

## THE OCCURRENCE AND ECONOMIC IMPORTANCE OF MAIZE DISEASES IN MIKULICE (SOUTH-EASTERN POLAND) IN 1993-1999

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**Abstract.** The paper presents results of studies on the occurrence and economic importance of maize diseases: common smut (*Ustilago zae* /Beckm./Unger) root et stalk rot (*Fusarium* spp.) and eye spot of leaves (*Kabatiella zae* Narita et Hiratsuka) (conducted in 1993-1999) as well as corn rust (*Puccinia sorghi* Schw.) and blotch of leaf sheaths (*Pseudomonas andropogoni* E. F. Smith/Stapp., *P. syringae* van Hall.) (conducted in 1996-1999).

**Key words:** maize diseases, occurrence, economic importance, south-eastern Poland

### I. INTRODUCTION

Fungi and bacteria are important groups of maize agrophages in Poland, but studies on the occurrence and economic importance of diseases caused by these pathogens are carried out sporadically and only in some regions of the country. In view of that the aim of the conducted analyses was to estimate the incidence and harmfulness of the most important maize diseases in south-eastern Poland.

### II. MATERIALS AND METHODS

Studies on the occurrence and economic importance of the common smut of corn (*Ustilago zae* /Beckm./ Unger), root and stalk rot (*Fusarium* spp.) as well as eye spot of leaves (*Kabatiella zae* Narita et Hiratsuka) were performed in the years 1993-1999. From 1996, the analyses also covered the corn rust (*Puccinia sorghi* Schw.) and blotch of leaf sheaths (*Pseudomonas andropogoni* /E. F. Smith/Stapp and *P. syringae* van Hall.). Observations were conducted at the Plant Breeding Station in Mikulice (south-eastern Poland) in 1993-1995 on the hybrid KLG-2210 and from 1996 till 1999 – on the cv. Ola.

The incidence of the common smut of corn and losses in maize seed yield caused by that disease were estimated according to the author's methods (Lisowicz 1980) by conducting analyses of infestation degrees of plants at their developmental stages (Siódmiak 1990) from 82 (milky ripeness) to 83 (silo ripeness). Plant lodging and infestation degrees caused by the root and stalk rot were estimated shortly before harvest, when the plants were at developmental stages from 87 (threshing ripeness) to 89 (dead ripe), and in accordance with methods presented by Czaplińska and Jaša (1980). The intensity of eye spot of leaves was calculated, when the plants were at developmental stages from 82 (milky ripeness) to

83 (silo ripeness), by assessing infestation with the use of the 9-grade scale (Czaplińska and Przybysz 1985). Analyses of rust occurrence were also carried out according to the 9-grade score, when the plants were at developmental stages from 83 (silo ripeness) to 85 (physiological maturity). Observations on plant infestation with the blotch of leaf sheaths were conducted at the time, when the plants were at development stages from 83 (silo ripeness) to 85 (physiological maturity) using the 9-grade score.

### III. RESULTS AND DISCUSSION

Results of the studies on the occurrence and economic importance of the common smut of corn, root and stalk rot as well as eye spot of leaves are summarized in Table 1.

Table 1

The occurrence of the common smut, root and stalk rot and eye spot of leaves on maize in 1993-1999

Disease	Index	Year							Mean
		1993	1994	1995	1996	1997	1998	1999	
Common smut	% infested plants	2.1	6.9	5.8	11.8	2.1	5.9	3.5	5.4
	yield loss %	0.2	4.7	4.2	7.4	1.7	0.5	2.6	3.0
Root and stalk rot	average infestation degree	1.2	1.2	1.4	2.2	2.5	1.8	2.1	1.8
	% of lodging plants	0.0	0.0	0.0	1.5	1.7	0.8	1.0	0.7
Eye spot of leaves	average infestation degree	0.5	0.5	1.0	1.2	1.0	0.8	0.4	0.8

The size of plant infestation with the common smut of corn and its injuriousness to maize depended on meteorological conditions and also on the degree of plant damage by frit flies (*Oscinella frit* L.), aphids (*Aphididae*) and thrips (*Thysanoptera*). The highest yield losses were recorded in 1994-1996, while the lowest – in 1993 and in 1998. The mean loss in maize seed yield in the years 1993-1999 was 3.0%. It was very similar to that calculated in the years 1976-1992 (Lisowicz 1995).

