

# Cabbage whitefly (*Aleyrodes proletella* L.) – Dominant Polyphagous of the Cabbage Family (Brassicaceae) of Ukraine

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Received: January 28, 2026; Accepted: February 09, 2026; Published: February 16, 2026

## ABSTRACT

**Objective:** To analyze the dynamics of the spread of the cabbage whitefly (*Aleyrodes proletella* L.) in Ukraine based on data from the State Service of Ukraine on Food Safety and Consumer Protection, literature sources, and personal observations.

### Methods:

- **Information-Analytical:** collection and analysis of materials
- **Field:** monitoring of the pest at the farm “Zlagoda” (Kyiv region, Bila Tserkva district) during 2022–2024
- **Laboratory:** identification of the pest at the Laboratory of Pesticide Application Technology, Institute of Plant Protection, NAAS of Ukraine.

**Results:** The cabbage whitefly (*Aleyrodes proletella* L.) is a polyphagous pest with high reproductive intensity, capable of developing 5–6 full generations during the growing season depending on weather conditions. It infests many crops belonging to 12 botanical families, with the primary hosts being plants of the cabbage family (Brassicaceae).

According to research results and data from the State Service of Ukraine on Food Safety and Consumer Protection, the development of the cabbage whitefly has been recorded in Ukraine from 2016 to 2024. The pest was first detected in 2016 in the western regions; by 2022, it had spread to 13 regions, and by 2024, it was present in all regions of Ukraine.

**Conclusions:** As of January 1, 2025, the range of the cabbage whitefly in Ukraine covers all ecological zones: Polissia, Forest-Steppe, and Steppe, with its distribution area continuing to expand. Monitoring revealed that in the Forest-Steppe zone, the pest infests all types of cabbage: Chinese, Savoy, Brussels sprouts, cauliflower, broccoli, white cabbage, and red cabbage. Among weeds, it was found on wild radish, common charlock, field mustard, and shepherd’s purse. Notably, it does not damage plants of the cucurbit family, such as pumpkin, cucumber, melon, zucchini, watermelon, and pattypan squash.

## Introduction

### *Aleyrodes proletella* L.: Harmfulness, Colonization, Abundance, and Impact on Brassicaceae Crops

The cabbage whitefly (*Aleyrodes proletella* L.) was first identified in England in 1870. Initially, it was considered a pest of protected cultivation, infesting and damaging crops exclusively in greenhouses. However, it later established itself

in open-field conditions and has recently been spreading rapidly in agricultural ecosystems [1,2].

Belonging to the order Hemiptera and the family Aleyrodidae, *A. proletella* has become widespread across continents: Africa, Australia, Asia (Taiwan), South America (Brazil), and since 1993, in the northeastern United States [3-5]. Its broad distribution

reflects high adaptive capacity, allowing it to quickly adjust to various climatic conditions. Global transportation of host plants and the presence of a continuous food base in many countries contribute to its expansion [4-7].

Since 2000, the pest has become widespread in EU countries. In Italy, it is known as a pest of white cabbage; in the UK, it affects white, cauliflower, Brussels sprouts, broccoli, kale, swede, and turnip [8,9]. In Germany, it was recorded earlier as a pest of cabbage crops, primarily kale. The threat to Brassicaceae cultivation became more pronounced after 2000, especially in kale fields, and for over 20 years it has been a harmful species in Germany, massively reproducing on Brussels sprouts, kale, kohlrabi, and Savoy cabbage. In northern Germany, rapeseed fields serve as optimal overwintering habitats. In 2010, mass reproduction was recorded with up to 60,000 adults and larvae per plant.

According to Polish researchers, 18 whitefly species are found in Poland, three of which are invasive: *Bemisia tabaci*, *Trialeurodes vaporariorum*, and *Massilieuroides chittendeni*. The cabbage whitefly (*A. proletella*) is a native species, first detected in the 1930s. Until 2014, it posed little threat to Brassicaceae crops, but in 2015 it spread to 20 regions, excluding the Eastern Sudetes, Eastern Beskids, Trzebnica Hills, and the Tatras. It also colonized swede, turnip, and mustard fields. In the wild, it occurs on several plant families, including *Chelidonium majus* L., *Capsicum annuum* L., *Euphorbia amygdaloides* L., and *Pyrola chlorantha* L., with *Chelidonium* being the most common host.

