Доклади на Българската академия на науките
Comptes rendus de l'Académie bulgare des Sciences
Tome 79, No 5, 2026

AGRICULTURAL SCIENCES
Pest control

POSSIBILITY OF *MYZUS PERSICAE* SULZER CONTROL IN TOBACCO PLANTATIONS

Zheko Radev[✉], **Hristo Bozukov**

Received on February 24, 2026
Presented by H. Najdenski, Member of BAS, on April 28, 2026

Abstract

The peach aphid *Myzus persicae* Sulzer is one of the most dangerous, widespread and economically important pests in tobacco, as well as a vector of various viruses. The species has the ability to develop resistance to various groups of insecticides, high reproductive potential and spread, which makes the control against it difficult. In a two-year period under field conditions with a natural infected background, experimental work was carried out to evaluate the efficacy of AFITEK$_{EC}$, used to control *M. persicae* in tobacco. The data showed that the product demonstrated a strong initial efficacy against the aphid individuals, which allows effective control at high pest densities. The disadvantage is that after drying, the product does not work due to its specific characteristic, which would require subsequent treatment to regulate the density of *M. persicae*. AFITEK$_{EC}$ can be considered a reliable product for control, reducing the risk of mass multiplication and the emergence of resistance of *M. persicae*. The product does not demonstrate phytotoxicity on tobacco plants.

Key words: *M. persicae*, entomology, control, pests, tobacco

Introduction. Aphids of species *Myzus persicae* Sulzer are a serious threat to a large number of crops [1, 2], including tobacco. This threat is due to the fact that aphids cause serious indirect, in addition to direct damage. Indirect damage is expressed in the transmission of viral diseases [3, 4], such as potato virus Y (PVY), and cucumber mosaic virus (CMV) during the feeding. The control is extremely difficult and is expressed mainly through the use of chemicals.

https://doi.org/10.7546/CRABS.2026.05.17

The specific biological characteristics of the pest, such as development of a large number of generations during the year, the development of resistance to chemicals, etc., make chemical control difficult. Considering these facts and the increasing requirements in recent years for cleaner production, it is necessary to develop and search for new active substances for pest control. One of the most widespread alternative means used to control pests are products of botanical origin, such as *Citrus aurantium* L., *Allium cepa* L., *Allium sativum* L., etc., since plant biopesticides are easily degradable [5].

Another option is to use the substance Azadirachtin from the tree *Azadirachta indica* A. Juss, which is characterized by insecticidal activity [6] and has the widest application [7]. Bozukov et al. [8] used tobacco extract to control *M. persicae*, while Radev et al. [9] used essential oil from *Origanum vulgare* subsp. hirtum (Link). Radev [10,11] used essential oils from *Thymus pulegioides* L. and *Satureja kitaibelii* Wierzb. ex Heuff. The search and development of alternative means to control pests in agriculture is a challenge for scientists [12].

$\text{AFITEK}_{\text{EC}}$ is a product for blocking and mechanical removal of a wide range of insects, based on innovative *3D-IPNS*$^{\text{TM}}$ technology guaranteeing high efficiency, manufactured by ICB PHARMA. It has a purely physical action, expressed in the creation of a thin sticky film on the insects' bodies, immobilizing and removing them quickly from plants, and does not contain conventional chemical pesticides.

The aim of the study is to evaluate the efficacy of $\text{AFITEK}_{\text{EC}}$ at the manufacturer's recommended dose used to control *Myzus persicae* Sulzer for the purpose of implementing alternative control of aphids in tobacco agrocenoses.

Materials and methods. For the control of *Myzus persicae* Sulzer in tobacco, the biological efficacy of the product $\text{AFITEK}_{\text{EC}}$ was tested at the manufacturer's recommended dose of 0.1%. The study was conducted in the experimental field in the territory of the Institute of Tobacco and Tobacco Products - Markovo over a two-year period. The experimental plot had size 20 m^2. The treatment of the test area was carried out using knapsack sprayer, and 2 L of solution were used. The study was carried out in three replicates, with three plants in each replicate. The control was in one replicate with three plants treated by spraying with water.

Before and after treatment, aphids were counted. Infested plants with a significant number of aphids were marked. After treatment, the number of living individuals was counted according to the product characteristics, after 15 min, 30 min, and 60 min to establish its efficacy. The population dynamics of aphids on plants continued to be recorded on the 1st, 3rd and 7th day after treatment. The efficacy (%) of the tested product was calculated using the method of Henderson et al. [13]:

$$\text{Corrected } \% \ = \left(1 - \frac{n \text{ in } Co \text{ before treatment} * n \text{ in } T \text{ after treatment}}{n \text{ in } Co \text{ after treatment} * n \text{ in } T \text{ before treatment}}\right) * 100,$$

where n is the insect population, T are the treated, Co is the control. Aphids which did not respond when touched were counted as dead.

The data was statistically processed by using one-way ANOVA at $P \leq 0.05$.

Results and discussion. The results of the study regarding the insecticidal efficacy of the product AFITEK$_{EC}$ against the peach aphid *M. persicae* in tobacco are presented in Table 1 and Table 2.

