UDC 632.7/93

FIELD CONTROL EFFECT OF 10 INSECTICIDES ON *BEMISIA TABACI* IN GREENHOUSE TOMATOES IN CHINA

Liu Shunxiao
PhD student
Sumy National Agrarian University, Sumy, Ukraine,
Henan Institute of Science and Technology, Xinxiang, China
ORCID: 0000-0002-3304-1795
Lshx_07@163.com

Vlasenko Volodymyr
Doctor (Agricultural Sciences), Professor
Sumy National Agronomy University, Sumy, Ukraine
ORCID: 0000-0002-5535-6747
vlasenkova@ukr.net

Bemisia tabaci (tobacco whitefly) is one of the most harmful invasive species in the world. It causes devastating damage to many crops during the invasion process and is an important pest worldwide. B. tabaci harms crops mainly by directly feeding on plant juice, affecting plant nutrient metabolism, causing plant leaves to appear yellow spots, yellowing and falling off in severe cases, and abnormal or irregular fruit structure. Adults and nymphs of B. tabaci can also secrete honeydew to contaminate plant organs and induce coal pollution. When the density is high, the leaves can turn black, which seriously affects the photosynthesis of plants and reduces the quality of crops. Another important way of B. tabaci is to spread plant viruses. Generally, after an outbreak of B. tabaci, the virus transmitted by it will occur. These viruses can cause plant leaf curling, plant dwarfing and fruit abortion, causing serious losses. A single foliar spray of 10 pesticides was used in order to screen out high-efficiency pesticides for controlling B. tabaci on tomato. Control experiments to carry out at the initial stage of the occurrence of B. tabaci, and a survey of the control effect was carried out 1, 3 and 7 days after the treatment. The results showed that the best effect on B. tabaci had on F (5% Diprofen) variant 1 day after treatment. It was 41%, which was significantly higher than other test reagents. None of the reagents showed good fast-acting effects. Option C (22,4% Spirotetramat) had the best control effect on B. tabaci three days after spraying – 72%. The worst effect (62%) was when treated with pesticides in experimental variants I (50% Flonicamid) and G (10% Cyantraniliprole). Spraying the plants gives the best effect of neutralizing the pest and is 86% on option J (20% Mevirpirazone) after 7 days, which is much higher than other test reagents. Phytotoxicity for tomatoes was not detected in three field studies conducted from 13 to 20 October 2020. We can choose in the field control process of pest B. tabaci 20% Mevirpirazone suspension concentrate, which can be used in combination with 22,4% Spirotetramat suspension concentrate and 5% Diprofen dispersible concentrate to achieve better control effect. This method of pesticides selection will provide effective protection of greenhouse vegetables from the damage impact of pest B. tabaci.

Key words: *damage, tomato, screening, treatment, prevention and disinfection of vegetables from pests.*

DOI https://doi.org/10.32845/agrobio.2021.4.12

Introduction

China is a big agricultural country. As one of the important agricultural products, vegetables are very rich in types and variety resources (Fang Wei, 2011), China is the world's largest vegetable consumer country, with the rapid development of the times and the continuous improvement of the people's living standards. In order to meet people's demand for fresh vegetables in different seasons, more and more facility vegetables such as solar greenhouses and plastic greenhouses are being planted (Wu, 2017). The development of the facility vegetable industry has played a key role in the year-round supply of vegetables in the long-existing seasons of lack of vegetables in winter and summer in China. It is of great significance to vegetable production in high latitude areas with short frost-free periods and insufficient light and heat sources (Fang, 2011). The proportion of facility vegetable production in the vegetable planting industry has gradually increased. The large-scale development of facility vegetable plots has become the main force in vegetable production (Hou, 2011).

