they caused environmental problems and increasing consumer concerns. Recently their effectiveness decreased, apparently due to the resistance developed in many pests. Hence, alternative means of control are urgently needed. The most frequently applied environment friendly methods are those related to sex pheromones. Until recently, their use has been limited mainly to monitoring, aimed at reduction of chemical treatments. Mating disruption (MD) presents a more perspective solution, however. From 2007 a programme to manage OFM without pesticides started. It relied on mating disruption with Isomate OFM Rosso dispensers (ShinEtsu, Japan). Trials were carried out in an isolated 10-ha peach orchard in 2007 and 2008. Pheromone trap catches were completely inhibited in the MD block, whereas they were numerous in a reference, conventionally treated orchard during both years. Isomate OFM Rosso dispensers, installed before the first flight of OFM males, efficiently reduced fruit damage – down to 0.1-0.2% at harvest. In the reference orchard, with 5-6 treatments against OFM, damage reached 5-6% before harvest. The results indicate that mating disruption for control of oriental fruit moth may be effective in Bulgaria. Its use will be helpful in meeting the requirements of EU for residues free fruit production.

51. Kutinkova H., J. Samietz, V. Dzhuvinov, V. Veronelli, A. Iodice. 2010. Isomate C plus dispensers as an alternative means for control of codling moth, *Cydia pomonella* L., in apple orchards of Bulgaria. IOBC/wprs Bulletin 54: 657-662.

In the years 2006-2008 trials on control of codling moth (CM), *Cydia pomonella* (L.) (Lepidoptera: Tortricidae), by mating disruption (MD), using Isomate-C plus dispensers (ShinEtsu, Japan), were carried out in an isolated 1-ha apple orchard in southeast Bulgaria and compared to a reference orchard with conventional treatments. Dispensers were hung in the upper third of tree canopies, at the density of 1000 pieces per ha, before CM flights started. Dynamics of CM flights was monitored by pheromone traps installed in the reference orchard and watching for trap shut down inside the trial plot. Fruit infestation was periodically assessed till the harvest time. Hibernating population was estimated in autumn, by counting diapausing CM larvae in corrugated cardboard bands. Every year, Isomate-C plus dispensers completely inhibited CM captures in pheromone traps inside the trial plot. Fruit damage remained at a low level until late July and only increased slightly in August. At harvest the percentage of damaged fruits was below 1%. The hibernating population stayed at a low level. In the reference orchard the final fruit damage was, in spite of numerous conventional treatments, high (5-15%), apparently due to resistance of CM to insecticides. Therefore, mating disruption may serve as an alternative means for control of codling moth in Bulgarian

apple orchards. Contrary to reports from other countries, this study has shown that good results from MD can be obtained even on a small-size plot, when isolated from external sources of infestation and initial CM population is low.

52. **Kutinkova H., J. Samietz, V. Dzhuvinov. 2010. Control of codling moth in Bulgaria with a combination of Isomate C plus dispensers and the baculovirus product Madex[®]. Journal of Plant Protection Research (Poznan, Poland) 50 (4): 479-482.**

In the years 2007-2009, trials on control of codling moth (CM), *Cydia pomonella* (L.), were carried out in apple orchards of South-East Bulgaria, where the pressure of the pest was very high. Mating disruption with Isomate C plus dispensers was applied in combination with sprays of the virus product Madex[®]. With a single installation of Isomate C plus dispensers per season + 4 treatments of Madex[®] at 100 ml per ha against the first and 6 treatments against the second generation, fruit damage at harvest and population density of codling moth were kept at a low level. At the same time fruit damage and population density of the pest, as estimated by the hibernating CM larvae population, was very high in the conventionally treated orchard serving as a reference. Using Isomate C plus dispensers and the baculovirus product Madex[®] may be a promising alternative to traditional programmes trying to control high initial infestation of codling moth. For Bulgaria, the combined tested strategies of mating disruption and virus control are suggested for control of codling moth in the orchards with CM population density of more than 3 larvae per tree or more than 5% fruit damage in the previous year.

53. **Andreev R., H. Kutinkova. 2010. Possibility of reducing chemical treatments aimed at control of plum insect pests. Acta Horticulturae (ISHS) 874: 215-220.**

During the last two years the main insect pests on plum trees in the region of Plovdiv (Central-South Bulgaria) were black and yellow plum sawflies (*Hoplocampa minuta* and *H. flava*) that destroyed 68-84% of fruitlets after bloom. Red plum maggot (*Grapholitha funebrana*) damaged more than 24-32% of fruits. Other important pests were two aphids (*Hyalopterus pruni* and *Brachycaudus helichrysi*), infesting 86-95,3% of shoots and brown scale (*Parthenolecanium corni*). Leaf sawfly (*Neurotoma nemoralis*), fall webworm (*Hyphantria cunea*), and plum ermine moth (*Yponomeuta padellus*) caused significant damage on leaves too. Some secondary pests, such as weevils, *Rhynchites sp.* and *Phyllobius sp.* as well as pear lace-bug (*Stephanitis pyri*) and others, damaged buds, fruits and leaves. Plant protection systems recommended for control of plum pests commonly include 10-12 chemical treatments. The experiments carried out in the orchards of the Agricultural University – Plovdiv have shown that the number of treatments may be significantly reduced without any negative effect on the trees or on the crop quantity and quality. This can be done by optimisation of the date of treatments, selection of proper insecticides and use of pheromones for mating disruption.

