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RELATIONS BETWEEN SEED YIELD AND PLANT NITROGEN CONTENTS IN THREE FESTUCA SPECIES.

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Although seed yield is a complex trait affected by agricultural practices as well as environmental factors, traits related to seed production reveal considerable genetic variation, prerequisite for improvement by direct or indirect selection [Boelt and Studer, 2010]. Numerous research documented primary, secondary etc. traits with its quantified relation to seed yield in most of grass species significant for agricultural practice [Bugge 1987, Elgersma 1990, Hampton and Hebblethwaite 1983].

Application of nitrogen in early spring stimulates the development of reproductive tillers, but excess nitrogen can lead to severe lodging, reduced seed set, and increased secondary tillering. The nitrogen application strategy, i.e., rate and distribution between autumn and spring, is a very important management tool to stimulate seed crop development. However, recent environmental concern has brought restrictions to the amount of nitrogen that farmers are allowed to use in some seed production areas [Boelt and Studer, 2010]. Therefore, it is important to search for existing genetic variation of nitrogen contents in plants with its relation to seed yield.

Due to above, relations between plant nitrogen status and seed yield were examined during two-years field studies located in four locations in Poland: Radzików, Szelejewo, Leszno and Nieznanice. Fifteen grass genotypes from three fescue species: tall fescue (*Festuca arundinacea* Schreb.), meadow fescue (*F. pratensis* Huds.) and red fescue (*F. rubra* L.) were used, including commercial varieties, breeding lines and ecotypes.

Despite of phenological observations (heading and flowering start dates), biometrical measurements (plant height, leaf dimension, number of generative stems etc.) seed yield of single panicle, seed yield of plant and seed yield from plot were measured. Also, chlorophyll contents index (CCI) was measured at the onset of heading phase and some plants were harvested at the same time for analytical nitrogen contents determination. Due to regression curves plotted, nitrogen contents values were extrapolated for all plants measured. Nitrogen contents in all plants tested was extrapolated on the basis of regression formulas calculated due to relation between CCI and nitrogen contents determined in 25 plants per species harvested each year. Different formulas were used each year.

Data analysis exposed high and positive correlation coefficients between seed yield of single panicle and nitrogen contents in tall and red fescue plants. For meadow fescue negative and significant correlation coefficient was calculated for nitrogen

contents and seed yield from single plant.

Table 1. Summary of correlation coefficients calculations between seed yield and nitrogen contents in plants.

Seed yield of:	<i>Festuca:</i>		
	<i>arundinacea</i>	<i>rubra</i>	<i>pratensis</i>
single panicle	0,89 **	0,98 ***	0,45 ^{ns}
single plant	- 0,59 ^{ns}	0,31 ^{ns}	- 0,90 **
plot (50 plants)	- 0,68 ^{ns}	0,48 ^{ns}	- 0,77 ^{ns}

Explanation: **, *** - significance of CV at $\alpha < 0,05$ and $0,001$, respectively, ns – not significant

Our studies indicated possibilities for selecting high-yielding genotypes on the basis of quick and non-invasive determination of chlorophyll contents in plants of tall and red fescue. However, further research is still required for closer determination of nitrogen contents in single plant and whole genotype (population, variety etc.) seed yield.

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