B. tabaci belongs to the whitefly genus Hemiptera (Palumbo et al., 2001; Liu et al., 2012; De Barronet et al., 2011; Chu et al., 2005; Zhang et al., 2019). It is an omnivorous insect and mainly damages Solanaceae, Cucurbitaceae, Cruciferae, leguminous vegetables and some flower crops. It has a wide host range, with more than 600 species of host plants, which can transmit more than 15 kinds of viruses and cause more than 40 kinds of plant diseases (Xu et al., 2011; Wang et al., 2016; Pan et al., 2015; Li et al., 2015). The adults, nymphs, and eggs of *B. tabaci* in facility vegetables basically feed on the back of the leaf. The sprayed chemicals are basically covered on the front of the leaf, which is less harmful to pests (Peng et al., 2016). Frequent increase in the frequency of application of pesticides did not significantly reduce the number of pests. This phenomenon is caused by unreasonable chemical control in production that makes pests resistant to commonly used pesticides (Tang et al., 2016; Wang et al., 2010; Luo et al., 2010; Roditakis et al., 2010). In the process of using pesticides, only 1 % of them are effective, and the remaining 99% are scattered in the soil, air and water bodies, greatly causing agricultural environmental pollution and ecological damage (Erdogan et al., 2008; Kang et al., 2006; Qin et al., 2011).

At present, there are three main types of conventional chemical insecticides used to control *B. tabaci*: nicotinic insecticides (imidacloprid), synthetic insecticides (pyrethroids) and insect growth regulators (floxacin). Due to the long-term use of these agents to control the *B. tabaci* has developed a certain resistance to these types of drugs, making it difficult to prevent and control pest. We often use the method of rotating chemical agents to slow down the resistance of whitefly. Chemical agents such as 10% imidacloprid, abamectin, 25% Actai (WG) are commonly used to prevent and control the whitefly in the early stage of the occurrence of whitefly. In order to avoid the pests from developing resistance, a variety of agents can be used in rotation (Wang, 2012; Castle, 2005; Watanabe et al., 2018; Turson et al., 2011). The purpose of this experiment is to understand the resistance level and development status of *B. tabaci*, and to provide a basis for the rational use of pesticides and delay the development of *B. tabaci* resistance.

Materials and methods

Test agent

25% Thiamethoxam water dispersible granules (Zhejiang Qianjiang biochemistry Co., Ltd.), 9% Mineral oil emulsifiable concentrate (Shandong Keda Venture Biology Co., Ltd.), 22,4% Spirotetramat suspension concentrate (Bayer Crop Science), 17% Flurpyrone soluble concentrate (Bayer Crop Science), 70% Acetamiprid water dispersible granules (Shaanxi Thompson Biotechnology Co., Ltd.), 5% Diprofen dispersible concentrate (BASF (China) Co., Ltd.), 10% Cyantraniliprole suspension concentrate (FMC (China) Investment Co., Ltd.), 1,8% Abamectin emulsifiable concentrate (Zhejiang Zhongshan Chemical Group Co., Ltd.), 50% Flonicamid water dispersible granule (Shandong Huimin Zhonglian Biotechnology Co., Ltd.), 20% Mevirpirazone suspension concentrate (Shanghai Shengnong Biochemical Products Co., Ltd.).

Test materials

The experimental crop was tomato (Zaofen 2) in greenhouse.

