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PHYTOSANITARY STATE OF AGROCENOSES

of vegetable crops of the genera *Solanum*, *Raphanus* and *Brassica* in open soil in the conditions of the central part of the Right-Bank Forest-Steppe of Ukraine

[1]S. SHCHETYNA,
Candidate of Agricultural Sciences, Docent
ORCID: 0000-0001-8504-2944
[1]I. MOSTOVIAK,
Doctor of Agricultural Sciences, Professor
ORCID: 0000-0003-4585-3480
[2]V. FEDORENKO,
Doctor of Biological Sciences, Professor, academician of the National Academy of Sciences
ORCID: 0000-0002-7783-1617
[1]Uman National University of Horticulture
1, st. Instytutska, Uman, 20300, Cherkasy region, Ukraine
[2]Institute of plant protection, National Academy of Sciences of Ukraine
33, st. Vasylkivska, Kyiv, 03022, Ukraine
e-mail: sv_shetina@ukr.net, mostovjak@gmail.com, tana57-2009@ukr.net

Goal. Phytosanitary assessment and determination of pest and disease prevalence and development in open-field vegetable crop plantings of the genus *Solanum* (tomato, pepper, eggplant), genus *Raphanus* (radish, oilseed radish, common radish, black radish, daikon), and genus *Brassica* (cabbage, cauliflower, broccoli) in the Central Part of the Right-Bank Forest-Steppe Region of Ukraine. **Methods.** The research was conducted using established entomological, phytopathological, and horticultural methods. From 2008 to 2022, the population, distribution, and development of pests and phytopathogens were assessed in households and small farms within the Cherkasy region of Ukraine. **Results.** Among the dominant pest species in the agroecosystems of vegetable crops from the genus *Solanum*, insects accounted for 80% (8 species), followed by mites at 10% (1 species), and slugs at 10% (1 species). In agroecosystems of Brassicaceae crops, insects caused significant damage, constituting 94% (16 species) of the total pest structure, along with naked snails (1 species). The area of infestation in tomato, sweet pepper, and eggplant crops by phytophagous insects ranged from 13% to 98%, with plant damage ranging from 14% to 65%. Common spider mites accounted for 26%. Exceedances of the Economic Pest Threshold (EPT) were observed, such as *Leptinotarsa decemlineata* Say at 2.6 times, *Gryllotalpa gryllotalpa* L., *Trialeurodes vaporariorum* Wstw., *Agrotis segetum* Denis & Schiff., and *Lacanobia oleracea* at 2.2 times, *Agriotes* spp. larvae at 1.4 times, and *Tetranychus urticae* Koch. at 1.9 times the threshold levels. The highest area of infestation in Brassicaceae crops was found for *Eurydema ventralis* (46.7%), *Pieris brassicae* (42.4%), *Agrotis segetum* Denis & Schiff. (41.6%), *Phyllotreta crusiferae* and *Phyllotreta undulate* (37.6—37.8%), and *Brevicoryne brassicae* (26.6%). Exceedances of the EPT were recorded at 1.1—2.5 times for these pests. In the structure of the phytopathogenic complex of vegetable crop agroecosystems, fungi were dominant, accounting for an average of 49—58%. Viral pathogens had the smallest share, approximately 6—8%, causing mosaic diseases. Bacterial and oomycete agents occupied an intermediate position in the pathogenic complex structure. Nevertheless, their negative impact on plant health could be significant. **Conclusions.** In the Cherkasy region, which encompasses the central part of the Right-Bank Forest-Steppe of Ukraine, approximately 75% of surveyed vegetable crop plantings, including tomatoes, peppers, eggplants, radishes, oilseed radishes, common radishes, black radishes, daikons, cabbages, cauliflowers, and broccolis, exhibit high pest infestations exceeding the EPT thresholds, indicating an ecologically hazardous phytosanitary state. In these agroecosystems, insects dominated, representing 80% and 94% of the pest structure in *Solanum* and Brassicaceae crops, respectively. Additionally, significant damage was attributed to naked snails (*Kailie gliemeži*) and, in the case of *Solanum* crops, mites (*Tetranychus urticae* Koch.). EPT exceedances ranged from 1.1 to 2.5 times, depending on the pest species. Fungi, causing mycoses, dominated the phytopathogenic complex structure, ranging from 14% to 40% (max 88—90%). The prevalence of diseases varied from 21% to 38%, with disease development rates ranging from 21% to 33%. Among the identified phytopathogens, five species are among the world's most dangerous: *Pseudomonas syringae* and *Xanthomonas campestris* (bacteria), *Botrytis cinerea* and *Fusarium oxysporum* (fungi), and *Phytophthora infestans* (oomycete), which require strict control of their populations.