54. **Vitanova I., S. Dimkova, N. Marinova, D. Ivanova, H. Kutinkova. 2010. Pomological and chemical characteristics of some Bulgarian plum cultivars. Acta Horticulturae (ISHS) 874: 317-320.**

The Bulgarian plum cultivars ‘Goulyaeva’, ‘Balvanska slava’, ‘Gabrovska’, ‘Strinava’ and ‘Nevena’ have been bred in the Plum experimental station in the town of Dryanovo. These cultivars were studied in the period 2002-2006. It was established the yield, mechanical composition of the fruits, the content of dry matter, glucose, fructose, saccharose, organic acids, nitrogen, phosphorus, potassium, calcium and magnesium. The plum cultivars ‘Goulyaeva’, ‘Balvanska slava’, ‘Gabrovska’ and ‘Strinava’ were highly productive. Their

yield surpassed 20 t/ha. The fruits of the studied cultivars were large and very tasty. The dry matter ranged from 19.17 to 23.10%. The fruits of 'Strinava' and 'Goulyaeva' had the highest sugar content. The content of nitrogen in the fruits varied from 0.62 to 0.83%, of the phosphorus from 0.11 to 0.15%, of potassium from 0.76 to 0.98%. The Bulgarian plum cultivars 'Goulyaeva', 'Balvanska slava', 'Gabrovska', 'Strinava' and 'Nevena' are productive, with large and tasty fruits and tolerant to some economic important diseases, they are very suitable for propagation in plum growing regions in Bulgaria.

55. Vitanova I., N. Marinova, D. Ivanova, S. Dimkova, H. Kutinkova. 2010. Plum production in Bulgaria. Acta Horticulturae (ISHS) 874: 373-376.

Plum is a fruit species traditionally grown in Bulgaria. Plum orchards in Bulgaria have been situated in four basic industrial and commercial regions. The main plum production region is the Central Balkan, which have favorable nature and economic conditions. The plum orchard area in Bulgaria reached its maximum in 1965 – 53 300 ha and since then has begun to decrease and in 2004 took 10 967 ha. Two cultivars 'Kyustendilska sinia sliva' and 'Stanley' have been included in the plum orchards and during the last 15-20 years cv. 'Stanley' has predominated. The technology for biological plum production includes pruning, fertilizing, plant protection. The applying of green manure is recommended as one of the modes for maintaining of the soil surface in plum orchards. Suitable cultures crops are rye, repko, winter forage peas, or peas-rye mixture. It recommends new and different plum cultivars, highly productive and tolerant to Plum Pox Virus: 'Ruth Gersteter', 'Opal', 'Chachanska lepotitsa', 'Tuleu timpureu', 'Althan's gage', 'Green gage', 'California blue', 'Gabrovska', 'Strinava', 'Hramova renkloda', 'Stanley', 'Mirabelle de Nancy', 'Valevka', 'Bluefree', 'Nevena', 'Anna Schpett' and some local plum cultivars, which are tolerant to diseases as 'Biala Razgradska', 'Klestachka', 'Medenka', 'Tarkulka', 'Zimna karadjeika', 'Pushevka', 'Drebna biala rakyinitza' and 'Sinia rakyinitza'.

56. Шевчук И., Х. Кутинкова. 2011. Сезонная динамика лета сливовой плодовой моли *Grapholita funebrana* Tr. (Lepidoptera: Tortricidae) на феромонные ловушки в садовых агроценозах [Seasonal flight dynamics of plum fruit moth *Grapholita funebrana* Tr. in plum agrocenoses]. Вестник защиты растений [Plant Protection News (Institute of Plant Protection, Sankt-Petersburg-Pushkin) (1): 51-55.

Flight dynamics of plum fruit moth (*Grapholita funebrana* Tr.) was studied in different geographic regions in 2008-2009 by use of pheromone traps. Overwintered generation and one summer generation developed when the degree-days sum reached 1231-1353^o under conditions of the northern Forest-Steppe of Ukraine, and overwintered and two summer generations developed when the degree-days sum reached 1812-1858^o under conditions of the central-southern Bulgaria. Terms of the main stages of population development depend on the rate of accumulation of effective temperatures and on their sum. The main forecasting criteria for date of insecticide application are seasonal flight dynamics and magnitude and date of flight peaks.

57. Kutinkova H. V. Dzhuvinov, J. Samietz, V. Veronelli, A. Iodice, C. Bassanetti. 2011. Control of plum fruit moth, *Grapholita funebrana*, by Isomate OFM rosso dispensers, in plum orchards of Bulgaria. IOBC/wprs Bulletin 72: 53-57.

The plum fruit moth, *Grapholita* (*syn. Cydia*) *funebrana* (Tr.) is an important and the most difficult pest to control in traditional plum production of Bulgaria. Economic trends in world fruit production, as well as high ecological flexibility and tolerance to some diseases and pests make plum one of the most suitable fruit crop for ecologically sound agriculture like

integrated or organic production. However, till the present time, pest management in stone fruit growing in Bulgaria has been relied mainly on organophosphate and pyrethroid insecticides. Considering requirements of the EU and the need for environmentally friendly fruit production, alternative means of control of the plum fruit moth are urgently needed. Trials on mating disruption (MD) with Isomate OFM rosso dispensers (Shin-Etsu, Japan) were carried out in an isolated 50-ha plum orchard in two consecutive years. Catches of male moths in pheromone traps were completely inhibited in the MD block, whereas they were numerous in the reference, conventionally treated orchard during both years of study. Isomate OFM rosso dispensers, installed before the first flight of *Grapholita funebrana* males, reduced fruit damage significantly. The percentage of fruits containing plum fruit moth larvae was below the Economic Injury Level (EIL). The positive results obtained in this study indicate that mating disruption for control of plum fruit moth may be an effective alternative to conventional (pesticide) treatments. The studies are being continued.