Test method

The test plot is located in the solar greenhouse on the east campus of Henan University of Science and Technology. Tomatoes were planted on August 19, 2020, with 667 m^2 planting 2000 plants. The cultivation conditions (cultivation, fertilization, plant and row spacing, etc.) of the test plots are consistent and conform to local cultivation habits. A total of 10 chemical treatment groups and a clear water control were set up in the experiment: treatment A – 25% Thiamethoxam water dispersible granules (20 g for 667 m^2); treatment B – 9% Mineral oil emulsifiable concentrate (500 g for 667 m^2); treatment C – 22,4% Spirotetramat suspension concentrate (30 mL for 667 m^2); treatment D – 17% Flurpyrone soluble concentrate (40 mL for 667 m^2); treatment E – 70% Acetamiprid water dispersible granules (3 g for 667 m^2); treatment F – 5% Diprofen dispersible concentrate (40 mL for 667 m^2); treatment G – 10% Cyantraniliprole suspension concentrate (40 mL for 667 m^2); treatment H – 1,8% Abamectin emulsifiable concentrate (40 mL for 667 m^2); treatment I – 50% Flonicamid water dispersible granule (10 g for 667 m^2); treatment J – 20% Mevirpirazone suspension concentrate (40 mL for 667 m^2). Each treatment was repeated 3 times, a total of 33 test plots, each plot area is about 18 m^2, arranged in random blocks. The dosage of each test agent is the maximum recommended dosage. The medicament is sprayed with Zhejiang Taizhou Minghui 3WBD-16 electric sprayer, and the water consumption is 30 L per 667 m^2. The first application will be carried out on October 13, 2020.

Investigation methods

Investigate the number of insect populations before spraying, and at 1, 3, 7 days (October 14, 16 and 20) after spraying, the number of insect populations was determined at designated locations. Each plot adopts a 5-point sampling method, and each spot is marked with 2 tomato plants. Investigate the number of adults in the whole plant when the adults are not active in the morning.

Formula for calculating efficacy: Decline rate of insect population = (number of insects before spraying – number of insects after spraying) / number of insects before spraying times 100%.

Corrected control effect = 1 – the number of prednisolone in blank control area times the number of insects after chemical treatment / the number of insects after chemical treatment in blank control area times the number of insects before pesticide treatment times 100%.

Statistical Analysis

DPS software was used to perform statistical analysis on the test data, and Duncan's new multiple range method was used to analyze the variance of different agents against *B. tabaci*.

Results

Control effect of treatment agent on B. tabaci

The effect of different treatments on the control of *B. tabaci* was different 1 day after the medicine. The corrected control effect of treatment F on *B. tabaci* is the best 41%, which is equivalent to the effects of treatments H, A, B and J, which is significantly higher than other test reagents. Treatment C has the worst control effect on *B. tabaci* on tomato by 28%. None of the treatment reagents showed good quick-acting properties. 3 days after the treatment, although there are differences in the control effects of different treatments on *B. tabaci*, the overall difference is small. Treatment C has the best control effect on *B. tabaci* at 72%, and treatments I and G have the worst effect at 62%. 7 days after treatment the best control effect of treatment J was 86%, which was equivalent to treatment G and D, and treatment B had the worst effect of 52%, which was significantly higher than other test reagents (Table 1, Figure 1).

Drug safety

In the three field surveys conducted on October 13–20, 2020, the tomato plants were growing well, and there were no symptoms of wilting, yellowing and other phytotoxicity, indicating that each chemical treatment group controlled smoke powder according to the dosage and concentration of the field trial. Lice are safe for tomato crops.

Discussion

The test results showed that: one day after treatment, treatment F had the best effect on *B. tabaci* by 41 %, which was significantly higher than other test reagents. Treatment C had the worst effect on *B. tabaci* control by 28 %, none of the treatment reagents shows good quick-acting. Three days after treatment C had the best control effect on *B. tabaci* at 72 %, and treatments I and G had the worst effect at 62 %. Seven days after the treatment the best control effect of treatment J was 86 %, and the worst effect of treatment B was 52 %, which was significantly higher than other test reagents. In the three field surveys conducted on October 13–20, 2020, the tomato plants were growing well, and there were no symptoms of wilting, yellowing and other phytotoxicity, which indicated that the control of *B. tabaci* in accordance with the dosage concentration of this field experiment was safe for tomato crops. In the field control process, you can choose 20 % mefenproper suspending agent, which is used together with 22,4 % spirotetramat suspending agent and 5 % diprofenac dispersible liquid agent.

