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Agricultural traits of blue grass accessions in Black Sea Region of Turkey

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Abstract. Breeding of blue grass (*Poa* sp.) is a very important issue in Turkey and seed collections play a key role in enhancing the genetic pool. For this reason, blue grass seeds were collected from Northern Anatolian Region in 2007, and were subsequently characterized. Accessions were sown in seed trays and then seedlings were transplanted to field. At the end of the measurements and observations, the results were: (i) plant heights ranged between 22 and 100 cm; (ii) internode distance between 2.5 and 25.0 cm; (iii) main stem diameter between 0.10 and 1.38 mm; (iv) number of internode between 2 and 3; (v) flag leave blade length between 1.2 and 23.9 cm; (vi) flag leave blade width between 0.10 and 0.50 cm; (vii) panicle length between 3.10 and 16.60 cm. Number of spikelet in *Poa* sp. was found between 15 and 207, number of tiller per plant was between 19 and 382, number of fertile tiller per plant was between 0.11 and 15.6 g, dry matter yield per plant was between 10.03 and 27 g, 1000 seed weight was between 0.10 and 0.70 g.

Keywords. Diversity – Natural vegetation – Agricultural characters – Blue grass.

Caractéristiques agricoles des accessions d'herbe bleu dans la région de la mer Noire de la Turquie

Résumé. La culture de l'herbe bleue (*Poa* sp.) est très importante en Turquie et les collections de semences jouent un rôle clé dans l'amélioration du pool génétique. Pour cette raison, des graines d'herbe bleue ont été recueillies au Nord région d'Anatolie en 2007, et ont ensuite été caractérisées. Les accessions ont été semées dans des plateaux de semences et de plants ont été transplantés ensuite au champ. A la fin des mesures et des observations, les résultats étaient les suivants: (i) la hauteur des plantes varie entre 22 et 100 cm ; (ii) la distance internodale entre 2,5 et 25,0 cm ; (iii) le diamètre de la tige principale entre 0,10 et 1,38 mm ; (iv) le nombre d'entrenœuds entre 2 et 3 ; (v) la longueur de la feuille drapeau entre 1,2 et 23,9 cm ; (vi) la largeur de la feuille drapeau entre 0,10 et 0,50 cm ; et (vii) la longueur de la panicule entre 3,10 et 16,60 cm. Le nombre d'épillets a été trouvée entre 15 et 207, le nombre de talles par plante était comprise entre 19 et 382, le nombre de talles fertiles par plante était comprise entre 0,11 et 15,6 g, le rendement en matière sèche par plante était comprise entre 10,03 et 27 g, et poids de 1000 grains était comprise entre 0,10 et 0,70 g.

Mots-clés. Diversité – Végétation naturelle – Caractéristiques agricoles – Herbe bleu.

I – Introduction

Nearly half of the fodder production in Turkey is provided from ranges and pastures. The botanical composition of these lands has negatively been affected by early grazing and overgrazing. Consequently, their yields have rapidly declined.

It is essential to determine the suitable species and varieties in a certain region to improve ranges and pastures. The most efficient short-term way to cover feed deficiency is to increase the cultivation and yields of forages. Blue grass (*Poa* sp.) is inarguably an important plant for the Black Sea region since it is highly consumed by grazing animals. There is a wide range of variation among the blue grass plants raised in different areas of Mid-Black Sea Region in terms of exam-

