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Morphological traits of orchard grass accessions in Black Sea Region of Turkey

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Abstract. Breeding of orchard grass (*Dactylis glomerata* L.) is a very important issue in Turkey and seed collections play a key role in enhancing the genetic basis. For this reason, orchard 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 63 and 160 cm; (ii) internode distance between 1.50 and 29.30 cm; (iii) main stem diameter between 1.39 and 4.63 mm; (iv) number of internode between 3 and 6; (v) flag leave blade length between 2 and 36 cm; (vi) flag leave blade width between 0.27 and 1.00 cm; (vii) panicle length between 1.95 and 32 cm; (viii) spikelet number in a panicle between 60 and 479; and (ix) fertile tiller number between 18 and 487. Considering the studied characters, the results obtained from the experiments are promising to breed new varieties in the future for different usage purposes (hay production and pasture)

Keywords. Diversity – Natural vegetation – Morphological characters – Orchard grass.

Caractères morphologiques des accessions de dactyle dans la région de la mer Noire en Turquie

Résumé. L'amélioration du dactyle (*Dactylis glomerata* L.) est un thème très important en Turquie et les collections de semences jouent un rôle-clé pour augmenter la base génétique. Pour cette raison, des semences de dactyle ont été collectées dans la région du nord de l'Anatolie en 2007 et caractérisées. Les accessions ont été semées dans des portoirs de semences et les plants ont été transplantés aux champs. À la fin des mesures et observations les résultats étaient : (i) hauteur de la plante entre 63 et 160 cm ; (ii) distance internodale entre 1,50 et 29,30 cm ; (iii) diamètre de la tige principale entre 1,39 et 4,63 mm ; (iv) nombre d'entre-nœuds entre 3 et 6 ; (v) longueur du limbe de la feuille drapeau entre 2 et 36 cm ; (vi) largeur du limbe de la feuille drapeau entre 0,27 et 1,00 cm ; (vii) longueur de la panicule entre 1,95 et 32 cm ; (viii) nombre d'épillets dans une panicule entre 60 et 479 ; (ix) nombre de talles fertiles entre 18 et 487. Considérant les caractères étudiés, les résultats obtenus à partir des expériences sont prometteurs pour différents usages (production de foin et pâturage) en vue d'améliorer de nouvelles variétés dans le futur.

Mots-clés. Diversité – Végétation naturelle – Caractères morphologiques – Dactyle.

I – Introduction

Nearly half of the fodder production in Turkey is provided from range and pastures. The botanical composition of these areas has been affected negatively by early grazing and overgrazing and consequently their yields have declined. It is essential to determine the suitable species and varieties in a certain region for improving ranges and pastures. The most efficient short-term way to cover feed deficiency is to increase the cultivation and yields of forages for this aims. Orchard grass (*Dactylis glomerata* ssp. *glomerata* L.), is clearly an important plant for the Black Sea region due to the fact that it is consumed with appetite by animals. There is a wide range of variation among the orchard grass plants raised in different areas of Mid-Black Sea

Region in terms of examined 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 (Ayan *et al.*, 2006; Mut and Ayan, 2008). Moreover, orchard grass is resistant to drought, cold, tolerant to shadow, resistant to grazing, cutting and it begins to grow in earlier times of spring (Acikgoz, 2001; Manga *et al.*, 2002). Sagsoz *et al.* (1996) mentioned that there were differences in terms of all phenological, morphological and biological traits among the orchard grass collected from different regions of Erzurum. They also reported that the plants collected from Oltu District to had bigger plant height, stem thickness, node numbers, leaf length and leaf width. The plant height, leaf length and leaf width were determined for orchard grass as 60-100 cm, 10-34 and 3-9 mm, respectively, in a study conducted with the aim of determining some morphological and agronomic traits of plants collected from ranges in Minnesota and North Dakota (Sedivec *et al.*, 1997). Some positive and significant relationships were found between hay yield and plant height, leaf length, leaf width and number of tillers in a study which aimed at determining relationships between hay/seed yields and some morphological traits in wild orchard grass (*Dactylis glomerata* L.) samples collected from 8 different locations in Erzurum province (Tosun *et al.*, 1996).

In the present study, *Dactylis glomerata* L. 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 and forage agriculture 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. The collected 292 seed samples from 62 different locations were sown in seed trays in January 2008 and seedlings were transplanted to field at 70 cm row spacing with 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) were done 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

Average plant heights of the orchard grass plants were measured as 96.11 cm. The difference between the lowest and the highest plant height (63 cm and 160 cm, respectively) indicates that a large variation exists among the samples (Table 1 and Fig. 1). The average distance between internodes of 292 orchard grass samples was found as 14.96 cm. Despite the large variation on distance between internodes (1.50-29.30), most of the samples had between 10 and 18 cm internode lengths (Fig. 2). Other measurements such as the mean stem diameter and the average number of internodes were 2.76 mm and 3.81 cm, respectively. The number of nodes varied from 3.00 to 6.00 (Fig. 3). It is also noteworthy to mention that the flag leaf blade length of the samples ranged from 2 to 36 cm (Fig. 4). Regarding this character, which is very important for yield and quality, high variation may give an alternative to select better samples for breeding. On the other hand, average flag leaf blade width was measured as 0.49 cm (Table 1).

