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THE MAIN PEST OF PEAS – THE PEAS GRAIN EEDER (*BRUCHUS PISORUM* L.)

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Problem statement. The garden or field pea is cultivated worldwide in temperate climates, but *Pisum sativum* L. is naturally found in Europe, north-west Asia and extending south to temperate east Africa, while *P. fulvum* Sibth. and Sm. is restricted to the Middle East. The pea has been cultivated for millennia, possibly because of the low levels of toxins in the seed and the relatively high protein content of 25%. Peas remain today one of the most important temperate pulse, fodder and vegetable crops. Garden peas (*P. sativum* var. *sativum*) are produced primarily for human consumption, field peas *(P. sativum* var. *arvense* (L.) Poiret) for livestock and traditionally as green manure. The pods are also eaten immature as a vegetable (e.g. mangetout, sugar snap peas or snow peas). In a number of developed countries, a significant proportion of the crop is now harvested in an immature state and frozen to make a convenience food.

Pea (*Pisum sativum* L.) is one of the most important leguminous crops in world and domestic agriculture. It has significant food, feed and agrotechnical importance, as it is an important source of vegetable protein and a valuable precursor in crop rotations due to its ability to biologically fix atmospheric nitrogen. In Ukraine, pea culture is widely grown in various soil and climatic zones, in particular in the Steppe and Forest-Steppe, where favorable conditions are created for the formation of high yields.

However, obtaining a consistently high productivity of peas is largely limited by the harmful effects of a complex of phytophagous pests. Among them, the pea grain borer (*Bruchus pisorum* L.) is particularly dangerous – a specialized pest that damages the seeds of the crop both in the field and during storage. The larvae of this species develop inside the grain, eating away a significant part of the endosperm, which leads to a significant reduction in seed weight, deterioration of its sowing and nutritional qualities, as well as a decrease in germination.

An additional difficulty in combating the pest is its hidden lifestyle. The main part of development takes place inside the grain, which significantly complicates the use of insecticides and reduces the effectiveness of traditional methods of plant protection. In this regard, the improvement of the system of integrated protection of pea crops, which combines agrotechnical, organizational, biological and chemical measures to control the number of pests, is of particular relevance.

Analysis of recent research and publications. According to many studies, damage to peas by the grain borer can lead to a loss of 30–35% of the seed mass, and the infection rate of grain batches in some years reaches 80–98%. This problem is especially acute in the southern regions of Ukraine, in particular in the Odessa region, where climatic conditions contribute to the active development of the pest and the formation of its high numbers [1].

An additional difficulty in combating the pest is its hidden lifestyle. The main part of development takes place inside the grain, which significantly complicates the use of insecticides and reduces the effectiveness of traditional methods of plant protection. In this regard, the improvement of the system of integrated protection of pea crops, which combines agrotechnical, organizational, biological and chemical measures to control the number of pests, is of particular relevance [2].

Diversity in pea plant germplasm is crucial in breeding programmes to select highly yielding varieties resistant to Bruchid damage. At the Institute of Forage Crops in Pleven, Bulgaria, nine field pea accessions underwent evaluation for resistance to the pea weevil *Bruchus pisorum* L. The study identified a relationship between the damage inflicted by the weevils and certain phenological and morphological characteristics. Earlier flowering and formatting pod accessions had a lower sum of the effective temperatures and were characterised by low weevil density. Accessions with

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a low percentage of damaged seeds with Bruchid emergence holes were distinguished by high seed weight and higher-damaged ones with parasitoid emergence holes. The large seeds had low weight loss from weevil larvae, too. Parasitoid Triaspis thoracica reduced weevil larvae when the larvae in damaged seeds were in early instars and can be a successful biological agent of B.pisorum in earlier and shorter flowering and pod formation cultivars. Also, a mechanical barrier, such as the thickness of the pod wall, can limit larvae penetration in the pod and reduce weevil damage. Line 5/04-8 and L 5/01-3 were classified as resistant to B.pisorum and could be used in future breeding programmes such as resistant sources [3].

Bruchus pisorum (L.) is one of the most intractable pest problems of cultivated pea in Europe. Development of resistant cultivars is very important to environmental protection and would solve this problem to a great extent. Therefore, the resistance of five spring pea cultivars was studied to *B. pisorum*: Glyans, Modus; Kamerton and Svit and Pleven 4 based on the weevil damage and chemical composition of seeds. The seeds were classified as three types: healthy seeds (type one), damaged seeds with parasitoid emergence holes (type two) and damaged seeds with bruchid emergence holes (type three). From visibly damaged pea seeds by pea weevil *B. pisorum* was isolated the parasitoid *Triaspis thoracica* Curtis (Hymenoptera, Braconidae). Modus, followed by Glyans was outlined as resistant cultivars against the pea weevil. They had the lowest total damaged seed degree, loss in weight of damaged seeds (type two and type three) and values of susceptibility coefficients. A strong negative relationship ($r = -0.838$) between the weight of type one seeds and the proportion of type three seeds was found. Cultivars with lower protein and phosphorus (P) content had a lower level of damage. The crude protein, crude fiber and P content in damaged seeds significantly or no significantly were increased as compared with the healthy seeds due to weevil damage. The P content had the highest significant influence on pea weevil infestation. Use of chemical markers for resistance to the creation of new pea cultivars can be effective method for defense and control against B. pisorum [4].