Currently, in Ukraine, *A. proletella* is one of the most harmful insect species in cabbage crop fields, with its range significantly expanding over the past decade [12,13].

Studies on varietal resistance to the cabbage whitefly revealed that among 432 samples (including wild and cultivated material), resistant genotypes were found in *Brassica oleracea* var. *capitata*, *Brassica villosa* Biv., and *Berteroa incana* (L.) DC. Resistance in cabbage appears only in plants at least 12 weeks old, while wild species show resistance as early as 6 weeks, highlighting the importance of wild relatives in breeding for pest resistance.

The cabbage whitefly overwinters on plant residues and under tree bark in the egg, larval, and nymph stages [15,16]. Adults are up to 2 mm long, with the body and both pairs of wings covered in a white, powdery wax secretion—hence the name “whitefly.” In terms of damage to vegetable crops, this pest ranks among the most harmful.



**Figure 1:** Adult (imago) of the cabbage whitefly [9]

During its development, the cabbage whitefly (*Aleyrodes proletella* L.) undergoes three main stages: adult (imago), egg, and larva (nymph). All developmental phases of the pest may simultaneously be present on a single plant [17-19].

The most harmful stage for plants is the larval phase. Larvae undergo three molts during development. Wax glands secrete a protective wax barrier around the larva, which adheres tightly to the leaf surface. After the first molt, the larvae's legs and antennae significantly reduce in size, rendering them immobile. In the fourth instar, the body shape changes—it swells and becomes enclosed in a wax capsule. At this point, the larva stops feeding, and wings, long legs, antennae, and other adult structures begin to form (Figure 2).

Depending on air temperature, each larval stage lasts from three to eight days. Only the first instar larva (crawler) is mobile. Before the final molt, the fourth instar larva (puparium) ceases feeding, becomes covered with a waxy substance, and transitions into the nymph stage, from which the adult whitefly emerges. Mating occurs 12–20 hours after the adult emerges.



**Figure 2:** Colonization of Different Cabbage Types by Cabbage Whitefly (Adults and Larvae): A – on white cabbage; B – on cauliflower (author's photo)

All developmental stages of this polyphagous pest occur exclusively on the underside of the plant leaf. The cabbage whitefly feeds on plant sap, leading to leaf yellowing and deformation, which halts plant development and significantly reduces crop yields.

Another form of damage is caused by sooty mold fungi that settle on the sugary secretions of the pest. Initially, infested leaves are covered with a white waxy layer, which later turns black due to fungal development, forming what is known as “sooty blotch.” This fungal growth causes substantial harm to plants, making them lose market value and rendering them unsuitable for consumption. Additionally, the cabbage whitefly is a vector of viral, bacterial, and fungal diseases, which further increases its harmfulness.

During the growing season, the pest develops from four to eight generations, with each generation lasting 3–4 weeks depending

on air temperature and humidity[22-24]. Researchers note that ambient temperature has the greatest influence on the number of generations per season[25-27].

### Objective of the Study

To analyze the dynamics of cabbage whitefly (*Aleyrodes proletella* L.) spread across different agro-climatic zones of Ukraine in Brassicaceae crop fields.

### Research Methodology

A retrospective analysis of data from the State Service of Ukraine on Food Safety and Consumer Protection was used to calculate the prevalence and population density of cabbage whitefly during the growing seasons of 2016–2024 across all agro-climatic zones of Ukraine.

Field studies were conducted at the private farm “Zlagoda” (Bila Tserkva district, Kyiv region) and in the Laboratory of Pesticide Application Technology at the Institute of Plant Protection, NAAS of Ukraine, during 2022–2024.

