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Disease symptoms on chickpea (*Cicer arietinum* L.) and their causal agents

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ABSTRACT

Field experiments on health state of chickpea plants growing in southern Poland conditions were carried out in the years 2000 – 2002. Field observations during vegetation indicated, that often various specific disease symptoms occurring on chickpea plants were caused by the fungi infesting plant tissues. Leaf, stems and pods spots, yellowing and drying of whole plants and root rot and basal rot were dominant symptoms. The main reasons of those disease symptoms were fungi from genus: *Fusarium*, *Alternaria*, and *Ascochyta* and additionally *Botrytis cinerea* and *Rhizoctonia solani*.

INTRODUCTION

In many regions of the world chickpea (*Cicer arietinum* L.) is one of the most popular vegetables. Also in Poland studies are conducted to examine the possibility of growing this valuable vegetable, and their authors indicate, that some cultivars could grow in the conditions of the southern region of the country (Poniedziałek et al. 1996). During the chickpea cultivation there have appeared some problems connected with diseases, which could reduce yield and crop quality. The aim of the present experiments was to describe the most frequent disease symptoms occurring on plants in the southern region of Poland and to recognize the causal agents.

MATERIAL AND METHODS

Field experiment were conducted in the years 2000 – 2002, in the Experimental Station of the Department of Plant Protection, University of Agriculture in Kraków. The whole area of the observation field was 0.2 ha. During the vegetation period the evaluation of health state was carried out, including visible disease symptoms on overground parts of plants and roots. Plants with evident symptoms were collected from the plantations and size, proportions, and colour of disease spots were estimated. Disease symptoms were described on leaves, stems, pods, and roots. After descriptions, fragments of infested plant tissues were taken for microscopic analyses. Isolation of fungi (Mazur et. al. 2002) and their identification was based on standard methods, using mycological keys (Gilman 1957, Neergaard 1979, Domsch et al. 1980, Nelson et al. 1983).

RESULTS AND DISCUSSION

As the result of observations and experiments many fungal species and forms and bacteria were isolated from the diseased plants. Their participation in infesting of morphological parts of plants was differentiated (Mazur et al. 2002). On each plant organ various disease changes were noted, which mainly had the character of maculation or necrosis. The chickpea roots and basal part of stems were decolourised and necrosed, especially at the beginning of the vegetation period. Those plants then became yellow and dry (Figs 1 and 2). Such symptoms were caused by fungi from genus *Fusarium*, particularly *F. oxysporum, F. avenaceum,* and *F. solani. F. oxysporum* is considered to be the main cause of parasitic wilting of plants. *F. solani* indicated high pathogenicity for chickpea in polish weather conditions as well as *F. avenaceum.* Both of the fungal species could transmitted by seeds (Deb and Dutta 1991, Wagner 1996).

Characteristic disease symptoms were caused by fungus *Rhizoctonia solani*, which can occasionally cause rot of root collar and gradual suberization of plant tissues (Fig. 3). In the literature *R. bataticola* is mentioned as the causal agent of disease. In the authors' experiments, however, that species was not isolated (Mazur et al. 2002). Occurrence of *R. solani* probably was the result of potatoes grown previously on the same field. In countries with a large area of chickpea cultivation, *R. bataticola* is the most important fungus, which may cause the rotting of seeds, root rot of seedlings, and later necrosis of root collar, and suberization of infested tissues (Dhrub-Sing et al. 1987, Taya et al. 1988).

In the phyllosphere zone mainly symptoms of dry spots were observed. These were concentric composition of spots with a dark border (Fig. 4). From such spots only *Ascochyta* sp. was isolated. In spite of numerous attempts of growing this fungus on different media, it did not produce spores, so that identification of species was difficult. In the literature *A. rabiei* was described as the cause of similar disease symptoms. This fungus can also cause the drying of leaves, pods, and seeds, which frequently had not so good a quality for reproduction in the next year (Mazur et al. 2002).

On stems and pods, browning and blurred spots were also noted (Fig. 5). From them mainly *Botrytis cinerea* was isolated. This fungus was noted especially after long periods of rainfall. On diseased plants coating of spawn and conidial spores of fungus were observed (Fig. 6). Infestation of pods by *B. cinerea* was the cause of high seed infestation, this being confirmed in the authors' previous experiments (Mazur et al. 2001).

From the infested stems, especially from the basal part close to the ground, additionally *Alternaria alternata* was isolated. The species was also frequently isolated from drying leaves, stems (Figs 7 and 8), and pods, from which seeds can be infected, this being confirmed in the authors' experiments during mycological analysis of fresh seeds immediately after harvesting (Mazur et al. 2001).

The results of three-year experiments demonstrate that there is a threat of mycopathogens occurrence in a cultivated areas of chickpea in the southern region of Poland. This was confirmed by many fungal disease symptoms noted during the vegetation period. The analysis of their occurrence in invaded plant tissues in comparison with the disease symptoms indicated that this process has a composite character. From the diseased part of plants many species of fungi were isolated, but with different intensity (Mazur et al. 2002).

CONCLUSIONS

1. Leaf spots and necrosis on the basal part of stems and root rot were the most frequently occurring symptoms on the diseased chickpea.
2. Such symptoms were caused mainly by fungi from genus *Fusarium*, *Botrytis*, *Alternaria*, and Ascochyta.
3. Infestation of plant tissues had mainly a composite character with the dominant species of *Fusarium oxysporum*, F. *avenaceum*, F. *solani*, *Rhizoctonia solani*, *Botrytis cinerea*, *Alternaria alternata*, and *Ascochyta* sp.

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REFERENCES

DEB P.R., DUTTA B.C., 1991. Studies on biological control of root rot disease of soybean caused by *Fusarium solani*, *Rhizoctonia solani* and *Sclerotium rolfsii*. Zeitsch. Pflanzenschutz Krankh. 98(5): 539-546.

DHRUB-SINGH K., NEMA K.G., SIMGH D., 1987. Effect of soil amendment on *Rhizoctonia bataticola* causing dry root rot of chickpea. Intl. Chickpea Newsletter 17: 23-25.

DOMSCH, K.H., GAMS W., ANDERSON T.H., 1980. Compendium of soil fungi. Acad. Press, London.

GILMAN J.C.A., 1957. A manual of soil Fungi. The Iowa State Coll. Press, Ames, Iowa.

MAZUR S., NAWROCKI J., KUĆMIERZ J., 2001. Fungi isolated from chickpea (*Cicer arietinum* L.) seeds. Vegetable Crops Research Bulletin 54(2): 77-81.

MAZUR S., NAWROCKI J., KUĆMIERZ J., 2002. Fungal diseases of chickpea (*Cicer arietinum* L.) cultivated in the south region Poland. Plant Proct. Sci. 38(2): 337-340.

NELSON P.E., TOUSSON T.A., MARASAS W.F.O., 1983. *Fusarium* species. The Pensylvania State University Press, University Park and London.

NEERGARD P., 1979. Seed Pathology. The Macmillan Press LTD, London.

PONIEDZIAŁEK M., SĘKARA-BANDUŁA A., CYWIŃSKI M., 1996. The value of some cultivars of chickpea (*Cicer arietinum* L.) in South Poland. In: II

Ogólnopolskie Sympozjum „Nowe rośliny i technologie w ogrodnictwie", Poznań: 56-62.

TAYA R.S., TRIPATHI N.N., PANWAR M.S., 1988. Influence of soil type, soil moisture and fertilizers on the severity of chickpea dry root rot caused by *Rhizoctonia bataticola* (Taub.) Butler. Indian Journal of Mycology and Plant Pathology 18(2): 133-136.

WAGNER A., 1996. Pathogenicity of some isolates of *Fusarium solani* (Mart.) Sacc. to chickpea (*Cicer arietinum* L.). In: Materiały Sympozjum „Nowe kierunki w fitopatologii", Kraków: 357-360.

NAJCZĘŚCIEJ WYSTĘPUJĄCE SYMPTOMY CHOROBOWE W UPRAWIE CIECIERZYCY (*CICER ARIETINUM* L.) I ICH PRZYCZYNY

Streszczenie: W latach 2000 – 2002 prowadzono badania nad zdrowotnością ciecierzycy uprawianej w warunkach Polski południowej. W trakcie obserwacji polowych stwierdzono na roślinach występowanie wielu charakterystycznych objawów chorobowych, których powodem były grzyby zasiedlające porażone tkanki. Wśród symptomów dominowały plamistości liści, pędów i strąków, żółknięcie i zasychanie całych roślin oraz zgnilizny systemu korzeniowego i podstawy łodyg. Za sprawców tych objawów uznano gatunki z rodzajów: *Fusarium*, *Alternaria* oraz *Botrytis cinerea* i *Rhizoctonia solani*.

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