The pea weevil, *Bruchus pisorum* L. is a major insect pest of field pea, Pisum sativum L. worldwide and current control practices mainly depend on the use of chemical insecticides that can cause adverse effects on environment and human health. Insecticides are also unaffordable by many small-scale farmers in developing countries, which highlights the need for investigating plant resistance traits and to develop alternative pest management strategies. The aim of this study was to determine oviposition preference of pea weevil among P. sativum genotypes with different level of resistance (Adet, 32410-1 and 235899-1) and the non-host leguminous plants wild pea (Pisum fulvum Sibth. et Sm.) and grass pea (Lathyrus sativus L.), in no-choice and dual-choice tests. Pod thickness and micromorphological traits of the pods were also examined [5].

Pea weevil (*Bruchus pisorum*) is a damaging insect pest affecting pea production worldwide. The aim of this study was to identify sources of resistance to pea weevil in a *Pisum* spp. germplasm in multi-environment field tests. Seed infestation and larval development were assessed in each environment and subjected to a heritability-adjusted genotype and genotype x environment biplot analysis. Results showed that seed infestation and larval development are independent traits. Accessions P669 (*P. sativum* ssp. *elatius*) and P656 (*P. fulvum*) showed a stable reduction in seed infestation across environments. Meanwhile, accessions P314 (*P. sativum* ssp. *elatius*) and P1 (*P. abyssinicum*) showed a stable reduction in larval development. The most promising accession was P665 (*P. sativum* ssp. *syriacum)* which showed resistance at both pod and seed levels. This study demonstrates the importance of environmental conditions for pea weevil infestation. Moreover, by submitting data to a CCA, the influence of climatic parameters over seed infestation and larval development has been elucidated [6].

Studies by domestic and foreign authors indicate that damage to pea seeds by the grain eater can reach 70–90% under favorable weather conditions for the pest. Crop losses can range from 10 to 40%, depending on the degree of crop infection [7–9].

A study was conducted to determine the response of five pea varieties (*Pisum sativum* L.) to damage degree of *Bruchus pisorum*: Glyans, Modus, Kamerton, and Svit (Ukrainian cultivars) and Pleven 4 (Bulgarian cultivar). The seeds were classified into three types: healthy seeds (type 1), damaged seeds with parasitoid emergence hole (type 2), and damaged seeds with bruchid emergence hole (type 3) and they were sown. It was found that the weight of 1000 seeds did not affect the field germination of the pea varieties. Healthy and damaged seeds with parasitoid emergence holes (first and second seed types) provide a very good opportunity for growth and development while plants from damaged seeds with bruchid emergence holes had poor germination and vigor and low productivity. These seeds cannot provide the creation of well-garnished seeding and stable crop yields. Among tested varieties, the Ukrainian variety Glyans had considerably higher seed weight, field germination, and index germination and weak egg-laying activity of *B. pisorum* compared to others. Use of spring pea cultivars that are weakly preferred by the pea weevil in breeding programs would reduce losses due to pea weevil and provide an environmentally safer option to its control [10].

Recent studies also indicate that the distribution and harmfulness of the pea weevil are largely dependent on climate change. Rising average annual temperatures are contributing to the expansion of the species' range and increasing its numbers, especially in the northern regions of Europe [11, 12].

Modern approaches to pest control involve the use of an integrated plant protection system. It includes: crop rotation, the use of resistant varieties, optimization of sowing and harvesting times, as well as the use of insecticides during the mass flight of beetles. Considerable attention is also paid to biological control methods, in particular the use of parasitic hymenoptera, which are able to reduce the number of pests.

Thus, the analysis of literary sources shows that the pea grain borer remains one of the most dangerous pests of pea crops. Despite a significant amount of research,

the issue of improving effective and environmentally safe control measures for this species, especially in conditions of climate change, requires further study.

The aim of the research was to study the biological features of the development of the pea weevil (*Bruchus pisorum* L.) in pea crops in the conditions of the Steppe of Ukraine, to establish the dynamics of the pest's population during the growing season, and to assess its impact on the mass and sowing quality of seeds of different crop varieties.

Therefore, studying the biological characteristics of the pea grain borer, the patterns of its development and distribution, as well as improving effective control measures in the conditions of modern agroclimatic changes is an important scientific and practical task.