Observations of pest development and assessments of colonization and population density in cabbage crops were carried out systematically, at least once every 7–10 days, following standard methodologies. Pest density was determined by examining 10 plants in 10 samples, evenly distributed across the central rows of each plot [28-29].

### Research Results and Discussion

Recent climate warming has led to a deterioration of the phytosanitary condition in Ukrainian agroecosystems, contributing to the emergence of new harmful insect species, including the cabbage whitefly.

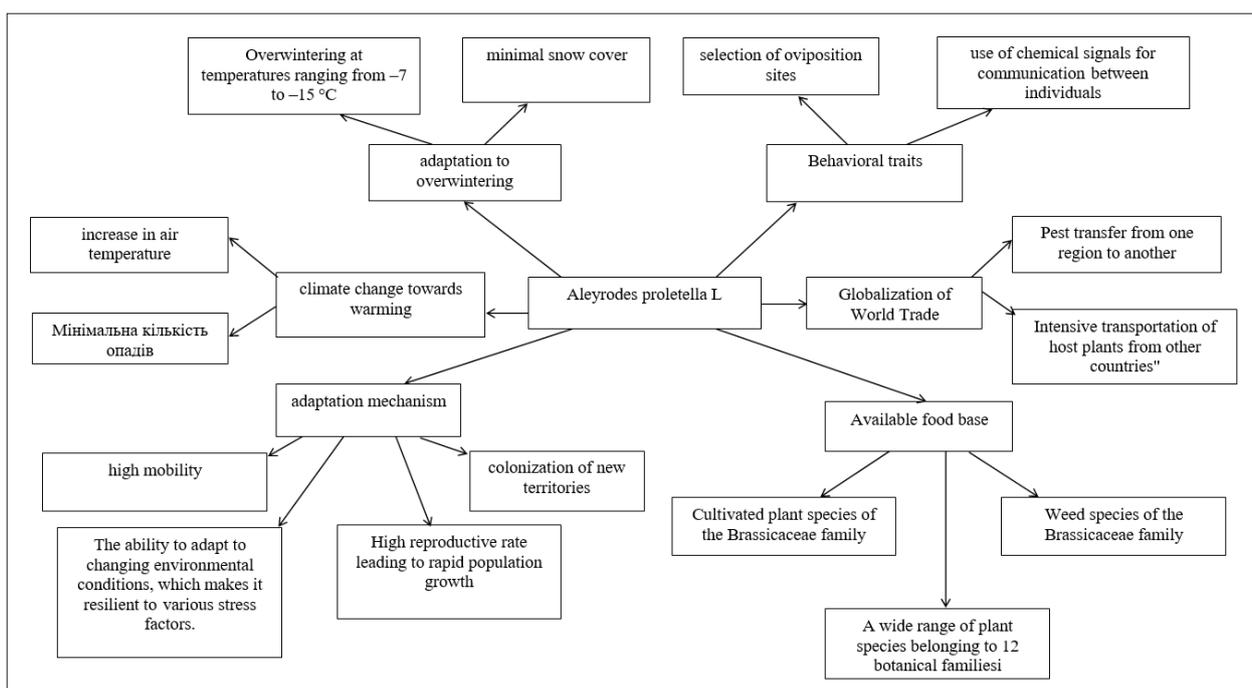
*Aleyrodes proletella* L. is a relatively new pest in open-field conditions, but in recent years it has become a major problem in the cultivation of Brassicaceae vegetables and has spread

throughout Ukraine over the past decade.

Several factors (Figure 3) have created favorable conditions for the mass spread and reproduction of the cabbage whitefly across all regions of Ukraine:

- **Climate change:** Rising average annual temperatures and minimal precipitation during the growing season compared to climatic norms create ideal conditions for pest reproduction and development, increasing the risk of further spread.
- **Global vegetable trade:** Facilitates the transfer of the pest between regions and promotes intensive migration.
- **Overwintering in open fields:** All developmental stages of the cabbage whitefly have adapted to the climatic conditions of Ukraine’s agro-climatic zones and overwinter successfully in sheltered locations, including soil crevices, even under low temperatures (–7 to –15°C, and even –18°C) and minimal snow cover, indicating acclimatization and further expansion.
- **Adaptation mechanisms:** High mobility, ability to adjust to changing environmental conditions, resistance to stress factors, high reproductive rate, and colonization of new areas.
- **Available food base:** The pest widely infests and damages many cultivated and weedy plant species of the Brassicaceae family.