T a b l e 1

Aphids after treatment by AFITEK$_{EC}$, I year

Repeats	Number of aphids before treatment	15 min		30 min		60 min	
		Number of live aphids	Efficacy %	Number of live aphids	Efficacy %	Number of live aphids	Efficacy %
A 0.1%-1	315	75.7	76.3	48	85.1	46.3	85.4
A 0.1%-2	355.7	69	80.8	45.3	87.6	41	88.6
A 0.1%-3	293.3	46	84.5	40.7	86.5	42.7	85.6
means±std			80.5±4.1		86.4±1.3		86.5±1.8
Control	234.3	237		240.3		236	

T a b l e 2

Aphids after treatment by AFITEK$_{EC}$, II year

Repeats	Number of aphids before treatment	15 min		30 min		60 min	
		Number of live aphids	Efficacy %	Number of live aphids	Efficacy %	Number of live aphids	Efficacy %
A 0.1%-1	180.7	33.7	81.3	27	85.4	27.3	85.4
A 0.1%-2	201	22.7	88.7	15	92.7	17.7	94.4
A 0.1%-3	193.3	23	88.1	16.3	91.7	15	92.5
means±std			86±4.1		89.9±3.9		90.8±4.7
Control	198	197.3		202		204.7	

The results showed a strong initial effect of the product against the individuals of peach aphid. The rapid initial effect is due to the creation of a specific structure of the product after spraying, according to the manufacturer's information. High biological activity against *M. persicae* in tobacco was reported 15 min after treatment – efficacy up to 88.7% (means±std 80.5±4.1 and 86±4.1). An efficacy increase was found 30 min after treatment to 92.7% (means±std 86.4±1.3 and 89.9±3.9), but no difference was found 60 min after treatment to 94.4%

(means±std 86.5±1.8 and 90.8±4.7) compared to the previous report (Tables 1 and 2).

According to its characteristics, the product does not work after drying, but does not create conditions for resistance even with repeated application, because it does not contain conventional chemical products, which contain substances toxic to human health according to a number of authors [14, 15]. The reported data on the population dynamics of aphids on the first, third and seventh day after the last report of the efficacy of the product showed a progressive increase in the density of *M. persicae*. One day after treatment, an increase from 1.7% to 42% was found (means±std 7.8±1.8 and 19.1±20.7); three days after treatment showed an increase from 11.3% to 73.3% (means±std 27.8±14.1 and 35.5±33.2), and the seventh day after treatment showed an increase from 25.9% to 102% (means±std 43.5±17.9 and 53.6±42.1) (Tables 3 and 4). No phytotoxicity of the product in tobacco plants was detected. In the control groups, an increase of *M. persicae* was reported compared to the treated ones.

Table 3

Dynamics of the number of aphids after treatment, I year

Repeats	Number of aphids after 60 min	1st day		3rd day		7th day	
		Number of live aphids	Dynamics of aphids %	Number of live aphids	Dynamics of aphids %	Number of live aphids	Dynamics of aphids %
A 0.1%-1	46.3	49.3	6.5	56.3	21.6	61.7	33.7
A 0.1%-2	41	45	9.8	59	43.9	67.3	64.1
A 0.1%-3	42.7	45.7	7	50.3	17.8	56.7	32.6
means±std			7.8±1.8		27.8±14.1		43.5±17.9
Control	236	255.3		270.7		302	

Depending on the characteristics of the product and the results obtained, a follow-up treatment may be necessary in order to regulate the aphid population density. It is recommended that the next treatment be adjusted after carrying out phytosanitary monitoring regarding the density of the pest. In the analysis after the monitoring, it is recommended to take into account the meteorological conditions of the area, which is able to influence the population dynamics of aphids.

As regards the climatic characteristics during the study period, the average values of atmospheric humidity, temperatures, and the amount of precipitation were similar for both years.

Taking into account this information and the fact that the development of the pest is influenced by climatic factors, the data showed a lower density of *M.*

Table 4

Dynamics of the number of aphids after treatment, II year

Repeats	Number of aphids after 60 min	1st day		3rd day		7th day	
		Number of live aphids	Dynamics of aphids %	Number of live aphids	Dynamics of aphids %	Number of live aphids	Dynamics of aphids %
A 0.1%-1	27.3	31	13.6	33.3	21.9	39	42.9
A 0.1%-2	17.7	18	1.7	19.7	11.3	22.3	25.9
A 0.1%-3	15	21.3	42	26	73.3	30.3	102
means±std			19.1±20.7		35.5±33.2		53.6±42.1
Control	204.7	215.7		238		264	

persicae in the second year of reporting. The standard deviations have the lowest variability in the first year from 1.3% to 4.1% in terms of product efficacy and from 1.8% to 17.9% in terms of aphid development dynamics after treatment (Tables 1–4).

The use of alternatives to conventional chemical plant protection products is increasingly being applied in agriculture. The use of products that are gentle on soil fertility and effective in controlling pests is recommended [16]. Studies have established the toxicity of many types of pesticides to honey bees [17–19], and a large number of pesticides have harmful effects on non-target species [20].