To achieve the goal, it was planned to solve the following tasks: to establish the features of the seasonal dynamics of the number of pea grain borer in pea crops; to determine the impact of seed damage by the pest on the weight of 1000 grains; to assess the impact of seed damage on its germination; to establish the effectiveness of post-harvest fumigation of grain during storage to preserve seed quality.

Materials and methods. The research was conducted in 2023–2025 in the pea production crops of the VIP-AGRO LLC farm in the Odessa region, which is located in the Southern Steppe zone of Ukraine. The soil and climatic conditions of the region are characterized by a warm climate, moderate rainfall and a long growing season, which creates favorable conditions for the development of the pea weevil. The following pea varieties were used in the research: Svit, Belyy Angel, Darunok Stepu, Kruiz and Prystan.

Monitoring of the pest population in crops was carried out during the growing season of the crop in the budding and flowering phases. Beetles were counted using the entomological net method, performing 100 sweeps along the diagonal of the field. The results obtained were converted into the number of individuals per 100 sweeps of the net.

Grain mass determination was carried out by laboratory method by weighing 1000 seeds. For this purpose, undamaged and damaged seeds were selected separately. Grain mass losses were determined in percentages according to generally accepted methods.

Seed germination was determined by the laboratory germination method, in accordance with generally accepted methods for determining the germination of agricultural seed. Seed germination was determined in percentage as the ratio of the number of germinated seeds to the total number of seeds sown.

To assess the effectiveness of post-harvest treatment during storage, part of the grain was left untreated, while the other part was fumigated with the drug Fumifos before storage, which contains aluminum phosphide and is used to combat pests of stocks.

Fumigation was carried out in accordance with the regulations for the use of the drug at a grain mass temperature of not lower than 15 °C and grain moisture up to 15.5%. The treatment ensured the destruction of various stages of pest development – beetles, larvae and pupae.

The obtained experimental data were processed using statistical analysis methods, determining the average values of indicators by years of research [13, 14].

Results of the research. The research was conducted in the production crops of peas of the VIP-AGRO LLC farm in the Odessa district, Odessa region, with the aim of determining the impact of seed damage by the pea grain borer (*Bruchus pisorum* L.) on grain mass indicators, its germination, quality indicators, and establishing the features of the development and dynamics of the number of this pest in the conditions of the Ukrainian Steppe.

The results confirmed that the pea grain borer is one of the most widespread and dangerous specialized pests of peas in the southern region of Ukraine. Its development is closely related to the biology of the crop and weather conditions of the growing season.

During field observations and analysis of literature data, it was established that the adult pea grain borer is a small beetle 4–5 mm long. The body is broadly oval, somewhat flattened, black with rusty-gray pubescence. Whitish stripes are clearly visible on the elytra, which form characteristic oblique bands. At the end of the abdomen there is a characteristic pattern in the form of a white cross. The elytra are shortened and do not cover the last two segments of the abdomen. The eyes are large, convex. The antennae are eleven-segmented, thickening towards the apex. The first three segments of the antennae, as well as the front legs and shins, have a reddish color. The thighs of the hind legs on the inner side have a well-pronounced pointed tooth.

The eggs are amber-yellow, elongated, about 0.6 mm long, with two threadlike appendages. The first-instar larva is reddish, covered with hairs, and has three pairs of well-developed legs. After the first molt, it loses its limbs and acquires the typical legless worm-like shape of granivores. The adult larva is light yellow, C-shaped, 5–6 mm long, with a small light brown head retracted into the thoracic region. During development, it molts up to five times and after feeding it turns into a pupa.

Studies have shown that the pea grain borer is a typical oligophagous pest that damages mainly cultivated peas (*Pisum sativum* L.) and field peas (*Pisum arvense*). The development of the pest is closely related to the formation of beans and grains of the crop.

Adult beetles overwinter mainly inside pea grains in storage or in carrion in the field. Part of the population may overwinter under tree bark, in plant debris or in soil shelters. In spring, when the air temperature rises to 20–28°C, a mass exodus of beetles from the grain occurs.

In the field conditions of the Odessa region, the appearance of beetles was noted in May. At first, they concentrated on well-warmed areas – on weeds, in gardens, on the edges of forest belts. After that, the pest could fly to pea crops at a distance of up to 3 km. The period of active settlement of crops coincided with the phase of budding and the beginning of flowering of the crop. At this time, the beetles fed on pollen and petals of pea flowers. The greatest activity was observed in sunny weather at temperatures above 21 °C.

Females laid eggs on the surface of young beans. The fecundity of one female ranged from 70 to 222 eggs. Embryonic development lasted 6–10 days, after which the larvae penetrated into the middle of the grain, where the full cycle of its development took place. Within one grain, only one larva developed, which ate a significant

part of the endosperm. After completing feeding, the larva formed a pupation chamber. Larval development lasted 28–36 days, pupae – 14–20 days. The optimal temperature for development was 26–28°C, and at temperatures below 10–12°C, development stopped.

