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Infection of plants with bulging nematodes

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Abstract: Pathological changes are observed mainly in the root part of cotton infected with bulging nematodes. As a result of the development of larval nematode larvae and the formation of giant cells, the function of the conductive tissue in the plant root is impaired. As a result, moisture and nutrients are spent on the larvae of bulging nematodes. As a result, crop yields are sharply reduced.

Key words: nematode, bulge, plant, root, meloidogyne

INTRODUCTION

Swelling nematodes (*Meloidogyne*) are parasites of the surface parts of plants. Various bumps appear, which are damaged by nematodes of plants. Sexual dimorphism is very well developed in nematodes; The adult male is fibrous, 1,5-2 mm long, does not feed, lives in the soil. Females are fed in a noxious form, sucking plant cells using a special stiletto. In the female nematode lays about a hundred eggs in a special egg-sac. The larvae hatch from the eggs and damage the plant root. Under favorable climatic conditions, several generations of nematodes develop throughout the year. Embankment nematodes in Uzbekistan were first discovered in 1935 by PI Arkhangelsky in the Botanical Garden of the National University of Uzbekistan (former Tashkent State University) at the root of a peony plant. Currently, 5 species of protruding nematodes are recorded in Uzbekistan. Including: sand bulge nematode – *Meloidogyne arenaria*, slow bulge nematode - *Meloidogyne javanica*, southern bulge nematode - *Meloidogyne* incognita, cotton bulge nematode – *Meloidogyne acrita*, northern bulge nemadosi - *Meloidogyne*.

Infiltration of bulbous nematodes into plant roots and bulge formation. Embryonic nematodes have the ability to actively search for plant roots and root access only to larvae in the second age stage. However, because the larvae have a poorly developed stiletto, they can only break through the walls of young cells. Therefore, these larvae enter the plant root mainly along the third part of the root, where the root growth area is located. In this case, several larvae can enter the inside of the root through a hole formed by a single larva in the third part of the root. The secretory substance secreted by the larvae through the stiletto facilitates their entry into the roots. Wheat nematode - Anguinatririci damages wheat and some cereals. In damaged wheat ears, a nematode bulge is formed instead of a grain. Inside the rash there are 15-17 thousand nematode larvae in an anabiotic state. In dry grains, the larvae can survive up to 20 years. When the larvae land in moist soil with grain, they emerge from the water-soaked bulge into the soil

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and enter the armpit through the root of the wheat grass. As the wheat sprouts, it passes into the flower bud; it is here that it feeds, matures, and multiplies. Fertilized female nematodes lay up to 2,500 eggs, from each egg an invasive larva emerges. In each grain develops offspring of 6-8 female nematodes. It has been found that enzymes of bulging nematodes break down plant cells and convert them into a form suitable for nematode assimilation, have a disruptive effect on cell walls, significantly affect the process of plant cell division, and cause changes in the size f individual cells. As a result of the acceleration of the process of division of plant cells (hyperplasia), a large number of cells accumulate around the areas where the nematodes are located (hypertrophy) or merge as a result of the melting of the barrier areas between the cells. The result is multinucleated giant cells. The vacuoles of these cells increase in size, the granular cytoplasm and the large-sized nucleus are noted. As a result, nematode larvae develop in the affected parts of the plant and begin to increase in body size, resulting in bulges in the plant root. (root knot nematode. **Picture 1**)

Picture 1. Root knot nematode.