- 58. Kutinkova H., Samietz J., Dzhuvinov V., Zingg D., Kessler P. 2012. Successful application of the baculovirus product Madex[®] for control of *Cydia pomonella* (L.) in Bulgaria. Journal of Plant Protection Research (Poznan, Poland) 52 (2): 205-213.**

The codling moth (CM), *Cydia pomonella* (L.), causes heavy damage in Bulgarian apple orchards. Conventionally treated orchards, were monitored in this study. In spite of numerous chemical treatments, these orchards showed increasing flight densities of CM moths, growing populations of hibernating larvae and rising fruit damage rates. Thus, the control of CM by conventional spraying programmes became ineffective, apparently due to the development of resistance to insecticides. Products based on the *Cydia pomonella* granulosis virus (CpGV), such as Madex[®], may provide alternative control tools that can be applied with other approaches, for a sustainable control strategy. The trials were carried out in Central-South and South-East Bulgaria, in 2006–2010. Four treatments of Madex[®] against the first generation, and six treatments against the second generation kept the fruit damage and population density of CM at a low level. Based on the obtained results, different control strategies have been suggested, depending on the initial CM pressure in a particular orchard. Madex[®] may be a promising alternative to traditional programmes of CM control. Its dose, however, should be adjusted to the initial CM population density. Also, at a high or moderate CM population density Madex[®] applications should be combined with MD to avoid resistance of CM to granulovirus. At the peak of CM hatching, additional chemical treatments may be sometimes necessary. Such treatments include using insecticides which are still effective against CM.

- 59. Andreev R., H. Kutinkova, D. Rasheva. 2012. Non-chemical control of *Aphis spiraecola* Patch. and *Dysaphis plantaginea* Pass. on apple. Journal of Biopesticides 5 (supplementary): 239-242.**

Non-chemical methods for control of the most important aphids on apple in Bulgaria, rosy apple aphid (*Dysaphis plantaginea* Pass.) and spiraea aphid (*Aphis spiraecola* Patch.), were evaluated under field conditions in the region of Plovdiv (Central-South Bulgaria). Two treatments with the kaolin containing product, Surround[®]WP, applied in October, significantly reduced the number of winter eggs of *D. plantaginea*. Its effectiveness was comparable to that of the defoliation of apple trees. The botanical insecticides Neem Azal T/S (azadirachtin) and Pyretrum FS EC (pyrethrum) showed an excellent effectiveness against rosy apple aphid but were ineffective against spiraea aphid. The microbial insecticides Naturalis[®] (*Beauveria bassiana*) and Preferal WG (*Paecilomyces fumosoroseus*) had a delayed initial effect. However, on five to seven days after treatment, these pesticides showed a very good effectiveness against *A. spiraecola* and excellent effectiveness against *D. plantaginea*.

60. **Kutinkova H., V. Dzuvinov, I. Casagrande, J. Samietz. 2012. Mating disruption of codling moth, *Cydia pomonella* L., by applications of the microencapsulated formulation CheckMate[®] CM-F in Bulgaria. Acta Horticulturae (ISHS) 933: 485-490.**

The codling moth (CM) *Cydia pomonella* (L.), is the main pest of pome fruits worldwide, including Bulgaria. Its larvae cause severe damage to apples, pears, quinces and walnuts. Resistance of CM to commonly used conventional insecticides (organophosphates and pyrethroids), which has already been noted in Bulgaria, as well as restrictions on insecticide use imposed by EU regulations, have encouraged a new approach to the control of this pest. Alternative methods have been extensively tested during the last few years. Mating disruption appears as a very promising solution. CheckMate[®] CM-F is a sprayable microencapsulated sex pheromone formulation, containing the active ingredient (E,E)-8,10-dodecadien-1-ol (14.3%), has recently been introduced into many countries for the mating disruption of codling moth. Trials comparing this encapsulated sprayable pheromone against conventional CM control practices were carried out during two consecutive years (2007-2008), in Central North Bulgaria. The microencapsulated pheromone (183 ml of CheckMate[®] CM-F per ha) was applied 6 times per season at 22-25 day intervals. In both years, it totally suppressed captures of male moths in codlemone baited traps in the trial plot. The fruit damage in the pheromone-treated plot stayed at a very low level, amounting at harvest 0.13% in 2007 and 0.3% in 2008 and the overwintering CM population in autumn was 0.55 and 0.65 larvae per tree in 2007 and 2008, respectively. In contrast, in the reference orchard, treated 9-11 times per season with conventional insecticides, fruit damage reached 2.3% in 2007 and 2.7% in 2008 and the hibernating CM population was 1.05 in 2007 and 1.85 larvae per tree in 2008. In conclusion, it was evident that applications of Check Mate[®] CM-F can provide an effective control of codling moth, with better results than the conventional protection program in Bulgaria and should be implemented in commercial apple production.

