

DEVELOPMENT OF CROPPING TECHNOLOGY AND FODDER VALUE OF PERENNIAL RYE

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Introduction

Perennial rye (*Secale cereanum*) is a stable hybrid of the winter rye (*Secale cereale* L.) and the perennial wild rye (*Secale montanum* Guss.).

Crossings in the genus *Secale* were made already at the end of the XIX century. Later the objectives of plant breeding (e.g. increasing the winter and drought resistance, developing resistance to biotic and abiotic factors, increasing the protein content) get more importance. The hybrid was made in several countries but Kotvics G. in Hungary made the first plants, which were useful for the plant breeding, in the 1950's (Kotvics, 1970). The variety "Kriszta" was developed from this material in the Research Centre of Nyíregyháza, which was state registered in 1998.

Owing to its high green productivity and perennial type and because of its low seed productivity perennial rye is utilized as a green fodder. Its drought resistance is very good, it adapts well to the disadvantageous soil and weather conditions, and so it can be sown also on weak habitats, loose or acid sandy soils (Kruppa, 2001). Attributable to covering the fields throughout the year and the fast tillering perennial rye is instrumental in protecting the loose sandy soils from erosion and deflation. Expectedly its role will extend in the game farming because it is exceedingly suitable to winter pasture: it can be grazed also in the winter and it tillers fast early in the spring (Halász 2003).

Perennial rye as a new culture crop has some problems which make more difficult the growth technology. The most important from these that germination of seeds is usually not too good, it changes between 47 and 79%. This quality is caused by genetic background (problems of conformation of chromosome pairs) and morphological parameters (likely because of seed form they are sensitive for thresh). This problem can be solved on the one hand through plant breeding, on the other hand through improvement the cropping technology – and this latter way seems to be faster.

In the Research Centre of Nyíregyháza we started a development of a new forage mixture with perennial rye and perennial papilionaceae (alfalfa, bird's-foot trefoil, red clover and vetch). This association can be another cultivating alternative for perennial rye.

Methods

We analysed the relationship between the germination and some harvest and thresh methods: we studied the effect of the set of threshing machine and combine (rev) on germination ability. We harvested perennial rye in two ways: one step harvesting and threshing one week after mowing (two steps harvesting). Several standards were threshed by hand. The germination was carried out accordingly to the cereal standard.

In the forage mix experiment we prepared 7 different mixes with perennial rye and alfalfa, and 7 mixes with perennial rye and bird's-foot trefoil and we compared their products with the components. The small parcels of this experiment were sown on acid sandy soil in March of 2002. We mowed the parcels four times a year and weighed the green and dry mass product.

Results and discussion

The results of germinating study are shown in Table 1.

Table 1.: Effects of harvest methods on germination ability of perennial rye

Threshed by:	Rev l/min	Harvest method	
		in one step	in two steps
		Germination of perennial rye (%)	
Plot combine	1000	82,3 %	-
	1500	79,0 %	-
	1800	75,3 %	-
Single ear thresher	1000	92,5 %	93,3 %
	1500	58,3 %	57,3 %
	1800	14,0 %	7,8 %
Manually		89,0 %	88,0 %

In cases of either threshing methods we found correlation between the rev and the germination ability. By the plot combine threshing and also by the single ear thresher we found that the lowest rev eventuates the best results (82,3 and 92,5 %), which don't differ significantly from the control threshed by hand (89,0 %). The disadvantage of low rev is that after threshing a lot of seeds stay in the ears. The difference between the two mechanical methods follows probably from the length of threshing-time: the ears stay much shorter in the threshing drum of plot combine than in the single ear thresher.

Between the one step and two steps harvesting methods on the score of germination we didn't find any significant differences.

In the forage mix experience the productivity was considerably low in the year of sow, the green yield suffice for grazing. From the second year the relation of perennial rye and papilionaceae changed as follows: in the first growth the perennial rye was presented by 40-60 % in the green mass, this value later decrease and the fourth growth we could harvest only alfalfa. Because of the frequent mowing technology (which adapts to alfalfa) the forage mix can utilize for three years, then the perennial rye get thinner. In second year perennial rye produced 30-35 t/ha green mass (6,8-7 t/ha/year dry mass), but the mixed stand yielded 78-85 t/ha green mass (15,7-16,5 t/ha/year dry mass),

Conclusions

Results show that one of the most important influential factors of germination ability of perennial rye is the harvesting and threshing method. Disadvantages results from the morphological parameters of seed can moderate with suitable threshing method.

In the forage mix experiment we experienced the follow environmental and economic advantages in connection with new forage mixture:

- The two plants with different fodder value in the mixture are complementary to each other from the point of view of dietetics; the mixture produce great mass fodder with digestible fiber and high quantity of crude protein.

- Because of the lack of fodder on pastures in summer it is necessary to eat hay or apply additional feeding at this time. The mixture with perennial rye can produce pasturable green mass from spring to autumn.
- If the mixture is utilized by grazing, the surplus of green yield in spring and autumn can be utilized by making hay or silage, which can make use of feeding in winter.
- The influence of this new mixture from Papilionaceae and Gramineae is advantageous for the soil. Alfalfa has deep taproot, that reduces the compactness of soil and it can collect nitrogen from the air. The fibrous root system of perennial rye contributes to development of favourable structure of surface soil.
- It is advantageous from the point of water balance of soil, that perennial rye and alfalfa utilize the water from different bed owing to they different root-system and they don't enter into competition with each other.
- The forage mixture can profitably be utilized for three-five years; it depends on the soil and intensity of utilization.
- This mixture can play great part in soil protective agriculture, because the perennial culture overgrows the surface of the soil during the whole year and it affords possibility of ecological farming.

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