monitoring; harmful organisms; population control; phytosanitary state; open-field vegetable crops; pathogens

The current state of the domestic agricultural sector is characterized by the concentration and specialization of agricultural production, namely the introduction of intensive varieties, including and GMOs, the active use of mineral fertilizers and chemical plant protection agents, and the use of heavy machinery. The intensification of technologies, the cultivation of agricultural crops with a certain dominance of some of them, the violation of scientifically based crop rotations and the transition to monoculture and a number of other factors are observed, which caused a sharp decrease in the number of useful entomofauna, pollinating insects, destructors, and thus led to a violation of natural self-regulation mechanisms in agrobiocenoses, refugiums and even neighboring biogeocenoses. Currently, agroecosystems are characterized by extremely low stability of the phytosanitary state (outbreaks of mass reproduction of pests, epiphytotic plant diseases, spread of weeds) [1, 2]. In recent years, deterioration of

the phytosanitary state of agrocenoses in many rural areas has been recorded on the territory of Ukraine. crops, which is associated both with a change in hydrothermal parameters and a violation of agricultural techniques for growing crops [3].

Among the biological factors affecting the growth and development of vegetable crops, including their ripening and fruit formation, are harmful organisms. It is from their negative effect that crop losses can reach 40% [4, 5, 6].

Thus, domestic researchers note the significant spread of pathogens of bacterial, phytoplasma, and viral diseases of vegetables. These are, first of all, bacteriosis and fusarium wilt of cabbage, powdery mildew of onions, late blight, stem and viral diseases of tomatoes, cercosporosis of beets, alternariosis, and bacterial burn of carrots. All mentioned diseases of fungal etiology can be controlled with biological and chemical preparations. However, the control and harmfulness of viral and phytoplasma diseases depends on the quality of seed/seedling material, agricultural technology, variety resistance, crop rotation [1, 3, 7]. In particular, tomato, pepper, eggplant, and potato plants are most often affected by late blight and alternaria, cucumbers and onions by powdery mildew, cabbage by alternaria, fusarium wilt, etc. These diseases cause the loss of vegetative plants up to 40%, and crop failure reaches 10—15% [8].

Among the main insect pests of vegetable crops, sucking pests are especially dangerous, especially from the family Thripidae (thrips) of the suborder Terebrantia (egg-laying). This most common dangerous polyphage, whose life cycle (from egg to adult) takes place on a plant, is inhabited by almost all greenhouses and greenhouses and large areas of open ground. Despite weak migration capabilities, thrips are able to inhabit neighboring fields with vegetable crops indirectly through segetal vegetation on the roadsides [9]. On vegetable plants such as onions and shallots, cucumbers, the infestation of this pest causes desensitization in the form of growth retardation, distortion and loss of turgor of leaves, its deformation and premature death, damage to inflorescences, and leads to the death of plants [9, 10].

Whiteflies (Hemiptera: Aleyrodidae) have long been known as economically important insect pests worldwide. Tobacco or cotton whitefly (*Bemisia tabaci* Gen.) is a widespread pest that affects vegetable crops of the Brassicaceae and Solanaceae family, both in open and closed soil [11, 12]. Another type of whitefly — the greenhouse whitefly (*Trialeurodes vaporariorum* Wstw.) is impressive in terms of its level of damage because it can cause damage to vegetable and garden crops, with more than 300 plant species, namely tomatoes, beans, eggplants, sweet peppers, potatoes, zucchini, cucumbers, pumpkins, cotton and many other crops [13, 14]. Along with the above-mentioned insects-phytophagous mites and nematodes, which are also carriers of viral and fungal pathogens, are pests that cause significant damage to vegetable crops [15, 16].

The Colorado potato beetle (*Leptinotarsa decemlineata* Say) is the main pest of solanaceous crops, which causes significant economic losses in the cultivation of potatoes, tomatoes, eggplant, pepper and other crops around the world [17, 18]. Thus, during the full larval stage (3—4 weeks), the larvae of the Colorado potato beetle consume about 40 cm^2 of potato leaves, and its adults can destroy up to 10 cm^2 of the leaf area of the plant per day [19, 20].

