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A Floristical Study on *Poaceae* spp. Growing Naturally in Malatya Province

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Abstract: This study includes species of *Poaceae* (*Gramineae*) growing in Malatya province. According to the grid system used in the Flora of Turkey, the research area is situated in the B6, B7, C6 and C7 squares. Approximately 346 plant specimens were collected from the area. At the end of the study 89 species (101 taxa) belonging to 47 genera were identified. Species' totals of the larger genera in the study area as follows: *Bromus* L. 10, *Elymus* L. 6, *Aegilops* L. 6, *Hordeum* L. 5, *Alopecurus* L. 4, *Poa* L. 4, and *Stipa* L. 4. The phytogeographic elements represented in the study area are as follows: Irano-Turanian 29 (28.7%), Mediterranean 9 (8.9%) and Euro-Siberian 6 (5.9%). Species appraised according to IUCN Red Data Categories (IUCN, 2001) include 1 EN-(Endangered) taxon, 4 Vu-(Vulnerable) taxa, 1 NT-(Near Threatened) taxon and 2 LC-(Least Concern) taxa. Four species are endemic to Turkey.

Key Words: Malatya, *Poaceae* (*Gramineae*), Morphological

Malatya Yöresinde Doğal Olarak Yetişen *Poaceae* Türleri Üzerinde Floristik Bir Araştırma

Özet: Bu çalışma, Malatya yöresinde yetişen *Poaceae* (*Gramineae*) familyasına ait türleri içermektedir. Türkiye Florası'nda kullanılan kare sistemine göre araştırma alanı B6, B7, C6 ve C7 karelerinde yer almaktadır. Yöreden 346 kadar bitki örneği toplanmıştır. Bu örnekler üzerinde yapılan çalışmalar sonucunda 47 cinse ait 89 tür (101 takson) saptanmıştır. İçerdikleri tür sayılarına göre araştırma alanında en büyük cinsler sırasıyla: *Bromus* L. 10, *Elymus* L. 6, *Aegilops* L. 6, *Hordeum* L. 5, *Alopecurus* L. 4, *Poa* L. 4, *Stipa* L. 4'dür. Araştırma alanındaki fitocoğrafik elementlerin dağılımı ise şöyledir: İran-Turan 29 (%28,7), Akdeniz 9 (%8,9), Avrupa-Sibirya 6 (%5,9). Türler IUCN Red Data Kategorilerine (IUCN, 2001) göre değerlendirilmiştir. EN-(Endangered) kategorisinde 1, Vu-(Vulnerable) kategorisinde 4, NT-(Near Threatened) kategorisinde 1, LC-(Least Concern) kategorisinde ise 2 taksonun bulunduğu saptanmıştır. Türkiye için endemik tür sayısı ise 4'dür.

Anahtar Sözcükler: Malatya, *Poaceae* (*Gramineae*), Morfoloji

Introduction

Malatya is located in the south-east part of Turkey. As well as the south-east of the Anatolian diagonal, which is one of the main endemic centres of Turkey. The area is in the Irano-Turanian phytogeographical region. However, the south-east part of the area is close to the Mediterranean phytogeographical region. *Pinus brutia* Ten. forest, which is a typical Mediterranean element, survives in the south-east of the area. According to the grid square system used in the Flora of Turkey most of the area is located in square B7, while another section in the west lies in square B6 and a small part in the south is in squares C6 and C7 (Figure 1). Karakaya dam lake is situated nearby the city. The area is also close to Keban

and Atatürk dam lakes, and the climate of the area has become mild. The Fırat (Euphrates) River and Tohma, Sultansuyu, Şiro and Şotik brooks are the water courses of the area.

Steppe vegetation is dominant in the area. However, in the vicinity of Doğanşehir, Hekimhan, Arapkir and Pütürge *Quercus* L. shrubs are common.

The *Poaceae* (*Gramineae*) are one of the largest families of flowering plants, with approximately 600 genera and 10,000 species. The members of the family are widespread in all climates and regions. Grasslands, which make up 20% of the world's vegetational cover, are composed of *Poaceae* members (Heywood, 1985).