In the steppe zone of Ukraine, the pest formed one generation per year.

Monitoring of crops showed that the number of beetles in pea crops gradually increased throughout the growing season (Table 1).

Table 1

Dynamics of the number of pea grain borer in pea crops of VIP-AGRO LLC, Odesa region, average 2023–2025

Pea development phase	Number of beetles, specimens/100 net sweeps
Beginning of budding	18.3
Mass budding	23.4
Beginning of flowering	34.8
Mass flowering	48.2

The data in Table 1 characterize the dynamics of the number of pea grain borer in pea crops during the main phenological phases of crop development. The census was carried out using the entomological net method, the results are given per 100 sweeps, which is a standard method for assessing the number of phytophagous insects in field conditions. The indicators are given as average values for three years of research (2023–2025), which allows a more objective assessment of the features of the development of the pest population.

Analysis of the results obtained indicates a gradual increase in the number of beetles during the growing season of peas. At the initial stage of crop development, in the phase of the beginning of budding, the number of pea grain borer was on average 18.3 individuals/100 sweeps of the net. During this period, the mass flight of beetles after wintering and the beginning of their settlement of crops occurs.

In the phase of mass budding, the pest population increased to 23.4 individuals/100 strokes, which is explained by the active flight of beetles from wintering places to pea crops and their concentration on plants. It was during this period that the main part of the population participating in reproduction was formed.

The most intensive increase in the pest population was observed in the phase of the beginning of flowering, when the indicator was 34.8 individuals/100 sweeps of the net. At this time, the beetles actively feed on pollen and flower petals, which creates favorable conditions for their development and increased reproductive activity..

The maximum number of pea grain borer was noted in the phase of mass flowering of peas, when it reached 48.2 individuals/100 net sweeps. During this period, mass egg laying is observed on young beans, which determines the further formation of a new generation of the pest. It is this stage of crop development that is the most critical for the grain borer's harmfulness, since the larvae, after rebirth, penetrate the grain and begin to feed on the endosperm.

The results also indicate that already in the phase of budding, the number of beetles approaches the economic threshold of harmfulness, which is approximately 150–200 specimens per 100 sweeps of the net (15–20 beetles per 10 sweeps). Subsequently, the number of the pest significantly exceeds this indicator, which confirms the need for protective measures during the budding period – the beginning of pea flowering.

Thus, the results of the research showed that in the conditions of the Odessa region, the development of the pea grain borer population is characterized by pronounced seasonal dynamics, with a gradual increase in numbers from the beginning of budding to mass flowering of the crop. This confirms the need for systematic monitoring of pea crops and timely application of integrated plant protection measures to prevent significant crop losses.

The conducted studies showed that the pea grain borer is one of the key factors in reducing the quality and mass of pea seeds in the conditions of the Odessa region. The maximum number of the pest was observed in the flowering phase of the crop, when favorable conditions are created for egg laying and larval development.

Seed damage resulted in a loss of 3.7–11.5% of the 1000-grain weight, depending on the variety. The greatest losses were characteristic of the Prystan variety, while the Darunok Stepu variety was relatively more resistant to damage.

One of the indicators of the pest's harmfulness is the reduction in seed weight due to the larvae eating the endosperm.

During the research, the effect of damage to pea seeds by the pea grain borer (*Bruchus pisorum* L.) on the weight of grains of different crop varieties was studied. The research was conducted on the crops of the VIP-AGRO LLC farm in the Odessa region, where the weight of 1000 undamaged

Table 2

The impact of damage by the pea grain borer on the weight of 1000 grains of different pea varieties, VIP-AGRO LLC, Odesa region, average for 2023–2025

Variety name	Weight of 1000 grains, g		Difference in weight	Mass loss, %
	undamaged	damaged	undamaged damaged	
World	198.1	180.4	17.7	8.9
White Angel	202.2	191.1	11.1	5.5
Gift of the Steppe	190.6	183.6	7.0	3.7
Cruise	201.6	186.3	15.3	7.6
Pier	206.8	183.1	23.7	11.5
LSD_{05}			5.7	-

and damaged grains was determined, as well as the difference between these indicators (Table 2).

It is known that the larvae of the pea grain borer develop inside the seed, feeding on the endosperm, which leads to the formation of cavities in the grain and a significant reduction in its mass. The degree of damage depends on the variety, growing conditions and the number of the pest during the period of bean formation.

Analysis of the 1000-grain weight indicators showed that damage to peas by grain borers leads to a noticeable decrease in seed weight in all studied varieties. The largest weight of 1000 undamaged grains was noted in the Prystan variety – 206.8 g, while the smallest – in the Darunok Stepu variety (190.6 g).