ined traits in a study. This case is of great importance with respect to genetic diversity. Genotypic features of plants should be determined by eliminating the effects of environmental factors, which might be succeeded by raising plants in similar environmental regions (Acar *et al.*, 2009). *Poa species*, which are significant pasture plants, could grow in well drained lands, humid and cool regions with regular rainfall and in the soils with 6 and 7 pH values (Açıkgöz, 2001). *Poa species* show a large variation in terms of biotype characters due to their spreadable characters. Although most of the species are located in the native pastures; some are used in forage production and establishment of green lands (Manga *et al.*, 2002). Davis (1985) conducted an experiment on *Poa species*, and determined some agricultural characters of some *Poa species*. For example, in *Poa infirma*, plant height was between 5 and 20 cm, leaf blade width was between 0.5 – 2 mm; in *Poa annua*, plant height was between 7 and 40 cm, leaf blade width was between 0.8 – 3.5 mm, panicle length was between 3.5 and 10 cm, in *Poa trivialis*, plant height was between 25 and 90 cm, leaf blade width was between 2 and 3.6 mm, panicle length was between 4 and 13 cm; in *Poa pratensis*, plant height was between 20 and 80 cm, leaf blade width was between 1.5 and 4 mm, panicle length was between 3.5 and 12 cm; in *Poa angustifolia*, plant height was between 20 and 80 cm, leaf blade width was between 0.8 and 2 mm, panicle length was 20 cm; in *Poa longifolia*, plant height was between 30 and 100 cm, leaf blade length was 5 cm, leaf blade width was between 1.5 and 4.5 mm, panicle length was between 7 and 15 cm; in *Poa compressa*, plant height was between 30 and 55 cm, leaf blade width was between 2 and 4 mm, panicle length was between 3 and 7 cm; in *Poa nemoralis*, plant height was between 25 and 60 cm, leaf blade width was between 1 and 3 mm; in *Poa sterilis*, plant height was between 15 and 40 cm, leaf blade width was between 1 and 1.8 mm, panicle length was between 12 and 15 cm; in *Poa alpine*, plant height was between 8 and 35 cm, leaf blade width was between 1.5 – 3 mm; in *Poa bulbosa*, plant height was between 9 and 55 cm, leaf blade width was between 0.5 and 1.5 mm, panicle length was between 2 and 7 cm.

In different reserches, many characters were determined in *Poa pratensis*. For example, plant height was found as 120 cm in a study (Anon., 2011a). Brede (2001) also measured some characters of *Poa pratensis*. Plant height was found between 45-60 cm, leaf blade length was between 7-10 cm. Clayton (2010a) found the leaf blade length as 5-30 cm, leaf blade width as 2-4 cm number of internod as 2-4, panicle length as 2-20 cm. According to a research (Anon. 2011b), plant height was found between 20-80 cm and leaf blade width was found between 2 and 4 cm. Zylk and Pronczuk (2000) recorded that 1000 seed weight was between 0.245 and 0.425 g.

In the present study, *Poa sp.* seeds were collected from natural flora of Samsun, Sinop and Ordu provinces. Firstly, some morphological and agricultural traits of the plant genotypes were characterized and after that, the usage potentialities of these materials will be set up in improvement of pastures, forage and green area in the region.

II – Materials and methods

Seeds were collected from natural flora of Ordu, Samsun and Sinop provinces located in the Middle Black Sea Region in the period of June and September 2007-2008. The collected 292 seed samples from 62 different locations were sown in seed trays in January 2009 and seedlings were transplanted to field at 70 cm row spacing 70 cm plant spacing within the rows (70 x 70 cm) at the end of March and at the beginning of April in Samsun, Turkey. The experimental area has the typical Mediterranean climatic conditions. All observations and measurements (plant heights, internode distance, main stem diameter, number of internode, flag leave blade length, flag leave blade width, panicle length, spikelet number in a panicle and fertile tiller number, dry matter yield per plant, seed yield per plant) were performed in the second year of the study at blossoming stage and the obtained data were analyzed using SPSS 11.0 program (SPSS, 2002).

