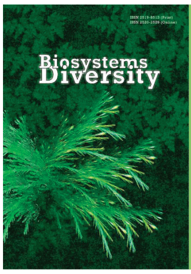

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The current state of the population of the golden potato cyst nematode *Globodera rostochiensis* (Nematoda, Heteroderidae) in the northwest of Ukraine

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The golden potato cyst nematode (GPCN) *Globodera rostochiensis* (Wollenweber, 1923) Skarbilovich, 1959 is a highly specific parasite of the roots of the nightshade plants (Solanaceae). Thus, the state of the pest population demands constant monitoring and control of distribution and numbers. The distribution of *G. rostochiensis* in Volyn region of Ukraine was studied in 2008–2018 using the data of the state institution the Volyn Regional Phytosanitary Laboratory. The present article gives the analysis of the study results. The disease foci were detected by visual above-ground inspection of potato plantings, also by manually collecting soil samples before planting the potatoes and after harvesting, and consequently analyzing theme. The initial (pre-planting) and conclusive (after harvest) population density of GPCN in the soil was determined by the number of cysts and the mean number of larvae and eggs in cysts obtained from 100 cm^3 of soil. Cysts were isolated from soil samples by the standard funnel flotation method. The dead and living larvae were identified visually by the shape of the body and the state of internal organs. According to the results of assessing pre-planting and post-harvest nematode numbers in soil, the reproduction coefficient P_f/P_i was calculated. In Volyn region, *G. rostochiensis* was first observed in 1968 on farmland and since then, the parasite has spread. Pest foci were recorded in 15 districts of the region in 303 settlements on the area of 946.123 hectares. It was however found that during the latest decade, the area of soils affected by *G. rostochiensis* in Volyn region decreased by 147.647 hectares. The largest infected areas (over 100 ha) were located in Kovel, Rozhyshche and Manevistky districts, the least infected area was observed in Ivanychi district of the region. The pest was not found in Lutsk district. The highest infection rate was recorded in Rozhyshche district. The highest ratio of viable cysts was observed in the soils of Volodymyr-Volynsky and Rozhyshche districts. The soils of the southern districts (located in the natural zone of forests and steppe) of the region demonstrated 1.5 times higher infection rates compared to soils of the northern districts (in the natural zone of mixed forests). The soils of the southern districts also harboured stable and strong pest populations. The pre-planting soil infection rates proved to directly depend on the reproduction coefficient of GPCN. If the values of P_i, initial infection rate, were lower than 1,000 larvae and eggs per 100 cm^3, the reproduction coefficient was 1.18. Increase in the pre-planting infection rate to 2,000 eggs and larvae per 100 cm^3 did not affect the reproduction coefficient. At approximately 5,000 eggs and larvae per 100 cm^3 the reproduction coefficient exceeded 2, which should be considered in developing the pest control measures.

Keywords: numbers dynamics; reproduction coefficient; infection rate

Introduction

The golden potato cyst nematode *Globodera rostochiensis* (Wollenweber, 1923) Skarbilovich, 1959 is the greatest threat to the production of potatoes around the world (Baker et al., 2012). The nematode persists in soil for 10 to 12 years, sometimes up to 20 years (Philis, 1980; Polozhenets et al., 2010). Thus, this species is subject to strict quarantine control in many countries including Ukraine (Pylypenko, 1998; Sigareva, & Pylypenko, 1998). The worst damage is caused by this pest on private plots where potatoes are grown without crop rotation (Babych et al., 2015). Canadian (Yu et al., 2010; Mimee et al., 2015), American (Brodie & Mai, 1989) and European (Philis, 1980; Webley & Jones, 1981; Minnis et al., 2012; Przetakiewicz, 2013) scientists rate the pathogenicity and reproduction and distribution abilities of GPCN as so high that without proper control it would cause 100 % harvest losses. At the same time, the growing world potato trade is associated with risks linked to the pest distribution and the problems with limiting its numbers. Culturing resistant potato varieties and introducing them to mass production in those conditions are most important in the relevant integral management programmes in Europe (Oka, 2010; Hockland et al., 2012; Sigareva et al., 2014).

