

Effect of Cropping System on a Fungal Community Colonizing Seeds of Fodder Galega (*Galega orientalis* Lam.)

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Abstract

The fungal population colonizing the seeds of fodder galega cultivated in pure stand was greater than that cultivated in mixed stand. No significant differences were observed in the species composition of the obtained fungal colonies. In all analyzed combinations, *Alternaria alternata* was predominantly isolated from the seeds. Other saprophytic fungi were represented by the following species: *Epicoccum purpurascens*, *Cladosporium cladosporioides* as well as fungi representing genera *Mucorales*: *Mucor hiemalis* and *Rhizopus nigricans*. Among the pathogens, *Botrytis cinerea* was most often isolated. The mineral and SNA medium as well as the process of superficial disinfecting of seeds reduced the number of isolated fungi.

Keywords: fodder galega (*Galega orientalis* Lam.); pure sowing; mixed sowing; seeds; fungi

INTRODUCTION

Fodder galega (*Galega orientalis* Lam.) is a perennial papilionaceous plant containing large protein concentrations in both the vegetative parts and in the seeds. Next to soil, these seeds are important source of pathogens representing *Fusarium* and *Botrytis cinerea* and *Sclerotinia sclerotiorum* (FILIPOWICZ 1989; NOWICKI 1995). A better understanding of the fungal species colonizing the seeds will help control them and improve plant health.

CWALINA-AMBROZIAK and MAJCHRZAK (2000) reports that in laboratory experiments with the seeds of fodder galega cultivated without fertilization, species representing *Fusarium* and *Botrytis cinerea* were isolated more frequently than from the seeds originating from the combination with fertilization.

The aim of the experiment was to determine the fungal community colonizing the seeds of fodder galega cultivated in pure and mixed sowing with smooth brome-grass.

MATERIALS AND METHODS

The experiment was carried out in 2000 and 2001 on an experimental field in Knopin. The experimen-

tal material were randomly selected mature seeds of fodder galega cultivated in pure and mixed sowing with smooth brome-grass (15–20 kg + 10 kg/ha, in the number of 600 seeds from each combination. The seeds used in the analysis were disinfected (30 s in 50% ethyl alcohol and 0.01% sublimate, followed by 3 rinsings in sterile water) and not disinfected (3 rinsings in sterile water). Three types of media were used: glucose – potato (PDA), SNA (NIRENBERG 1981) and mineral (ŁACICOWA 1970). After a 7-day incubation at 22°C the resulting fungi were transferred onto agar-agar slants for further identification.

RESULTS

The laboratory analyses of the fodder galega seeds resulted in the isolation of 976 fungal colonies (Table 1) represented by 12 species, yeast-like fungi and non-sporous fungi. The species of *Alternaria alternata* was dominant and constituted 64.7% of the total colony. The remaining saprophytic fungi included: *Epicoccum purpurascens* (6.6%), *Cladosporium cladosporioides* (2.7%) and *Penicillium* spp. and *Rhizopus nigricans* 1.2% each. The percentage of pathogens in the total fungal population was smaller and *Botrytis cinerea* (19.0%) was the most frequently isolated species. Rare

Table 1. Fungi isolated from seeds of fodder galega in investigated period

Fungi	Fodder galega						Total	Fodder galega with smooth brome-grass						
	disinfection			no disinfection				disinfection			no disinfection			Total
	PDA	SNA	m.m.	PDA	SNA	m.m.		PDA	SNA	m.m.	PDA	SNA	m.m.	
<i>Alternaria alternata</i> (Fr.) Keissler	61	40	54	89	64	44	352	50	28	34	68	43	56	279
<i>Botrytis cinerea</i> Pers.	18	14	15	30	21	17	115	14	7	11	16	9	13	70
<i>Cladosporium cladosporioides</i> Fres	1		1	7		3	12	1		2	8	1	2	14
<i>Epicoccum purpurascens</i> Ehrenberg	11		2		13		26				11		27	38
<i>Fusarium</i> spp.			1	1	7		9		2			2	2	6
<i>Mucor hiemalis</i> Wehmer													3	3
<i>Paecilomyces lilacinus</i> (Thom) Samson		1		2		1	4				1		2	3
<i>Penicillium</i> spp.	1	2	1	1		2	7			1	3		1	5
<i>Rhizopus nigricans</i> Ehrenberg	2					1	3	2		3			3	8
Yeast – like fungi	2			5		3	10			1			2	3
Non sporulating fungi	2			1	1		4	3		1	1			5
Total	98	57	74	136	106	71	542	70	37	53	108	55	111	434

m.m. = mineral medium

fungi from *Fusarium* genera (1.5%) were represented by *F. avenaceum*, *F. culmorum*, *F. oxysporum* and *F. poae*.

The results showed that there are no significant differences in fungal species composition in the seeds from particular combinations. However, the experimental factors such as crop type, medium, seed disinfecting method had an effect on the number of isolated fungi. The seeds of fodder galega cultivated in pure sowing produced 11% isolates more than the

seeds of fodder galega cultivated in mixed sowing (Figure 1A). The following species were isolated more frequently: *Alternaria alternata*, *Botrytis cinerea* and fungi representing *Fusarium* (Figure 2).