In order to control *B. tabaci* effectively, comprehensive control measures should be taken in addition to the above chemicals. The first is agricultural control. The field should be cleaned up in time. In the field with serious *B. tabaci* infestation, weeds and leaves should be treated as soon as possible, and the leaves with insect eggs should be removed. Reasonable arrangement of crop rotation, scientific layout, greenhouse cucumber, eggplant and other non-mixed cultivation, can be interplanted with celery, garlic and other crops with strong insect resistance. In winter, timely opening the shed for ventilation can effectively control the overwintering population of *B. tabaci* and reduce the population base of *B. tabaci* (Peng Li et al., 2016; Zheng Huixin et al., 2017).

Table 1

Control effect of tested insecticides on *B. tabaci*

Treatment	Pre-medicine treatment insect population base / head	1 day after medicine			3 days after medicine			7 days after medicine		
		Insect population base / head	Decline rate of population (%)	Control effect (%)	Insect population base / / head	Decline rate of population (%)	Control effect (%)	Insect population base / head	Decline rate of population (%)	Control effect (%)
A	139,3	98,3	0,29	0,39	54,2	0,61	0,72	86	0,38	0,58
B	102,1	75,1	0,26	0,37	43,0	0,58	0,70	72,6	0,29	0,52
C	137,4	115,2	0,16	0,28	53,7	0,61	0,72	92,2	0,33	0,55
D	95,0	76,0	0,20	0,31	49,5	0,48	0,63	23,5	0,75	0,83
E	234,7	195,0	0,17	0,29	105	0,55	0,68	128,1	0,45	0,63
F	187,0	128,5	0,31	0,41	94,2	0,50	0,64	62,0	0,67	0,78
G	155,3	117,2	0,25	0,35	82,1	0,47	0,62	34,2	0,78	0,85
H	124,5	86,2	0,31	0,40	57,2	0,54	0,67	82,3	0,34	0,55
I	144,0	112,0	0,22	0,33	75,3	0,48	0,62	62,3	0,57	0,71
J	172,6	123,5	0,28	0,38	78,0	0,55	0,67	34,6	0,80	0,86
CK	113,5	132,0			157,8			168,5		

Note: The control effect is the average value of each repeat.

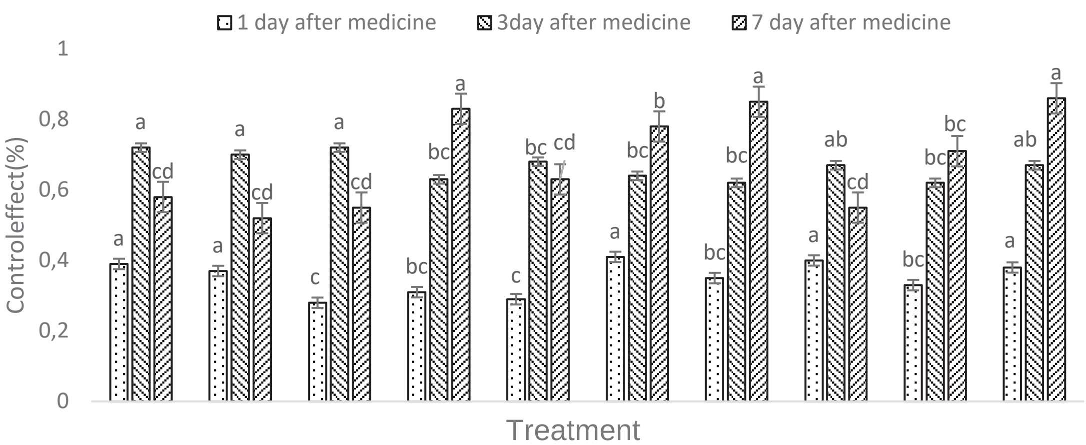

Fig. 1. 10 kinds of pesticides to control B. tabaci in different days

Note: The lowercase letters in the table indicate the significance of the difference at the 0.05 level

The second is physical control. The adults of *B. tabaci* have strong yellow tendency and can be trapped by yellow plate. The yellow board is usually suspended 20 cm above the crop, and the height of the yellow board is adjusted with the growth of the crop.