In Ukraine, GPCN was found for the first time in the 1960s. The species was introduced here from the Baltic countries with infected planting material (Pylypenko, 1998; Sigareva et al., 2014). The first finding of *G. rostochiensis* was recorded in Storozhynetsky district of Chernivtsi region. Analyzing the data of the Chief State Inspection of Plant Quarantine of Ukraine it was found that GPCN was found in 10 regions of Ukraine including Volyn region as early as 1985, and the infected area was 1231.3 ha. Despite the implemented measures, in the 50 years after the first finding, the pest occurred in 14 regions of Ukraine (Pylypenko, 1998; Ohlyad poshyrennya karantynnyx orhanizmiv v Ukrayini na 01.01.2019 [An overview of the spread of quarantine organisms in Ukraine on January 01, 2019]). Today, the total area of *G. rostochiensis* distribution is 5,812.7 ha all over the territory traditionally used in potato farming in Ukraine. In the Volyn region, *G. rostochiensis* was for the first time found on private plots in 1968 (Pylypenko, 1998;

Polozhenets et al., 2010). Today, according to the state institution "Volyn Regional Phytosanitary Laboratory", there are records of this pest from 15 districts, 303 settlements from an area of 946.123 ha. The largest infected areas are observed in Kovel, Rozhyshche and Manevits districts. The pest foci are absent only in Lutsk district.

The plant disease caused by GPCN parasitizing in the plant roots is sometimes called globoderosis. Its symptoms manifest variously, depending on the pest density in the soil, biotope characteristics and agricultural melioration conditions (Scholte, 2000; Osypchuk et al., 2018). Severely infected plants can be easily distinguished from healthy ones by leaf colour, arrested growth, "barbate" root system, densely packed with cysts, and the overall depressed condition of the plant. Visually, the severity of plant disease is evaluated in between the budding and mass blooming phases, when the external signs of disease are seen most clearly (Minnis et al., 2002; Sigareva et al., 2010). Heavily infected plants blossom poorly or do not produce flowers at all (Seinhorst, 1984). An infected plant is characterized by lower photosynthesis levels and the consequent decrease in biomass. The merchantability (freight to small fractions ratio) of newly formed bulbs decreases together with their quality. The complete life circle of GPCN on turf-podzolic and sandy loam soils of the zone of mixed forests occurs in 63 to 68 days in average (Polozhenets et al., 2010; Suhareva, & Babych, 2013).

The harmfulness of GPCN is observed only at a certain level of soil infestation. It is determined that potato harvest decreases at 1,000 to 5,000 larvae per 100 cm^3 of soil (Seinhorst, 1984). That level of infestation is usually seen 5 to 6 years after single cysts appear in the soil. If the susceptible potato varieties are grown in monoculture, the nematode population grows annually. At 15 to 25 thousand *G. rostochiensis* larvae in 100 cm^3, there is almost no potato harvest (Seinhorst, 1984; Sigareva et al., 2010).

Today, the main directions of solving the potato globoderosis problem are culturing potato varieties which are resistant to GPCN (Sigareva et al., 2014; Pysarenko et al., 2018), implementing scientifically sound crop rotation (Scholte, 2000) and pest control measures (Renco, 2007; Oka, 2010). Those measures heavily depend on the agrotechnical method, which includes rotating potatoes with crops which are not susceptible to the infection, and replacing the susceptible potato varieties with the resistant ones. It is important to prevent growing infected food potatoes as planting material. The crop rotation used to combat nematode infections involves growing legumes, grains, technical crops, perennial grasses, etc.

The aim of the present work was to determine the distribution and rate of *G. rostochiensis* infestation in the northwestern region of Ukraine, in particular Volyn region.

Material and methods

The study is based on the material collected in 2008–2018 by the state institution "Volyn Regional Phytosanitary Laboratory" in all districts of the Volyn region, and collections gathered by scientists of the Department of Zoology of the Lesya Ukrainka Eastern European National University in 2018.