61. **Kutinkova H. 2012. Use of mating disruption method for control of *Cydia pomonella* (L.) in apple orchards of Bulgaria. : Материалы XV международны конференции” Аграрная наука- сельскохозяйственному производству Сибири, Монголии, Казахстана и Болгарии, т. 2: 18-20.**

The key pest of apple trees in Bulgaria is the codling moth (acronym CM), *Cydia pomonella* L. /Lepidoptera: Tortricidae/. In Bulgaria, for many years it was managed with a broad spectrum of insecticides, such as organophosphates and some pyrethroids. The results obtained by the author in commercial apple orchards indicated that conventional protection programmes became ineffective, apparently due to development and steady increase of resistance of CM in to commonly applied pesticides. During the six-year period (2006-2011) trials have been carried out in different regions of Bulgaria using the technique, originally called as “disorientation of males” and recently as “mating disruption” (MD) as alternative means for controlling codling moth. For this purpose different kinds of dispensers were used – Isomate[®] C plus, Ecodian[®] CP, CheckMate[®] CM XL1000 and Cidetrak[®] CM DA. Use of mating disruption results in reducing chemical treatments in the orchards with a high or moderate population density of CM, whereas at a low density of the pest may present an alternative means for its complete control.

62. **Kutinkova H. 2012. Biological control of some important stone fruit pests in Bulgaria. 2nd International Symposium of Bio-Pesticides and Ecotoxicological Network (2nd IS-BioPEN, Bangkok, Thailand, September 24-25, 2012). Full Paper Proceedings Book: 253-260.**

Organic farming is a new, but already wide-spread farming system in the world. It forms a limited niche in Bulgarian agriculture, but there is an increasing interest towards it. The organic fruit production is one of the most attractive directions for Bulgarian farmers.

However, it meets serious difficulties – due to a long list of pests occurring in the orchards as well as to the short list of plant protection products permitted for use in this system. After entering into the EU, many conventional pesticides have been completely prohibited. Stone fruits are the most popular fruit crops in Bulgaria. However, they are infested by many pests as fruit moths, aphids, scale insects, mites and others. The topic of this contribution will be the use of mating disruption (MD) against important pests of stone fruits in Bulgaria, especially against fruit moths, as alternative means for their control. The trials were carried out during five years, 2006-2010. Different kind of dispensers of specific sex pheromones were tested for mating disruption of plum fruit moth (*Grapholitha funebrana*), oriental fruit moth (*Cydia molesta*) and peach twig borer (*Anarsia lineatella*) in plum, peach and apricot orchards. Positive results were obtained in all orchards where MD was employed. The percentage of damaged fruits in all orchards was below the economical threshold. The validation of the novel MD technology for control of main fruit pests on stone fruits and finally their implementation into the farming systems in Bulgaria should favour an improvement of environmental and human health condition.

63. Kutinkova H., V. Dzhuvinov. 2012. Biological control of oriental fruit moth on peach in Bulgaria. Acta Horticulturae (ISHS) 962: 449-453.

Peach is one of the major fruit species in Bulgaria. Oriental fruit moth (OFM), *Cydia molesta* Busck is one of the most important pests of this crop. Its control in commercial orchards has been carried out mainly by conventional methods, using chemical insecticides. Considering human health condition and preservation of natural environment, the use of chemicals in fruit growing must be limited – by more precise timing and thus reducing number of treatments and/or by introducing new, biological methods of pest management. The environment friendly methods related to sex pheromones are the most promising. At first, synthetic pheromones were used for monitoring of flights of the pests. Recently, mating disruption (MD) appeared as a more effective solution, eliminating completely chemical pesticides. In the years 2007-2008 a programme aimed at management of OFM without pesticides was carried out. It relied on mating disruption with Ecodian CM (Isargo Spa, Italy) dispensers. The trials was carried out in an isolated 1.5-ha peach orchard. Catches of moths in pheromone traps were completely inhibited in the MD block, whereas they were numerous in the reference, conventionally treated orchard, in both years of study. Ecodian CM dispensers, installed before the first flight of OFM males, efficiently reduced fruit damage – down to 0.2-0.3% at harvest. In the reference orchard, with 4-5 insecticide treatments against OFM, damage reached 4.7-6% before harvest. The results indicate that mating disruption for control of oriental fruit moth may be effective in Bulgaria. Its use will be helpful in meeting the requirements of EU for residue free fruit production.

64. Kutinkova H., V. Dzhuvinov, J. Samietz. 2012. Control of peach twig borer and oriental fruit moth by mating disruption in an apricot orchard. Acta Horticulturae (ISHS) 966:169-174.

The peach twig borer (PTB), *Anarsia lineatella* Zell., and the oriental fruit moth *Cydia molesta* (OFM) Busck are the main pests of apricot in Bulgaria. The main objective of this study was to test the possibility of using mating disruption (MD) as an alternative method to control both pests. The experiment was carried out in an isolated apricot orchard, established in spring 2003 in North-East Bulgaria. In the years 2008-2009 mating disruption (MD) was tested using Ecodian Combi CM+AL pheromone dispensers (ISAGRO SpA, Italy). Dispensers were installed twice per season at 60-day intervals. In both years, MD totally suppressed captures of male moths in orfamone and anemone baited traps in the trial plot. Fruit damage in the MD-treated plot was low, from 0 to 0.1-0.2% at harvest. The results have

confirmed that applications of Ecodian Combi CM+AL dispensers can provide more effective control of peach twig borer and oriental fruit moth than the conventional protection programme commonly applied in Bulgaria and should be implemented in commercial apricot production. This approach to controlling peach twig borer and oriental fruit moth is in line with the recent EU recommendations that take care of preservation of the natural environment and of production of healthy fruits, with no pesticide residues.

