

## DEVELOPMENT OF CHICKPEA ROOT ROTS AND SPECIES COMPOSITION OF THEIR AGENTS

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*Distribution and development of chickpea root rot in right-bank Forest-steppe of Ukraine were studied. Diagnostic symptoms and fungal pathogens of root rot of chickpea were specified.*

***Chickpea, root rot, symptoms, distribution, development, Fusarium.***

Chickpea (*Cicer arietinum* L.) is one of the most widespread pulse crops in many regions of the world. It is a valuable source of protein, vitamins and minerals. Chickpea is unpretending to growing conditions, so if crop get proper care, its yield can reach up to 3,2 t/ha [3]. One of the main problems of getting high and stable yields of chickpea in different regions of the world is its infestation of diseases. The most common and harmful diseases include root rots [6, 8, 9]. Yield losses caused by soil pathogens can reach 60% [7]. This disease isn't studied in Ukraine. About it is adduce just a few, fragmentary information in the references. Therefore carrying out of the ongoing monitoring of disease chickpea root system is important.

**Objective** – to determine the distribution and development of chickpea root rots under conditions Right-Bank Forest-steppe Ukraine, to establish the species composition of pathogens and symptoms.

**Materials and methods.** The research objects were chickpea plants with symptoms of root rots. Field experiments were conducted in a production unit of the National University of Life and Environmental Sciences of Ukraine (NULES Ukraine) "Agronomic Research Station" in Vasylkiv area Kyiv region during 2011–2012's. Sampling and analysis of samples of plants, research of chickpea

root rot were performed by the method of M. Kyryk, which worked out for determination development of peas root rots [2].

Distribution and development of the disease determined by the formulas:

$$P = \frac{n}{N} 100,$$

where  $P$  – distribution of the disease, %,

$n$  – number of infected plants, pcs.,

$N$  – the total number of plants, pcs.;

$$R = \frac{\sum(a \times b)}{N \times 4} 100,$$

where  $R$  – development of the disease, %,

$\sum(a \times b)$  – sum of products of diseased plants at the appropriate mark affection,

$N$  – the total number of plants, pcs.;

4 – the highest score scale.

Isolation root rots pathogens were carried in problem research laboratory “Mycology and Phytopathology” academician V. Peresyphkin NULES Ukraine. Identification fungi seized in pure culture was carried out by methods V. Bilay [1], V. Kotov et al. [5], Stepatonova M. et al. [4].

**Research results.** According to our results of research conducted over the years 2011-2012 in the fields of the separated subdivision of NULES of Ukraine “Agronomic Research Station” chickpea root rot was widespread. In the seedling stage we observed the first symptoms of the root rot disease as small light and dark brown spots in the basal part of the stem, the root collar or the main root. In the sequel, these dark brown pieces had been increasing in size, girdled infectious basal and root parts of plants. Affected dark plant tissues often became slender. In the early stages of the plant growing season the affected root system unlike health one was characterized by poor development and had a much smaller number of the lateral roots (Fig. 1).



Fig. 1 Chickpea seedling roots: a – health; б – affected.

During flowering and podfilling stages the root rot symptoms had been varying from small plots to darkening of the most part of plant root system. We watched the particulate or overall rotting of the lateral roots that's why the affected root system had the smaller size and volume. The intensive development of this disease caused the overall rotting of root system, which became underdeveloped and thin (Fig. 2). These plants often broke when they unplanted from soil. During the further development of the pathological process the affected plants had dwarfed, their leaves had turned yellow gradually and had dried up often.



Fig. 2. Symptoms of chick pea root rot during flowering stage: a – health plant; б – affected plants.

The weather conditions (2011 – 2012 years) were favorable for the active development of the disease. Thus, in 2011 in the seedling stage of plant the distribution and development of chickpea root rot were 44,0 and 21,0 %

accordingly. In the subsequent stages of growing season the disease had been progressing. During flowering stage the quantity of the affected plants had increased to 83,3 % and the disease development had attained to 39,2 % (Fig. 3).