For the timely detection of pests and diseases on crops of vegetables and other agricultural crops, it is necessary to carry out phytosanitary monitoring during the entire growing season to detect and control the number, distribution and intensity of development of harmful organisms with further determination of the level of danger and (development) of the application of appropriate plant protection measures.

The purpose of the research to analyze the phytosanitary condition and establish the distribution and development of pests and diseases in the plantations of vegetable crops of the genus *Solanum* (tomato, pepper, eggplant), the genus *Raphanus* (radish, oil radish, seed radish, black radish, daikon) and the genus *Brassica* (cabbage, cauliflower, broccoli) for cultivation in open ground conditions in the territory of the central part of the Right Bank Forest Steppe of Ukraine.

Research materials and methods. The research was carried out at the Uman National University of Horticulture. During 2008—2022, monitoring of the phytosanitary state of agrocenoses of vegetable crops was carried out on the territory of the Cherkasy region, as representative of the Right Bank Forest-Steppe zone: nightshade family (Solanaceae) of the nightshade family (*Solanum*) — tomato, pepper, eggplant; Cabbage family (Brassicaceae): genus Radish (*Raphanus*) — radish, oil radish, seed radish, black radish, daikon) and genus Cabbage (*Brassica*) — cabbage, cauliflower, broccoli.

Registration of pests and diseases of vegetable crops was carried out according to generally accepted methods [21, 22]. During phytopathological records, the spread of the disease in the agrocenosis and the degree of its development or the average damage of individual organs in percentages were determined according to the methods of the Institute of Plant Protection of the National Academy of Sciences [21]. The records of harmful entomofauna were carried out during route surveys during the growing season of crops in the main phases of their development using generally accepted methods [23, 24]. The establishment of the taxonomic affiliation of insects was carried out with the help of identifiers and directories [23].

Results and discussion. As a result of research, it was established that a high number of harmful organisms exceeding the economic threshold of harmfulness was found on about 75% of the examined areas of vegetable crop plantations (Table 1). This indicates a high level of biological pollution of agrocenoses and increased environmental risks, given the existing phytosanitary condition in vegetable plantations (table 1).

Dominant types of pests (insects, phytophagous mites, slugs) in the agrocenoses of the studied crops are listed in table. 2, 3.

As can be seen from the table. 2,

in the structure of the dominant species of pests of the agrocenosis of vegetable crops of the solanum genus (*Solanum*), there were insects (8 species or 80%), mites (1 species or 10%) and slugs (1 species or 10%).

On average, during 2008—2022, the area occupied by phytophagous insects, depending on the species, ranged from 13% to 98%, and plant damage ranged from 14% to 65%. It was also recorded that almost 26% of the cultivated areas were inhabited by the common spider mite, which caused 40.7% of plant damage. According to the number of pests on the plant and the percentage of damaged plants, it was found that the level of EPS was exceeded by 2.6 times: the Colorado potato beetle (*Leptinotarsa decemlineata* Say.), the common cabbage weevil (*Gryllotalpa gryllotalpa* L.), the greenhouse whitefly (*Trialeurodes vaporariorum* Wstw.), the gnawing scoop (*Agrotis segetum* Denis&Schiff., Lacanobia oleracea) — 2.2 times, larvae of weevils (*Agriotes* spp) — 1.4 times, ticks (*Tetranychus urticae* Koch.) — 1.9 times.

In the agrocenosis of crops of the cabbage family (Brassicaceae) (radish, oil radish, seed radish, black radish, daikon, white cabbage, cauliflower, broccoli) in the territory of the Cherkasy region. significant damage was caused by insects, which on average accounted for 94% of the total structure of pests, and slugs (Table 3).

Among the identified 16 dominant species of phytophagous insects, the most numerous (6.8—29.0 copies/plant) over the years of research were: cabbage aphid (*Brevicoryne brassicae* L), fleas: cruciferous (*Phyllotreta cruciferae* Goeze) and wavy (*Phyllotreta undulate* Kutsch.), cabbage moth (*Plutella maculipennis* Curt.), sprout fly (*Delia platura* Meigen,) and cabbage spring moth (*Delia brassicae* Bouche.). The largest area occupied by crops on average for 2008—2022 was found to be cabbage bug (*Eurydema ventrali* Kolenati,) — 46.7%, cabbage whitefly (*Pieris brassicae* L.) — 42.4%, winter sawfly (*Agrotis segetum* Denis&Schiff.) — 41.6%, cruciferous (*Phyllotreta cruciferae* Goeze) and wavy (*Phyllotreta undulate* Kutsch) fleas — 37.6—37.8%, cabbage aphid (*Brevicoryne*