65. Kutinkova H., Dzhuvinov V., Ivanova L. 2012. Mating disruption for control of oriental fruit moth by microencapsulated pheromone, Checkmate® OFM-F, in Bulgaria. Proceedings of the 2nd International Workshop of the Environment & Agriculture in Arid and Semiarid regions, Constanta, September 6-7 , 247-250

The oriental moth (OFM), *Cydia molesta* (Busck), is the main pest of some stone and pome fruits in Bulgaria. Its larvae cause severe damage to peaches, apricots, pears, quinces and sometimes to plums. The plant protection against this pest relies mainly on conventional insecticides, organophosphates and pyrethroids. After entering of Bulgaria in EU and the restrictions of many pesticides alternative methods have been extensively tested during the last few years. Mating disruption appears as a very promising solution. The trials were carried out in the years 2009-2010 in the Sliven district, south-eastern Bulgaria – the main peach region of the country. The microencapsulated formulation from SUTERRA (Oregon, USA) – CheckMate® OFM-F, containing 231 g of orfamone per litre, was used for mating disruption. Microcapsules were applied with a conventional sprayer, in 4-5 treatments – at 23.1 g a.i. per ha, at 30-32-day intervals. The total amount of pheromones applied per ha was about 100 ml per ha. In both years, it totally suppressed captures of male moths in orfamone baited traps in the trial plot. The fruit damage in the pheromone-treated plot stayed at a very low level, amounting at harvest 0.1% in 2009 and 0.3% in 2010. In contrast, in the reference orchard, treated 9 times per season with conventional insecticides, fruit damage reached 4.7% in 2009 and 5.4% in 2010. Applications of Check Mate® OFM- F can provide an effective control of oriental fruit moth, with better results than the conventional protection programmes employed in Bulgaria. So, it should be implemented in peach production on commercial scale.

66. Ivanova, L., Maneva, S., Kutinkova, H. 2012. Comparison of Integrated and Conventional plant protection of apricot orchards. Proceedings of the 2nd International Workshop of the Environment & Agriculture in Arid and Semiarid regions, Constanta, September 6-7 , 291-296

The investigations were carried out in two fruit-bearing apricot orchards (4 ha) of the Experimental Station of Apricot and Agriculture in Silistra during the period 2009 -2011. Two plant protection technologies (conventional and integrated protection) were applied for control of key diseases and pests: Peach twig borer (*Anarsia lineatella*), Oriental fruit moth (*Cydia molesta*), leafrollers (*Tortricidae*), weevils (*Curculionidae*) and diseases: Brown rot (*Monilinia laxa*), Shot-hole (*Stigmia carpophilla*), Apricot leaf scorch (*Gnomonia erythrostoma*), Bcterial leaf and fruit spots (*Xanthomonas pruni*, *Bacillus pumillus*), Bacterial canker (*Pseudomonas syringae*). Conventional technology - with protective applications during the autumn-winter, early spring and in the summer season for controlling of pests and diseases by treatments independently of its density. An Integrated Pest Management strategy including: a system of monitoring the phenological development of the apricot culture, biological development of diseases and population density of pests; sanitary pruning after infection with brown rot; protective and post infection (curative) treatments, using permitted fungicides and insecticides for integrated fruit production; application of economic

thresholds; pheromone traps for monitoring and dispensers for control were applied against the apricot key-pests. The integrated approach to apricot pest and diseases resulted in elimination of the broad spectrum insecticides use; decrease in total pesticide treatments.

67. **Kutinkova H., Dzhuvinov V., Lingren B. 2013. Control of oriental fruit moth, *Cydia molesta*, in the peach orchards of South-East Bulgaria, using CIDETRAK[®] OFM-L dispensers. 8th International Conference on Integrated Fruit Production (Kushadasi, Turkey, October 7-12, 2012) IOBC/wprs Bulletin 91: 209-2013.**

Oriental fruit moth (OFM), *Cydia molesta* (Busck) (Lepidoptera: Tortricidae), is an economically important pest of peach, nectarine and apricot in Bulgaria. Its larvae cause damage, infesting shoots and fruits. The aim of this study was to test the effectiveness of mating disruption (MD) in control of OFM in peach orchards, using CIDETRAK[®] OFM-L dispensers of Trécé Inc., USA. The trials were carried out in South-East Bulgaria in 2009–2011. The trial (MD) plots were located in three different 2-ha orchard blocks in the Sliven district. The damage of shoots was evaluated during the first generation of OFM on 20 trees, randomly selected within the central area of each block. The fruit damage was recorded accordingly, on 100 fruits per each selected tree; so, 2,000 fruits were inspected for damage in each block. The rate of damage in the trial plots was compared with that in the reference orchard, located in the vicinity, treated with conventional pesticides. CIDETRAK[®] OFM-L dispensers completely inhibited OFM captures in the pheromone traps, installed in the trial plots, indicating a high level of disruption. The percentage of shoots infested by OFM larvae was nil in the MD plots. The three-year data of fruit damage rate were subjected to the analysis of variance, considering successive years of study as replications. The rate of damage in the MD plots was low, below 1%. The difference in the percentage of damaged fruits between the reference orchard and the trial plots was highly significant for all cultivars under study; it was, however, greater in late than in early or mid-season cultivars. The considerable fruit damage noted in the reference orchard, in spite of many chemical treatments applied, indicates that commonly used organophosphates and pyrethroids have become ineffective against OFM. Probably OFM developed resistance to the insecticides used. On the other hand, the present results do confirm that mating disruption, using CIDETRAK[®] OFM-L dispensers, can provide a more effective control of oriental fruit moth. Implementation of this method in the commercial peach production in Bulgaria would be helpful in preservation of sound environment and in avoiding any risk of pollution of fruit products with pesticides.