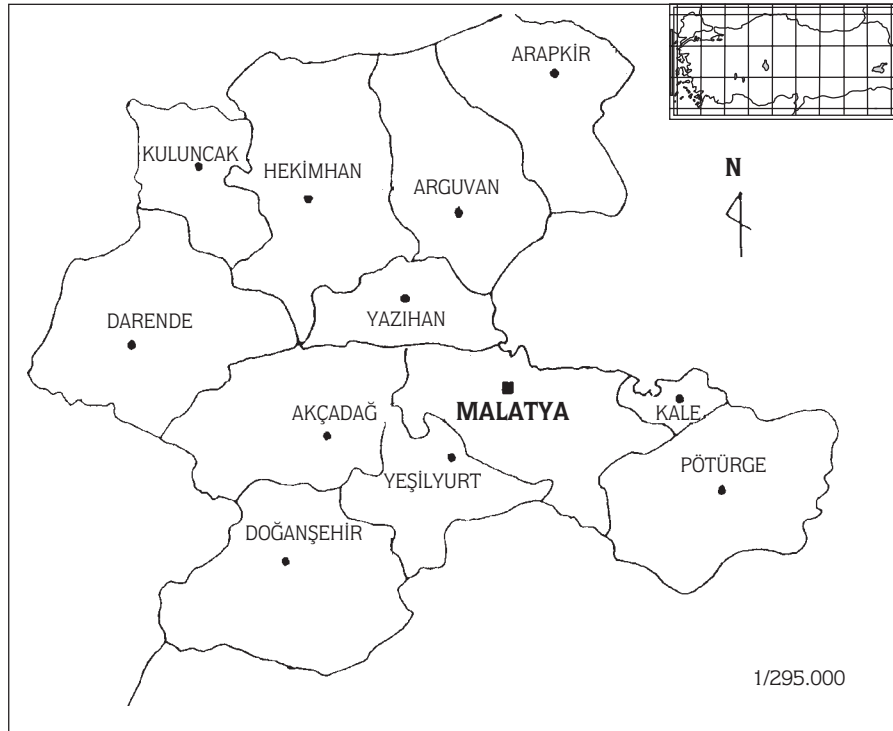


Figure 1. Geographic map of Malatya province.

In Turkey, 134 genera and 494 species belonging to *Poaceae* grow naturally. However, 11 genera and 29 species are cultivated (Davis, 1985; Davis et al., 1988; Güner et al., 2000).

Materials and Methods

The materials of this study are 346 plant specimens that were collected from Malatya province between 1986 and 2001. The specimens were prepared according to established herbarium techniques. The Flora of Turkey (Davis, 1985; Davis et al., 1988; Güner et al., 2000) and the other related floras (Boissieri, 1884; Komarov 1963; Townsend, 1968; Tutin, 1980; Meikle, 1985) and revisions (Doğan, 1999) were utilised in the identification of the specimens. Some of the specimens were determined by M. Doğan. The specimens were evaluated according to IUCN threat categories (Ekim et al., 2000). All the specimens are kept at the Herbarium of İnönü University in Malatya.

The floristic list is in the appendix. All the taxa were written in the same order as in the Flora of Turkey. Authors of plant names are written according to the Authors of Plant Names (Brummitt et al., 1992). Malatya

is not written in the localities as it is the research area. The abbreviations used in the text and appendix are as follows: Euro-Sib. Euro-Siberian; E. Medit. East Mediterranean; Medit. Mediterranean; Ir.-Tur. Irano-Turanian; Da.-Dağı; İ.U.-İnönü University; s.n.-without a number.

Results and Discussion

During the study, 346 specimens belonging to the family *Poaceae* were collected from the area. After the identification of the specimens, 98 species (112 taxa) belonging to 50 genera were established. These numbers show that the area is rich in *Poaceae* members.

The genera which include the majority of the species and the species totals are listed in Table 1.

As can be seen in Table 1, 49% of *Poaceae* members present in Malatya province belong to 10 genera. The main reasons for this are that these genera comprise many species of mainly Irano-Turanian elements and that Malatya province is in transitional belt between 2 phytogeographical regions, namely the Irano-Turanian and the Mediterranean.

Table 1. Species totals of the biggest genera found in the area.

Genera	Species Number	Genera	Species Number
<i>Bromus</i>	10	<i>Poa</i>	4
<i>Elymus</i>	6	<i>Stipa</i>	4
<i>Aegilops</i>	6	<i>Phleum</i>	3
<i>Hordeum</i>	5	<i>Lolium</i>	3
<i>Alopecurus</i>	4	<i>Melica</i>	3
		Total	48

As the members of this family are cosmopolitan, only 4 species are endemic to Turkey. A relatively large group consists of Irano-Turanian species. The Irano-Turanian element in the province comprises 29 (28.7%) species. Mediterranean species also constitute about 8.9% (9 species). Six species are Euro-Siberian and they are found in wet places.

We have established that some specimens have different characters from the descriptions given in the Flora of Turkey. These differences are listed in Table 2.

The species found in the area under threatened ICNU categories are given in the Table 3. (IUCN, 2001).