1. The phytosanitary state of agrophytocenoses of vegetable crops of the nightshade and cabbage family in the conditions of the central part of the Right Bank Forest Steppe of Ukraine (Cherkasy region), 2008—2022

Harmful organism	Proportion of plantations with an exceedance of EPSH, % of the total area	
	agrocenosis of Solanaceae*	agrocenosis of Brassicaceae
Phytophagous insects	86	61
Diseases	73	79
Note: * — except potatoes		

2. The main types of pests in agrocenoses of vegetable crops genus Solanum, average for 2008—2022*

Name of the pest	Crop settlement area, %	Number of pests, ex./plant	Plant damage, %
Potato beetle (*Leptinotarsa decemlineata* Say.)	97.7	27.1	65.1
Greenhouse peach aphids (*Myzodes persicae* Sulz.)	71.8	28.4	51.6
Tobacco thrips (*Thrips tabaci* Lindeman)	37.3	15.7	24.8
Winter scoop (*Agrotis segetum* Denis & Schiff.)	37.3	2.2	14.1
Garden scoop (*Lacanobia oleracea* L.)	38.8	3.0	18.2
Greenhouse whitefly (*Trialeurodes vaporariorum* Wstw.)	14.5	22.3	33.4
Wireworms — larvae of woodpeckers (*Agriotes* spp.)	31.9	7.1	15.7
Cabbage common or bear (*Gryllotalpa gryllotalpa* L.)	13.3	2.2	13.9
Common spider mite (*Tetranychus urticae* Koch.)	25.8	7.7	40.7
Naked snails (*Kailie gliemeži*)	7.2	1.7	13.6
Note: * — except potatoes			

3. The main types of pests in agrocenoses of vegetable crops genera Raphanus and Brassica**, average for 2008—2022*

Name of the pest	Crop settlement area, %	Number of pests, ex./plant	Plant damage, %
Cruciferous fleas (*Phyllotreta cruciferae* Goeze)	37.6	10.8	19.2
The plaque is wavy (*Phyllotreta undulate* Kutsch.)	37.8	7.4	14.6
Cabbage aphid (*Brevicoryne brassicae* L.)	26.6	29.0	20.6
Tobacco thrips (*Thrips tabaci* Lindeman)	8.2	2.8	3.6
Winter snowdrop (*Agrotis segetum* Denis & Schiff.)	41.6	1.8	4.2
Garden scoop (*Lacanobia oleracea* L.)	36.8	2.5	12.4
Cabbage bilan (*Pieris brassicae* L.)	42.4	2.5	7.3
Cabbage moth (*Plutella maculipennis* Curt.)	33.4	8.9	22.6
Cabbage bug (*Eurydema ventralis* Kol.)	46.7	3.0	4.0
Spring cabbage fly (*Delia brassicae* Bouché.)	10.9	6.8	13.6
Summer cabbage fly (Delia floralis Fallén)	8.8	2.4	2.2
Sprout fly (*Delia platura* Meigen)	6.2	7.5	13.3
Pod (burnt) bonfire (*Evergestis extimalis* Scop.)	1.8	1.7	1.2
Cabbage stem octopus (*Ceuthorrhynchus quadridens* Panz.)	6.8	2.2	4.3
Rapeseed leaf eater (*Entomoscelis adonidis* Pallas)	5.7	3.7	5.7
Rapeseed sawfly (*Athalia rosae* L.)	18.0	2.1	3.0
Naked snails (*Kailie gliemeži*)	7.0	1.2	6.7
Note: *genus Raphanus — radish, oil radish, seed radish, black radish, daikon); **genus Brassica — cabbage, cauliflower, broccoli			

brassicae L.) — 26.6%. Exceeding the level of ESR was 1.1—2.5 times.

It is worth noting that among the detected pests there are polyphagous species that damage both nightshade and cabbage family crops, as well as other crops, and therefore pose a greater threat to agricultural crops and require constant control of their numbers. Such species are tobacco thrips (*Thrips tabaci* Lindeman) and nibbling scoops: winter (*Agrotis segetum* Denis&Schiff.) and garden (*Lacanobia (Mamestra) oleracea* L.).

Among the harmful biological agents that cause significant crop yield losses and biological pollution of agrocenoses, it is important to constantly monitor and control the number of plant pathogens.

The analysis of long-term monitoring studies on the main diseases of vegetable crops of fungal, bacterial and viral etiology proved their significant spread and development in the studied agrocenoses in the territory of the Cherkasy region. (Fig. 1). Phytosanitary monitoring of agrocenoses of vegetable crops of the solanaceae and cabbage families, both in private (homestead) and farm farms, revealed a complex of diseases of various origins, among which the causative agents of mycoses dominated (49—58% on average). This group of mycelial microorganisms-phytopathogens causes significant damage to food safety due to the destruction of up to 30% of crop production due to diseases and spoilage processes, as well as the production of mycotoxins, which threatens the safety of food and feed products [25].

The share of pathogens of viral diseases was the smallest and amounted to 6—8%, which caused the development of viral mosaic, in particular in nightshades: tomato mosaic (*the causative agent of Tomato mosaic virus*), bronzing (*spotted wilt*) of tomato (*Tomato spotted wilt virus*), cucumber mosaic (*Cucumber mosaic virus*), tobacco mosaic of tomato (*Tomato mosaic tobamovirus*); in cabbage: turnip mosaic virus (*Turnip mosaic virus*), etc.

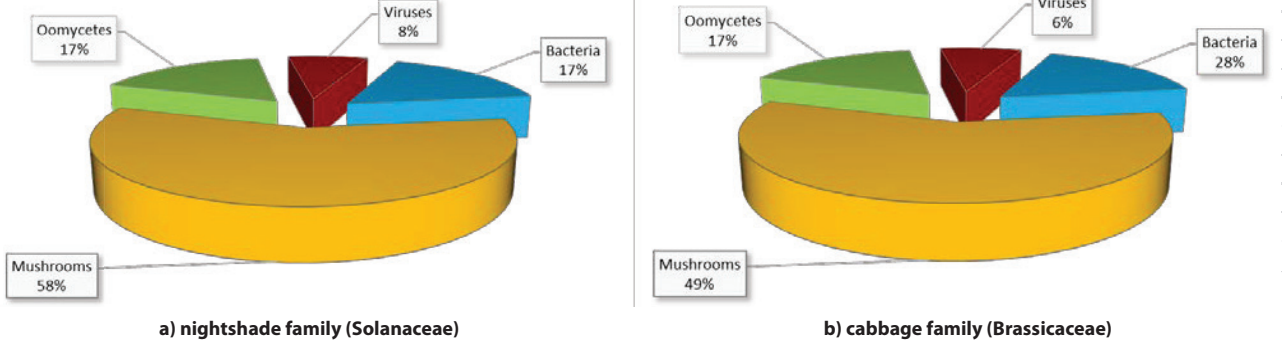
Agents of bacteria and oomycetes occupied intermediate importance in the structure of the pathogenic complex, but the negative consequences of their damage to plants can be threatening.

Thus, among the identified phytopathogens, five species are among the most dangerous in the world [26], which cause significant damage to vegetable crops. These species are classified as the most dangerous plant pathogens: bacteria *Pseudomonas syringae* and *Xanthomonas campestris*, fungi *Botrytis cinerea* and *Fusarium oxysporum*, oomycetes *Phytophthora infestans*. Therefore, it is very important to control the number of these pathogens of plant diseases and reduce the losses associated with their negative effects, especially with the introduction of environmentally safe methods.

It was established that during the growing season of 2008—2022 tomato, sweet pepper, and eggplant plants were dominated by pathogens that caused such diseases as late blight (*Phytophthora infestans*), black leg (*Pythium debaryanu*, *Rhizoctonia solani*, *Phytophthora* spp, *Fusarium* spp), rots of various plant organs (fusarium — *Fusarium* spp.), white rot (the causative agent of *Sclerotinia sclerotiorum*), gray rot (*Botrytis cinerea*), fruit top rot (*Pseudomonas persicum* Burd)) and septoria (*Septoria lycopersici*) (Table 4). The areas of crops affected by these diseases averaged 25—39% during the years of research, and in some years reached 82—90%. The average prevalence of these diseases was 42.3%, 31.4%, 38.3% and 28.4%, and their development was 35.3%, 27.5%, 23.7% and 25.9%, respectively. The spread of diseases of viral etiology was recorded on average at the level of 29.1%, and the development of diseases caused by pathogens *Tomato mosaic tobamovirus*, *Tomato mosaic virus*, *Tomato spotted wilt virus*) 22.0%.