According to monitoring conducted by specialists from the State Service of Ukraine on Food Safety and Consumer Protection and scientists from the Institute of Plant Protection, NAAS, the cabbage whitefly was first recorded in 2016 in the western regions of Ukraine (Volyn, Ivano-Frankivsk, Lviv, and Rivne), with infestation levels ranging from 6.0% to 50.0% of crop areas and population densities of 10.0–87.5 individuals per plant. In 2017, in the Polissia region, cabbage fields were infested at levels of 4.0–48.0% of plants, with densities of 10.0–69.0 individuals per plant (Table 1).



**Figure 3:** Key factors influencing the spread and reproduction of the cabbage whitefly

**Table 1: Dynamics of colonization and population size of the cabbage whitefly in Ukraine (based on data from the Institute of Plant Protection of NAAS and the State Service of Ukraine on Food Safety and Consumer Protection)**

ZONE	Monitoring Unit	Year								
		2016	2017	2018	2019	2020	2021	2022	2023	2024
Polissia Forest-Steppe	Infestation rate, %  Density, individuals per plant	6,0–50,0	4,0–48,0	15,0–62,0	30,0–60,0	12,0–87,0	6,0–25,0 (45,0)*	15,0–80,0 (100,0)*	20,0–48,0 (65,0)*	26,0–42,0 (65,0)*
	Infestation rate, %  Density, individuals per plant	10,0–87,5 (201,0)*	10,0–69,0	7,5–47,5	16,0–68,0	7,0–15,0 (45,0)*	6,0–48,0 (120,0)*	18,0–56,0	13,0–32,0 (150,0)*	13,0–32,0 (120,0)*
Steppe Polissia	Infestation rate, %  Density, individuals per plant	–	–	–	70,0–100,0	8,0–26,0	25,0–83,0 (90,0)*	23,0–85,0 (90,0)*	5,0–60,0 (100,0)*	23,0–83,0 (100,0)*
	Infestation rate, %  Density, individuals per plant	–	–	–	28,0–100,0 осередково	20,0–60,0	45,0–63,0 (500,0)*	15,0–45,0 (120,0)	12,0–52 (75)*	20,0–62,0 (84,0)*
Forest-Steppe Steppe	Infestation rate, %  Density, individuals per plant	–	–	–	–	–	5,0–20,0	9,0–45,0	15,0–40,0 (90,0)*	15,0–35,0 (88,0)*
	Infestation rate, %  Density, individuals per plant	–	–	–	–	–	10,0–68,0 (380,0)*	30,0–90,0	15,0–27,0 (70,0)*	15,0–40,0

Note: \* – maximum value of the indicator is given in parentheses (max)

### Dynamics of Cabbage Whitefly Infestation in Brassicaceae Crops in Ukraine (2018–2024)

In subsequent years, the area of Brassicaceae crop fields infested by the cabbage whitefly (*Aleyrodes proletella* L.) continued to grow. In the Polissia zone in 2018, harmfulness was recorded in 4.0–12.0% of mid-season white cabbage crops in Volyn, Zakarpattia, Ivano-Frankivsk, Lviv, and Rivne regions, and in 5.0–25.0% of late-season crops in Volyn, Lviv, Rivne, and Ternopil regions. Pest density was slightly lower than the previous year, ranging from 7.5 to 47.5 individuals per plant.

In 2019, infestation began earlier—during the third ten-day period of May—with peak adult emergence in the second half of June. In addition to the previously mentioned regions, pest concentration was observed in the Forest-Steppe zone, particularly in several districts of Vinnytsia and Chernivtsi regions, affecting Chinese cabbage.