The third is biological control. Studies have shown that the feeding of *B. tabaci* can increase the content of resistant substances in some peppers, which is conducive to the enhancement of insect resistance (Li Chuanming et al., 2017). The experimental results of using different pesticides to control whitefly on cowpea proved that the avermectin biopesticide is more effective than other pesticides. 22 % Flonicamid suspension has high control effect on eggs and nymphs, and 10 % Flonicamid water dispersible granules have high control effect on adults. When the generation of *B. tabaci* is serious, it can be based on different insect states. The control effect is to choose the mixed use of several pesticides (Chen Jincui et al., 2017).

Chemical fumigation is used to control *B. tabaci*. The fumigation agent is 22 % aphid aerosol, and the insecticidal rate can reach more than 95 % (Li Yan and Zhao Wanxuan, 2010). Imidacloprid was sprayed and rooted to control *B. tabaci*, and the results showed that root irrigation was better than spraying (Zong Jianping, 2009; Fariña AE et al., 2019; Zou Chunhua et al., 2014). Using different concentrations of imidacloprid roots to irrigate the method, the control effect on tomato *B. tabaci* showed that imidacloprid root irrigation can effectively prevent and control the harm of *B. tabaci* and promote the growth of tomato plants, which can be popularized in production (Wang Shaoli et al., 2017; Liu Zhongliang, 2017).

Conclisions

Use 10 kinds of insecticides to control *B. tabaci* on tomatoes in greenhouses. One day after treatment, 70 % Acetamiprid water dispersible granules have the best effect on *B. tabaci* at 41 %; 22,4 % Spirotetramat suspension concentrate is effective for *B. tabaci* on tomatoes and the worst control effect is 28 %. 3 days after treatment, the 22,4 % Spirotetramat suspension concentrate has the best control effect on *B. tabaci* at 72 %. 7 days after treatment, the best control effect of 20 % Mevirpirazone suspension concentrate on *B. tabaci* is 86 %. In the reagent production process, we can choose 70 % acetamiprid water dispersible granules, 22,4 % Spirotetramat suspension concentrate and 20 % Mevirpirazone suspension concentrate to promote the prevention and control of *B. tabaci* and achieve better prevention effect.

References:

1. Fang Wei, Zhang Qing, Hui Chengzhang, Yang Guang, Lu Jiaojiao & Liu Lei (2011). Problems and countermeasures in the development of facility vegetable industry in Shenyang. Agricultural Economy, (01), 18–20. doi: 10.3969/j.issn.1001-6139.2011.01.006.

2. Wu Luofa (2017). Research review on economic hotspots of China’s vegetable industry. Journal of Jiangxi agriculture, 29 (04), 139–145. doi: 10.19386/j.cnki.jxnyxb.2017.04.29.

3. Hou Jun (2011). The current situation and characteristics of vegetable production in Shenyang. Liaoning Agricultural Sciences, (01), 64–66. doi: 0.3969/j.issn.1002-1728.2011.01.016.

4. Palumbo J.C., Horowitz A.R. & Prabhaker N. (2001). Insecticide control and resistance management for Benisia tabaci. Crop Protection, 20 (9), 739–765. doi: 10.1016/S0261-2194(01)00117-X.

5. Liu S.S., Colvin J. & De Barro P.J. (2012). Species concepts as applied to the whitefly Bemisia tabaci systematics: how many species are there? Journal of Integrative Agriculture, 11 (2): 176–186. doi: 10.1016/S2095-3119(12)60002-1.

6. De Barro P.J., Liu S.S., Boykin L.M. & Dinsdale A.B. (2011). Bemisia tabaci: A statement of species status. Annual Review of Entomology, 56 (1), 1–19. doi: 10.1146/annurev-ento-112408-085504.