The pest foci were found by visual inspection of the potato plantings, also by collecting and analyzing soil samples (Sigareva & Pylypenko, 1998; Sigareva et al., 2010). The first signs of GPCN infection were seen at the beginning of potato vegetation. Infected plants produce a few weak shoots which yellow prematurely. They also experience arrested behaviour, they have a depressed appearance, the leaves are twisted, faded and subsequently become brown and fall off. Severely damaged plants do not flower or blossom poorly and form small tubers in small quantities.

In the course of routine inspections of private plots with the purpose of detecting *G. rostochiensis*, we used standard methods (Korzhuk et al., 2005; Mimee et al., 2015). Soil was sampled manually to determine the qualitative and quantitative composition of nematode populations before planting potatoes and after harvesting. The initial (pre-planting) and post-harvest density of the GPCN population in the soil was determined by the number of cysts and the average number of larvae and eggs in cysts isolated from 100 cm^3 of soil. Cyst samples were isolated using a standard funnel flotation method based on cysts floating in the water. Live and dead larvae were recognized visually by the shape of the body and the state of their internal organs. Some of the cysts (maximum 50) from the soil sample of each site were placed on a slide in a drop of water, covered with cover slip and pressed against the slide, and examined under a binocular microscope MBS-10 (van den Elsen et al., 2012; Mimee et al., 2015). Viable larvae became flattened, with a normal turgor of the body. Their cuticles allowed a good view of the internal organs. The dead larvae had a C-shaped sharply curved body, without a clear view of the internal organs.

In the second decade of April 2018, private plots in settlements of the Manevychi and Kovel districts (zone of mixed forests) and Rozhyshchin and Volodymyr-Volynsky districts (zone of forests and steppe) of the Volyn region of Ukraine were inspected in order to detect *G. rostochiensis.*

According to the results of inspection in 2018, four groups of private plots were identified with different degrees of GPCN invasion: high (> 5,000 larvae and eggs per 100 cm^3 of soil), medium (1,001–5,000 larvae and eggs per 100 cm^3 of soil) and low (<1,001 larvae and eggs in 100 cm^3 of soil), suitable for field research. The sites for field research were established in Naviz village, Rozhyshche district; Khmel'ivka village, Volodymyr-Volynsky district; Dorotyshche village, Kovel district; Ostrovky district, Manevychi district of the Volyn region. The chosen plots were used for planting local potatoes without any measures for globoderosis pest control.

After the potato harvest, the plots' soil was examined in September to detect and record the cysts of the new generation of *G. rostochiensis*. The pre-planting and post-harvesting nematode densities in the soil were compared resulting in the reproduction coefficient, Pf/Pi (the ratio of Pf, the number of newly formed cysts, to Pi, the number of cysts at the beginning of the experiment).

The vegetation period in 2018 began on March 29, when the average daily temperature was +5 ºC. April 2018 was characterized by fairly high temperatures and almost zero precipitation, so the planting of potatoes in the area started earlier. During the planting in the third decade of April, the average daily temperature was +17 to +19 ° C. The potatoes grew at moderate precipitation in May, June and July, while April, August and September were dry.

The data was compared using Tukey's test. Differences between the samples were considered statistically significant at P < 0.05. The data was analyzed in BioStat LE 6 (Analyst Soft Inc., CA, 2019). The large squares in the diagrams show the 25% and 75% quartiles, the vertical lines show 95% of the variation, the stars and circles show the outliers. The median is shown in a line, the middle is dotted.

Results

Data of the annual reports of the state institution "Volyn Regional Phytosanitary Laboratory" were studied to analyze the dynamics of GPCN distribution (Fig. 1) over the last 10 years and establish the distribution of this plant pest (Table 1).