Early and mid-season white cabbage crops were damaged up to 15.0%, with peak infestation reaching 45.0–50.0% of plants and densities of 16.0–68.0 adults and larvae per head. Late-season cabbage showed up to 62.0% infestation, with localized outbreaks reaching 100.0% of plants in Vinnytsia and Rivne regions, at densities of 28.5–85.5 individuals per plant.

In 2020, infestation in Forest-Steppe and Polissia zones was observed during the first two ten-day periods of June. In Vinnytsia, Volyn, Zakarpattia, Kyiv, Rivne, and Chernivtsi regions, the pest was found on 12.0–87.0% of surveyed early and mid-season white cabbage fields, with densities of 7.0–15.0

(maximum 45.0) individuals per head. Damage averaged 5.0–20.0%, with peaks up to 65.0%.

Late-season cabbage was affected at rates of 8.0–26.0%, with localized infestation reaching 78.0–100.0% of plants in Volyn, Rivne, and Chernivtsi regions, at densities of 20.5–60.2 individuals per plant. Overall, pest harmfulness ranged from low to moderate, except in some farms in Chernivtsi region, where high levels (up to 10.0%) were recorded.

In 2021, infestation increased across all agro-climatic zones of Ukraine, especially in western and southern regions. In Kirovohrad, Mykolaiv, and Kherson regions, 5.0–20.0% of surveyed areas and 4.0–20.0% of plants were infested, with average densities of 10.0–68.0 individuals per plant. Mykolaiv region recorded a peak density of 380 individuals per plant.

In Polissia and Forest-Steppe zones, the pest infested up to 83.0% of cabbage fields, with total infestation of all maturity stages in Volyn, Vinnytsia, Chernivtsi, and Ternopil regions. Damage to early and mid-season cabbage reached 25.0% (maximum 45.0%), with densities of 6.0–48.0 (maximum 120.0) individuals per head. Late-season cabbage showed 12.0–75.0% infestation (maximum 90.0%) and densities of 28.0–500.0 individuals per plant (Chernivtsi region).

In 2022, the cabbage whitefly continued its expansion in industrial plantings across 13 regions. In the Steppe zone (Kirovohrad and Odesa), 10.0–45.0% of surveyed areas were infested, with densities of 30.0–90.0 individuals per plant.

In Polissia and Forest-Steppe zones, infestation of cabbage crops of all maturity stages ranged from 15.0 to 80.0%, with peaks up to 100.0% in Volyn and Sumy regions. Average pest density ranged from 11.0 to 35.0 individuals per plant, with maximum densities of 80.0–120.0 adults and larvae per head.

Favorable weather conditions (low humidity and elevated temperatures) in 2023 and 2024 contributed to further expansion, mass reproduction, and increased pest density, especially in both industrial and private cabbage plantings. In the Steppe zone, average infestation ranged from 15.0 to 37.5%, with peaks up to 90.0% (mid-season cabbage, Kirovohrad region), and average densities of 15.0–33.5 individuals per plant, with maximums of 150.0 on early and mid-season cabbage and up to 75.0 on late-season varieties.

In Polissia and Forest-Steppe zones, infestation of cabbage crops of all maturity stages ranged from 23.0–45.0% (maximum 65.0%, Volyn and Rivne), and 14.0–72.0% (maximum 100.0%, Vinnytsia, Khmelnytskyi, Cherkasy), with densities of 13.0–32.0 (maximum 120.0) and 16.0–56.3 individuals per plant, respectively.

Based on phytosanitary assessments of Brassicaceae crops during 2022–2024, widespread infestation by cabbage whitefly was confirmed in the Forest-Steppe zone of Ukraine. All cabbage types were infested throughout the entire growing season.

Field studies conducted at the “Zlagoda” farm (Kyiv region, 2022–2024) showed that cabbage whitefly colonized Chinese cabbage and broccoli most intensively (up to 100.0%) early in the season, with densities of 58.5–84.8 and 50.0–80.0 individuals per plant, respectively. Cauliflower was also heavily infested (up to 85.0%) with densities of 37.0–75.0 individuals per plant. Late-season white and Savoy cabbage showed infestation rates of 23.5–68.0% and 47.3–73.5%, with densities of 11.0 and 33.6 individuals per plant, respectively (Table 2).