Table 2. Characters different from descriptions in the Flora of Turkey.

Species	The characters given the Flora of Turkey	Established
<i>Elymus longearistatus</i> (Boiss.) Tzvelev subsp. <i>sintensisii</i> Melderis	Awn of lemma recurved	Some awns are divaricate
<i>Elymus elongates</i> (Host) Runemark subsp. <i>elongatus</i>	Maritime sands to 100 m	Calcareous and steppe to 1600 m
<i>Ventenata dubia</i> (Leers) Cosson	Awn of upper lemmas 20-25 mm	Awn of upper lemmas c. 12 mm
<i>Milium pedicellare</i> (Bornm.) Roshev ex Melderis	Stem 30-50 cm	Less than 30 cm (15-20 cm)
<i>Lolium multiflorum</i> Lam.	Awn of lemma 2.5-5.5 mm	Awn of lemma to 7 mm
<i>Parapholis incurva</i> (L.) C. E. Hubbard	Spike 1-10 cm (or longer), Glumes 4.5-7 mm	Spike 1-13.5 cm, Glumes 4.5-10 mm
<i>A. muticum</i> (Boiss.) Eig var. <i>loliaceum</i> (Jaub. & Spach) Eig	All spikelets glabrous	Spikelets hispidulous or glabrous

Table 3. Threatened taxa and categories.

Taxa	Categories
<i>Alopecurus utriculatus</i> Sol. subsp. <i>malatyaensis</i> M. Doğan	VU
<i>B. tectorum</i> L. subsp. <i>lucidus</i> Sales	VU
<i>Crithopsis delileana</i> (Schultes) Roshev.	VU
<i>Elymus erosiglumis</i> Melderis	NT
<i>E. lazicus</i> (Boiss.) Melderis subsp. <i>divaricatus</i> (Boiss. & Bal.) Melderis	LC
<i>E. longearistatus</i> (Boiss.) Tzvelev subsp. <i>sintensisii</i> Melderis	EN
<i>Festuca callieri</i> (Hackel ex St.-Yves) F. Markgraf subsp. <i>zederbaueri</i> Markgr.-Dannenb.	LC
<i>Triticum dicoccoides</i> (Koern.) Koern.	VU

As can be seen in Table 3, 1 EN-(Endangered) category taxon, 4 Vu-(Vulnerable) category taxa, 1 NT-(Near Threatened) category taxon and 2 LC-(Least Concern) category taxa are established.

However, some taxa could not be collected from the records in the area. These taxa are as follows: *Elymus erosiglumis* Melderis, *Polypogon monspeliensis* (L.) Desf., *Agropyron cristatum* (L.) Gaertner subsp. *pectinatum*

(Bieb.) Tzvelev var. *pectinatum*, *Alopecurus utriculatus* Sol. subsp. *malatyaensis* M.Doğan, *Eremopyrum bonaepartis* (Sprengel) Nevski subsp. *bonaepartis*, *Heterantherium piliferum* (Sol) Hochst., *Trisetum turcicum* Chrtek, *Echinochola oryzoides* (Ard.) Fritsch, *Poa supina* Schrader, and *Poa angustifolia* L.

These taxa are included in the appendix.

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APPENDIX

The list of *Poaceae* species that grow naturally in Malatya province. The sequence of genera and species in the following list follows the system adopted in the Flora of Turkey.

Trachynia distachya (L.) Link

B7: 30 km from Malatya in the direction of Arapkir, steppe, 900-1000 m, 03 vii 1993, *B Yıldız-10854 & E Aktoklu*, Medit.

Elymus longearistatus (Boiss.) Tzvelev subsp. *sintensis* Melderis

B7: Kube Da., 1700 m, 20 vii 1193, *B Yıldız-11007*. Bey Da., north-west slopes, 1600-1800 m, 01 vii 1994, *B Yıldız-11681*, Endemic, Ir.-Tur.

E. lazicus (Boiss.) Melderis subsp. *divaricatus* (Boiss. & Balansa) Melderis

B6: Akçadağ, north of Develi village,

slopes, c. 1200 m, 16 vi 2000, *B Yıldız & T Arabacı-1101*. **B7:** Bey Da., south of Eski Çamurlu village, calcareous slopes, 1800-2000 m, 08 vi 1995 *B Yıldız-12645*. **C6:** Sürgü, Reşadiye pass, calcareous area, 1500 m, 28 v 1989, *B Yıldız-8599 & E Aktoklu*, Endemic, Ir.-Tur.

E. elongatus (Host) Runemark subsp. *elongatus*

B6: Kuluncak, west of Kale village, fossil bed, 1600 m, 18 vi 1994, *B Yıldız-11576*. **B7:** Çamurlu village, Kilizik, vineyards, calcareous area, 1100-1200 m, 28 vi 1994, *B Yıldız-11644*.

E. elongatus (Host) Runemark subsp. *turcicum* (McGuire) Melderis

B6: Arguvan, Akören village, Urudüzü, steppe, 1250 m, 11 vii 1992, *B Yıldız-9536*. **B7:** Between Malatya and Hekimhan, around Tecirli village, steppe, 900 m, 21 v 2000, *T*

Arabacı-1035.

E. repens (L.) Gould subsp. *repens*

B7: Bey Da., Venk village, Tavşan hill, calcareous rocks, 1400-1600 m, 06 vii 1996, *B Yıldız-13733*.

E. hispidus (Opiz) Melderis subsp. *hispidus*

B6: Kuluncak, around Beşiktepe village, 1300 m, 18 vi 1994, *B Yıldız-11552*. **B7:** Venk village, around Tavşan hill, 1100-1200 m, 01 vii 1995, *B Yıldız-12999*. **C6:** Doğanşehir, Erkenek, Boğaz, rocky slopes, 1350 m, 29 vi 1987, *E Aktoklu-0588*.

E. farctus (Viv.) Runemark ex Melderis subsp. *farctus* var. *farctus*

B7: Bey Da., around Eski Çamurlu village, streamside, 1500-1600 m, 01 vii 1995, *B Yıldız-12957*, Medit.

Eremopyrum distans (K.Koch) Nevski

C6: Doğanşehir, between Erkenek and Radar, steppe, 1600 m, 04 vii 1987, *E Aktoklu-0692*, Ir.-Tur.

Crithopsis delileana (Schult.) Roshev.

B7: 24 km from Malatya in the direction of Hekimhan, steppe, c.950 m, 21 v 2000, *T Arabacı-1027*. **C7:** Malatya, Sürgü, Eski Kurucaova village, fallow fields, 1500 m, 13 v 1989, *B Yıldız-8470*, Ir.-Tur.

Amblyopyrum muticum (Boiss.) Eig var. *muticum*

B7: İ.U. Campus, steppe, 900 m, 16 vi 1986, *B Yıldız-7687*.

A. muticum (Boiss.) Eig *lioliceum* (Jaub. & Spach) Eig

B7: Bey Da., around Eski Çamurlu village, 1500 m, 14 vi 1995, *B Yıldız-12810*.

Aegilops speltoides Tausch var. *speltoides*

B7: İ.U. Campus, Balıkdere, calcareous area, 1200-1400 m, 10 v 1990, *B Yıldız-8747 & E Aktoklu*.

Ae. speltoides Tausch var. *ligustica* (Savign.) Bornm.

B7: Arapkir, 3 km north of Onar village, steppe, 1500 m, 06 vii 1992, *B Yıldız(9485) & M Yalvaç*.

Ae. cylindrica Host

B6: Arguvan, Çobandere village, Oruçdede, *Quercus* scrub, 1300 m, 11 vii 1992, *B Yıldız-9563 & B Çıplak*, Ir.-Tur.

Ae. umbellulata Zhuk. subsp. *umbellulata*

B7: Yeşilyurt, around Gözene village, hill slopes, 950 m, 11 vi 2000, *T Arabacı-1091*. **C6:** Doğanşehir, Erkenek, Deveyata?, calcareous rocky slopes, 1400 m, 28 v 1989, *B Yıldız & E Aktoklu-1621*, Ir.-Tur.

Ae. triuncialis L. subsp. *triuncialis*

B6: Arguvan, Çobandere village, Şotik brook, Sağırtaş, mixed scrubs, 1300 m, 12 vii 1992, *B Yıldız-9711 & B Çıplak*. **B7:** İ.U. Campus, c. 900 m, 27 vi 1986, *E Aktoklu-0140*. **C6:** Sürgü, Reşadiye pass, calcareous area, 1500 m, 28 v 1989, *B Yıldız & E Aktoklu-1547*.

Ae. biuncialis Vis.

B6: Arguvan, Çobandere village, Oruçdede, *Quercus* scrub, 1300 m, 11 vii

1992, *B Yıldız-9602 & B Çıplak*. **B7:** Malatya, around Şahnahan village, steppe, c. 900 m, 21 v 2000, *T Arabacı-1019*.

Ae. geniculata Roth

B7: Bey Da., Konak, Horata, vineyards, 1000 m, 03 vi 1995, *B Yıldız-12486*. **C6:** Doğanşehir, 15-20 km from Erkenek in the direction of Gölbaşı, roadsides, 850 m, 24 v 1987, *E Aktoklu-0454*, Medit.

Triticum baeoticum Boiss. subsp. *baeoticum* var. *viridihaussknechtii* Hammer & A.Filat.

B7: İ.U. Campus, c. 900 m, 27 vi 1986, *E Aktoklu-0139*.

T. baeoticum Boiss. subsp. *baeoticum* var. *viridinigrireuteri* Hammer & A.Filat.

B6: Between Malatya and Darende, Karahan pass, 17 vi 2000, *B Yıldız & T Arabacı-1112*, Endemic.

T. dicoccoides (Körn.) Körn.

B7: Between Malatya and Arapkir, south of Karayolları Bakımevi, calcareous rocks, 1100 m, 26 vi 1999, *B Yıldız-14361*, Ir.-Tur.

Hordeum violaceum Boiss. & Huet

B6: Kuluncak, around Sarıkız and Karaçayır villages, wet places, 1600 m, 18 vi 1994, *B Yıldız-11548*, Ir.-Tur.

H. geniculatum All.

B6: 3 km from Darıca in the direction of Yukarılupınar village, basalt area, 17 vi 2000, *B Yıldız & T Arabacı-1125*, Euro-Sib.

H. murinum L. subsp. *glaucum* (Steud.) Tzvelev

B7: Konak, Hacı Emir Da., steppe, 1600-1800 m, 01 vii 1996, *B Yıldız-13523*.

H. bulbosum L.

B6: 3 km from Darıca in the direction of Yukarılupınar village, basalt area, 17 vi 2000, *B Yıldız & T Arabacı-1130*. **B7:** Malatya, Beylerderesi, steppe, 950 m, 16 vi 1993, *B Yıldız-10499*. **C6:** Doğanşehir, Erkenek, Boğaz, rocky slopes, 1350 m, 29 vi 1987, *E Aktoklu-0602 A Güner*. **C7:** Malatya, Sürgü, Eski Kurucaova village, vineyards, 1500 m, 13 v 1989, *B Yıldız-8470 E Aktoklu*.

H. spontaneum K.Koch.

B6: Akçadağ, around Doğanlar village, slopes, c. 1000 m 16 vi 2000, *B Yıldız & T*

Arabacı-1194, Ir.-Tur.

Taeniatherum caput-medusae (L.) Nevski subsp. *asper* (Simonk.) Melderis

B7: 30 km from Hekimhan in the direction of Kangal, steppe, 01 vii 2000, *B Yıldız & T Arabacı-1151*.

T. caput-medusae (L.) Nevski subsp. *crinitum* (Schreb.) Melderis

B6: Akçadağ, around Doğanlar village, slopes, c. 1000 m 16 vi 2000, *B Yıldız & T Arabacı-1193*. **B7:** İ.U. Campus, c. 900 m, 26 vi 1986, *E Aktoklu-0142*. **C6:** Sürgü, Reşadiye pass, calcareous area, 1500 m, 28 v 1989, *B Yıldız-8600 & E Aktoklu*. **C7:** Sürgü, Eski Kurucaova village, vineyards, 1500 m, 13 v 1989, *B Yıldız-8465 & E Aktoklu*, Ir.-Tur?

Henrardia persica (Boiss.) C.E.Hubb. var. *glaberrima* (Hausskn. ex Bornm.) C.E.Hubb.

B7: Bey Da., Venk village, Tavşan hill, calcareous area, 1400-1600 m, 20 v 1995, *B Yıldız 12181*, Ir.-Tur.

Bromus hordeaceus L. subsp. *hordeaceus*

B6: Between Malatya and Darende, Karahan pass, 17 vi 2000, *B Yıldız & T Arabacı-1114*.

B. japonicus Thunb. subsp. *japonicus*

B7: İ.U. Campus, steppe, 950m, 16 vi 1986, *B Yıldız-7688*.

B. japonicus Thunb. s u b s p . *anatolicus* (Boiss. & Heldr.) Pénez

B6: Akçadağ, North of Develi village, slopes, c. 1200 m, 16 vi 2000, *B Yıldız & T Arabacı-1108*.

B. scoparius L.

B7: Bey Da., east of Eski Çamurlu village, steppe and rocks, 1500-1600 m, 08 vi 1995 *B Yıldız-12684*.

B. lanceolatus Roth

B7: Konak, around A. Karagözlü village, vineyards, 1300 m, 03 vi 1995, *B Yıldız-12390b*.

B. danthoniae Trin.

B6: Darende, above Gürpınar Şelalesi, steppe, c. 1300 m, 17 vi 2000, *B Yıldız & T Arabacı-1137*. **B7:** 24 km from Malatya in

the direction of Hekimhan, steppe, c. 950 m, 21 v 2000, *T Arabacı*-1025. **C6:** 15 km from Erkenek in the direction of Gölbaşı, gypsum area and deep soiled slopes, 1450 m, 29 vi 1987, *E Aktoklu*-0580 & *A Güner*.

B. pumilio (Trin.) P.M.Sm.

C6: Doğanşehir, Erkenek, east of Büngüldek, steppe and slopes, 1550-1650 m, 14 v 1989, *B Yıldız & E Aktoklu*-1473.

B. tectorum L. subsp. **tectorum**

İ.U. Campus, Balıkdereşi, calcareous area, 1200-1400 m, 10 v 1990, *B Yıldız*-8771 & *E Aktoklu*.

B. tectorum L. subsp. **lucidus** Petzi

B7: Between Gündüzbey and Kozluk, calcareous slopes, 1100-1200 m, 21 v 1995, *B Yıldız*-12224. **C6:** Between Malatya and Gölbaşı, Reşadiye pass, 1550 m *Astragalus* steppe, 19 v 2001, *T Arabacı*-1192, Ir.-Tur./Sharo-Sindian.

B. sterilis L.

B7: Malatya, around Şahnahan village, steppe, c. 900 m, 21 v 2000, *T Arabacı*-1016.

B. diandrus Roth

B7: Between Konak and A. Karagözlü villages, vineyards, calcareous area, 1100-1200 m, 03 vi 1995, *B Yıldız*-12471.

B. tomentellus Boiss.

B6: Darende, above Gürpınar ?elalesi, steppe, c. 1300 m, 17 vi 2000, *B Yıldız & T Arabacı*-1141. **B7:** Kube Da., 1700 m, 20 vii 1993, *B Yıldız*-11008. **C6:** Doğanşehir, 3 km from Erkenek in the direction of Gölbaşı, rocky slopes, 1350 m, 22 v 1987, *E Aktoklu*-0414, Ir.-Tur.

Avena barbata Pott ex Link subsp. **barbata**

B6: Arguvan, around Yazıbaşı village, 30 v 1987, *H Eren*-s.n. **B7:** Malatya, around Dilek, fallow fields, 900 m, 21 v 2000, *T Arabacı*-1039. **C6:** 15-20 km from Erkenek in the direction of Gölbaşı, roadsides, 850 m, 24 v 1987, *B Yıldız & E Aktoklu*-0451, Medit.

Arrhenatherum palaestinum Boiss.

B6: 3 km from Darıca in the direction of Yukarılupınar village, basalt area, 17 vi 2000, *B Yıldız & T Arabacı*-1133. **B7:** Bey Da., west slopes, calcareous area, 1700-1800

m, 06 vi 1994, *B Yıldız*-11515. **C6:** Doğanşehir, Erkenek, Boğaz, rocky slopes, 1350 m, 29 vi 1987, *E Aktoklu*-0605 & *A Güner*, E.-Medit.

Ventenata dubia (Leers) Coss.

B6: 3 km from Darıca in the direction of Yukarılupınar village, basalt area, 17 vi 2000, *B Yıldız & T Arabacı*-1132.

Gaudiniopsis macra (Bieb.) Eig subsp. **macra**

B7: Bey Da., Venk village, Tavşan hill, calcareous rocks, 1300-1500 m, 20 v 1995, *B Yıldız*-12029, Ir.-Tur.

Rostraria cristata (L.) Tzvelev v a r . **cristata**

C6: Between Erkenek and Gölbaşı, c. 1000 m, 12 v 1989, *B Yıldız & E Aktoklu*-1404.

Koeleria cristata (L.) Pers.

B6: Akçadağ, north of Develi village, slopes, c. 1200 m, 16 vi 2000, *B Yıldız & T Arabacı*-1104. **B7:** Yeşilyurt, around Gözene village, steppe, 1050 m, 11vi 2000, *T Arabacı*-1088. **C6:** 15 km from Erkenek in the direction of Gölbaşı, gypsum area and deep soiled slopes, 1450 m, 29 vi 1987, *A Güner & E Aktoklu*-0579.

Calamagrostis pseudophragmites (Haller fil.) Koeler

B6: Arguvan, Çobandere village, Şotik brook, Sağırtaş, mixed scrubs, 1300 m, 12 vii 1992, *B Yıldız*-9707 & *B Çıplak*. **B7:** Malatya, around Tecirli village, wet places, 900 m, 21 v 2000, *T Arabacı*-1038. **C6:** 10 km from Erkenek in the direction of Gölbaşı, *P. brutia* forest openings, 1000 m, 28 v 1989, *B Yıldız & E Aktoklu*-1570, Euro-Sib.

Polypogon viridis (Gouan) Breistr.

B7: Bey Da., around Eski Çamurlu village, streamside, 1500-1600 m, 01 vii 1995, *B Yıldız*-12947, Euro-Sib.

Milium pedicellare (Bornm.) Roshev. ex Melderis

B6: 3 km from Darıca in the direction of Yukarılupınar village, basalt area, 17 vi 2000, *B Yıldız & T Arabacı*-1123, Ir.-Tur.

Zingeria biebersteiniana (Claus) P.Simirnov subsp. **trichopoda** (Boiss.) R.Mill

B7: Bey Da., Venk village, Tavşan hill, calcareous rocks, 1500-1600 m, 08 vi 1996,

B Yıldız-13394, Ir.-Tur.

Alopecurus arundinaceus Poir.

B7: Bey Da., Bürücek hill, streamside, 1900 m, 21 v 1995, *B Yıldız*-12291.

A. vaginatus (Willd.) Boiss.

B7: Kube Da., Kube wold, steppe, 1800 m, 11 v 1992, *B Yıldız*-9136, Ir.-Tur.

A. myosuroides Huds. subsp. **tonsus** (Blanche ex Boiss.) Dogan

B7: 3 km from Malatya in the direction of Yeşilyurt, 950 m, 23 vi 1995, *B Yıldız*-12906, Medit.

A. utriculatus Sol. subsp. **utriculatus**

C7: Malatya, Sürgü, Eski Kurucaova village, fallow fields, 1500 m, 13 v 1989, *B Yıldız*-8468, E.-Medit.

Phleum pratense L.

B6: Kuluncak, Kızılyüce Da., north slopes, pasture, 1700 m, 18 vi 1994, *B Yıldız*-11580, Euro-Sib.

P. exaratum Hochst. ex Griseb. subsp. **exaratum**

B6: 3 km from Darıca in the direction of Yukarılupınar village, basalt area, 17 vi 2000, *B Yıldız & T Arabacı*-1131. **B7:** 24 km from Malatya in the direction of Hekimhan, steppe, c. 950 m, 21 v 2000, *T Arabacı*-1036. **C6:** 10 km from Erkenek in the direction of Gölbaşı, stream bed, 1000 m, 28 v 1989, *E Aktoklu*-1573.

Phleum boissieri Bornm.

B7: İ.U. Campus, steppe, 900 m, 16 vi 1986, *B Yıldız*-7654, Ir.-Tur.

Festuca callieri (Hack. ex St.-Yves) F.Markgr. subsp. **callieri**

B6: 3 km from Darıca in the direction of Yukarılupınar village, basalt area, 17 vi 2000, *B Yıldız & T Arabacı*-1124.

F. callieri (Hack. ex St.-Yves) F.Markgr. subsp. **zederbaueri** Markgr.-Dann.

B6: 3 km from Darıca in the direction of Yukarılupınar village, basalt area, 17 vi 2000, *B Yıldız & T Arabacı*-1124, 1127. **B7:** Bey Da., Venk village, Tavşan hill, calcareous rocks, 1500-1600 m, 08 vi 1995, *B Yıldız*-12608, Endemic, Ir.-Tur.

Lolium multiflorum Lam.

B7: Bey Da., around Kilizik, calcareous area, c. 1000 m, 14 vi 1995 *B Yıldız*-12719.

- L. persicum* Boiss. & Hohen. ex Boiss.
B7: Bey Da., around Venk village, vineyards, 1000-1200 m, 08 vi 1995, *B Yıldız-12536*, Ir.-Tur.
- L. rigidum* Gaudin var. *rigidum*
C6: 10 km from Erkenek in the direction of Gölbaşı, *P. brutia* forest openings, 1000-1100 m, 12 v 1989, *B Yıldız & E Aktoklu-1373*.
- Vulpia persica* (Boiss. & Buhse) V.I.Krecz. & Bobrov
B7: Between Gündüzbey and Kozluk, calcareous slopes, 1100-1200 m, 21 v 1995, *B Yıldız-12241*, Ir.-Tur.
- Vulpia persica* (Boiss. & Buhse) V.I.Krecz. & Bobrov form. *hirtiglumis*
B7: Bey Da., east of Eski Çamurlu village, streamside, 1600-1700 m, 08 vi 1995, *B Yıldız-12650c*.
- V. ciliata* Dumort. subsp. *ciliata*
B7: Bey Da., East of Eski Çamurlu village, streamside, 1600-1700 m, 08 vi 1995, *B Yıldız-12650b*.
- Catapodium rigidum* (L.) C.E.Hubb. ex Dony subsp. *rigidum* var. *majus* (C. Presl) Lainz
B7: Kube Da., Kube wold, south slopes, 1600-1700 m, 14 vi 1993, *B Yıldız-10485*.
- Psilurus incurvus* (Gouan) Schinz & Thell.
B7: Bey Da., Çamurlu village, Toptaş brook, calcareous area, 1300-1500 m, 20 v 1995, *B Yıldız-12034*.
- Poa trivialis* L.
B7: Bey Da., west slopes, wet places, 1600-1700 m, 03 vi 1995, *B Yıldız-12300*.
- P. pratensis* L.
B6: 3 km from Darıca in the direction of Yukarıulupınar village, basalt area, 17 vi 2000, *B Yıldız & T Arabacı-1126*. **B7:** Malatya, around Şahnahan village steppe, c. 900 m, 21 v 2000, *T Arabacı-1012*.
- P. timoleontis* Heldr. ex Boiss.
B7: Bey Da., above Kilizik, Dil hill, calcareous area, 1300-1500 m, 14 vi 1995, *B Yıldız-12785*, E.-Medit.
- P. bulbosa* L.
B7: Bey Da., Çamurlu village, Toptaş brook, calcareous area, 1300-1500 m, 20 v 1995, *B Yıldız-12070*.
- Eremopoa persica* (Trin.) Roshev.
C6: 10 km from Erkenek in the direction of Gölbaşı, stream bed, 1000 m, 28 v 1989, *E Aktoklu-1574*, Ir.-Tur.
- E. songarica* (Schrenk) Roshev.
B7: South of İ.U. Campus, Balıkdere, calcareous area, 1200-1400 m, 10 vi 1990, *B Yıldız-8772 & E Aktoklu*, Ir.-Tur.
- Catabrosa aquatica* (L.) P. Beauv.
B7: Bey Da., Çamurlu village, Kilizik, calcareous area, 1000-1100 m, 20 v 1995, *B Yıldız-12151*.
- Dactylis glomerata* L. subsp. *glomerata*
B7: Bey Da., south of Kilizik village, vineyards and protected area, 1000-1100 m, 14 vi 1995 *B Yıldız-12754*. **C6:** 10 km from Erkenek in the direction of Gölbaşı, open area and wet places, c. 1000 m, 12 v 1989, *B Yıldız & E Aktoklu-1392*, Euro.-Sib.
- D. glomerata* L. subsp. *hispanica* (Roth) Nyman
C6: Doğanşehir, Erkenek, Boğaz, rocky slopes, 1350 m, 29 vi 1987, *E Aktoklu-0600*.
- Cynosurus echinatus* L.
B6 : Arguvan, Siğircıuşağı village, Killik, steppe, 1700 m, 11 vii 1992, *B Yıldız-11681 & B Çiplak*, Medit.
- Briza humilis* M.Bieb.
B6: Arguvan, Çobandere village, Oruçdede, *Quercus* scrub, 1300 m, 11 vii 1992, *B Yıldız-9564 & B Çiplak*. **B7:** İ.U. Campus, steppe, 900 m, 16 vi 1986, *B Yıldız-7680*. **C6:** 10 km from Erkenek in the direction of Gölbaşı, open area and pasture, c. 1000 m, 12 v 1989, *B Yıldız & E Aktoklu-1390*.
- Parapholis incurva* (L.) C.E.Hubb.
B7: ? U. Campus, steppe, 900 m, 14 vi 1986, *B Yıldız-7696*.
- Echinaria capitata* (L.) Desf.
B7: Bey Da., Venk village, Tavşan hill, calcareous area, 1400-1600 m, 20 v 1995, *B Yıldız-12221*.
- Melica penicillaris* Boiss. & Balansa
B6: Akçadağ, north of Develi village, slopes, c. 1200 m, 16 vi 2000, *B Yıldız & T Arabacı-1105*. **C6:** Doğanşehir, Erkenek, Boğaz, rocky slopes, 1350 m, 29 vi 1987, *E Aktoklu-0598 A Güner*, Ir.-Tur.
- M. ciliata* L. subsp. *ciliata*
B6: Darende, above Gürpınar Şelalesi, steppe, c. 1300 m, 17 vi 2000, *B Yıldız & T Arabacı-1140*.
- M. persica* Kunth subsp. *persica*
B7: Bey Da., Konak, Horata, vineyards, 1000 m, 03 vi 1995, *B Yıldız-12489*. **C6:** