WEEDS OF TALL FESCUE CROP IN THE FOUNDING YEAR AND WEED CONTROL

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Abstract: *Tall fescue (Festuca arundinacea Schreb) is a perennial forage crop which can be used for grazing, or as hay, silage and a component in combination with leguminous crops. When seed production is considered, a special attention ought to be paid to weed control in the founding year. Grassy weeds represent a particular problem for spring tall fescue crops, because it is not recommendable to prevent weeds during the spring sowing. This study was aimed to identify weed species and number during the founding year of tall fescue crop. For that reason, a field trial was set at the experimental field of the Institute of Forage Crops in Kruševac, during 2007. The investigated cultivar of tall fescue was K-20. The applied herbicides in the trial were the following: Lentemul (2,4 D), Banvel (dicamba), Galbenon (bentazon) and Boss (clopyralid). The trial was set in random complete block design with four replications. Number of weed species was determined per square meter and herbicide efficiency degree was established according to Dodel. Results obtained in this study showed that in tall fescue crop were observed twenty weed species, as annual as perennial ones, with their average total number of 21.2 individuals/m^2. Annual weed species were most abundant (13 individuals/m^2). The highest frequency of appearance showed Matricaria chamomilla (3.63 individuals//m^2), Cirsium arvense (3.52 individuals//m^2) and Chenopodium album (2.60 individuals/m^2). The greatest coefficient of efficiency (83.62) was reached by the herbicide Boss, and the lowest one (64.46) by the herbicide Lentemul. The best prevention effect on annual weed species was shown by the herbicide Boss (86.6), but the herbicide Banvel was the best in preventing perennial weeds (92.6). However, in order to reach higher forage yields and better forage quality, it is necessary to kill weeds in the year of tall fescue crop founding, and also during further exploitation of tall fescue crop. Results of this study point to a necessity of chemical protection measures for an efficient weed control in tall fescue crop*.

***Key words*:** *tall fescue, weeds, herbicides, coefficient of efficiency*

INTRODUCTION

Tall fescue (*Festuca arundinacea* Schreb) is a perennial forage crop which can be used for grazing, or as hay, silage and a component in combination with leguminous crops. Production of grassy crops seed ought to be done with constant care during whole vegetation, because even minor mispractice can jeopardize the entire production cycle (GAŠPAROV et al., 1987; VUČKOVIĆ et al., 2003). MIJATOVIĆ (1980) pointed that the best conditions for grassy crops seed production were in hilly and lower mountainous areas, while VUČKOVIĆ et al. (1998) reported that high grassy crops seed yields could also be reached in lowland areas. Thus STANISAVLJEVIĆ et al. (2006), in eastern Serbia at vertisol soil type, got grass seed yield of 623 kg ha^{-1} using mineral fertilization. When seed production is considered, a special attention ought to be paid to weed control in the founding year. Grassy weeds represent a particular problem for spring tall fescue crops, because it is not recommendable to prevent weeds during the spring sowing. In such conditions, spring sowing in chemically prepared soil is recommended, where soil is pretreated by herbicides during autumn and winter in order to prevent germination of weed seeds (LEE, 1965). The same author in 1973 developed the

technique for establishing tall fescue crop in autumn sowing term, where every row of just sown seed was covered by a layer of activated carbon, and inter-row space was treated by herbicides. Certainly, in order to reach higher yield and better quality of bulky feed, it is necessary to control weeds as during the founding year, as during the rest of tall fescue exploitation period. This study was aimed to identify weed species and number in tall fescue crop and to investigate possibility of weed control using different herbicides.

MATERIAL AND METHODS

The field trial was established at the experimental field of the Institute of Forage Crops in Kruševac, during 2007. The study included the tall fescue cultivar Kruševačka-20 (K-20) and four herbicides. The trial was set in random complete block design with four replications. Weeds number was counted per square meter, and degree of herbicide efficiency was determined according to DODEL (cit. by STANKOVIĆ,1969).

Table 1

Herbicides applied in the trial

Treatments	Preparations	Active substance	Dose
I	Lentemul	2,4 D	1 l/ha
II	Banvel	Dicamba	0.7 l/ha
II	Galbenon	Bentazon	3 l/ha
IV	Boss	Clopyralid	0.4 l/ha
Control	--	--	--

Climatic conditions

Growth and development of tall fescue, as well as of weeds, is in direct dependence on meteorological conditions, above all on air temperature and precipitation amount. The most sensitive developmental stages are emerging and intensive growth. Air temperature and precipitation amount are listed in table 2. Unstable and rainy weather at the end of May and beginning of June made difficult herbicide application, while a droughty summer with high temperatures caused poor growth and development of tall fescue.

Table 2

Meteorological conditions during the trial

Months	Average monthly temperature (^oC)	Amount of precipitation (mm)
May	18.2	87.0
June	22.6	65.6
July	25.0	7.6
August	23.5	57.6
September	15.5	88.8
	Total:	**306.6**

Soil conditions

Table 3

Chemical properties of the soil

Humus (%)	N	P_2O_5	K_2O	pH in H_2O	pH in KCl
0.57-0.99	0.10-0.14	1.74	13.45	6.75	6.22

The trial was carried out on pseudogley soil type, and soil chemical properties were characterized by low content of humus and phosphorus, while content of nitrogen and potassium were at the level of moderate supplies.

RESULTS AND DISCUSSIONS

Because of sensitivity to herbicides for narrow-leaf weeds of tall fescue seed crop, those weeds were not studied although they were present (*Setaria viridis*, *Cynodon dactylon* and *Avena fatua*). Table 4 gives the observed weed species and their number per square unit.

Table 4

Weed species and their number of individuals per m^2 in tall fescue crop

Life cycle	No	Scientific name	Common name	Individuals/m^2
Annual	1	*Matricaria chamomilla* L.	Chamomile	3.63
	2	*Sonchus oleraceus* L.	Common sowthistle	0.42
	3	*Atriplex patula* L.	Spear saltbush	0.36
	4	*Stellaria media* L.	Common chickweed	0.13
	5	*Chenopodium album* L.	Lamb's quarters	2.60
	6	*Fumaria officinalis* L.	Common fumitory	0.50
	7	*Geranium dissectum* Jusl.	Cutleaf geranium	0.45
	8	*Hibiscus trionum* L.	Flower of an hour	0.45
	9	*Polygonum aviculare* L.	Common knotgrass	2.50
	10	*Polygonum convolvulus* L.	Black bindweed	0.30
	11	*Polygonum persicaria* L.	Spotted ladysthumb	0.31
	12	*Veronica agrestis* L.	Green field speedwell	0.05
	13	*Viola arvensis* Murr.	Field pansy	0.13
Biennial	14	*Daucus carota* L.	Wild carrot	1.14
Perennial	15	*Cirsium arvense* (L.) Scop.	Creeping thistle	3.52
	16	*Taraxacum officinale* Web.	Common dandelion	0.86
	17	*Convolvulus arvensis* L.	Field bindweed	2.14
	18	*Trifolium repens* L.	White clover	1.07
	19	*Rumex crispus* L.	Curly dock	0.009
	20	*Rumex obtusifolius* L.	Bitter dock	0.67
			Average weed number per m^2	**21.24**

Twenty weed species were registered in the trial and their number was 21.24 individuals/m^2. The most numerous weed species were *Matricaria chamomilla* L., *Cirsium arvense* (L.) Scop. and *Chenopodium album* L., while the weeds *Rumex crispus* L., *Veronica agrestis* L., *Stellaria media* L. and *Viola arvensis* Murr. were present in very small number. Among the observed weed species, 13 were annual, one was biennial, and six were perennial.

Coefficient of efficiency

Before herbicide application, number of weed species and their individuals was determined at the experimental field. Because of unfavorable weather conditions and irregular emerging of tall fescue plants, herbicide treatment was slightly delayed. Three weeks after treatment, number of weed species and their individuals was determined again in order to establish coefficient of herbicide efficiency in weed control. Results are given in table 5.

Table 5

Efficiency of herbicides (%) in weed control

Weed species	Herbicides			
	Lentemul	Banvel	Galbenon	Boss
Cirsium arvense (L.) Scop.	18	74	--	100
Matricaria chamomilla L.	8	17	98	100
Chenopodium album L.	100	83	23	86
Convolvulus arvensis L.	74	94	50	8
Polygonum convolvulus L.	80	--	17	56
Rumex obtusifolius L.	73	100	90	--
Taraxacum officinale Web.	100	100	100	100
Polygonum aviculare L.	99	96	15	86
Polygonum persicaria L.	--	100	--	100
Sonchus oleraceus L.	25	87	100	100
Geranium dissectum Jusl.	75	--	100	100
Daucus carota L.	0	30	100	92
Stellaria media L.	--	100	100	--
Trifolium repens L.	100	95	11	100
Hibiscus trionum L.	33	38	100	38
Atriplex patula L.	66	100	100	--
Fumaria officinalis L.	--	33	100	100
Viola arvensis Murr.	--	25	--	--
Veronica agrestis L.	--	--	100	100
Rumex crispus L.	--	--	--	72
Average preparation efficiency	**64.46**	**73.25**	**70.83**	**83.62**

The highest average efficiency coefficient was shown by the herbicide Boss (83.62), and the lowest one by Lentemul (64.46), while Banvel and Galbenon showed approximately same efficiency. Preparation Boss had hundred percent efficiency for nine weed species, but had no efficiency for four weeds. Similar results were given by the preparation Galbenon.

Table 6

Efficiency of herbicides (%) in control of annual and perennial weeds

Weed life cycle	Herbicides			
	Lentemul	Banvel	Galbenon	Boss
Annual	60.75	67.90	77.54	86.6
Perennial	73.00	92.60	50.20	76.00

The best result in control of annual weed species was shown by the herbicide Boss (86.60), and the poorest one by the herbicide Lentemul (60.75). In control of perennial weeds the best result was given by the herbicide Banvel (92.60) and the poorest one by the herbicide Galbenon (50.20), while Lentemul and Boss gave nearly same results.

CONCLUSIONS

On the basis of the study we can conclude the following:

- Twenty weed species were registered in the tall fescue crop during founding year, and their average number was 21.24 individuals/m^2;
- The most numerous weed species were *Matricaria chamomilla* L., *Cirsium arvense* (L.) Scop. and *Chenopodium album* L.;
- The lowest number was shown by *Rumex crispus* L., *Veronica agrestis* L., *Stellaria media* L. and *Viola arvensis* Murr.;
- Among the observed weed species, 13 were annual, one was biennial, and six were perennial;
- The highest average efficiency coefficient was shown by the herbicide Boss (83.62), and the lowest one by Lentemul (64.46), while Banvel and Galbenon showed approximately same efficiency;
- The best result in control of annual weed species was shown by the herbicide Boss (86.60), and the poorest one by the herbicide Lentemul (60.75);
- In control of perennial weeds the best result was given by the herbicide Banvel (92.60) and the poorest one by the herbicide Galbenon (50.20), while Lentemul and Boss gave nearly same results.

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