**Table 2: Infestation of different cabbage species by the cabbage whitefly (*Aleyrodes proletella*) (Farm 'Zlagoda', Kyiv region, average for 2022–2024)**

Cabbage species	Infested plants, %	Average density, individuals per plant	Infestation coefficient
Early white cabbage	7,5–10,5/ (19,0)*	6,3–14,3/ (20,0)*	0,9
Late white cabbage	23,5–68,0/ (83,5)*	27,5–62,0/ (80,0)*	18,2
Chinese cabbage	100,0/ (100,0)*	58,5–84,9/ (91,5)*	70,0
Broccoli	100,0/ (100,0)*	50,0–80,0/ (85,5)*	65,0
Cauliflower	80,0–85,0/ (100,0)*	37,0–75,0/ (85,0)*	46,7
Red cabbage	3,2–10,5/ (13,5)*	3,5–6,5/ (15,3)*	0,3

Savoy cabbage	47,3–73,5/ (80,0)*	25,0–45,3/ (63,2)*	20,1
Brussels sprouts	6,0–8,3/ (13,0)*	5,8–12,5/ (15,0)*	0,7

Note: \* – maximum value of the indicator is given in parentheses (max)

**Infestation Levels of Cabbage Whitefly on Brassicaceae Crops and Weeds (2022–2024)**

The cabbage whitefly (*Aleyrodes proletella* L.) showed the lowest infestation rates on red cabbage varieties—3.2–10.5% of plants, with average densities of 3.5–6.5 individuals per plant. Early white cabbage varieties were infested at 7.5–10.5%, with densities of 6.3–14.3 individuals per plant. Brussels sprouts showed 6.0–8.3% infestation and 5.8–12.5 individuals per plant. In contrast, Savoy cabbage fields were infested at rates of 47.3–73.5%, with average densities of 25.0–45.3 individuals per plant. Based on three years of research, the average infestation ranking of Brassicaceae crops by cabbage whitefly was as follows:

- Chinese cabbage – 100.0%
- Broccoli – 88.5%
- Cauliflower – 72.3%
- Late white cabbage – 47.5%
- Savoy cabbage – 47.0%
- Early white cabbage – 19.5%
- Brussels sprouts – 4.0%
- Red cabbage – 3.5%

Infestation of Brassicaceae weeds was also observed, with dominant species including wild radish (*Raphanus raphanistrum*), common charlock (*Sinapis arvensis*), shepherd’s purse (*Capsella bursa-pastoris*), and field mustard (*Brassica campestris*). The lowest infestation was recorded on wild radish (5.0–6.0%) and shepherd’s purse (4.7–8.7%), with colonization coefficients of 0.1 and 0.4, respectively. Higher infestation was observed on common charlock (15.3–25.0%) and field mustard (18.5–27.5%), with coefficients of 2.7 and 3.8.

**Table 3: Cabbage Whitefly Infestation of Brassicaceae Weeds (Zlagoda Farm, Kyiv Region, Average 2022–2024)**

Weed Vegetation Types	Infested Plants, %	Average Density, individuals/plant	Infestation Coefficient
Wild radish	5,0–6,0/ (8,5)*	2,0–3,5/ (7,5)*	0,1
Common wintercress	15,3–25,0/ (35,5)*	12,3–15,0/ (20,5)*	2,7
Shepherd’s purse	4,7–8,7/ (15,8)*	4,5–7,0/ (12,5)*	0,4
Wild mustard	18,5–27,5/ (40,3)*	15,0–18,5/ (31,5)*	3,8

**Colonization Coefficients of Cabbage Varieties (Forest-Steppe Zone, 2022–2024)**

- Chinese cabbage – 70.0
- Broccoli – 65.0
- Cauliflower – 46.2
- Savoy cabbage – 20.1
- Early white cabbage – 0.9

- Late white cabbage – 20.4
- Red cabbage – 0.3
- Brussels sprouts – 0.7
- Brassicaceae weeds – 0.1 to 3.8

These results highlight the pest's specificity for host plants within the Brassicaceae family and its ability to damage all plant organs, indicating a high adaptive potential and growing threat to open-field cabbage crops.

