ERGOT AND ITS IMPORTANCE IN GRASS SEED PRODUCTION

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ABSTRACT
Ergot sclerotia are found periodically in seed of various grass species grown for seed in the Northern Moravia region of the Czech Republic over the past 15 years. The main host plant is Kentucky bluegrass (KBG). This study provides promising results. However, the use of fungicides, either as sprays or seed treatments, only is recommended in special cases (i.e. protection of foundation seed or breeder seed) because of the expense of these treatments. Developing ergot resistance in KBG is a cost-effective and environmentally safe means of control. Use of resistant varieties is important in areas where there is high infection pressure. Therefore, it is important to develop a breeding program for ergot resistance in KBG.

KEYWORDS
Kentucky bluegrass, ergot, control

INTRODUCTION
The Northern Moravia region is the largest producer of KBG seed in the Czech Republic. Analysis of seed since 1979 has shown that ergot is the most serious disease problem in this area. Ergot, caused by *Claviceps purpurea* (Fr.)Tul., influences the yield and quality of seed harvested in some grass species in the Czech Republic. Separating ergot sclerotia by mechanical means causes significant seed loss. Cagas (1986) conducted fungicide spray trials on KBG, annual ryegrass and various intergeneric hybrids at the full anthesis developmental stage from 1983 through 1986. The purpose of this study was to evaluate known chemical and non-chemical control methods and make recommendations of potential control methods for central Europe.

MATERIALS AND METHODS
The incidence of ergot sclerotia in the grass species grown for seed in Northern Moravia was investigated since 1979. The possibilities of chemical control of ergot (spraying with different types of fungicides in the full anthesis stage) were studied in Kentucky bluegrass, annual ryegrass and intergeneric hybrids in 1983-1986 (Cagas, 1986). Trials with fungicidal seed treatment (Kentucky bluegrass, intergeneric crosses) were conducted in 1989-1991 (Cagas, 1992). The possibility of obtaining Kentucky bluegrass plants with a higher level of resistance to ergot were studied in 1991-1995 (Cagas, 1995).

The field and glasshouse trials and observations were conducted in the Grassland Research Station at Zubøí.

RESULTS AND DISCUSSION
The most important grass host of ergot among the eleven species during 1979-1984 was KBG (Table 1). The incidence of ergot in seed fluctuated from 0% in 1993 and 1994 to 13.2% in 1985.

Chemical control by spraying with propiconazole /Tilt 250 EC, CIBA at 0.5 kg per ha provided best control in glasshouse and field trials on KBG, annual ryegrass and intergenic crosses with a high degree of male sterility (Cagas, 1986). Use of bitertanol and fuberidazol as a seed treatment (Sibutol DS, 39, 8 WS) at 1 kg per 1 ton of seed decreased the germination of sclerotia and many malformations were observed (Cagas, 1992).

Glasshouse trials with four ergot isolates and a special assortment of KBG varieties suggested the existence of differing levels of resistance. The variety with the highest level of resistance (Slezanka), could be used as a donor source of resistance in a breeding program (Cagas, 1995).

Currently in the Czech Republic there is no reliable control of ergot in grasses. The most serious problem is in the bluegrass seed production industry. Observations shown in Table 1 suggests that C. purpurea is not only serious in seed production, but it can be an important problem when it affects male sterility in fescue and ryegrasses in plant breeding nurseries.

Spraying with propiconazole presents many problems when it is applied at full anthesis, in that it only decreases the number of sclerotia but does not provide full control. Flusilazole (Punch 25E) was successfully tested in the USA (Johnston *et al*. 1995). It effectively controls ergot but is not economically suitable for commercial use in central Europe because of its high price (is not registered for use in the USA). However, fungicides are used on breeding nurseries and on fields where basic seed is produced.

Use of donor resistant varieties, as a source of resistance, to ergot will be important in the future. Varieties with high levels of resistance to ergot could be used in growing areas where there are periodically strong infection pressure.

Non-chemical control procedures, such as post-harvest burning (and residue removal techniques), could be recommended in special cases only.

Control of ergot in KBG grown for seed in central Europe is not simple. It involves a complex of many different control measures which are dependent upon the severity of ergot infection and potential seed yield loss in an environmentally diverse growing area.

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Table 1
Maximal incidence of ergot sclerotia in grass seed in Northern Moravia in 1979-1994

Species	Years															
	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
Phleum pratense	-	-	-	1	-	-	0,1	-	-	-	-	-	-	-	-	-
Lolium x hybridum	0,2	0,3	-	-	-	0,1	-	-	-	-	-	-	0,1	-	-	-
Lolium multiflorum, ssp. westerw.	1,0	0,3	1,7	1,9	0,7	0,6	1,9	0,5	0,2	0,8	2,2	0,4	-	-	-	-
Lolium multiflorum, ssp. italicum	1,0	0,9	2,8	0,3	0,3	1,4	0,3	1,1	0,5	-	0,1	0,3	-	-	-	-
Lolium perenne	-	-	-	2,5	0,1	-	-	-	-	-	-	0,1	-	-	-	-
Festuca rubra	1,9	0,4	-	0,4	0,1	0,8	4,9	0,4	0,7	0,8	0,3	0,3	-	-	-	-
Festuca pratensis	-	-	-	-	-	1,0	-	-	-	-	-	-	-	-	-	-
Poa pratensis	-	-	-	-	0,1	0,2	13,2	2,5	2,0	0,8	2,2	0,7	2,2	0,3	-	-
Cynosurus cristatus	-	-	-	0,2	-	0,1	0,1	-	0,1	0,3	0,1	-	-	-	-	-
Dactylis glomerata	-	-	-	-	-	-	-	0,1	0,1	-	-	-	-	-	-	
Trisetum flavescens	-	-	-	-	-	-	0,2	-	-	0,2	-	-	-	-	-	-