After damage by the pest, a decrease in grain weight was observed. The greatest weight loss was observed in the Prystan variety, where the difference between undamaged and damaged grains was 23.7 g, indicating a significant level of damage. Significant weight losses were also recorded in the Svit variety – 17.7 g, and the Kruiz variety – 1–5.3 g.

The smallest difference in mass between undamaged and damaged grains was found in the Darunok Stepu variety – only 7.0 g, which may indicate a relatively higher resistance of this variety to damage by the grain eater or a less intensive development of the pest in its seeds.

The results obtained indicate that damage to pea seeds by the pea grain borer significantly affects grain weight. On average, the weight loss of 1000 grains in the studied varieties was 7.4%.

The greatest weight losses were characteristic of the Prystan variety (11.5%), which may indicate a greater attractiveness or susceptibility of this variety to damage by the pest. The Svit and Kruiz varieties were also characterized by significant losses – 8.9% and 7.6%, respectively.

The lowest level of losses was found in the Darunok Stepu variety (3.7%), which may indicate certain morphological or biochemical features of the grain that reduce the feeding intensity of the pest larvae.

Thus, the results of the research confirm the significant impact of the pea grain borer (*Bruchus pisorum* L.) on the qualitative and quantitative indicators of the pea harvest. It was established that seed damage leads to a decrease in grain mass, which negatively affects the marketable and sowing qualities of the product. The data obtained indicate the need to improve the system of pea crop protection and introduce more resistant varieties into production.

Eating grain damaged by the pea grain borer can cause digestive disorders, since the waste products of the larvae contain toxic substances. In this regard, peas affected and contaminated with grains lose their value as a food product. In addition, the sowing quality of such seeds is significantly reduced, which negatively affects the formation of the future harvest.

In order to establish the effect of damage by the grain borer on seed germination and assess the effectiveness of post-harvest treatment during storage, a study was conducted at the farm of VIP-AGRO LLC in the Odessa region. After harvesting, part of the seeds were stored without additional treatment, while the other part was subjected to fumigation before storage.

For seed disinfection, permitted fumigants based on phosphine were used, in particular the drug Fumifos, which is widely used to combat pests of stocks. The treatment was carried out in accordance with the application regulations at a grain mass temperature of not less than 15 °C and grain moisture content of up to 15.5%. As a result of fumigation, beetles, larvae and pupae of the pest in the grain were destroyed.

To assess the impact of damage by the grain eater on sowing quality, a laboratory determination of the germination of seeds of different pea varieties was carried out. The experiment compared affected seeds (without fumigation) and healthy, disinfected seeds (after fumigation) (Table 3).

The results obtained indicate a significant negative impact of grain damage by the pea grain eater on its sowing quality. In all studied varieties, the germination of affected seeds was significantly lower compared to uninjured ones.

The highest germination rate among damaged seeds was found in the variety Svit – 57.7%, while the lowest rate was observed in the variety Kruise – only 43.8%. This indicates significant damage to the seed embryo due to feeding by the grain eater larvae.

After disinfection and selection of undamaged seeds that had undergone fumigation during storage, germination rates increased significantly. Thus, in the Darunok Stepu variety, germination reached 96.8%, in the Svit variety – 95.3%, and in the Kruiz variety – 94.3%.

The difference between affected and undamaged seeds ranged from 37.6% to 50.5%, which indicates significant damage by the pea grain borer.

The greatest decrease in germination was noted in the Kruiz variety, where the difference between affected and healthy seeds was 50.5%. This is explained by the fact that the pest larva, developing in the grain, often damages the seed embryo, which leads to a complete loss of its viability.

On average, the decrease in germination of affected seeds was about 43.8%, which is a significant indicator of the loss of sowing qualities.

Table 3

Effect of damage by the pea grain borer (*Bruchus pisorum* L.) on pea seed germination,%, average 2023–2025

Sort	Pea germination,%		Difference,%
	affected seeds	undamaged, after fumigation	
Svit	57.7	95.3	37.6
White angel	47.8	92.5	44.7
Darynok Stepu	51.6	96.8	45.2
Kruise	43.8	94.3	50.5
Pristan	51.8	92.6	40.8

Thus, the results of the conducted studies confirm that damage to pea seeds by the pea grain borer (*Bruchus pisorum* L.) significantly worsens its sowing and food qualities. The affected grain is characterized by significantly lower germination, which can lead to thinned seedlings and reduced crop yield.

It has been established that the use of seed fumigation during storage with preparations such as Fumifos is an effective measure to combat the pest of stocks. Such treatment allows you to destroy various stages of grain borer development and maintain high sowing quality of seeds.

Therefore, to ensure high germination of pea seeds and prevent crop losses, it is advisable to combine timely protection of crops in the field and mandatory grain fumigation during storage. The integrated use of these measures allows you to significantly reduce the harmfulness of the pea grain borer and preserve the quality of seed material.

Conclusions. As a result of the conducted research, it was established that the pea grain borer (*Bruchus pisorum* L.) is one of the most dangerous specialized pests of peas in the conditions of the Southern Steppe of Ukraine.

A clear seasonal dynamics of the pest population was revealed. The largest number of beetles was observed in the phase of mass flowering of peas (48.2 individuals/100 net sweeps), which coincides with the period of maximum harmfulness.

Damage to seeds by the grain borer leads to a decrease in the mass of 1000 grains by 3.7–11.5%, depending on the variety. The greatest mass losses were recorded in the Prystan variety, the smallest – in the Darunok Stepu variety, which indicates differences in the resistance of varieties. The germination of seeds damaged by the grain borer is significantly reduced – by 37.6–50.5% compared to undamaged ones. This can lead to thinned seedlings and reduced yield.

It has been established that fumigation of grain during storage with the drug Fumifos is an effective measure to combat pests of stocks and allows maintaining high sowing quality of seeds.

Relevant for further research is a comprehensive study of resistant pea varieties, optimization of terms and methods of protection, as well as a systematic analysis of the influence of climatic factors on the dynamics of the *Bruchus pisorum* L. population and the effectiveness of integrated control measures.

BIBLIOGRAPHY:

1. Шушківська Н. І. Ентомофауна агроценозу гороху посівного. *Агробіологія.* 2013. № 11 (104). С. 142–145. URL: https://agrobiologiya.btsau.edu.ua/uk/content/entomofauna-agrocenozu-gorohu-posivnogo
2. Кукуруза О. Є., Ременюк С. О. Ріст та продуктивність гороху за різних технологічних прийомів вирощування в умовах Лісостепу України. *Наукові праці Інституту біоенергетичних культур і цукрових буряків*. 2023. № 31. С. 85–96. https://doi.org/10.47414/np.31.2023.292400.
3. Nikolova I. Evaluation of phenological and morphological traits in pea accessions (*Pisum sativum* L.) and their resistance to pea weevil (*Bruchus pisorum* L.). *Journal of Applied Entomology*. 2025. №149(2). P141–156.
4. Nikolova I. Pea weevil damage and chemical characteristics of pea cultivars determining their resistance to *Bruchus pisorum* L. *Bulletin of Entomological Research*. 2016. № 106(2). P. 268–277. https://doi.org/110.1017/S0007485315001133.
5. Mendesil E., Rämert B., Marttila S., Hillbur Y., Anderson P. Oviposition preference of pea weevil, *Bruchus pisorum* L. among host and non-host plants and its implication for pest management. *Frontiers in Plant Science*. 2016. № 6. P.1186.
6. Aznar-Fernández T., Carrillo-Perdomo E., Flores F., Rubiales D. Identification and multi-environment validation of resistance to pea weevil (*Bruchus pisorum*) in Pisum germplasm. *Journal of Pest Science*. 2018. № 91(2). P. 505–514.
7. Gadi V. P. Reddy, Anamika Sharma, Ramadevi L. Gadi. Biology, Ecology, and Management of the Pea Weevil (Coleoptera: Chrysomelidae). Annals of the Entomological Society of America. 2018. Vol.111, Iss. 4, P. 161–171. https://doi.org/10.1093/aesa/sax078
8. Кривенко А.І. Особливості розвитку горохового зерноїда на посівах гороху в центральному Лісостепу України. *Агробіологія.* 2011. Вип. 5(84). С. 24–26.
9. Шулещенко В. В. Біологічний та хімічний контроль комплексу шкідників бобових культур у Лісостепу України. *Scientific Progress & Innovations*. 2025. Т. 28(4). С. 65–73. https://doi.org/10.31210/spi2025.28.04.09.
10. Nikolova I. M. Response of Pea Varieties to Damage Degree of Pea Weevil, *Bruchus pisorum* L. *Scientifica*. 2016. № 1, 8053860. https://doi.org/10.1155/2016/8053860.
11. Kenis M., Hurley B.P., Hajek A.E. Cock M.J.W. Classical Biological Control of Insect Pests of Trees: Facts and Figures. *Biological Invasions*. 2017. Vol. 19. P. 3401–3417. https://doi.org/10.1007/s10530-017-1414-4
12. FAO. Grain Legumes Production and Protection. Rome: Food and Agriculture Organization of the United Nations. URL: https://www.fao.org/3/cb8898en/cb8898en.pdf (дата звернення 10.03.2026).
13. Трибель С. О., Сігарьова Д. Д., Секун М. П., Іващенко О. О. Методики випробування і застосування пестицидів. Київ: Світ, 2020. 448 с.
14. Хомик Н. І., Мартинюк В. В., Бабій А. В., Цьонь Г. Б., Довбуш Т. А., Довбуш А. Д. Агрозахист: навчальний посібник / за заг. ред. к. т. н., доц. Хомик Н. І. Тернопіль : ФОП Паляниця В. А., 2025. 520 с.