### Conclusions

The widespread distribution of *Aleyrodes proletella* in Africa, Europe, and the USA demonstrates its high adaptability to various climatic conditions. Climate change, successful overwintering in open fields, and a constant food base have contributed to its emergence as a dominant pest, previously not considered economically harmful to open-field cabbage crops.

Across all agro-climatic zones of Ukraine, cabbage whitefly has become widespread. From 2016 to 2024, infestation rates were:

- Polissia zone: 7.0–87.0% of crops, with densities of 6.0–87.5 individuals per plant
- Forest-Steppe zone: 5.0–85.0% and 12.0–85.5 individuals per plant
- Steppe zone: 5.0–45.0% and 10.0–90.0 individuals per plant

Colonization coefficients for different cabbage types in the Forest-Steppe zone during 2022–2024 confirm increasing pest density and harmfulness, necessitating timely protective measures.

A potential limiting factor for cabbage whitefly development is prolonged frost (over 10 consecutive days) at temperatures below –10°C, which may freeze overwintering sites and soil in areas with minimal snow cover.

### References

1. Kovaříková K, Holý K, Skuhrovec J, Saska P. The efficacy of insecticides against eggs and nymphs of *Aleyrodes proletella* (Hemiptera: Aleyrodidae) under laboratory conditions. *Crop Protection*. 2017. 98: 40-45.
2. Müller V, Maiwald F, Lange G, Nauen R. Mapping and Characterization of Target-Site Resistance to Cyclic Ketoenol Insecticides in Cabbage Whiteflies. *Aleyrodes proletella* (Hemiptera: Aleyrodidae). *Insects*. 2024. 15: 178.
3. DeBarro PJ, Carver M. Cabbage Whitefly, *Aleyrodes proletella* (L.) (Hemiptera: Aleyrodidae), Newly Discovered in Australia. *Australian Journal of Entomology*. 1997. 36: 255-256.
4. Evans GA. The Whitefly (Hemiptera : Aleyrodidae) of the world and their host plants and natural enemies. *Animal Plant Health Inspection Services (APHIS)*. USDA. 2008.
5. NPAG. *Aleyrodes proletella*, Brassica whitefly. USDA. 2001.
6. Dale PS, Hayes JC, Johannesson J. New records of plant pests in New Zealand. *New Zealand Journal of Agricultural Research*. 1975. 19: 265-269.
7. Laurenz S, Meyhöfer R. Conservation of Non-Pest Whiteflies and Natural Enemies of the Cabbage Whitefly *Aleyrodes proletella* on Perennial Plants for Use in Non-Crop Habitats. *Insects* 2021. 12: 774.
8. Nebreda M, Nombela G, Muniz M. Comparative Host Suitability of Some Brassica Cultivars for the Whitefly, *Aleyrodes proletella* (Homoptera: Aleyrodidae). *Entomologia Experimentalis et Applicata*. 2005. 23: 91-95.
9. Franielczyk-Pietryra B, Depa Ł, Wegierek P. Morphological and histological study of the forewing of *Aleyrodes proletella* (Linnaeus 1758) (Sternorrhyncha, Hemiptera) with a comparative analysis of forewings among Sternorrhyncha infraorders. *Zoomorphology*. 2019. 138: 321-333.
10. Iheagwam EU. Comparative flight performance of the seasonal morphs of the cabbage whitefly, *Aleyrodes brassicae* (Wlk), in the laboratory. *Ecological Entomology*. 1977b. 2: 267-271.
11. Klasa A. A faunistic review of Polish whiteflies (Hemiptera: Aleyrodidae). *Polish Journal of Entomology*. 2011. 80: 245-264.
12. Forecast of the phytosanitary state of agrocenoses of Ukraine and recommendations for plant protection in . 2016-2025.