7. Chu Dong, Bi Yuping, Zhang Youjun, Lou Yunping (2005). Research progress on Bemisia tabaci biotype. Acta Ecologica Sinica, 25 (12): 3398–3405. doi: 10.3321/j.issn:1000-0933.2005.12.040.

8. Zhang Xiuxia, Mao Xiaohong, Gao Qiang, Bai Tingting & Zhang Ansheng (2019). Laboratory toxicity and field efficacy of three biological insecticides against Bemisia tabaci. Chinese agricultural bulletin, 35 (20), 99–103. doi: CNKI:SUN:ZNTB.0.2019-20-018.

9. Xu J., Lin K. K. & Liu S.S. (2011). Performance on different host plants of an alien and an indigenous Bemisia tabaci from China. Journal of Applied Entomology, 135 (10), 771–779. doi: 10.1111/j.1439-0418.2010.01581.x.

10. Wang Wenlong, Wang Shaoli, Han Guangjie, Du Yuzhou & Wang Jianjun (2016). Lack of cross-resistance between neonicotinoids and sulfoxaflor in field strains of Q-biotype of whitefly, Bemisia tabaci, from eastern China. Pesticide Biochemistry & Physiology, 136, 46. doi: 10.1016/j.pestbp.2016.08.005.

11.Pan Huipeng, Preisser E.L., Chu Dong, Wang Shaoli, Wu Qingjun, Carrière Yves, Zhou Xuguo & Zhang Youjun (2015). Insecticides promote viral outbreaks by altering herbivore competition. Ecological Application, (6), 1585–1595. doi: 10.1890/14-0752.1.

12. Li Caixin, Zhang Yongqiang, Zhang Bingbing, Wang Dan & Ding Wei (2015). Experiments on 6 insecticides to control Bemisia tabaci in tobacco fields. Phytosan, 28 (3), 41–42. doi: 10.13718/j.cnki.zwys.2015.03.025.

13. Tang Qiuling, Ma Kangsheng & Gao Xiwu (2016). The current status of vegetable aphids resistance and resistance management strategies. Plant Protection, 42 (06), 11–20. doi: 10.3969/j.issn.05291542.2016.06.002.

14. Wang Zhengyu, Yan Haifei, Yang Yihua & Wu Yidong (2010). Biotype and insecticide resistance status of the Whitefly Benisia tabaci from China. Pest Management Science, 66 (12), 1360–1366. doi: 10.1002/ps.2023.

15. Luo C., Jones C. M., Devine G., Zhang F., Denholm I. & Gorman K. (2010). Insecticide resistance in Benisia tabaci biotype Q (Homoptera: Aleyrodidae) from China. Crop Protection, 29 (5), 429–434. doi: 10.1016/j.cropro.2009.10.001.

16. Roditakis E., Roditakis Nikos E. & Tsagkarakou A. (2010). Insecticide resistance in Benisia tabaci (Homoptera: Aleyrodidae) populations from crete. Pest Management Science, 61 (6), 577–582. doi: 10.1002/ps.1029.

17. Erdogan C., Moores G.D., Gurkan M.O., Gorman K.J. & Denholm I. (2008). Insecticide resistance and biotype status of populations of the tobacco whitefly Benisia tabaci (Homoptera: Aleyrodidae) populations from Turkey. Crop Protection, 27 (3/4/5), 600–605. doi: 10.1016/j.cropro.2007.09.002.

18. Kang C.Y., Wu G. & Miyata T. (2006). Synergism of enzyme inhibitors and mechanisms of insecticide resistance in Benisia tabaci (Gennadius) (Hom., Aleyrodidae). Journal of Applied Entomology, 130 (6/7), 377–385. doi: 10.1111/j.1439-0418.2006.01075.x.

19. Qin Yue, Zhang Zhongxin, Zhang Huichen, Guo Changjun, Wang Xiaojuan & Li Chao (2011). Study on the application of natural enemy insects in controlling greenhouse vegetable pests. Modern horticulture, (17), 49. doi: 10.3969/j.issn.1006-4958.2011.17.038.