Also, a high rate of disease development (29.7%) was noted for bacterial cancer causative agents — *Clavibacter michiganensis* subsp. Michiganensis, *Corynebacterium michiganensis* Jensen., *Pseudomonas tumefaciens* Stew., and the maximum area of plantation damage in some years reached 80%.

A somewhat different situation was recorded in the agrocenoses of the studied crops of the genus *Raphanus* and *Brassica* from the cabbage family. In particular, the area of crops affected by diseases was within 14—40% (Table 5). We recorded the largest areas affected by fusarium wilt (*Fusarium oxysporum* f. sp. *raphani*) — 39.9% (max 88%), powdery mildew (*Erysiphe communis* Grew. f. brassicae Hamm.) — 32.4% (max 90%), black stem (*Pythium debaryanu, Rhizoctonia solani, Phytophthora* spp., *Fusarium* spp.) — 30.4% (max 80%), phomosome (*Phoma lingam* (Tode) Desm.) — 29.9% (max 86%), leaf blight (*Pseudomonas syringae* pv. *maculicola*) — 28.3% (max 84%).



a) nightshade family (Solanaceae)

b) cabbage family (Brassicaceae)

Fig. 1. The structure of the pathogenic complex of agrocenoses of vegetable crops (a — Solanaceae, b — Cabbage), average for 2008—2022, %

According to the averaged data from 2008—2022, the greatest prevalence of powdery mildew (35.7%), cruciferous root rot (35.5%), rot (35.4%), leaf blight (34.4%), alternariosis (32, 8%), fusariosis (32.8%) and fomosis (31.1%). For the remaining types of diseases, the distribution was less than 30% and almost at the same level — in the range of 26.6—28.6%.

For the studied period on the studied cultures of the genus *Raphanus* and *Brassica* a significant development of powdery mildew was noted (33.2%), bacterial cancer and leaf bacteriosis (30.0—30.1%), fusariosis (28.8%), vascular bacteriosis (28.3%) and phomosis (28.1%).

The least developed (24.2%) were diseases of viral etiology, for which the lowest percentage of affected crop areas was noted, on average 13.7%.

CONCLUSIONS

It was established that in the territory of the Cherkasy region. (central part of the Right Bank Forest-Steppe of Ukraine) on 75% of the surveyed areas of vegetable crops (tomato, pepper, eggplant, radish, oil radish, seed radish, black radish, daikon, white cabbage, cauliflower, broccoli) there is a high number of harmful organisms with an excess of EPSH, and the phytosanitary condition of agrocenoses needs drastic improvement.

In the structure of the dominant species of pests of agrocenoses of vegetable crops of the genera *Solanum*, *Raphanus* and *Brassica*, harmful insects occupied 80% and 94%. Naked snails (*Kailie gliemeži*) also caused significant damage to vegetables, and mites (*Tetranychus urticae* Koch.) also caused agrocenoses of nightshade crops.

According to the number of pests on the plant and the percentage of their damage, an average of 1.1—2.5 times the level of EPSH was found to be exceeded.

The phytopathogenic complex of vegetable crops was dominated by pathogens of fungal etiology, which affected an average of 14—40% (max. 88—90%), the area of plantations, and the spread of diseases ranged from 21 to 38%, depending on their development — 21—33%.

4. Spread and development of the main diseases of crops of the genus Solanum during growing seasons, average for 2008—2022, %*

Name disease and causative agent	Area of affected crops	Spread of diseases	Development of diseases
Phytophthora (*Phytophthora infestans*)	38.5 (90)**	42.3	35.3
Rotten: white rot (*Sclerotinia sclerotiorum*); gray rot (*Botrytis cinerea*); fruit top rot (*Pseudomonas persicum* Burd)	27.3 (88)	38.3	23.7
Fusarium wilt (*Fusarium oxysporum* f. sp. *melongena*)	15.9 (80)	21.3	20.7
Black leg (*Pythium debaryanu, Rhizoctonia solani, Phytophthora* spp., *Fusarium* spp.)	32.7 (82)	31.4	27.5
Alternariosis (*Alternaria alternata*)	18.9 (85)	23.6	22.1
Anthracnose (*Colletotrichum coccodes, phomoides, kruegerianum*)	14.2 (80)	23.3	21.1
Bacterial cancer (*Clavibacter michiganensis* subsp. Michiganensis, *Corynebacterium michiganensis* Jensen., *Pseudomonas tumefaciens* Stew.)	18.9 (80)	24.8	29.7
Verticillium wilt (*Verticillium albo-atrum, Verticillium dahliae*)	14.8 (84)	28.8	25.5
Septoria (*Septoria lycopersici*)	25.1 (87)	28.4	25.9
Mosaics (*Tomato mosaic tobamovirus, Tomato mosaic virus, Tomato spotted wilt virus*)	15.3 (80)	29.1	22.0
Note: * — except potatoes; **– in brackets — the maximum (max) value of the indicator			