13. Tkalenko Yu O, Shyta OV. Cabbage whitefly in Ukraine - a dangerous pest in open ground: distribution, harmfulness. Current aspects of the development of science and education: Materials of the III International Scientific and Practical Conference of Scientific and Pedagogical Workers and Young Scientists "Current aspects of the development of science and education", November 9–10, 2023. Odesa. 2023. 462-463.
14. Pelgrom KTB, Broekgaarden C, Voorrips RE, Bas N, Visser RGF, Vosman B. Host plant resistance towards the cabbage whitefly in Brassica oleracea and its wild relatives. *Euphytica*. 2015. 202: 297-306.
15. Adams AJ. The photoperiodic induction of ovarian diapause in the cabbage whitefly, *Aleyrodes proletella* (Homoptera: Aleyrodidae). *Journal of Insect Physiology*. 1985a 31: 693-700.
16. Niemann JU, Menssen M, Poehling HM. Manipulation of Landing Behaviour of Two Whitefly Species by Reflective Foils. *J. Plant. Dis. Prot.* 2021. 128: 97-108.
17. Alonso D, Gomez AA, Nombela G, Muniz M. Temperature-dependant development of *Aleyrodes proletella* (Homoptera: Aleyrodidae) on two cultivars of Broccoli under constant temperatures. *Population Ecology*. 2009. 38: 11-17.
18. Tkalenko Yu O, Shyta OV. Features of the development of cabbage whitefly in the conditions of the Northern Forest-Steppe of Ukraine. Breeding, genetics and technologies of growing agricultural crops: materials of the XII International Scientific and Practical Conference of Young Scientists and Specialists (Tsentralne village, April 19, 2024) / NAAS, V. M. Remesla MIP, Ministry of Agrarian Policy and Food of Ukraine. 2024. 68-169.
19. Holý K, Kovaříková K. Spring Abundance, Migration Patterns and Damaging Period of *Aleyrodes proletella* in the Czech Republic. *Agronomy*. Basel. 2024. 14: 1477.
20. Iheagwam EU. Effects of temperature on the development of the immature stage of the cabbage whitefly, *Aleyrodes proletella* (Homoptera: Aleyrodidae). *Entomologia Experimentalis et Applicata*. 1978. 23: 91-95
21. Byrne DN, Bellows Jr TS. Whitefly biology. *Annual Review of Entomology*. 1991. 36, 431-457.
22. Iheagwam EU. Influence of cabbage Brassica oleracea varieties and temperature on population variables of the cabbage whitefly *Aleyrodes brassicae*. *Oikos*. 1981. 36: 233-237.
23. Iheagwam EU. Effect of population density on the ethology

- and eidonomy of the cabbage whitefly *Aleyrodes brassicae* (Homoptera: Aleyrodidae). *Entomologia Generalis*. 1982. 74: 343-346.
24. Richter E. Population dynamics and chemical control of *Aleyrodes proletella* in vegetable brassica crops. *Julius-Kühn-Archiv*. 2001. 428: 216.
25. Butler CG. On the ecology of *Aleyrodes brassicae* Walk. (Hemiptera) *Transactions of the Royal Entomological Society of London*. 1938a. 87: 291-311.
26. Koca AS, Kutuk H. Population dynamics of *Aleyrodes proletella* L. (Hemiptera: Aleyrodidae) and its parasitoids in Düzce Province of Turkey. *Journal of Plant Diseases and Protection. New Series*. 2020. 127: 607-614.
27. Martin JH, Mifsud D, Rapisarda C. The Whiteflies (Hemiptera: Aleyrodidae) of Europe and the Mediterranean Basin. *Bull. Entomol. Res.* 2000. 90. 407-448.
28. Omelyuta VP. Kyiv: Urozhay, Accounting for pests and diseases of agricultural crops; edited. 1986. 296.
29. Trybel SO. Kyiv: Svit. Methods of testing and application of pesticides; edited by, 2001. 174-175.