The intensity of root and stalk rot was weak in the study period, as conditions for plant infestation and damage were not too favourable. In 1993-1995, only few plants infested to the lowest degrees were encountered. For the last three years of the studies (1996-1999) that disease caused lodging of single plants. The occurrence and injuriousness of the disease were lower than those during 1976-1992 (Lisowicz 1995).

The degrees of plant infestation with the eye spot of leaves were also low. Somewhat more spots of that diseases were observed during the years with larger amount of rainfall in the summer months (1995, 1996 and 1997). That disease caused no significant losses in maize yields.

Plant infestation with rust and blotch of leaf sheaths is presented in Table 2.

The incidence of these diseases in the preceding years was very low. In 1996, the atmospheric conditions were favourable to plant infestation with rust and later – with blotch of leaf sheaths. Plant damage by sucking pests, especially aphids and thrips, also contribu-

Table 2

## The occurrence of rust and blotch leaf sheaths on maize in 1996-1999

Disease	Index	Year				Mean
		1996	1997	1998	1999	
Rust of maize	% of infested plants	100.0	3.5	3.0	6.5	28.3
	average infestation degree	2.3	0.1	0.1	0.2	0.7
Blotch of leaf sheaths	% of infested plants	78.5	12.5	16.0	28.5	33.9
	average infestation degree	3.2	0.8	1.1	1.9	1.8

ted to such significant infestation increase. A record incidence of aphids in 1996 was noted by the end of June – in the period of their maximum occurrence amounting to 454 individuals per plant (Lisowicz 1997). The infestation of upper leaves with rust was the cause of their precocious drying, whereas a heavy blotch of leaf sheaths caused leaf rotting (or drying in the periods of dry weather) as well as necrosis of leaf blades, which certainly had an impact on maize seed yield and caused impairment of the obtained feed quality. During the next years (1997-1999), the infestation of plants with these diseases was significantly lower, though blotch of leaf sheaths has remained one of the most important diseases of maize in south – eastern Poland.

## IV. LITERATURE

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## WYSTĘPOWANIE I ZNACZENIE GOSPODARCZE CHOROÓB KUKURYDZY W MIKULICACH (POŁUDNIOWO-WSCHODNIA POLSKA), W LATACH 1993-1999

## STRESZCZENIE

W latach 1993-1999 wykonano badania nad występowaniem na kukurydzy i znaczeniem gospodarczym: główni guzowatej (*Ustilago zaeae* /Beckm./ Unger), zgnilizny korzeni i zgorzeli podstawy łodygi (*Fusarium* spp.) oraz drobnej plamistości liści (*Kabatiella zaeae* Narita et Hiratsuka), a od

1996 obserwacjami objęto także rdzę (*Puccinia sorghi* Schw.) i plamistość pochew liści (*Pseudomonas andropogoni* E. F. Smith/Stapp., *P. syringae* van Hall.).

Spośród pierwszych trzech chorób największe znaczenie posiadała głownia guzowata, która spowodowała średnią stratę w plonach ziarna 3,0%. Pozostałe dwie choroby występowały w słabym nasileniu i nie zagrażały plonom kukurydzy.

W 1996 roku, w wyniku sprzyjających warunków meteorologicznych oraz bardzo silnego uszkodzenia roślin przez mszyce i przylżeńce, w dużym nasileniu wystąpiły dwie choroby: rdza i plamistość pochew liści. W latach 1996-1999 ostatnia z wymienionych stała się jedną z najważniejszych chorób kukurydzy w południowo-wschodniej Polsce.