5. Spread and development of the main diseases of Raphanus and Brassica** crops during growing seasons, average for 2008—2022, %*

Name disease and causative agent	Area of affected crops	Spread of diseases	Development of diseases
Black leg (*Pythium debaryanu, Rhizoctonia solani, Phytophthora* spp., *Fusarium* spp.)	30.4 (80)***	28.3	25.4
Alternariosis (*Alternaria alternata*)	17.3 (83)	32.8	25.9
White rot (*Whetzelinia sclerotiorum* (dBy.) Korf. et Dumont, *Botrytis cinerea* Fr.)	17.3 (90)	35.4	27.4
Wet rot (*Erwinia carotovora* Holl.)			
Black rot (alternaria) (*Alternaria* Nees. *A. raphani* Groves et Skolko, *A. brassicae* (Berk.) Sacc., A. oleraceae Milb., *A. tenuis* Nees., *Aphanomyces raphani*)			
Rhizoctonia (red rot) (*Rhisoctonia violacea* Tul.)			
Pythium rot (*Pythium* spp.)			
Bacterial cancer (*Clavibacter michiganensis* subsp. *Michiganensis*)	19.0 (83)	28.7	30.0
Downy mildew (false powdery mildew) *Hyaloperonospora brassicae* (ex *Peronospora Hyaloperonospora parasitica)*	23.4 (85)	28.4	26.0
Powdery mildew (*Erysiphe communis* Grew. f. brassicae Hamm.)	32.4 (90)	35.7	33.2
White rust (*Albugo candida, Cystopus candidus*)	24.4 (85)	27.1	26.7
Fusarium (*Fusarium oxysporum* f. sp. raphani)	39.9 (88)	32.8	28.8
Bacterial spotting (*Bacillus mycoides* Flugge, *Bac. mesentericus v. vulgatus* Flugge, *Bac. butiricus* v. betae Koczura)	25.4 (82)	28.6	25.5
Vascular bacteriosis (*Xanthomonas campestris* Dows.)	24.4 (87)	26.6	28.3
Phomosis (*Phoma lingam* (Tode) Desm.)	29.9 (86)	31.1	28.1
Bacteriosis of leaves (*Pseudomonas syringae* pv. *maculicola)*	28.3 (84)	34.4	30.1
Cruciferous hernia (or hernia) (*Plasmodiophora brassicae* Wor.)	24.4 (80)	35.5	27.1
Mosaics (*Turnip mosaic virus, Tomato mosaic tobamovirus*)	13.7 (81)	27.8	24.2
Note: *genus Raphanus — radish, oil radish, seed radish, black radish, daikon); **genus Brassica — cabbage, cauliflower, broccoli; ***in brackets — the maximum (max) value of the indicator			

Among the detected phytopathogens, 5 species are among the most dangerous in the world: *Pseudomonas syringae* and *Xanthomonas campestris*, fungi *Botrytis cinerea* and *Fusarium oxysporum*, oomycetes *Phytophthora infestans*, which requires constant control and limitation of their number and harmfulness.

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[1]Щетина С.В., [1]Мостов'як І.І., [2]Федоренко В.П.

