RESEARCH ON SEED GERMINATION AT *ALOPECURUS PRATENSIS* L..

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Abstract: *Appropriate assessment (genetic, ecological, physiological, chemical, etc..) attributes of plants collected from pastures flora is a prerequisite for recovery of potential values which are hidden in each collected source (Cristea M., 2006). In fact it is the ultimate goal of all work done on line of sustainable use of biodiversity prospecting - collection - research - conservation (usage) which requires an intensive labor, and high financial costs for materials to ensure that in end society can access to goods and services that biodiversity can provide. It is important not to lose a number of valuable biotypes from the spread species in spontaneous flora of grasslands and some, unfortunately, are neither studied nor used at the desired level, such as species Alopecurus pratensis L.. This plant has not been studied very much abroad and with much less in Romania, which is emphasized by the fact that the official list of varieties in Romania there is no approved variety of Alopecurus pratensis L.. Therefore in this paper we specifically targeted on Alopecurus pratensis L. seeds, which are actually planting material, knowing that there are very many problems to solve related to the propagation of this species. The purpose of this paper is to determine the time required by Alopecurus pratensis L. seeds to mature to be sown, and to determine their germination capacity. In this sense we conducted two laboratory experiments, to see the time in days taken from harvest to germination, and in the second we studied seed germination of seven biotypes studied compared with the variety Alpha (Saatzucht Steinach, Germany) for Alopecurus pratensis L . As biological material studied we used seeds collected from biotypes of Alopecurus pratensis L. collected in 2009 in the Banat area. Biotypes from the meadows of the area localities: Remetea Mare Topolovățu Mare, Lugoj, Traian Vuia, Sinersig, Buzias and Albina. The seeds were harvested from May 25 - June 10, 2009. The seeds collected from the seven biotypes were prepared to germinated at a temperature of 22 ° C in germinator, every 14 days from harvest, from June 25 to October 28. It is ascertained that after four months, the first seeds germinated (biotype of Remetea Mare and Albina), and in the next days the other biotypes germinate. In the second laboratory experiment, mature seeds of Alopecurus pratensis L. biotypes gathered were set to germinated with the Alpha variety witness to emphasize the proportion of seeds germinated. While at the Alpha German variety, the seed germination was 78%, the percentage of germination in the studied biotypes was very small except for Sinersig biotype (52%).*

Key words: *Alopecurus pratensis L., biotypes, seed germination, maturation, germinative capacity.*

INTRODUCTION

From the technology rings of seed production of perennial graminaceus of grassland, one of the most important of them is the harvest. The phase and the type the harvest is done has a direct effect on qualitative indexes of the seeds and the correct establishment of the optimum moment for harvest has to be made following precise criteria's, based on the level of maturity of the seeds.

The setup of the these criteria's constitutes the subject of the conducted research with the purpose to make easier the decision of the period and the type of harvest, so that the losses are minimum and the seeds have superior quality.

The results of some research plead for the use of the consistency of endosperm as a criterion of the appreciation of the degree of maturity (GRIFFITHS, 1978). Others consider seed size (POPOVICI, 1981), color and share different organs of plants (HEBBLETWAITE, 1977) or degree of maturation of seeds (AHMED, 1978) as the criterion.

In this paper we will address primarily less discussed issues such as seed germination of *Alopecurus pratensis* L. seeds respectively the time needed to harvest and seed maturation from the harvest to the germination capacity stage.

MATERIAL AND METHODS

For the accomplishment of the experiment there has been used the *Alopecurus pratensis* L. seeds collected from local populations.

Research has been conducted within University Of Agricultural Sciences And Veterinary Medicine Timisoara 2009, 2010 respectively.

Seed germination studies on the biological material was composed of biotypes collected in 2009 in Banat, Timiş, biotypes from the meadows around - June 10, 2009. Seeds collected from the seven biotypes were set to germinate in three repetitions for each biotype the villages: Remetea mare, Topolovatu Mare, Lugoj, Traian Vuia, Sinersig, Buzias si Albina. Seeds were harvested from 25th may – 10th June 2009 at a temperature of 22 ° C in the type germinator Jacobsen (Rumed 5000), at intervals of 14 days from harvest, from 25 th June – 28 th October.

In the second laboratory experience, mature seeds of biotypes of Alopecurus pratensis L. collected were made with germinated control variety Alpha (Saatzucht Steinach, Germany), to highlight the percentage of seeds germinated. The testing of the seed germination is been done using the standard method (Sumalan R., Carmen Dobrei, 2000).

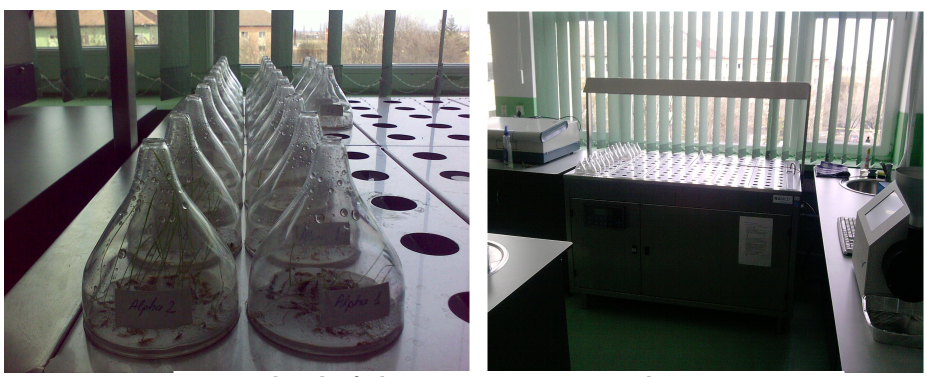

Figure 1. Germinated seeds of Alopecurus pratensis L. in Jacobsen germinator type.

Statistical analysis have been perfomed by STATISTICA 8 package (PETERSEN R.G., 1994; MEAD R., 2002).

RESULTS AND DISCUSSIONS

Seed germination is a set of morphological changes, biochemical and physiological, that allow the passage of the embryo or sleep latency from active biological. Seed germination capacity is not constant, being dependent on multiple internal and external factors (SUMALAN R. CARMEN DOBREI, 2000).

Because seed maturation is particularly important in research on the first experience of *Alopecurus pratensis* L. seed germination and seed maturation turned to time since harvest.

Alopecurus pratensis L. seeds germinated after three months and two weeks from the harvest, but the seeds that germinated were just biotypes of Remetea Mare and from Albina, other biotypes reaching our full maturation have germinated. In the following two weeks and the other biotypes were germinated as for full maturation of seeds of all populations being studied necessary about four months since harvest (see Table 1).

Table 1

Seed maturation period in the studied biotypes of *Alopecurus pratensis* L..

C. n.	Biotyp	Germination set up date									
		2wk.	4wk.	6wk.	8wk.	10wk.	12wk.	14wk.	16wk.	18wk.	20wk.
		24.06	08.07	22.07	05.08	19.08	02.09	16.09	30.09	14.10	28.10
1.	Remetea Mare	-	-	-	-	-	-	-	*	*	*
2.	Topolovatu Mare	-	-	-	-	-	-	-	-	*	*
3.	Lugoj	-	-	-	-	-	-	-	-	*	*
4.	Sinersig	-	-	-	-	-	-	-	-	*	*
5.	Traian Vuia	-	-	-	-	-	-	-	-	*	*
6.	Buzias	-	-	-	-	-	-	-	-	*	*
7.	Albina	-	-	-	-	-	-	-	*	*	*

In the second laboratory experiment, mature seeds of *Alopecurus pratensis* L. from all the seven populations studied were made from germinated again next year aiming to biotypes that first began to germinate seeds that germinated percentage as biotypes: Remetea Mare, Buzias, Sinersig and began to germinate 8 days from the date of the germ, followed by biotype of Topolovatu Mare, Albina (9 days), biotype from Lugoj (10 days), last biotype Traian Vuia germinant 11 day control over the variety Alpha which germinated after seven days from the date of the germinated (see Table 2).

Table 2

Early process of germination percentage of seeds germinated in the biotypes of *Alopecurus pratensis* L. studied.

C. n.	Biotyp	Germination starting days					
		7 days	8 days	9 days	10 days	11 days	%
1.	RemeteaMare		X				24.66
2.	Topolovatu Mare			X			43.33
3.	Lugoj				X		31.33
4.	Sinersig		X				52.33
5.	Traian Vuia					X	18.66
6.	Buzias		X				39
7.	Albina			X			26.33
8.	Mt. Alpha	X					78.33

Looking at the capacity of germination on the biotypes studied (see Figure 1) compared with the Alpha variety of *Alopecurus pratensis* L., the average percentage of germinated seeds was 52.33% to biotype of Sinersig, followed by biotype of Topolovatu Mare

(43.33%), biotype of Buzias (39%), biotype from Lugoj (31.33%), biotype of Albina (26.33%), biotype of Remetea Mare (24.66%) and the lowest percentage recorded to the biotype of Traian Vuia (18.66%) compared with variety Alpha has averaged 78.33% seeds germinated.

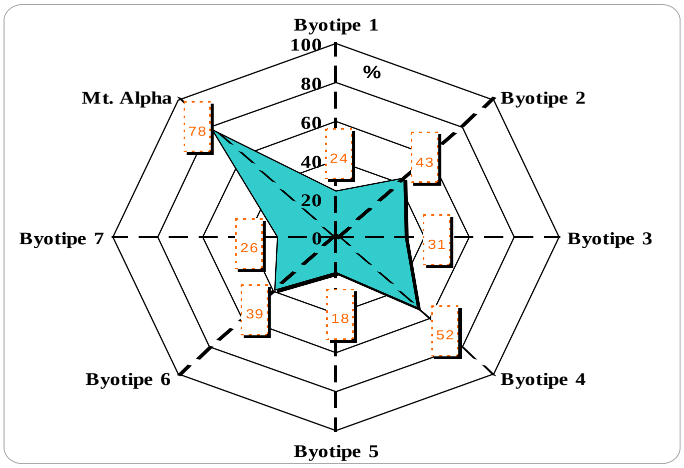

Figure 2. Percentage of seeds germinated at biotypes studied.

The basic descriptive statistics (mean, minimum, maximum and standard deviation) are presented in *table 3.*

Table 3

The basic descriptive statistics

Variable	Descriptive Statistics				
	Valid N	Mean	Minimum	Maximum	Std.Dev.
Var1	8	40,00000	15,00000	68,00000	20,22022
Var2	8	37,75000	13,00000	75,00000	19,78275
Var3	8	38,50000	20,00000	78,00000	18,53953
Var4	8	40,12500	21,00000	85,00000	21,38382
Var5	8	40,75000	16,00000	85,00000	21,33910
Var6	8	38,12500	18,00000	79,00000	19,65006

Analysis of variance performed (see Table 4) on the 6 variables for the reference group with 8 cases revealed significant statistical differences between all the observables.

A joining analysis (tree clustering, hierarchical clustering) has been performed in order to find whether the above biotypes form "natural" clusters that can be labeled in a meaningful manner.

The Euclidean distance (see Table 5) has been used to compute the distances between clusters. The complete linkage it was chosen as amalgamation rule that means the distance between two clusters is determined by the distance of the furthest neighbors. The *Amalgamation Schedule* results spreadsheet (see Table 6) lists the biotypes that are joined together at the linkage distances showed in the leftmost column of the spreadsheet.

Table 4

Analysis of variance performed

ANOVA

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*		
Remetea Mare	6	146	24,33333	34,26667		
Topolovatu Mare	6	260	43,33333	31,06667		
Lugoj	6	188	31,33333	22,66667		
Sinersig	6	314	52,33333	45,86667		
Traian Vuia	6	112	18,66667	22,26667		
Buzias	6	234	39	78		
Albina	6	158	26,33333	47,06667		
Alpha	6	470	78,33333	41,46667		
Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	15546,58	7	2220,94	55,06464	1,53E-18	2,249024
Within Groups	1613,333	40	40,33333			
Total	17159,92	47				

Table 5

Euclidean distances

Case No.	Euclidean distances							
	Remetea Mare	Topolovatu Mare	Lugoj	Sinersig	Traian Vuia	Buzias	Albina	Alpha
Remetea Mare	0	47,8	26	70,3	21	44	25	133
Topolovatu Mare	48	0,0	35	26,6	62	25	49	88
Lugoj	26	35,4	0	54,7	35	32	21	117
Sinersig	70	26,6	55	0,0	85	41	70	70
Traian Vuia	21	62,0	35	85,3	0	57	28	147
Buzias	44	24,8	32	40,6	57	0	38	100
Albina	25	49,1	21	70,0	28	38	0	128
Alpha	133	88,2	117	69,5	147	100	128	0

Table 6

The Amalgamation Schedule

Linkage distance	Amalgamation Schedule Complete Linkage Euclidean distances							
	Obj. No. 1	Obj. No. 2	Obj. No.	Obj. No. 4	Obj. No. 5	Obj. No.	Obj. No. 7	Obj. No. 8
21,21320	Remetea Mare	Traian Vuia VVuia						
21,35416	Lugoj	Albina						
24,77902	Topolovatu Mare	Buzias						
34,89986	Remetea Mare	Traian Vuia uiaVV.Vuia	Lugoj	Albina				
40,57093	Topolovatu Mare	Buzias	Sinersig					
85,29947	Remetea Mare	Traian Vuia	Lugoj	Albina Mare	Topolovatu	Buzias	Sinersig	
146,7106	Remetea Mare	Traian Vuia	Lugoj	Albina Mare	Topolovatu	Buzias	Sinersig	Alpha

The result of the clustering analysis is the hierarchical tree (see Figure 3) revealed that the biotypes Remetea Mare and Traian Vuia, Lugoj and Albina, Topolovatu Mare and Buzias form clusters.

The *Graph of amalgamation schedule* (see Figure 4) gave us a display on the line graph of the linkage distances at successive clustering steps. This plot showed a clear plateau at the linkage distance 40 which means that many clusters were formed at essentially the same linkage distance. This distance is the optimal cut-off which allowed us to decide how many clusters to retain and interpret.

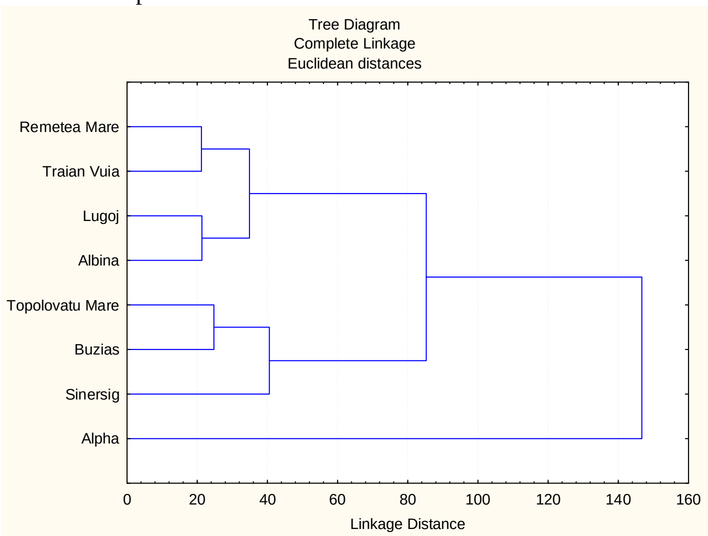

Figure 3 Tree Diagram, Complete Linkage, Euclidean distances

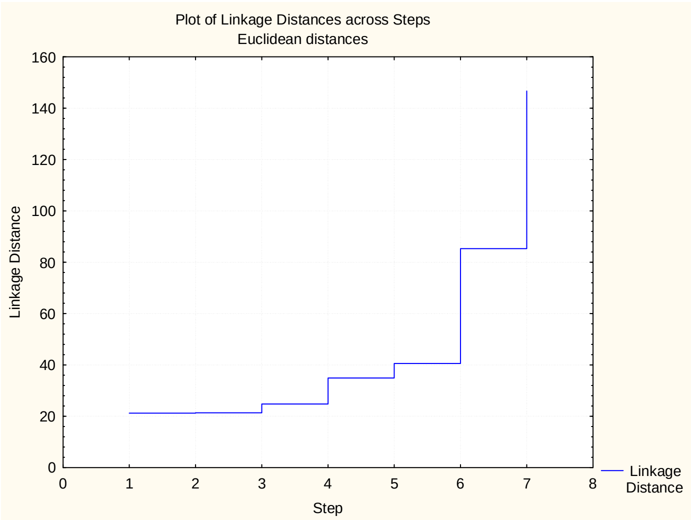

Figure 4 Plot of linkage Distances across Steps Euclidian distances

CONCLUSIONS

As the percentage of germinated seeds in populations studied is relatively low compared with other forage grass species from the spontaneous flora, we can say that there are problems in breeding this endangered species generation (the seeds). This makes us believe that in grassland this plant does not multiply in only a small proportion further by vegetative by rhizomes and runners, whose development occurs when humidity is very high.

Taking in consideration the analysis of variance (see Table 4), the optimal cut-off at the linkage distance 40 (see Figure 4) and the clusters in Figure 1, we can conclude that there are significant statistical differences between all the analyzed biotypes, but they can be formally classified in two clusters as follows: Remetea Mare, Traian Vuia, Lugoj, Albina; and Topolovatu Mare, Buzias, Sinersig.

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