The fungal population was also modified by the type of medium. The smallest number of fungi was isolated on the SNA and the mineral media, which were deficient in nutrients. The SNA medium enabled the isolation of a fungal colony representing *Fusarium*. The most favorable medium for fungal

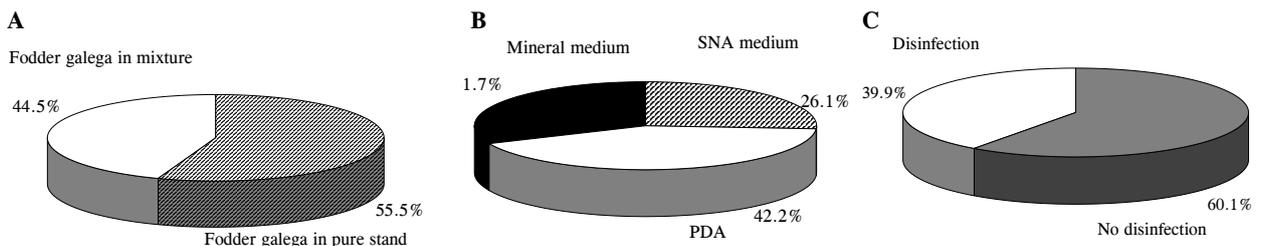


Figure 1. Fungi isolated from seeds of *Galega orientalis* Lam.

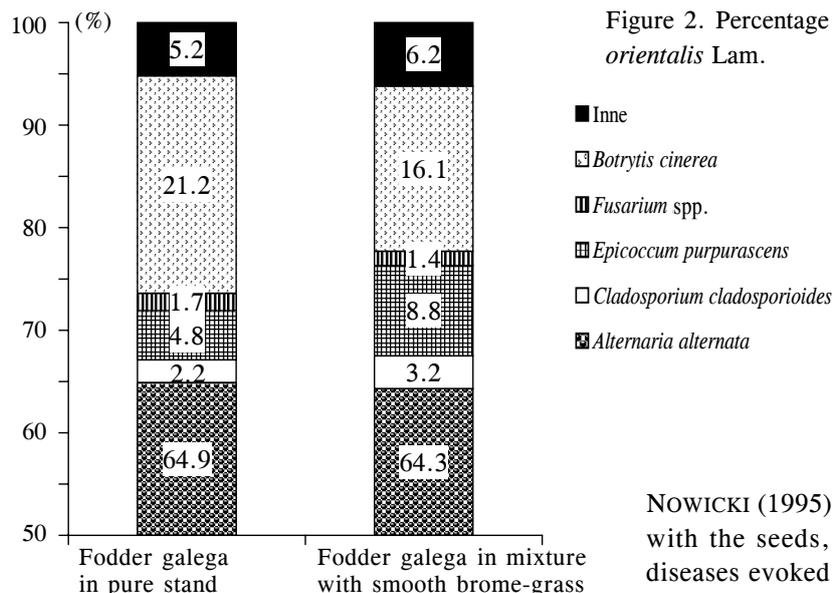


Figure 2. Percentage of fungi isolated from seeds of *Galega orientalis* Lam.

development was the PDA, which is commonly used for phytopathological experiments. The resulting fungal colonies constituted 42.2% of the total number of the isolated fungi. Seed disinfection decreased the number of isolated *Alternaria alternata* and *Botrytis cinerea* by 15% (Figures 1B, 1C).

DISCUSSION

As the result of the laboratory experiments with seeds of fodder galega, the following fungal species were isolated most frequently: *Alternaria alternata*, *Botrytis cinerea*, *Epicoccum purpurascens*, *Cladosporium cladosporioides* as well as fungi representing *Fusarium*. Scientific literature (SIMAY 1994; MARCINKOWSKA 1997) widely confirms the occurrence of the above fungi on seeds of many papilionaceous plants. They are often described as “field fungi”. The species of *Alternaria alternata* was most commonly isolated (64.7% of the total isolated colony). This fungus, recognized as a weak pathogen, causes defects in the sowing material of papilionaceous plants (GRZELAK 1977). Additionally, in the experiments of NARKIEWICZ-JODKO and SCHNEIDER (1983) working with red clover seeds, the following species were most frequently isolated *Alternaria alternata*, *Botrytis anthophila* and *Stemphylium botryosum*.

Among the pathogenic fungi, the species of *Botrytis cinerea* most frequently colonized the seeds of fodder galega (19% of the total isolates). Fungi from *Fusarium* genera were sparsely represented mainly on the SNA medium. The above pathogens were more frequently isolated from the seeds of fodder galega cultivated in pure sowing. According to FILIPOWICZ (1989) and

NOWICKI (1995), these fungi are transferred together with the seeds, which are an important source of diseases evoked by these fungi.

Fungi from the genera of *Penicillium*, *Mucor* and *Rhizopus*, which are common in nature, were scarcely represented in the experiment.

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