REFERENCES:

1. Shushkivska, N. I. (2013). Entomofauna ahrotsenozu horokhu posivnoho [Entomofauna of the agrocenosis of field peas]. *Ahrobiolohiia,* 11(104), 142–145. URL: https://agrobiologiya.btsau.edu.ua/uk/content/entomofauna-agrocenozu-gorohu-posivnogo [in Ukrainian].
2. Kukuruza, O. Ye., & Remenyuk, S. O. (2023). rist ta produktyvnist horokhu za riznykh tekhnolohichnykh pryyomiv vyroshchuvannya v umovakh Lisostepu Ukrayiny [Growth and productivity of peas under different technological methods of cultivation in the conditions of the Forest-Steppe of Ukraine]. *Naukovi Pratsi Instytutu Bioenerhetychnykh Kul'tur i Tsukrovykh Buryakiv,* 31, 85–96. https://doi.org/10.47414/np.31.2023.292400 [in Ukrainian].

3. Nikolova, I. (2025). Evaluation of phenological and morphological traits in pea accessions (*Pisum sativum* L.) and their resistance to pea weevil (*Bruchus pisorum* L.). *Journal of Applied Entomology*, *149*(2), 141–156.
4. Nikolova, I. (2016). Pea weevil damage and chemical characteristics of pea cultivars determining their resistance to *Bruchus pisorum* L. *Bulletin of Entomological Research*, *106*(2), 268–277. https://doi.org/110.1017/S0007485315001133.
5. Mendesil, E., Rämert, B., Marttila, S., Hillbur, Y., & Anderson, P. (2016). Oviposition preference of pea weevil, *Bruchus pisorum* L. among host and non-host plants and its implication for pest management. *Frontiers in Plant Science*, 6, 1186.
6. Aznar-Fernández, T., Carrillo-Perdomo, E., Flores, F., & Rubiales, D. (2018). Identification and multi-environment validation of resistance to pea weevil (*Bruchus pisorum*) in Pisum germplasm. *Journal of Pest Science*, 91(2), 505–514.
7. Gadi, V. P. R., Sharma, A., & Gadi, R. L. (2018). Biology, Ecology, and Management of the Pea Weevil (Coleoptera: Chrysomelidae). Annals of the Entomological Society of America, *111*(4), 161–171. https://doi.org/10.1093/aesa/sax078.
8. Kryvenko, A.I. (2011). Osoblyvosti rozvytku horokhovoho zernoida na posivakh horokhu v tsentralnomu Lisostepu Ukrainy [Peculiarities of the development of pea grain borer on pea crops in the central forest-steppe of Ukraine]. *Ahrobiolohiia*, *5*(84), 24–26 [in Ukrainian].
9. Shuleshchenko, V. V. (2025). Biolohichnyi ta khimichnyi kontrol kompleksu shkidnykiv bobovykh kultur u Lisostepu Ukrainy [Biological and chemical control of legume pest complex in the Forest-Steppe of Ukraine]. *Scientific Progress & Innovations,* 28(4), 65–73. https://doi.org/10.31210/spi2025.28.04.09.
10. Nikolova, I. M. (2016). Response of Pea Varieties to Damage Degree of Pea Weevil, *Bruchus pisorum* L. *Scientifica*, 1, 8053860. https://doi.org/10.1155/2016/8053860.
11. Kenis, M., Hurley, B.P., Hajek, A.E. & Cock, M.J.W. (2017). Classical Biological Control of Insect Pests of Trees: Facts and Figures. *Biological Invasions*, 19, 3401–3417. https://doi.org/10.1007/s10530-017-1414-4.
12. FAO. Grain Legumes Production and Protection. Rome: Food and Agriculture Organization of the United Nations. URL: https://www.fao.org/3/cb8898en/cb8898en.pdf
13. Trybel, S. O., Sigaryova, D. D., Sekun, M. P., & Ivashchenko, O. O. (2020). *Metodyky vyprobuvannya i zastosuvannya pestytsydiv [Methods of testing and application of pesticides].* Kyiv: Svit [in Ukrainian].
14. Khomyk, N. I., Martyniuk, V. V., Babii, A. V., Tson, H. B., Dovbush, T. A., & Dovbush, A. D. (2025). *Ahrozakhyst [Agroprotection].* Ternopil : FOP Palianytsia V. A. [in Ukrainian].

Trandafir I.V., Kryvenko A.I., Balan G.O., Zorunko V.I., Dzham M.A. The main pest of peas is the pea weevil (*Bruchus pisorum* L.)