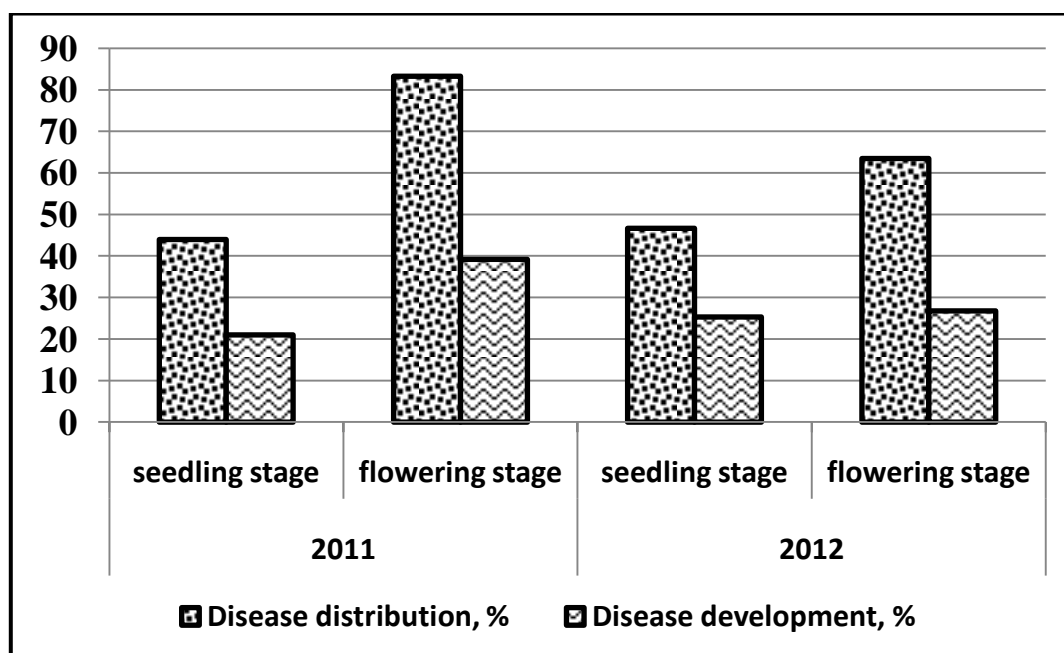


Fig. 3. Distribution and development of chick pear ootrot (varietyAntey, SDof NULES of Ukraine “Agronomic Research Station”, 2011-2012).

2012 year was characterized the highe rparameters of infectious chickpea by root rot pathogens too. Thus, in the beginning of growing season the distribution of disease was 46,7 %, and in the flowering stage – 63,5 %. The development of disease was up to par 25,3 i 26,8 % (Fig. 3).

Mycological researches of fungal root rot pathogens of chick pea have revealed that in these edling stage from the affected plant tissues have been secure donly fungi species, which are included to the genus *Fusarium* Link. (*F. oxysporum* (Schlecht.) Snyd. et Hans. var. *orthoceras* (App. et Wr.) Bilai comb. nova, *F. moniliforme* Sheld., *F. javanicum* Koord.var. *radicicola*). In the flowering period the species *F. solani*(Mart.) App. etWr.,*F. moniliforme*, *F. oxysporum* (Schlecht.) Snyd. Et Hans were met frequently. At the same time from the affected root tissues, it means that chickpea root rot disease caused by the complex infection.

**Conclusions.** As a result of records were established that under conditions Right-Bank Forest-steppe Ukraine chickpea showed relatively high sensitivity to root rot pathogens. During the 2011–2012's a significant distribution and development of chickpea root rots were detected. Thus, in the growing season 2011, the number of diseased plants varied from 44,0 up to 83,3%, and development of disease was respectively 21,0 and 39,2%. In 2012, these figures were within 46,7–63,5, and 25,3–26,8, respectively. *F. oxysporum* (Schlecht.) Snyd. et Hans. var. *orthoceras* (App. et Wr.) Bilai comb. nova, *F. moniliforme* Sheld., *F. javanicum* Koord. var. *radicicola*, *F. solani* (Mart.) App. et Wr. were extracted from the affected tissues of plant roots.