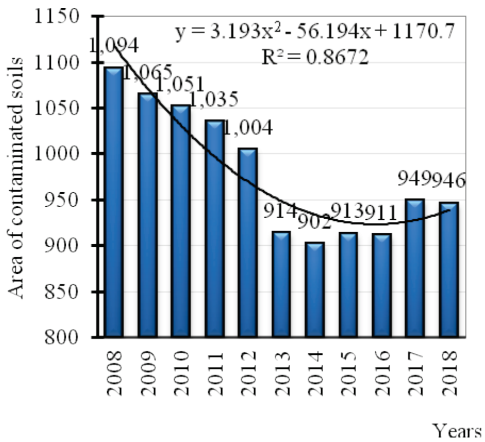

Fig. 1. Dynamics of distribution of the golden potato cyst nematode in Volyn region in 2008–2018 (are in ha): ____ – polynomial trend line

The area of soil affected by *G. rostochiensis* decreased in Volyn region by 147.647 hectares over the past 10 years. The second-level polynomial trend line confirms the tendency for a partial reduction of the soil area of the area infested by this harmful pest. The approximation accuracy is approximately 0.87, so this smoothing can be considered reliable. The golden potato cyst nematode was found in 15 of 16 districts of the region. Pest foci were recorded in 303 settlements on an area of 946.120 hectares. The largest areas of infection were recorded in Kovel, Rozhyshche and Manevychi districts, the least infected area was in Ivanychi district. There were no foci in Lutsk district only. At the four selected sites in the region, the soil infestation with cysts of GPCN was evaluated before potato planting (Table 2).

At all examined sites, no measures were used to control the GPCN, and pest cysts were discovered. The average soil infestation rate varied from 12 to 26 cysts/100 cm^3. The worst damage was observed in Naviz village, Rozhyshche district. In general, the intensity of soil infestation was 1.5 times higher in the southern (forest and steppe zone) districts of the region (Volodymyr-Volynsky and Rozhyshchin), as compared to the northern ones (Manevytsky and Kovel districts in the zone of mixed forests) (Fig. 2).

Table 1
Distribution of the golden potato cyst nematode in Volyn region of Ukraine

No	Administrative district of the region	Infested: cities and settlements	Infested: private plots	Infested area, ha
1	Volodymyr-Volynsky	5	89	36.13
2	Horokhiv	2	9	13.70
3	Ivanychi	1	3	1.79
4	Kamin-Kashyrsky	19	203	57.58
5	Kivertsi	24	186	57.58
6	Kovel	61	708	194.38
7	Lokachi	8	76	15.17
8	Liubeshiv	15	118	29.41
9	Liuboml	30	179	65.73
10	Manevychi	23	265	108.21
11	Ratne	19	143	43.48
12	Rozhyshche	31	408	160.18
13	Stara Vyzhivka	20	286	59.38
14	Turiisk	24	248	78.51
15	Shatsk	21	110	31.05
	Total	303	3030	946.12

Table 2
Soil infestation with the golden potato cyst nematode in the northwest of Ukraine

Sampling site	Area, ha	Number of samples	Pre-planting soil infestation: cyst density in 100 cm^3 of soil	Pre-planting soil infestation: egg and larvae density in 100 cm^3 of soil	Post-harvest soil infestation: cyst density in 100 cm^3 of soil	Post-harvest soil infestation: egg and larvae density in 100 cm^3 of soil	Reproduction coefficient P_f/P_i
Ostrovky village, Manevychi district	7.5	15	12.82 ± 1.20	863 ± 3	15.29 ± 2.17	1 016 ± 4	1.18
Dorotysche village, Kovel district	4.5	39	14.53 ± 2.27	1 825 ± 3	16.73 ± 2.54	2 175 ± 3	1.19
Khmel'ivka village, Volodymyr-Volynsky district	5.6	20	19.30 ± 3.54	4 571 ± 4	20.94 ± 3.29	4 980 ± 5	2.09
Naviz village, Rozhyshche district	9.4	43	25.63 ± 3.77	5 706 ± 6	37.46 ± 4.15	13 867 ± 5	2.43
Total	27.0	117	18.07 ± 2.70	3 241 ± 4	22.61 ± 3.04	4 128 ± 5	1.27

Note: P_f – number of newly formed cysts, P_i – number of cysts at the start of experiment.