The purpose of the research is to study the biological features of the development of the pea weevil (*Bruchus pisorum* L.) in pea crops under the conditions of the Steppe of Ukraine, to establish the dynamics of the number of the pest during the growing season, as well as to assess its effect on the weight and sowing quality of seeds of various crop varieties. **Methodology.** The research was conducted in 2023–2025 in the pea crops of the LLC "VIP-AGRO" farm of Odesa region, which is located in the Southern Steppe zone of Ukraine. **Results.** The obtained results indicate a significant negative impact of grain damage by pea grain on its sowing quality. Germination of affected seeds was significantly lower in all investigated varieties compared to unaffected ones. The highest germination among damaged seeds was found in the Svit variety – 57.7%, while the lowest indicator was observed in the Cruise variety – only 43.8%. After decontamination and selection of unaffected seeds that were fumigated during storage, germination rates increased significantly. Thus, the similarity reached 96.8% in the Darunok Stepa variety, 95.3% in the World variety, and 94.3% in the Cruise variety. The difference between affected and unaffected seeds was from 37.6% to 50.5%, which indicates the significant harmfulness of the pea weevil. The greatest decrease in germination was noted in the Cruise variety, where the difference between affected and healthy seeds was 50.5%. As a result of the conducted research, it was established that the pea weevil (*Bruchus pisorum* L.) is one of the most dangerous specialized pests of peas in the conditions of the Southern Steppe of Ukraine. A clear seasonal dynamics of the number of pests in crops was revealed. The largest number of beetles was observed in the phase of mass flowering of peas, when the number reached 48.2 specimens/100 sweeps of the net. Damage to pea seeds by a granuloid leads to a significant decrease in grain weight. Weight loss of 1000 grains, depending on the variety, was 3.7–11.5%. Infestation of the seed by a granuloid significantly worsens its sowing quality. The similarity of damaged seeds was lower by 37.6–50.5% compared to undamaged ones. It has been established that fumigation of grain during storage with the drug Fumifos is an effective measure to combat pests of stocks and allows maintaining high sowing qualities of seeds.

Key words: pea (*Pisum sativum* L.), productivity, pea weevil (*Bruchus pisorum* L.), 1000-seed weight, seed germination, plant protection, yield, grain.

Трандафір І.В., Кривенко А.І., Балан Г.О., Зорунько В.І., Джам М.А. Головний шкідник гороху – зерноїд гороховий (*Bruchus pisorum* L.)

Мета досліджень – вивчення біологічних особливостей розвитку горохового зерноїда (*Bruchus pisorum* L.) у посівах гороху в умовах Степу України, встановлення динаміки чисельності шкідника протягом вегетаційного періоду, а також оцінка його впливу на масу та посівні якості насіння різних сортів культури. **Методика.** Дослідження проводили у 2023–2025 рр. у виробничих посівах гороху господарства ТОВ «ВІП-АГРО» Одеської області, яке розташоване в зоні Південного Степу України. **Результати.** Отримані результати, свідчать про значний негативний вплив пошкодження зерна гороховим зерноїдом на його посівні якості. У всіх досліджуваних сортів схожість ураженого насіння, була істотно нижчою порівняно з неураженим. Найвищу схожість серед пошкодженого насіння, було встановлено у сорту Світ – 57,7%, тоді як найнижчий показник, спостерігався у сорту Круїз – лише 43,8%. Після знезараження та відбору неураженого насіння, яке пройшло фумігацію під час зберігання, показники схожості значно зростали. Так, у сорту Дарунок Степу схожість досягала 96,8%, у сорту Світ – 95,3%, у сорту Круїз – 94,3%. Різниця між ураженим і неураженим насінням становила від 37,6% до 50,5%,

що свідчить про значну шкодочинність горохового зерноїда. Найбільше зниження схожості відзначено у сорту Круїз, де різниця між ураженим і здоровим насінням становила 50,5%. У результаті проведених досліджень встановлено, що гороховий зерноїд (Bruchus pisorum L.) є одним із найнебезпечніших спеціалізованих шкідників гороху в умовах Південного Степу України. Виявлено чітку сезонну динаміку чисельності шкідника в посівах культури. Найбільша кількість жуків спостерігалася у фазі масового цвітіння гороху, коли чисельність досягала 48,2 екз./100 помахів сачком**.** Пошкодження насіння гороху зерноїдом, призводить до суттєвого зменшення маси зерна. Втрати маси 1000 зерен, залежно від сорту становили 3,7–11,5%**.** Ураження насіння зерноїдом значно погіршує його посівні якості. Схожість пошкодженого насіння, була нижчою на 37,6–50,5% порівняно з неураженим. Встановлено, що фумігація зерна під час зберігання препаратом Фуміфос є ефективним заходом боротьби зі шкідниками запасів та дозволяє зберегти високі посівні якості насіння.

Ключові слова: горох (*Pisum sativum* L.), продуктивність, гороховий зерноїд (*Bruchus pisorum* L.), маса 1000 насінин, схожість насіння, захист рослин, урожайність, зерно.

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