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POTATO NEMATODES OF THE BLACK SEA STEPPE OF UKRAINE

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Summary. The article presents the results of examination of potato tubers grown in the Odesa region (Ukraine) to detect helminths that damage it. Installed: in Odesa region, 5 species of phytohelminths (no potato stem nematode), 4 species of mycohelminths, and 4 species of saprobiotic nematodes were found in tubers with signs of dry rot from 21 locations, mainly in the southern regions. *Pratylenchus pratensis*, *Paratylenchus nanus* polyphages dominated.

Keywords: phytohelminths, mycohelminthes, saprobionts, potato, Odessa region.

Potatoes are not grown on an industrial scale in Odesa region. Its main production is concentrated in private farms, where it is grown to meet its own needs and for sale in intra-regional markets. Ultra-early varieties are used so that potatoes have time to form a crop before the onset of the hottest period.

Potatoes are damaged by more than ten types of harmful nematodes, among which the cyst-forming, stem and migrating nematodes cause the most damage. Crop losses vary widely and depend on a combination of many factors: an environment favorable for their growth, pest population density, soil structure, potato variety, and others [1, 2]. During storage of potatoes, nematodes of the genus *Ditylenchus* cause the greatest damage, namely *Ditylenchus destructor*, which, according to researchers, can parasitize almost 70 crops and weeds [3, 4].

Potato stem nematodes, which cause great damage to plants, were known even 100 years ago. According to the modern definition, stem nematode potato *Ditylenchus destructor* Thorne, 1945 belongs to the Nemathelminthes type of the Nematoda class of the Tylenchida order of the Angunidae family [5-8]. In some countries, the stem nematode is considered a quarantine object. In Ukraine, *Ditylenchus destructor* and *Ditylenchus dipsaci* are included in the list of "Regulated non-quarantine harmful organisms", which determines their phytosanitary regulation in relation to planting material and seed plots [9]. In our country, the mass spread of stem nematode in the field and the manifestation of diseases during potato storage leads to significant crop losses. It is believed that the nematode cannot withstand prolonged drying and therefore has significant economic value only when parasitizing in cool, moist soil. With an increase in soil moisture from 40% to 80%, the number of damaged potato stems and tubers also increases. The maximum damage was observed at a temperature of 17-20°C in the morning and 20-24°C during the day [10]. Research results show that nematodes are most often spread by infected planting material, soil, and together with agricultural tools [11, 12]. Controlling *Ditylenchus destructor* and *Ditylenchus dipsaci* is difficult because they have a wide host range, and therefore even crop rotation does not help [13].

The results of examinations of potatoes for the detection of stem nematode showed that it is found in twenty regions of Ukraine. In some farms of Kharkiv, Poltava, Cherkasy, and Sumy regions, potato tubers were affected by *D. destructor* by 15-30%, and in some farms of Kyiv and Donetsk regions, the damage of tubers by stem nematode was 30-40% [14-16]. There are no data for the Odesa region, but there is evidence that potato stem nematode damage remains too high in

Ukraine to this day [16]. There is no information on the harmfulness of the potato stem nematode and measures to cure tubers from it in the Southern Steppe zone of Ukraine, and very limited in other zones.

The main goal of research conducted at the scientific and technical base of the Odesa State Agricultural Research Station of the Institute of Climate-oriented Agriculture of the National Academy of Sciences was to find a biological preparation and determine its effectiveness in the fight against phytonematodes. But for this, first of all, it was necessary to determine the species composition of helminths present in potato tubers grown in the conditions of the Odesa region, which became the goal of the research, the results of which are presented in the presented material.

The research was conducted taking into account the methodological approaches used in international practice and corresponding to the state standards of Ukraine.

The selection of potato tuber samples was carried out in January-February 2024 in farms and private farms of the Odesa region (Fig.1) of the following territorial communities: Ovidiopolska Odesa district (Khlibodarske, Mykolaivka); Sergiivska (Mykolaivka), Plakhtiivska (Yaroslavka) Bilhorod-Dniester district; Vilkivska (Prymorske), Suvorovska (Kyrnychki), Safyanivska (Bagate, Komyshivka, Kyslytsia, Stara Nekrasivka), Reniyska (Kotlovina) and Izmaili of the Izmail district; Krynychnenska (Krynychne) Bolgrad district; Raukhovska (Shevchenkove) Bereziv district; Kuyalnytskyi (Yasinove) Podilsky district.