[1]Уманський національний університет садівництва, вул. Інститутська, 1, м. Умань, Черкаська обл., 20300, Україна

[2]Інститут захисту рослин НААН, вул. Васильківська, 33, м. Київ, 03022, Україна

Фітосанітарний стан агроценозів овочевих культур родів *Solanum*, *Raphanus* і *Brassica* відкритого ґрунту в умовах центральної частини Правобережного Лісостепу України

Мета. Проаналізувати фітосанітарний стан та встановити поширення і розвиток шкідників і збудників захворювань у насадженнях овочевих культур родів *Solanum* (помідор, перець, баклажан), *Raphanus* (редиска, редька олійна, редька посівна, редька чорна, дайкон) і *Brassica* (капуста білоголова, цвітна, броколі) за вирощування в умовах відкритого ґрунту на території центральної частини Правобережного Лісостепу України. **Методи.** Дослідження проведено відповідно до загальноприйнятих в ентомології, фітопатології та овочівництві методів. Упродовж 2008—2022 рр. на присадибних ділянках і фермерських господарствах на території Черкаської області визначали: щільність популяції, чисельність, поширення й розвиток шкідників та збудників захворювань овочевих культур. **Результати.** В структурі домінантних видів шкідників агроценозу овочевих культур роду паслін (*Solanum*) були комахи (8 видів — 80%), кліщі (1 вид — 10%) і слимаки (1 вид — 10%). В агроценозі культур родини Капустяні (Brassicaceae) значної шкоди наносили комахи, які в загальній структурі шкідників займали 94% (16 видів) та голі слимаки (1 вид). У середньому за 2008—2022 рр. площа заселення посівів помідора, перцю солодкого, баклажана комахами-фі-

тофагами залежно від виду варіювала від 13 до 98%, а пошкодження рослин — від 14 до 65%, звичайним павутинним кліщем — 26%. Встановлено перевищення рівня економічного порогу шкідливості (ЕПШ): *Leptinotarsa decemlineata* Say. в 2,6 раза, *Gryllotalpa gryllotalpa* L., *Trialeurodes vaporariorum* Wstw., *Agrotis segetum* Denis & Schiff. і *Lacanobia* (*Mamestra*) *oleracea* L. — в 2,2 раза, личинок *Agriotes* spp. — в 1,4 раза, *Tetranychus urticae* Koch. — в 1,9 раза. Найбільша площа заселення посівів культур родини Brassicaceae у середньому за 2008—2022 рр.: *Eurydema* (*Rubrodorsalium*) *ventralis* Kolenati — 46,7%; *Pieris brassicae* L. — 42,4%; *Agrotis segetum* Denis & Schiff. — 41,6%; *Phyllotreta cruciferae* Goeze та *Phyllotreta undulate* Kutsch.) — 37,6—37,8%, *Brevicoryne brassicae* L.) — 26,6%. Зафіксовано перевищення ЕПШ — в 1,1—2,5 раза. У структурі фітопатогенного комплексу агроценозів досліджуваних овочевих культур родин Пасльонові і Капустяні домінували збудники мікозів (у середньому 49—58%). Частка збудників вірусних хвороб була найменшою і становила 6—8%, які спричиняли розвиток вірусної мозаїки. Проміжне значення в структурі комплексу займали представники бактерій та ооміцетів, проте негативні наслідки ураження ними рослин в окремі роки можуть мати загрозливий характер.

Висновки. На території Черкаської області (центральна частина Правобережного Лісостепу) близько 75% обстежених площ насаджень помідора, перцю, баклажана, редиски, редьки олійної, редьки посівної, редьки чорної, дайкона, капусти білоголової, цвітної, броколі характеризуються високою чисельність шкідливих організмів із перевищенням ЕПШ, а фітосанітарний стан агроценозів потребує постійного моніторингу та оперативного контролю. У структурі домінантних видів шкідників в агроценозах культур родів *Solanum*, *Raphanus* і *Brassica* переважали комахи (до 94%). Також значної шкоди завдавали голі слимаки (*Kailie gliemeži*), а в агроценозах пасльонових культур — ще й кліщі (*Tetranychus urticae* Koch.). Перевищення рівня ЕПШ становило в середньому в 1,1—2,5 раза залежно від виду шкідника. У фітопатогенному комплексі овочевих культур домінували збудники грибної етіології, якими було уражено від 14 до 40% (max 88—90%) площ овочевих насаджень, поширення захворювань становило 21—38%, їх розвиток варіював від 21 до 33%. Серед виявлених патогенів рослин, що потребують посиленого контролю, 5 видів належать до найбільш небезпечних у світі: фітопатогенна грамнегативна паличкоподібна бактерія *Pseudomonas syringae*; судинний бактеріоз, зокрема капусти *Xanthomonas campestris*; грибні захворювання *Botrytis cinerea* та *Fusarium oxysporum*; ооміцет *Phytophthora infestans*.

моніторинг; шкідливі організми; контроль чисельності; фітосанітарний стан; овочеві культури відкритого ґрунту; патогени

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