Table 1. Some measurements and statistical values obtained from the experiment

Features	N	Mean	Minimum	Maximum	Sd
Plant height (cm)	292	96.11	63.00	160.00	16.40
Internode length (cm)	292	14.96	1.50	29.30	4.69
Main stem diameter (mm)	292	2.76	1.39	4.63	0.66
Node number	292	3.81	3.00	6.00	0.65
Flag leaf blade length (cm)	292	15.33	2.00	36.00	5.73
Flag leaf blade width (cm)	292	0.49	0.27	1.00	0.13
Panicle length (cm)	292	16.97	1.95	32.00	5.35
Number of spikelet per panicle	292	204.94	60.00	479.00	77.34
Number of fertile tiller	292	131.97	18.00	487.00	57.25

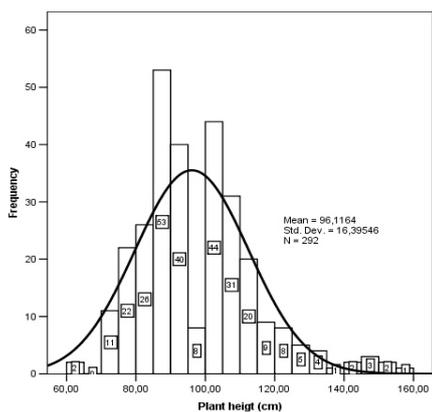


Fig. 1. General distribution of plant height values of orchard grass plants (cm).

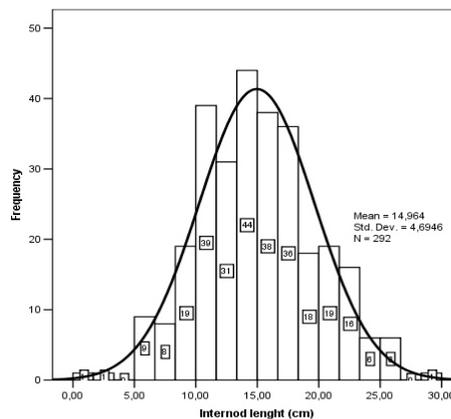


Fig. 2. General distribution of internode length of orchard grass plants (cm).

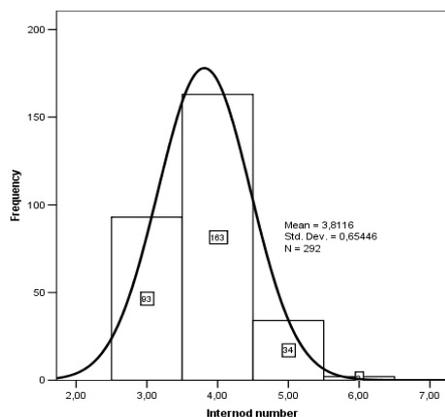


Fig. 3. General distribution of node number values of orchard grass plants.

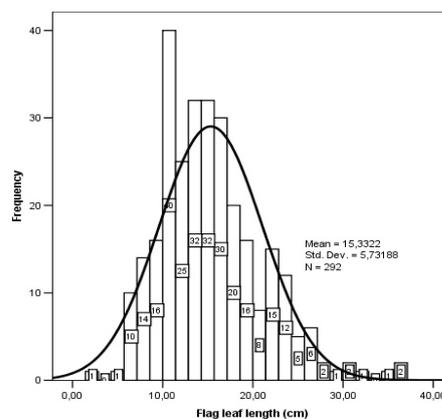


Fig. 4. General distribution of flag leaf blade length of orchard grass plants (cm).

Average panicle length, which is an important character for seed yield, was measured as 16.97 cm. The lowest and highest values were found out as 1.95 and 32 cm, respectively. The average spikelet number per panicle was figured out as 204.94, ranging from 60 to 479 (Table 1). Fertile tiller number per plant varied between 18 and 487 and the average value was calculated as 131.97 (Table 1). Previous studies showed the similar variation among the examined characters on orchard grass samples (Ayan *et al.*, 2006; Mut and Ayan, 2008). Some previous studies showed that, in general, there are positive correlations amongst the hay yield and plant height, flag leaf length and width, tiller number (Tosun *et al.*, 1996; Aygun *et al.*, 2009). Therefore, Middle Black Sea Region has potentially important genetic variation for orchard grass breeding studies. Higher standard deviations for some traits supports this idea (Table 1).

IV – Conclusions

A large variation was observed among the plant varieties. The results obtained from the study were very promising for releasing new cultivars to use in pasture improvement and forage cultivation. The taller plants and those having larger leaf plants were assessed for hay production, and the plants having more tillers and presenting spreading growing were assessed for pasture improvement. Overall, 37 plants for hay production and 25 plants for pasture improvement were found out as promising varieties and selected for further breeding studies.

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