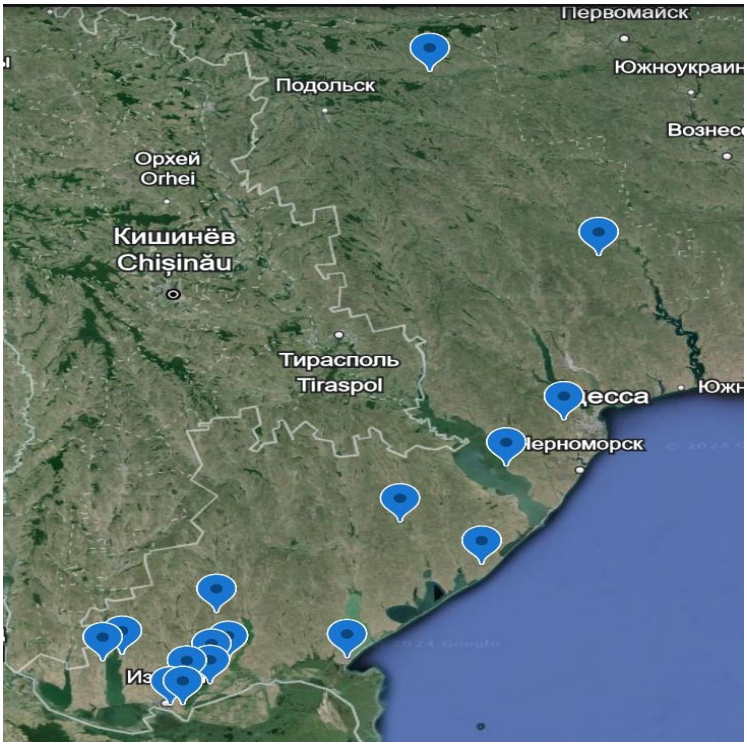


Figure 1. Places of taking potato samples

A total of 71,071 specimens of nematodes were registered in the selected samples, the distribution of which by sampling locations is presented in Table 1, and by species in Table 2.

The complex of phytonematodes was mainly represented by five species: *Pratylenchus pratensis* (de Man 1889) Filipjev 1936, *Paratylenchus nanus* Cobb, 1923, *Ditylenchus dipsaci* (Kuhn, 1857), *Tylenchorhynchus dubius* (Butschli, 1873) Filipjev, 1936, *Helicotylenchus dihystera* (Cobb, 1893) Sher, 1961. The registered species are the most characteristic of the agrocenoses of the Steppe zone.

Pratylenchus occupy the third place in the list of the most dangerous nematodes in agricultural production, they are migratory endoparasites affecting the root system of almost 400

plant species. Ubiquitous of *D. dipsaci* was found in 21% of damaged tubers, in large numbers in only one location (Bereziv district). This also applies to *T. dubius* (damaged 31% of tubers in Krynychny, Bolgrad district). Single specimens of *H. dihystera* were also found.

Table 1

The total number of nematodes identified in potato tubers damaged by dry rot

№	Place of sampling	Crop losses, %	Number of nematodes			
			species	of specimens		
				total	average	interval of oscillations
1	Khlybodarske , Odesa district	-	1	651	130	15-424
2	- II -	-	0	0	0	0
3	Mykolaivka, Odesa district	3	1	371	41,2	0-150
4	- II -	-	1	325	29,5	0-322
5	Mykolaivka, B-Dnistrovsky district	10	3	2477	225	0-2430
6	- II -	-	4	4950	413	0-2020
7	Prymorske, B-Dnistrovsky district	-	1	12	1	0-6
8	Yaroslavka, B-Dnistrovsky district	1	1	187	17	0-79
9	- II –	15	1	28435	2584	42-6720
10	- II -	-	1	16256	1626	0-6680
11	Bagate, Izmail district	5	0	0	0	0
12	Pershotravneve, Izmail district	10	3	545	90,8	1-220
13	- II -	-	2	6115	1019	120-3610
14	Kyslytsia, Izmail district	10	3	13	2,6	0-13
15	Komyshivka, Izmail district	2	1	443	111	0-443
16	Kotlovina, Izmail district	10	2	60	7,6	0-61
17	Stara Nekrasivka, Izmail district	15	0	0	0	0
18	Izmail	5	1	996	498	2-994
19	Krynychne, Bolgrad district	15-20	7	9207	572	0-2297
20	Shevchenkove, Bereziv district	5	1	23	2	0-20
21	Yasinove, Podilsky district	1-2	1	5	1,1	0-3
Total				71071		

The potato stem nematode *Ditylenchus destructor* Thorne was not found, although it was registered in Odesa region in the 70s of the last century [14]. The stem nematode *D. dipsaci* (together with the tuberous nematode *D.destructor*) belongs to the category of regulated non-quarantine harmful organisms (according to the State Production and Consumer Service).

