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TAXONOMY AND ECOLOGY OF PHYTONEMATODES OF SOME PLANTS GROWING IN THE GREENHOUSE

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Abstract: Various types of root-knot nematodes, heteroderas, stem nematodes, pratylenchos and a large number of other forms cause yield losses of vegetables, grains, industrial and other crops, reaching 30-40, and sometimes 60-70% or even more in a number of farms. This article discusses and analyzes the taxonomy and ecology of phytonematodes of some greenhouse plants.

Keywords: Phytonematode, ecology, protection, virus, plant, method.

INTRODUCTION

Nematodes are a large group of invertebrate animals, representatives of which are distributed in all climatic zones of the globe: in the seas and oceans they are found from the North Pole to the coastal waters and inland waters of Antarctica, inhabit freshwater bodies, and have colonized all types of soils (from tundra peat bogs to shifting desert sands) and parasitize animals and plants. Most soil invertebrates, including nematodes, settle in the top layer of soil up to 30 cm deep, regardless of the specifics of its economic use. In arable soils, nematodes make up 90.0–99.0% of all metazoa. There are somewhat fewer of them in forest and meadow soils.

MATERIALS AND METHODS

Various types of root-knot nematodes, heteroderas, stem nematodes, pratylenchos and a large number of other forms cause yield losses of vegetables, grains, industrial and other crops, reaching 30-40, and sometimes 60-70% or even more in a number of farms. Among the numerous parasites and pathogens of plants, nematodes are of great economic importance, since they account for ¼ of the total losses of world plant production from pests and diseases. Unfortunately, in known, far from rare cases, these losses are much greater and can currently reach catastrophic proportions.

The study of the biology and ecology of plant nematodes and, in particular, individual stages of their development (eggs, larvae) is of great importance, since it is these data that underlie the development of measures to combat these microscopic but highly pathogenic pests.

RESULTS AND DISCUSSION

The study of the morphology and taxonomy of plant nematodes of the fauna of the Far East was carried out on material available in the laboratory collection and collected over more than 50 years.

The sampling depth ranged from 10 to 30 cm depending on the type of soil and the nature of its cultivation. The volume of each soil sample was from 200 to 300 cubic cm. The samples were washed and decanted through sieve No. 0063. The sediment remaining on the sieve was fixed with 4% formaldehyde or TAF and used for further work. Isolation of phytonematodes from the soil was carried out using the centrifuge-flotation method [2], and from the root system of plants - in Berman funnels. Cyst nematodes were isolated from the soil using a Fenuik device. Nematodes were selected from samples under an MBS-9 binocular in watch glasses.

Clarification and preparation of permanent glycerin preparations of phytonematodes (with paraffin edging) were carried out according to the Seinhorst method [3]. Determination of plant nematodes was carried out under an MBB-1 light microscope with 10x, 20x, 40x, 90x lenses and 5x and 7x eyepieces. The drawings were made using a RA-6 drawing machine. Measurements were carried out with an eyepiece micrometer. For reliable quantitative recording of nematodes, the volume of the soil sample was 100 cubic cm.

Under the influence of human activity, certain types of nematodes can quickly become pests when, for example, an agricultural crop is grown continuously for several years, i.e. is a monoculture, thus creating to some extent an optimal opportunity for increased nematode reproduction. In some cases, even very small numbers of nematodes can cause great harm to crop species, for example when their feeding facilitates the introduction of secondary pathogens such as bacteria, fungi and viruses into the plant. In practice, “control measures” against parasitic plant nematodes mean suppressing the population density of the species to an acceptable level. A very simple method of control is crop rotation, which is effective against nematode species with a narrow host range. Polyphagous nematodes are more difficult to control in this way due to the problem of finding an economically viable non-host crop. Also, some plants contain or produce substances that are toxic to plant nematodes, for example, marigolds, castor beans, and sesame. An inexpensive and effective method of combating phytonematodes is the addition of oilseed cake to the soil. These are residues from the production of oil from cotton seeds, sesame seeds, mustard or castor beans. Currently, in the Russian Federation, due to the high toxicity and high cost of nematicides, chemical treatments are practically not carried out. In any biotope, a complex species complex of nematodes belonging to various trophic groups is usually found - bacteriophages, mycophages, predators and plant parasites. It has been proven that when interfering with the natural process of successive replacement of some biocenoses by others, changes occur in the nematode community, which facilitates the assessment of the “quality” of the environment and allows the use of nematodes as indicators in the disturbance and restoration of ecosystems. In the last decade, bioindication based on the community structure of free-living nematodes has become an object of particular interest among ecologists. The value of nematodes as bioindicators lies in the fact that they quickly respond to environmental changes, they can be isolated from soil and plant samples over long periods of the year, and nematode communities are highly diverse even in agricultural monocultures. Soil nematodes are heterotrophs and are consumers of the first order (plant parasites), consumers of the second order (predators) and consumers of destructors (fungi and bacteria). They also participate in soil ecological processes such as decay, mineralization and nitrogen cycling, and have organic matter destruction activities comparable in scale to those of bacteria. Nematodes have both positive and negative effects on primary production.

Root-knot nematodes of the genus *Meloidogyne Goeldi*, 1887 (Nematoda: Meloidogynidae) are one of the most pathogenic groups of plant nematodes that parasitize the roots of cultivated and wild plants in open and protected ground. They are widespread throughout the world.

CONCLUSION

The use of the community maturity index (MI), which is a measure of succession development, has become very important in recent years. The value of nematodes as bioindicators lies in the fact that they quickly respond to environmental changes. They can be isolated from soil samples over long periods of the year. Nematode communities are highly diverse even in agricultural monocultures. Thus, based on changes in the abundance of certain species in the structure of

trophic or functional groups, one can conclude that natural processes in succession are disrupted. The basis for conducting such studies is the correct identification of nematodes.

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