20. Wang Wenlu (2012). Discussion on integrated control technology of Bemisia tabaci in greenhouse. Modern horticulture, (10), 158. doi: CNKI:SUN:JXYA.0.2012-10-136.

21. Castle S.J. (2005). Concentration and management of Bemisia tabaci in cantaloupe as a trap crop for cotton. Crop Prot., 12, 1038–1041. doi: 10.1016/j.cropro.2005.08.013.

22. Watanabe L., Bello V.H., De Marchi B.R., Pereira Sartori M.M., Agenor Pavan M. & Krause-Sakate R. (2018). Performance of Bemisia tabaci MEAM1 and Trialeurodes vaporariorum on tomato chlorosis virus (ToCV) infected plants. Journal of Applied Entomology, 142 (10), 1008–1015. doi: 10.1111/jen.12559.

23. Tuerxun, Wu Jing, Guo Wenchao, Guan Zhijian, Li Cuimei, Elken Maimaiti & Zhang Zhenyu (2011). Control effects of greenhouse whitefly, the main pests of vegetables in different chemical control facilities. Xinjiang Agricultural Sciences, 48 (02), 356–359. doi: CNKI:SUN:XJNX.0.2011-02-035.

24. Peng Li, Tao Xiaoxiang & Duan Ruihua (2016). Occurrence regularity and control technology of Bemisia tabaci. Modern agricultural science and technology, (24), 127–128. doi: 10.3969/j.issn.1007-5739.2016.24.074.

25. Zheng Huixin, Xie Wen, Wang Shaoli, Wu Qingjun, Zhou Xiaomao & Zhang Youjun (2017). Dynamic monitoring (B versus Q) and further resistance status of Q type Benisia tabaci in China. Crop Protection, 94, & 115–122. doi: 10.1016/j.cropro.2016.11.035.

26. Li Chuanming, He Jing, Gu Aixiang, Su Honghua, Wu Xiaoxia, Zhang Haibo, Xie Yamei, Wu Yahong & Zhou Fucai (2017). Effects of Bemisia tabaci feeding on nutrients and resistant substances of pepper varieties with different insect resistance. Chinese Journal of ecological agriculture, 25 (10), 1456–1462. doi: 10.13930/j.cnki.cjea.170372.

27. Chen Jincui (2017). Control effects of Seven Insecticides on Whitefly in greenhouse. Plant protection, 43 (4), 228–232. doi: 10.3969/j.issn.0529-1542.2017.04.041.

28. Li Yan, Zhao Wanxuan (2010). Occurrence characteristics and pollution free control technology of whitefly in greenhouse in Xiuyan area. Liaoning Agricultural Sciences, (03), 100. doi: CNKI:SUN:LNNY.0.2010-03-033.

29. Zong Jianping, Wei Shujuan, Wang Jingyang & Luo Wanchun. (2009). Distribution of imidacloprid in tomato plants after spraying and root irrigation and its control effect on Bemisia tabaci. Chinese Journal of Pesticide Science, (02), 219–224. doi: CNKI:SUN:NYXB.0.2009-02-019.

30. Fariña A.E., Rezende J.A.M., Wintermantel W.M. (2019). Expanding knowledge of the host range of tomato chlorosis virus and host plant preference of Bemisia tabaci MEAM1. Plant Disease, 103 (6), 1132–1137. doi: 10.1094/PDIS-11-18-1941-RE.

31. Zou Chunhua, Li Lin, Dong Tingyan, Zhang Bowen & Hu Qiongbo (2014). Joint action of the entomopathogenic fungus Isaria fumosorosea and four chemical insecticides against the whitefly Bemisia tabaci. Biocontrol Science and Technology, 24 (3), 315–324. doi: 10.1080/09583157.20.