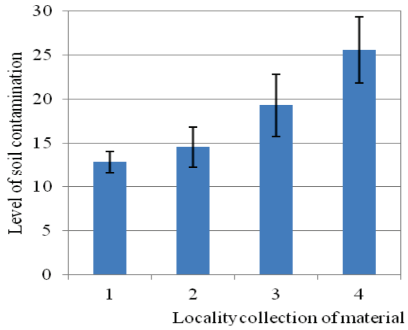

Fig. 2. Pre-planting soil infestation with the golden potato cyst nematode in several private plots in northwestern Ukraine in 2018: the abscissa axis, sampling sites: 1 – Ostrovky village, Manevychi district, 2 – Dorotysche village, Kovel district, 3 – Khmel'ivka village, Volodymyr-Volynsky district, 4 – Naviz village, Rozhyshche district; the axis of ordinates, soil infestation intensity (cysts/100 cm^3)

Table 3
Soil infestation and numbers of viable, non-viable and empty GPCN cysts in pre-planting soil samples from the selected study sites

Sampling site	Number of cysts in 100 cm^3: total	viable	non-viable	empty
Ostrovky village, Manevychi district	12.82 ± 1.20	3.72 ± 0.41	4.64 ± 0.38	4.44 ± 0.45
Dorotysche village, Kovel district	14.53 ± 2.27	4.87 ± 0.68	4.73 ± 0.77	4.93 ± 0.86
Khmel'ivka village, Volodymyr-Volynsky district	19.30 ± 3.54	13.60 ± 2.85	3.30 ± 0.46	2.35 ± 0.25
Naviz village, Rozhyshche district	25.63 ± 3.77	16.74 ± 2.87	5.74 ± 0.82	3.21 ± 0.59

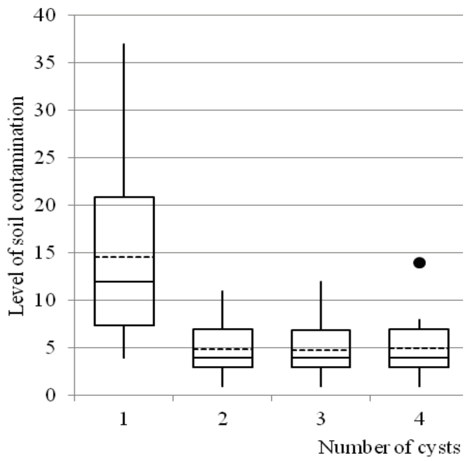

Fig. 3. The ratio of pre-planting soil infestation levels with viable, non-viable and empty GPCN cysts in samples from various private farms of Ostrovky village, Manevychi district: soil infestation rate (cysts/100 cm^3), n = 15, the median is shown in a line, the middle is dotted

The viability of the GPCN larvae was evaluated by a pressured preparation. The numbers of viable, non-viable and empty cysts were calculated on each of the selected sites. In private farms of Ostrovky village, Manevychi district, the average pre-planting intensity of GPCN soil infestation was 12.82 ± 1.20 cysts/100 cm^3 and 863 ± 3 larvae and eggs/100 cm^3. Only 29.1% of all cysts were viable, 36.3% of cysts were nonviable, and 34.6% were empty (Table 3). The average number of viable cysts was about one-third of all registered (Fig. 3).

In soils of private farms of Dorotysche village, Kovel district, the average pre-planting soil infestation level was 14.53 ± 2.27 cysts/100 cm^3 and 1826 ± 3 larvae and eggs/100 cm^3. Of all cysts, 33.5% were viable, 32.6% were non-viable, and 33.9% were empty (Table 3). The number of viable cysts was on average a third of all found (Fig. 4).