Table 2

Detection of nematodes in potato tubers damaged by dry rot

Helminths	Khlybodarske , Odesa district	Mykolaivka, Odesa district	Mykolaivka, B-Dnistrovsky district	Yaroslavka, B-Dnistrovsky district	Yasinove, Podilsky district	Pershotravneve, Izmail district	Kyslytsia, Izmail district	Komyshivka, Izmail district	Kotlovina, Izmail district	Krynychne, Bolgrad district	Prymorske, B-Dnistrovsky district	Shevchenkove, Bereziv district
Phytohelminths %												
Pratylenchus pratensis	-	-	17	-	-	50	20	-	-	50	-	-

Pratylenchus nanus	-	-	33	-	-	-	-	25	-	19	-	-
Ditylenchus dipsaci	-	-	-	-	-	-	-	-	-	-	-	21
Tylenchorhynchus dubius	-	-	-	-	-	-	-	-	-	31	-	-
Helicotylenchus dihystera	-	-	-	-	-	-	-	-	-	6	-	-
Mycohelminthes %												
Aphelenchus avenae	-	10	83	90	-	67	-	25	12	37	33	-
Aphelenchoides asterocaudatus	-	-	8	25	-	17	-	-	-	6	-	-
Aphelenchoides limberi	-	-	8	-	-	-	-	-	-	-	-	-
Saprobionts. %												
Eucephalobus oxiuroides	-	-	-	-	-	-	20	-	-	6	-	-
Panagrolaimus rigidus	-	-	-	-	25	-	-	-	-	-	-	-
Eudorylaimus obtusicaudatus	-	-	-	-	-	-	-	-	12	-	-	-
Mesorhabditis monohistera	20	-	-	-	-	-	20	-	-	-	-	-
Number of species	1	1	5	2	1	3	3	2	2	7	1	1

Four species of mycohelminths were also identified (*Aphelenchus avenae* Bastian, 1965; *Aphelenchoides asterocaudatus* Das, 1967; *Aphelenchoides limberi* Steiner, 1936; *Aglenchus agricola* (De Man, 1921) Andrassy, 1954). *A. avenae* was dominant - 50% of locations, potato infection was 10-90%. Potatoes from the village were the most damaged. Yaroslavka, B-Dnistrovsky district: the total number was 0-6680 specimens/10 g of tuber, despite the fact that phytohelminths were not registered in the studied tubers. *A. asterocaudatus* was found in 19% of locations (in small quantities), tuber contamination ranged from 6 to 25%. *A. limberi* was registered in one case, singly (Mykolaivka village, Odesa district).

Saprobionts are represented by four species: *Aporcelaimellus (Eudorylaimus) obtusicaudatus* (Bastian, 1865) Heyns, 1965 (omnivorous); *Eucephalobus oxiuroides* (De Man, 1880) Steiner, 1936; *Mesorhabditis monohystera* (Bütschli, 1873) Dougherty, 1955; *Panagrolaimus rigidus* (Schneider, 1866) Thorne, 1937. *E.oxiuroides* was found in two locations (Krynychne, Bolgrad district and Kyslytsia, Izmail district) and *M. monohistera* (Kyslytsia, Izmail district and Khlybodarske, Odesa district) well), their number was negligible, potato damage was 20%. In one case, *A. obtusicaudatus* (Kotlovina, Izmailsky district) and *P. rigidus* (Yasinove, Podilsky district) were registered in insignificant numbers. The maximum number of nematode species in potato tubers with signs of dry rot was found in the village of Krynychny (Bolhrad district) - 7 species and village Mykolaivka (B-Dnistrovsky district) - 5 types.

Conclusions

In Odesa, 5 species of phytohelminths (no potato stem nematode), 4 species of mycohelminths, and 4 species of saprobiotic nematodes were found in tubers with signs of dry rot from 21 locations, mainly in the southern regions. Pratylenchus pratensis, Paratylenchus nanus polyphages dominated.

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