32. Wang Shaoli, Zhang Youjun, Yang Xin, Xie Wen & Wu Qingjun (2017). Resistance Monitoring for Eight Insecticides on the Sweetpotato Whitefly (Hemiptera: Aleyrodidae) in China. Journal of Economic Entomology, 110 (2), 660–666. doi: 10.1093/jee/tox040.

33. Liu Zhongliang, Zheng Jianli, Gao Junjie & Tia Changgeng (2017). Adversity shielding effect of imidacloprid on tomato and its control effect on whitefly in greenhouse. Northern Journal of Agriculture, 45 (01), 65–69. doi: 10.3969/j.issn.2096-1197.2017.01.13.

***Лю Шунсяо,** аспірант, Сумський національний аграрний університет, м. Суми, Україна, Хенанський інститут науки та технології, м. Хенань, КНР*

***Власенко Володимир Анатолійович,** доктор сільськогосподарських наук, професор, Сумський національний аграрний університет, м. Суми, Україна*

Польовий контроль впливу 10 інсектицидів на Bemisia tabaci за тепличного вирощування помідорів у Китаї

Комаха Bemisia tabaci (білокрилка тютюнова) є одним із найбільш шкідливих інвазивних видів у світі. Вона завдає руйнівної шкоди багатьом сільськогосподарським культурам під час процесу враження рослин і є поширеним шкідником довкілля. B. tabaci завдає шкоди культурам, живиться безпосередньо соком рослин, впливає на метаболізм поживних речовин, спричиняє утворення жовтих плям на листках аж до цілковитого пожовтіння й опадання в разі сильного ураження, а також аномальну або неправильну структуру плодів. Дорослі особини та німфи B. tabaci також можуть виділяти медяну росу, яка забруднює органи рослин та викликає почорніння. У разі її високої щільності листя може чорніти, що серйозно впливає на фотосинтез рослин і знижує якість урожаю. Інший важливий напрям шкідливості B. tabaci – поширення вірусів рослин. Зазвичай після спалаху B. tabaci відбувається інфікування рослин вірусами. Ці віруси можуть спричинити скручування листя рослини, карликовість рослин і абортивність плодів, що завдає серйозних збитків. Для відбору високоефективних пестицидів для боротьби з B. tabaci на томатах було застосовано обприскування листя одним із 10 пестицидів. Контрольні обліки проводили на початковій стадії появи B. tabaci, а обстеження контрольного ефекту проводили через 1, 3 і 7 днів після обробки пестицидами. Результати показали, що найкращий ефект впливу на B. tabaci мали на варіанті F (5% Дипрофен) через 1 день після обробки. Він становив 41%, що було значно вищим, ніж в інших досліджуваних реагентів. Жоден із реагентів не показав хороших швидкодіючих ефектів. Через три дні після обприскування *найкращий контрольний ефект на B. tabaci в 72% мав варіант C (22,4% Спіротетрамат). Обробки пестицидами на дослідних варіантах I (50% Флонікамід) та G (10% Cyantraniliprole) мали найгірший ефект – у 62%. Найкращий контрольний ефект знешкодження шкідника становить 86% через 7 днів після обробки препаратом варіанта J (20% Мевірпіразон), що значно вище, ніж в інших тест-реагентів. У трьох польових дослідженнях, проведених із 13 по 20 жовтня 2020 року, не виявлено фітотоксичності для томатів. У процесі контролю B. tabaci ми можемо вибрати для досягнення кращого ефекту і контролю шкідника 20% концентрат суспензії Мевірпіразону, який можна використовувати в поєднанні із 22,4% концентратом суспензії Спіротетрамату та 5% диспергованим концентратом Дипрофену. Такий спосіб підбору пестицидів забезпечить ефективний захист овочів закритого ґрунту від шкідливої дії B. tabaci.*

Ключові слова: *пошкодження, помідор, скринінг, обробка, профілактика та знезараження овочів від шкідників.*

Date of receipt: 14.12.2021.