68. **Andreev R., D. Rasheva, H. Kutinkova. 2013. Occurrence and population density of aphids in apple orchards of South Bulgaria. [the article submitted for publication in Journal of Plant Protection Research (Poznan, Poland) in print.**

In a study conducted in 2006-2008 seven aphid species (Hemiptera: Aphididae) were detected on apple trees in South Bulgaria: *Rhopalosiphum insertum* Walk. (apple-grass aphid), *Dysaphis plantaginea* Pass (rosy apple aphid), *Dysaphis devectora* Walker (rosy leaf-curling aphid), *Macrosiphum euphorbiae* Thomas (potato aphid), *Aphis pomi* De Geer (green apple aphid), *Aphis spiraeicola* Patch. (spiraea aphid / green citrus aphid) and *Eriosoma lanigerum* Nausm. (wooly apple aphid). The dominant species were *D. plantaginea*, found in 97.8% of the surveyed orchards and two green aphids from the genus *Aphis*, found together in 96.4% of the orchards. The rosy apple aphid was more important as pests of bearing orchards, where infestation in spring always exceeded the economic injury level (15% of injured shoots). The green aphids were more important in young orchards and nurseries, where they developed during the entire vegetation period and infestation sometimes exceeded 50-80% of shoots. *A. pomi* was still more widely spread; however, *A. spiraeicola* was already found over all South

Bulgaria. The other species were less common, causing lower infestations and had minor economic importance as pests of apple.

69. Koutinkova, H., R. Andreev. 2001. Entomophages of the apple leaf miner, *Leucoptera (Cemiostoma) scitella* Zeller (Lepidoptera: Lyonetiidae). *Journal of Mountain Agriculture on the Balkans* 4 (1): 85-93.

In the period of 1997 - 1999, it was conducted a study to establish the entomophagous complex, regulating the population density of the leafminer moth *Leucoptera (Cemiostoma) scitella* Zeller. in the regions of Plovdiv and Assenovgrad. On the larvae and pupae of *Leucoptera scitella* Zel., there were found 28 parasite insects and 5 species of hyperparasites of order Hymenoptera, referring to 2 families, 4 subfamilies and 9 genera. Of them, the most important for regulation of *L. scitella* population density are: *Chrisocharis penteus* Walk., *Pediobius pyrgo* Walk. and *Achrisocharella formosa* Westw. From the predator insects - polyphagous - 25 species were found, belonging to 3 orders and 7 families. The predator lady bugs of the family *Coccinellidae* are with the highest density.

70. Andreev, R., H. Koutinkova. 2001. Часова динамика на летежа на миниращите молци *Leucoptera scitella* Zell., *Lithocolletis blancardella* F. и *Lithocolletis corylifoliella* Hb. Time flight dynamics of the leafminers: *Leucoptera scitella* Zell., *Lithocolletis blancardella* F. and *Lithocolletis corylifoliella* Hb. *Journal of Mountain Agriculture on the Balkans* 4 (2-3): 209-219.

През периода 1998 - 2000 г. в района на Учебно-опитното поле на Висшия Селскостопански Институт, Пловдив беше проведено проучване с цел да се установи часовата динамика на летежа на трите най-разпространени в България миниращи молци - *Leucoptera scitella* Zell./Lyonetiidae/, *Lithocolletis blancardella* F. и *Lithocolletis corylifoliella* Hw. /Lithocolletidae/, посредством синтетични феромонови уловки. беше установено, че мъжките пеперуди на *L. scitella* са активни и се привличат от половия феромон за вида през светлата част на денонощието между 9 и 17h, а пеперудите на *L. blancardella* летят само във вечерните часове на денонощието между 18 и 24h. Пеперудите от презимувалото поколение на *L. corylifoliella* са активни в светлата част на денонощието от 6 до 15h, а пеперудите от първо и второ летни поколения имат два периода на активност – сутрешен, между 4 и 8h и вечерен между 19 и 23h.

71. Andreev, R., H. Koutinkova 2001. Prognosis of damages caused by *Leucoptera scitella* Zell. /Lepidoptera: Lyonetiidae/, depending on the flight of the moths, determined by pheromone traps. *Acta Entomologica Bulgarica*. 7 (3-4), 57-62.

През периода 1996-1999 година, в района на Пловдив (Централна Южна България), бяха проведени наблюдения върху летежа на кръгломиниращия молец *Leucoptera scitella* Zell., установен с феромонови уловки и нивото на повредите от гъсениците по листата на ябълката. беше установено, че първите мини по листата се появяват по време на първия летежен максимум на пеперудите от презимувалото поколение. През останалата част от вегетацията има тенденция динамиката на повредите да следва динамиката на летежа на предходното поколение, но със забавяне от една две седмици. Установени са математическите параметри на тези зависимости чрез извеждането на пет регресионни уравнения, които може да се използват като прогнозен модел за прогнозиране рискът от нападения по листата, само чрез отчитане на летежа във феромоновите уловки.