Conclusions. AFITEK$_{EC}$ demonstrated excellent efficacy for control against the peach aphid *M. persicae* in tobacco. In all replicates, the product showed a strong initial effect on aphid populations. The strong initial effect allows it to effectively control the pest, but for a short period of time, due to its specific characteristics, which is its disadvantage. The product can be considered an alternative for controlling *M. persicae* in tobacco cenoses, to reduce the risk of mass multiplication and resistance. It should be used according to the manufacturer's instructions.

REFERENCES

[1] Grigorov S. (1980) Leaf aphids and their control, Zemizdat, Sofia, Bulgaria, 287 pp, (in Bulgarian).

[2] Blackman R. L., V. F. Eastop (2000) Aphids on the World's Crops. An Identification and Information Guide, 2nd ed., John Wiley & Sons, Chichester, 414 pp.

[3] Kennedy J. S., M. F. Day, V. F. Eastop (1962) A Conspectus of Aphids as Vectors of Plant Viruses, Commonwealth Institute of Entomology, London, 114 pp.

[4] Capote N., M. Cambra, G. Llácer et al. (2006) A review of *Plum pox virus*, Bulletin OEPP/EPPO Bull., **36**(2), 201–349.

[5] Abdallah M. S., I. Muhammad, F. A. Warodi (2017) Review on some plants as bio-pesticides, J. Contemporary Res. Rev., **8**(7), 20186–20191.
[6] Mordue A. J., A. J. Nisbet (2000) Azadirachtin from the neem tree *Azadirachta indica*: its action against insects, An. Soc. Entomol. Brasil, **29**(4), 615–632.
[7] Jagannathan R., R. V. Ramesh, V. A. Kalyanakumar (2015) A review on neem derivatives and their agricultural applications, Int. J. Pharm. Technol., **6**(3), 3010–3016.
[8] Bozukov H., S. Kirkova, T. Vaneva-Gancheva (2013) Exploring opportunities for development of bioinsecticide to combat harmful organisms on the tobacco, Bulg. J. Crop Sci., **50**(2), 78–80, (in Bulgarian).
[9] Radev Z., A. Dzhurmanski, S. Stanev (2023) Bioinsecticidal effect of *Origanum vulgare* subsp. *hirtum* (Link) essential oil vapours on *Myzus persicae* Sulzer in tobacco and *Apis mellifera* L., C. R. Acad. Bulg. Sci., **76**(7), 1137–1142.
[10] Radev Z. (2022) Influence of essential oil of *Thymus pulegioides* L. harvested in forest area on *Myzus persicae* S. in tobacco and *Apis mellifera* L., Forestry Ideas, **28**(2), 298–300.
[11] Radev Z. (2022) Impact of essential oil from *Satureja kitaibelii* Wierzb. ex Heuff. harvested from mountain area on *Myzus persicae* Sulzer in tobacco and *Apis mellifera* L., Forestry Ideas, **28**(2), 301–303.
[12] Joseph B., M. Sowmya, S. Sujatha (2012) Insight of botanical based biopesticides against economically important pest, Int. J. Pharm. Life Sci., **3**(11), 2138–2148.
[13] Henderson C. F., E. W. Tilton (1955) Tests with Acaricides against the brown wheat mite, J. Econ. Entomol., **48**(2), 157–161.
[14] Yu H., F. Li, W. Yu et al. (2013) Assessment of organochlorine pesticide contamination in relation to soil properties in the Pearl River Delta, China, Sci. Total Environ., **447**(C), 160–168.
[15] Meena R. S., R. Lal, G. S. Yadav (2020) Long-term impacts of topsoil depth and amendments on soil physical and hydrological properties of an Alfisol in Central Ohio, USA, Geoderma, **363**, 114164.
[16] Aktar W., D. Sengupta, A. Chowdhury (2009) Impact of pesticides use in agriculture: their benefits and hazards, J. Interdiscip. Toxicol., **2**(1), 1–12.
[17] Mullin C., M. Frazier, J. Frazier et al. (2010) High levels of miticides and agrochemicals in North American Apiaries: implications for honey bee health, PLoS ONE, **5**(3), e9754.
[18] Blacquière T., G. Smagghe, C. A. M. van Gestel, V. Mommaerts (2012) Neonicotinoids in bees: a review on concentrations, side-effects and risk assessment, Ecotoxicol., **21**(4), 973–992.
[19] Whitehorn P. R., S. O'Connor, F. L. Wackers, D. Goulson (2012) Neonicotinoid pesticide reduces bumble bee colony growth and queen production, Science, **336**(6079), 351–352.
[20] Sánchez-Bayo F. (2011) Impacts of agricultural pesticides on terrestrial ecosystems. In: Ecological Impacts of Toxic Chemicals, Sydney, Australia, 63–87.

Tobacco and Tobacco Products Institute, 4108 Markovo, Agricultural Academy, Sofia, Bulgaria
e-mails: zhekoradev@abv.bg, h_bozukov@abv.bg