Symptoms of plant damage. The disease that occurs in plants under the influence of bulging nematodes is called meloydoginosis. The first external signs of meloydoginosis are manifested in the appearance of growth retardation in the upper parts of the plant, leaf discoloration (chlorosis), crushing and premature ripening of fruits. In relatively severe damage to plants, the plant leaves dry out and the stem parts begin to dry out, with the drying process starting at the bottom of the plant stem. During the next development, the plant dies completely as a result of damage. Newly planted seedlings and seedlings in areas of soil strongly affected by nematodes are noted to dry out en masse. In some cases it is noted that in the case of damage to the plant, it dies before the formation of a bulge in the root. In some cases, as a result of the strong resistance of plants to nematodes, the symptoms of the disease are insignificant in the upper parts of the plant during the initial period of meloydoginosis. However, as the disease progresses in the later stages, the number of larvae in the plant root increases and the development of disease symptoms intensifies. During the hot season, in field conditions, the disease rarely occurs at lightning speed. In the observation of this disease, it is noted that the crops shed their leaves en masse and then the whole plant body withers. In turn, this process can develop as a result of irregular irrigation of crop fields in dry weather. In addition to the external signs of meloydoginosis in the upper parts of the plant, as noted above, the formation of bulges under the influence of bulging nematodes on the plant root usually begins a few weeks after the entry of invasive larvae. It was noted that the size of the bulges formed at the root of the plant depends on the type of parasite in a specific case, and that these dimensions depend on the disease resistance of the plant, nutritional conditions and a number of other factors.

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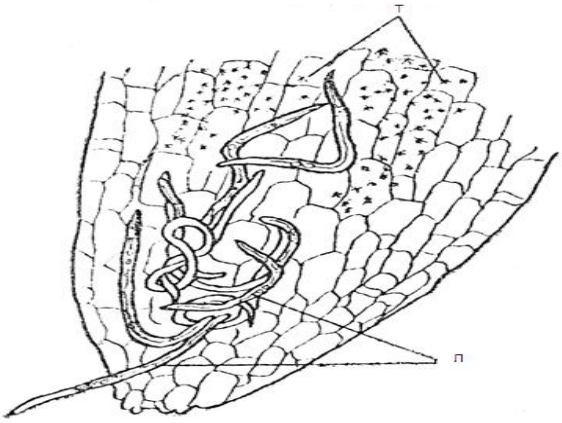
Effects of nematode on plant

№	Square	Extensiveness of plant nematode infestation	Root damage rate (5 point system)	Research data from 1 cotton plant		
				Plant length (in cm)	The average number of plant pods	Average weight off cotton yield (in.gr)
1	Undamagent	0	0	55,0	19,3	2,105
2	Infected	80,6	4-5	16,6	8,6	1,301

The larvae of the southern bulge nematode form bulges of 3–5 mm in the cotton root.



The process of entry root of the larva of a bulging nematode:1-larva, t-tilly

The size of the bumps formed under the influence of parasites on the plant root depends on the thickness of the plant root tissue and the structural features of the root system, as well as the methods of entry of the larva. For example, in the small, tiny roots of a plant, small bumps are formed, and inside them, in most cases, one female nematode develops, while in relatively large bumps, dozens and even hundreds of female nematodes develop.

Picture 2. Femele nematode body types, swollen (A, B, C) and cylindrical (D, E).

In all cases of severe damage by bulging nematodes, deformation of the underground parts of the plant is noted first.

Influence of swollen nematodes on plant growth and development. Embryonic nematodes have a direct negative effect on the plant, it is observed that a certain number of nematodes are constantly present in the damaged root tissue throughout the growing season. Under the influence of ectoenzyme activity of bulging nematodes irreversible pathological processes occur in plant tissues. At the same time, the correlation between physiological processes in plant tissue cells is lost, cell differentiation deviates from the norm, resulting in pathological - bulging forms in the root tissue. Typically, the formation of giant cells and bulges around the head area of the nematode in the root structure takes place simultaneously. However, the bulk of the bulge formation in the plant stem begins a little later, i.e., the bulge formation develops after the nematode larvae have settled in a relatively stable position.

Summary Based on the above data, it can be concluded that the growth and development of plants under the influence of bulging nematodes is lagging behind. Under the influence of bulging nematodes, plant productivity decreases sharply as a result of the weakening of normal physiological processes in the plant, the development of bulge nematodes in the plant root, as well as the lack of essential nutrients in the plant during the formation of giant cells.

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