72. **Dzhuvinov, V., H. Kutinkova, I. Slavov. 2001. Integrated fruit production of stone fruits. Higher School of Agriculture – Plovdiv, Scientific Works 46 (5): 243-250.**

This paper sets out principles and guidelines for Integrated production of stone fruits in Europe starting from 1996. These principles and guidelines are very important for future development of Bulgarian fruit industry.

73. **Кутинкова Х., Р. Андреев 2003. Използване на комбинирани уловки за мониторинг на черешовата муха (*Rhagoletis cerasi* L.) (Diptera; Tryptetidae) Растениевъдни науки 40 (5): 473-477.**

Черешовата муха *Rhagoletis cerasi* L. (Diptera: Tryptetidae) е икономически най-опасният неприятел по черешата в България. През периода 2001-2002 г., в черешови градини, в района на Института по Овощарство и в Учебно-опитното поле на Аграрния Университет, гр. Пловдив, беше проучена ефективността на жълти уловки, комбинирани с хранителен атрактант, производство на унгарската фирма “Csalomon”, които до сега не са изпитвани в България. Установено бе, че изпитваните уловки, са високо ефективни и не отстъпват на германските уловки “Celaflor”, като далеч превъзхождат жълтите уловки без атрактант. Уловките, поставени на по-голяма височина, привличат по-голям брой мухи. Броят на привлечените мухи в уловки поставени от южната страна на короната е по-голям, в сравнение с привлечените от северо-източната страна.

74. **Kutinkova, H., I. Slavov. 2003. Integrated plant protection of peach. Journal of Mountain Agriculture on the Balkans 6 (3): 309-321.**

Опитите са проведени през 2000- 2003 година в прасковено насаждение от 3.5 ха в района на Институт по овощарство, Пловдив. В настоящата статия предлагаме схема за интегрирана растителна защита при прасковата. Интегрираната растителна защита при прасковата се базира на: използване на слабо токсични пестициди, но с по-дълго последствие в първите месеци на вегетационния период от „зеления” и „жълтия” списък – с оглед опазване на полезната фауна; пръскане само при необходимост т.е при превишаване на икономическия праг на вредност за отделните вредители; използване на феромонов уловки за мониторинг на по-важните вредители- източен плодов червей и прасковен клонков молец. Прилагането на интегрирана растителна защита ще допринесе за получаването на екологично чиста продукция, опазване на околната среда от замърсяване и на здравето на хората.

75. **Kutinkova, H., V. Dzhuvinov. 2004. Ecological approach to apple pest control. Journal of Mountain Agriculture on the Balkans 7 (6): 738-751.**

Опитите са проведени през 2000- 2002 г., в период на пълно плододаване на интензивно ябълково насаждение състоящо се от два съседни, граничещи един с друг парцела в Институт по овощарство, Пловдив. В настоящата статия предлагаме екологосъобразна схема за борба с неприятелите по ябълката. За целта е необходимо да се спазват следните изисквания: 1. растително защитните препарати за борба с вредителите да се използват само при надвишаване на икономическия праг на вредност за отделните неприятелите- за да не се провеждат необосновани третираня. 2. Да се отглеждат сортове устойчиви на основните болести и някои неприятелите. 3. Използваните

пестициди да са одобрени за интегрираното плодово производство, щадящи полезната ентомофауна и околната среда от замърсяване.

76. **Kutinkova H., M. Subchev, D. Light, B.Lingren. 2006. Activity of ethyl (2E,4Z)-2,4-decadienoate alone and as a codling moth sex pheromone adjuvant admixture – further apple orchard investigations in Bulgaria. Растениевъдни науки, София [Plant Science, Sofia], 43 (6): 566-568.**

Ethyl (2E,4Z)-2,4-decadienoate was tested alone and as an admixture to the synthetic sex pheromone of codling moth, *Laspeyresia pomonella* (L.), as a possible attractant or co-attractant for this pest in Bulgaria. The field investigations with six different baits were carried out in apple orchards of the Institute of Fruit Growing - Plovdiv in 2005, in five replications. Neither males nor females of the pest were caught in the traps baited with (2E,4Z)-2,4-decadienoate alone. The catches in traps baited with combined lure, ethyl (2E,4Z)-2,4-decadienoate and synthetic codling moth sex pheromone, were not significantly higher than the catches in the traps baited with the sex pheromone alone. Thus we failed to confirm the synergistic effect of this compound to the sex pheromone of the codling moth found earlier by us. Rather, some decreasing of the males caught was found in the traps baited with the two compounds in a ratio of 3:10 and this suggests some inhibitory effect of (2E,4Z)-2,4-decadienoate to the synthetic pheromone when the amount of the former compound is higher than that of the pheromone.

77. **Кутинкова Х., В. Джувинов 2012. Биологична борба с плодовите червеи по овощните култури и лозата, Ново знание, год. I, бр.1, 107-112.**

Световна тенденция е въвеждането на екологичния подход в борбата с неприятелите по овощните култури. Това включва използването на по-широк спектър от методи за борба с неприятелите, които намаляват или напълно изключват химическите средства, замърсяващи околната среда и застрашаващи човешкото здраве с остатъчни количества от пестициди по плодовата продукция.

78. **Кутинкова Х., В. Арnaudов, З. Ранкова, В. Джувинов 2013. Проблеми и тенденции в растителната защита . Растениевъдни науки. (под печат)**

В този обзор е проследено историческото развитие на борбата с болестите, неприятелите и плевелите в овощните насаждения на България от 70-те години на 20 век до първото десетилетие на 21 век. В това отношение са разгледани етапите на тази система като конвенционална, интегрирана и първите стъпки за преминаване към биологичен контрол на тетраниховите акари и плодовите червеи при основните овощни култури в нашата страна. Отбелязани са изследванията на Института по овощарство в Пловдив при изучаване биологията, екологията и средствата за защита при икономически важни вредители по овощните култури, както и възможностите за контролиране на техните популации чрез агротехнически, химически, биологични и други методи. Разгледани са и проблемите след връщането на земята на бившите им собственици, както и появата на устойчивост при ябълковия плод червей към някои инсектициди. Проучени са ефективността и селективността на редица почвени и листни хербициди в млади и плододаващи овощни насаждения, в овощни разсадници, възможностите за внасяне на хербициди със системите за микронапояване /хербигация/, направени са изследвания върху косвената вреда от заплевеляването.

79. Джувинов В., Р. Пенев, И. Славов, Х. Кутинкова, П. Герчева, Л. Начева. 2013. Основни резултати от изучаване на генетичните ресурси и селекцията при ябълката. Растениевъдни науки. (под печат)

В обзора е проследено развитието на генетичните ресурси в род *Malus* в България от началото на 20 век, когато от 40 сорта генофондът при този овощен вид нараства на повече от 860 сортообразци. Установено е, че за района на Пловдив вегетацията започва към 10 март и завършва около 25 ноември. В резултат от проучването на ресурсите са отбрани сортове за размножаване в производството, както и за родителски форми в новата селекционна програма при ябълката за устойчивост към болести и неприятели. За първи път в България е въведено изкуственото заразяване на хибридният материал с *V.inaequali*, *E.amylovora*, *D. plantaginea* и *A.pomi*, а чрез соматично клониране на ин витро регенеранти се получиха три клона на сорта Чадел, устойчиви на струпяване и брашнеста мана, които ще бъдат изпитани в полски условия, заедно с оригиналният сорт.

80. Кутинкова Х., И. Шевчук, П. Минков, Б. Стефанова, В. Джувинов. 2013. Биологична борба със сливовия плодов червей *Grapholitha funebrana* Tr. в района на Централна Стара планина посредством метода полова дезориентация. Biological control of plum fruit moth, *Grapholitha funebrana* Tr., in the Central Balkan mountain region, through the method of mating disruption. Journal of Mountain Agriculture on the Balkans. 16:1 , 194-204

Опитите са проведени през 2009 и 2010 г. в Института по планинско животновъдство и земеделие – гр. Троян. Проучена е ефикасността на метода полова дезориентация чрез използването на диспенсерите Ecodian® CF – на фирмата Isagro Spa- Италия. Установено е, че методът полова дезориентация на мъжките пеперуди може да се използва като алтернативно средство за борба със сливовия плодов червей в района на централна Стара планина. Процентът на червивост в експерименталните площи варира от 0.6% до 0.9% и е под икономическия праг на вредност за този вредител. Процентът на червивост в конвенционално третирана градина е 15.7% - 21.4%. Въвеждането на метода полова дезориентация, като алтернативно средство за борба със сливовия плодов червей ще доведе до редуциране на използването на инсектицидите, а оттам и до намаляване замърсяването на околната среда, подобряване качеството на плодовете и опазване здравето на хората.

Брошури

81. Джувинов В., К. Куманов, Х. Кутинкова, З. Ранкова 2008. Екологично производство на ябълкови плодове. Белгийският опит приложен в България. 20 стр.

Брошурата е предназначена за запознаване на българските фермери – овощари с основните принципи и правила при производството на екологично чиста ябълкова продукция след приложение на белгийския опит у нас, т.е. с използване на по-малко агрохимикали при отглеждането на ябълката, която е основен овощен вид, както в световен мащаб така и в Европейския съюз, където от 1 януари 2007 г. нашата страна е равноправен член.

82. Кутинкова Х., Андреев А., Джувинов В. 2012. Биологична борба с плодовите червеи по овощните култури. 32 стр.

В тази брошура авторите си поставят за цел да запознаят производителите на овощни плодове с възможностите за биологична борба с най-опасната група неприятели в овощните градини – плодовите червеи, като избягнат недостатъците на химичните методи и средства.

Монографии

83 .Джувинов В., Хр. Динкова, В. Божкова, Ив. Минев, К. Драгойски, Х. Кутинкова, П. Герчева, Л. Начева, Б. Стефанова. 2012, Слива, 264 стр.

Монографията съдържа всички основни направления за сливовото производство по света и у нас. Описани са ботаническата характеристика, произхода на вида, генетичните ресурси, селекцията и генетиката на сливата, както и съвременните биотехнологични подходи при размножаването и. Отделено е внимание на биологичните особености и изисквания към екологичните условия на този овощен вид. Описани са съвременните сливови сортове и подложки, както и изискванията за създаване и отглеждане на съвременни сливови насаждения. За опазване на реколтата от болести и неприятели за първи път са описани освен конвенционалните методи, също така и биологична методи и средства за борба с тях.

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