Suitable Seed Harvesting Time for Six Grass Species

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SUITABLE SEED HARVESTING TIME FOR SIX GRASS SPECIES

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Abstract

Determination of the best period of seed harvesting was considered. Six grass species were selected. The research was conducted in three stations of Alborz, Sirachal and Homand Absard. According to maturing stages, seed collection for measuring seed water content (moisture content), weight of 1000 seeds and germination percentage has been done. The result showed that there were significant differences between harvesting time on seed germination for all species in all regions. Moisture content, germination rate, weight of 1000 seeds and seed shedding were important characteristics for determination of suitable seed harvesting time.

Keywords: Seed harvesting, Alborz, Sirachal, Homand Absard, Moisture content, Germination, Seed shedding, Weight of 1000 seeds.

Introduction

Time of seed harvesting is one of the fundamental factors affecting seed quality. Askarian (1993) believed when seed of grasses is harvested with high moisture content, seed quality in terms of seed germination, weight of 1000 seeds and storing period would be negatively affected. In addition deferred seed harvesting would cause seed shedding and

reduction of germination and weight of 1000 seeds. Kyu and Kang (1988), Seo and Kim (1980), Ryoo *et al*. (1985), Karimi and Arzani (1999) reported that the rate of germination, thousand grain weight and seed shedding are the most important factors influencing suitable seed harvesting time. So the main objective of this study was; investigation on relationship between time of seed harvesting to seed germination, moisture content, weight of 1000 seeds and seed shedding.

Material and Methods

Six grass species from three regions of Sirachal station with 531 mm annual rainfall, Alborz station (268 mm) and Homand Absard station (334 mm) in Tehran province were selected namely; *Agropyron tauri*, Sheep fescue (*Festuca ovina*), Orchardgrass (*Dactylis glomerata*), Red brome (*Bromus tomentellus*), Mountain rye (*Secale montanum*) and *Stipa barbata*. Before harvesting times, phenological stages of each species were recorded. Then according to maturing stages, seed collection was done. Weight of 1000 seeds, germination percentage and moisture content were measured. For determination of germination, complete random design experiment was used in four replicates and 5 or 7 treatments. Two types of seedbeds including top paper (TP) and between paper (BP) with two conditions of pre-chilling and without chilling were compared. Data analysis was done using Minitab and Mstatc softwares.

Results

The results showed that there were significant differences between germination percentage of all species for different times of seed collection in all of the regions. The best period of seed harvesting for *A. tauri* occurred when moisture content of seeds ranged from 11.5 to 15.1 percent and weight of 1000 seeds varied from 2.75 (Sirachal station) to 3.75

grams (Homand Absard). This period for red brome was from 11.2 to 18.17 percent moisture content and weight of 1000 seeds of 6.81 to 8.27 grams (Table 1). The best period of seed harvesting for orchardgrass occurred when seed moisture content was 12.8 to 18.25 percent and weight of 1000 seeds of 0.512 grams (in Sirachal Station) to 0.79 grams (in Alborz Station). Suitable moisture content for sheep fescue varied from 10.55 to 12.75 percent. Weight of 1000 seeds of these species differed from 0.36 (in Alborz) to 1 gram (in Homand). For mountain rye the best period of seed harvesting occurred, when seed moisture content ranged from 8.7 to 13.4 percent and thousand grain weight from 12.8 to 13.9 grams. When seed moisture content varied from 12.5 to 15.65 percent and one thousand seed weight from 3.47 (in Sirachal) to 5.1 grams (in Homand), it was the best period of seed collection for *S. barbata*.

Comparison of seed germination of *S. barbata* in Homand station with both TP and BP seedbeds showed that, germination increased up to 29.51% with TP method. Also TP method was significantly different to BP method ($P< 0.01$, Table 2).In addition germination percentage of these species with humid pre-chelling treatment increased up to 23.78 % using TP method. Humid pre-chelling did not have significant effect on germination percent of *S. barbata* in both regions of Sirachal and Homand Absard for TP seedbed.

Discussion

Determination of seed harvesting time by moisture content, weight of 1000 seeds and seed shedding conditions was also considered by Ryoo *et al*. (1985), Simon (1987), Kyu and Kang (1988), Reddy and Rolston (1977), Karimi and Arzani (1999).

Weight of 1000 seeds and germination percentage showed positive correlation in the present study. Therefore higher weight of 1000 seeds provided higher germination for each species. The reason is seed development and maturity increase seed nutritious storage, which

causes more seed germination. Delouche (1980) also reported that heavy seeds better germinated and produced stronger seedling and remained healthier in the store in his experiment.

The another finding of present study was that deferred harvesting time causes seed shedding in considered species. Ramirez and Hacker (1994) also reported one week deferred seed harvesting of *Digitaria eriantha* caused 56% reduction in seed collection. Pre-chilling treatment that has been recommended by ISTA (1976) did not significantly improved seed germination percentage of *Stipa barbata*.

In general seed moisture content, seed germination, weight of 1000 seeds and seed shedding were important characteristics for determination of seed harvesting time. In the best time of seed collection, seed germination and weight of 1000 seeds should be in highest level and seed shedding in lowest. In such time seed moisture content would be optimal for seed storing.

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Table 1 - Factors which have been measured for determination of seed harvesting time

Species	Region	Germination %	Seed weight (g/1000 seed)	Moisture %	Days after flowering
A. tauri	Homand Absard	95-99	3.24-3.75	11.5-12.93	27-34
	Sirachal	94.5-98.5	2.61-2.75	12.01-15.1	24-31
Re brome	Homand Absard	96.5	6.69-7.6	12.8-18.17	28-35
	Sirachal	94.6-95.6	6.81-6.91	11.2-11.23	31-38
	Alborz	48	8.27	12.3	32
Orchardgrass	Homand Absard	59-60	0.70-0.75	12.8-18.25	24-31
	Alborz	56.5-57-5	0.74-0.79	13.22-15.5	25-32
	Sirachal	62.5	0.512	13.42	30
sheep fescue	Homand Absard	97-98	0.96-1	10.5-12.75	28-35
	Alborz	92.5	0.36	12.72	31
mountain rye	Homand Absard	92-99	13.9-14.03	8.7-13.4	30-37
	Alborz	98	12.85	12.8	31
St. Barbata	Homand Absard	61-83	4.91-5.1	12.5-15.36	31-38
	Sirachal	80.5-82	3.47-4.18	12.75-15.65	29-36

Table 2 - Effect of humid pre-chilling and seedbed types on seed germination percentage of *tipa barbata*

Region	Pre-chilling	Seedbed	Mean germination % in different times of harvesting						Mean %	t value
			2 Jul.	9 Jul.	16 Jul.	24 Jul.	30 Jul.	6 Aug.		
Homand Absard	With pre-chilling	BP	20	28	52	14	13	6	22.17	3.57**
		TP	38.6	61	83	54.5	65	38	51.68	
	Without pre-chilling	TP	37.5	58	82	62	58	39	56.08	0.061 NS
			26 Jun.	3 Jul.	10 Jul.	17 Jul.	24 Jul.	31 Jul.		
Sirachal	With pre-chilling	BP	9	37	38.8	57.5	39.5	23	34.13	
		TP	36.5	82	80.5	79.5	51	18	57.91	1.87*
	Without pre-chilling	TP	21.7	79	81.3	78.5	67.5	20	58	0.005 NS

* *p< 0.01; * p < 0.05; NS. not significant.