In soils of private farms of Naviz village, Rozhyshche district, the average pre-planting soil infestation level was 25.63 ± 3.34 cysts/100 cm^3 and 5706 ± 6 larvae and eggs/100 cm^3. Of all cysts, 65.3% were viable, 22.3% were non-viable, and 12.4% were empty (Table 3). The number of viable cysts was on average more than a half of all found (Fig. 6).

In soils of the private farms of Khmel'ivka village, Volodymyr-Volynsky district, the average pre-planting soil infestation level was 19.30 ± 3.34 cysts/100 cm^3 and 4571 ± 4 larvae and eggs/100 cm^3. Of all cysts, 70.5% were viable, 17.2% were non-viable, and 12.3% were empty (Table 3). The number of viable cysts was on average two thirds of all found (Fig. 5).

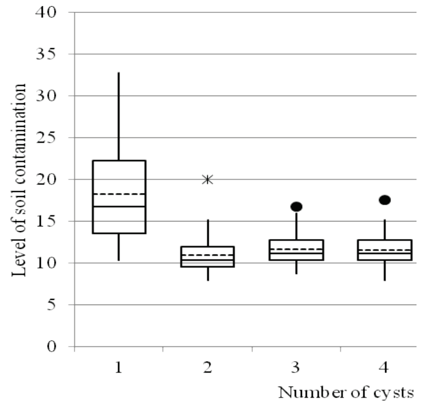

Fig. 4. The ratio of pre-planting soil infestation levels with viable, non-viable and empty GPCN cysts in samples from various private farms of Dorotysche village, Kovel district: soil infestation rate (cysts/100 cm^3), n = 39, the median is shown in a line, the middle is dotted

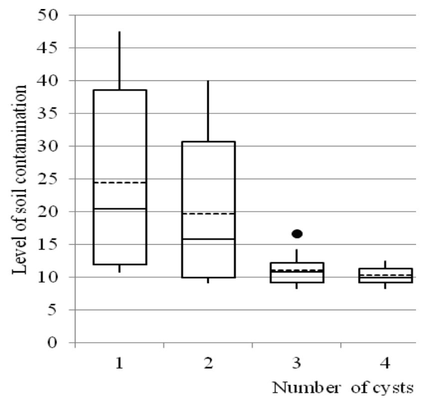

Fig. 5. The ratio of pre-planting soil infestation levels with viable, non-viable and empty GPCN cysts in samples from various private farms of Khmel'ivka village, Volodymyr-Volynsky district: soil infestation rate (cysts/100 cm^3), n = 20, the median is shown in a line, the middle is dotted

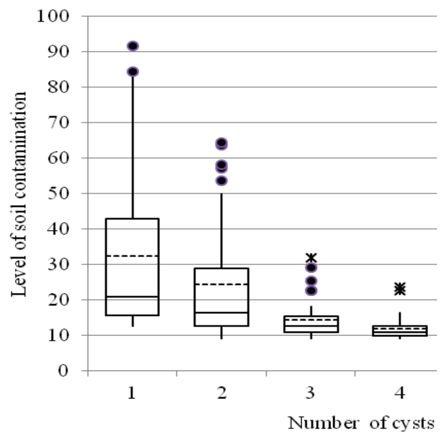

Fig. 6. The ratio of pre-planting soil infestation levels with viable, non-viable and empty GPCN cysts in samples from various private farms of Naviz village, Rozhyshche district: soil infestation rate (cysts /100 cm^3), n = 43, the median is shown in a line, the middle is dotted

Comparison of the level of soil infestation on the four studied sites (Fig. 7) revealed the true differences in the level of soil infestation between the northern (zone of mixed forests) and southern (zone of forests and steppe) districts of Volyn region, Ukraine.

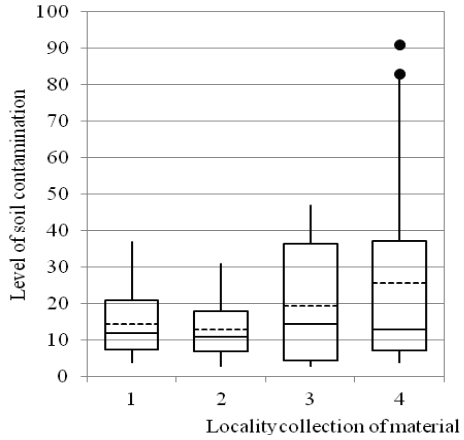

Fig. 7. The ratio of pre-planting soil infestation levels with viable, non-viable and empty GPCN cysts in samples from various private farms in northwestern Ukraine: *1* – Ostrovky village, Manevychi district, n = 15; *2* – Dorotysche village, Kovel district, n = 39; *3* – Khmel'ivka village, Volodymyr-Volynsky district, n = 20; *4* – Naviz village, Rozhyshche district, n = 43: soil infestation levels (cysts /100 cm^3), $P < 0.05$, the median is shown in a line, the middle is dotted

In order to determine the reproduction coefficient of *G. rostochiensis*, the post-harvest level of soil damage was established at the four selected sites. In the Manevychi and Kovel districts, the reproduction coefficient was relatively low, slightly higher than 1 (Table 2). In the southern districts of the region, the reproduction coefficient was more than 2, meaning that the number of cysts in the soil after harvesting had more than doubled.

In the study modeling the development of potato globoderosis, a direct proportional relationship was found between the level of pre-planting infestation loading of the soil and the reproduction coefficient of GPCN (Fig. 7). For example, at low P_i up to 1,000 larvae and eggs/100 cm^3, the reproduction coefficient was 1.18. If P_i load increased to 2,000 larvae and eggs/100 cm^3, the reproduction coefficient almost did not change. At P_i about 5,000 larvae and eggs/100 cm^3, the coefficient was more than 2 (Fig. 8). This should be taken into account when developing measures for protection against this plant pest. The determination coefficient ($R^2 = 0.96$) indicated a high correlation between the level of reproduction and the pre-planting density of nematodes in the soil. The determination coefficient ($R^2 = 0.84$) indicates an average correlation between the level of reproduction and the post-harvest density of nematodes in the soil.

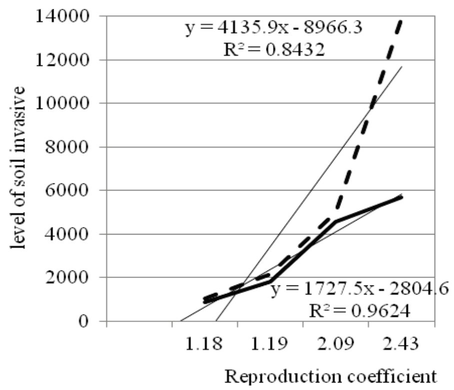

Fig. 8. Dependence of the reproduction coefficient (P_f/P_i) of *G. rostochiensis* on the level of soil infestation: the intensity of soil infestation (larvae and eggs in 100 cm^3), the reproduction coefficient (P_f/P_i), where P_f is the number of newly created cysts, P_i is the number of cysts at the beginning of the experiment; ▬ – pre-planting soil infestation, ▬ ▬ – post-harvest soil infestation, ▁ – trend lines

Discussion

The golden potato cyst nematode *G. rostochiensis* is a harmful pest. Monitoring its distribution and density control is an important problem for scientists both in Ukraine (Pylypenko, 1998; Sigareva & Pylypenko, 1998; Polozhenets et al., 2010; Sigareva et al., 2010) and all over the world (Brodie, & Mai, 1989; Baker et al., 2012). The life cycle of the golden potato cyst nematode is covered sufficiently well in the literature (Philis, 1980; Renčo, 2007; Minnis et al., 2012; Przetakiewicz, 2013; Mimee et al., 2015), and its general details are well observed for northwestern Ukraine. For example, there is a body of literature supporting the close connection between the nematode population density and the level of resistance abilities in potato varieties, and between the nematode population density and the quality of newly formed cysts (Webley & Jones, 1981; Seinhorst, 1984). Studying the biological specifics and the density dynamics of GPCN presents an important problem for the northwestern regions of Ukraine, because those data facilitate the planning and implementation of pest control measures. Of the arable land of the Volyn region, 0.14% is infested, placing the region second in Ukraine by the infested area (Sigareva et al., 2014). In 2018, new pest foci on an area of 0.0528 ha were found in the course of phytosanitary inspection of farming lands of the region. Revision of the infested area revealed the absence of GPCN on the area of 3.06 ha. Particularly, the quarantine regime against GPCN is implemented by the order of the Volodymyr-Volynsky District State Administration of June 6, 2018 No 200. The quarantine regime against GPCN was cancelled in the Kamin-Kashyrsky district by the Kamin-Kashyrsky District State Administration of September 24, 2018 No 285.

In general, the areas of infested soils are larger in the northern districts of the region than in the southern districts. Our results show that in the northern (Manevychi and Kovel) districts of the region, the level of both pre-planting and post-harvest soil infestation is lower than in the southern (Rozhyshche and Volodymyr-Volynsky). We also noted that the number of viable cysts in the northern districts is approximately one third of the total number of cysts in the soil, while in the southern districts it is more than a half. The obtained results are different from the literature data by the high level of GPCN infection in the zone of mixed forests of Ukraine. For example, a high level of GPCN infestation (over 5,000 larvae and eggs/100 cm^3 of soil) was recorded at the farmsteads of Bovsuny village, Luhyn region of the Zhytomyr region (Polozhenets et al., 2010). In our studies, areas with an average infestation rate (1001–5,000 larvae and eggs in 100 cm^3 of soil) and low (<1001 larvae and eggs in 100 cm^3 of soil) are observed in the zone of mixed forests of Ukraine. Results on the high and average level of soil infestation and the large number of viable cysts in the western zone of forests and steppe are fully consistent with the data of research conducted on the territory of the Ukrainian Scientific-Research Station of Plant Quarantine of IPP (Suhareva & Babych, 2013).

Having calculated the reproduction coefficient of *G. rostochiensis* in the conditions of the zones of mixed forests, and forests and steppe of Western Ukraine, we found a direct proportional relationship between the level of pre-planting infestation of soil and the reproduction coefficient if the pre-planting soil infestation increased from 863 ± 3 to 5,707 ± 6 larvae and eggs/100 cm^3 of soil. The obtained results are not entirely consistent with the literature (Suhareva & Babych, 2013). These authors recorded an inversely proportional relationship between the level of preplanting infestation of soil and the nematode reproduction coefficient if the initial soil infestation grew from 500 to about 20 thousand larvae and eggs/100 cm^3 of soil, in the conditions of the western zone of forests and steppe of Ukraine. Our results can be explained by the relatively lower initial of soil infestation rate in the northwestern Ukraine.

Conclusions

Over the past 10 years, the area of soils affected by *G. rostochiensis* in Volyn region decreased by 147.647 ha. The largest infested areas of more than 100 ha are recorded in Kovel, Rozhyshche and Manevychi districts, the lowest in Ivanychi district. There are no GPCN foci in Lutsk district. Further studies require a systematic monitoring of the number and distribution of *G. rostochiensis* in the region. The highest soil infestation rate and ratio of viable cysts are recorded in the zone of forests and steppe (Rozhyshche and Volodymyr-Volynsky districts). In the southern (zone of forests and steppe) districts of the region, the soil is infested 1.5 times more than the soil of the northern studied districts (the zone of mixed forests). There is a direct proportional relationship between the pre-planting soil infestation and the nematode reproduction coefficient. Further studies should be aimed at finding the infestation rates in all districts of the region, depending on the physical and chemical properties of the soil, climatic factors and crop rotation. A large number of detected cysts suggest that there is a risk of further spread of *G. rostochiensis* in the western regions of Ukraine. Therefore, potato producers need to pay attention to the use of crop rotation and the replacement of varieties of potatoes vulnerable to GPCN with the resistant varieties.

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