III – Results and discussion

At the end of the two-year study, totally 75 accessions in different 11 *Poa* species were collected from Samsun (36), Sinop (24) and Ordu (15) provinces. The most samples in total samples belong to *Poa angustifolia*, *Poa pratensis* and *Poa trivialis*. The species and the number of collected samples for each species as follow: *P. pratensis* 19, *P. sterilis* 5, *P. trivialis* 11, *P. compressa* 3, *P. nemoralis* 4, *P. annua* 3, *P. angustifolia* 22, *P. infirma* 3, *P. longifolia* 2, *P. bulbosa* 1 and *P. alpina* 2. *Poa alpina* was only found in high plateau of Ordu province. *P. bulbosa* and *P. annua* were only found in Sinop province. Plant height of all *Poa* species varied between 22 and 100 cm and general average was calculated as 58.21 cm. Coefficient of variation was found 34.58% as the variation was large concerning plant heights of *Poa* species (Table 1).

There was no a large variation regarding the internode number of all *Poa* species and samples and number of internode was found between 2 and 3 in all samples. However, there was a large variation in internode length and varied from 2.5 to 25 cm. Coefficient of variation was found as 34.99%. Main stem diameters of the samples were between 0.10 and 1.38 mm. (Table 1).

The variation was also large in leaf blade lengths of the samples and recorded between 1.2 and 23.9 cm. The coefficient of variation was calculated as 53.89 in terms of leaf blade length. Yet, the coefficient of variation was found as 29.55% regarding leaf blade width. It was recorded between 0.10 and 0.50 cm (Table 1). Panicle length changed from 3.10 to 16.60 cm and coefficient of variation was 27.44%.

Table 1. Some statistical data on *Poa* species

Characters	Number of population	Number of sample	Average	Minimum	Maximum	CV (%)	Sx
Plant height (cm)	75	379	57.42	22.00	100.00	22.71	1.03
Internode distance (cm)	75	379	11.84	2.50	25.00	34.99	0.21
Main stem diameter (mm)	75	379	0.93	0.10	1.38	19.28	0.01
Number of internode	75	379	2.39	2.00	3.00	20.43	0.02
Flag leave blade length (cm)	75	379	3.61	1.20	23.90	53.89	0.10
Flag leaf blade width (cm)	75	379	0.25	0.10	0.50	29.55	0.25
Panicle length (cm)	75	379	7.98	3.10	16.60	27.44	0.11
Spikelet number in a panicle	75	379	81.77	15.00	207.00	37.15	1.54
Fertile tiller number	75	379	81.07	10.00	382.00	57.12	2.38
Tiller of number	75	379	86.78	19.00	382.00	51.36	2.29
Seed yield per plant (g/ plant)	75	379	2.05	0.11	15.60	86.39	0.10
Dry matter yield per plant (g/ plant)	75	75	16.91	10.03	27.00	19.73	0.39
1000 seed weight (g)	75	75	0.27	0.10	0.70	50.56	0.02

Number of spikelet per panicle was between 15 and 207 and coefficient of variation was 37.15%. Number of tiller was found between 19 and 382; fertile tiller number was counted between 10 and 382 and coefficient of variation was found 51.36% and 57.12%, respectively. Seed yield per plant was 2.05 g as average of all populations (0.11 and 15.60 g). Coefficient of variation was found as 86.39%. 1000 seed weight of the samples were found between 0.10 and 0.97 and average was 0.27 g. Coefficient of variation was 50.46%. Dry matter yield per plant was between 10.03 and 27 g. Average of all populations was 16.91 g.

There was a statistically significant and positive relation between dry matter yield and plant height, internode length and internode number ($P \leq 0.01$). There was also statistically significant

and positive relation between dry matter yield and number of tiller and number of fertile tiller ($P \leq 0.05$). There was a statistically insignificant and positive relation between dry matter yield and internode length, panicle length and seed yield. However there was a statistically insignificant and negative relation between dry matter yield and leaf blade length & width, number of panicle and 1000 seed weight. There was a statistically significant and positive relation between seed yield per plant and number of tiller and number of fertile tiller ($P \leq 0.01$).

IV – Conclusions

At the end of the study, a large gene pool was obtained from *Poa* genus. In this material, samples were classified regarding forage production, pasture establishment and establishing turfs. Breeding studies should continue to release cultivars for the purposes.

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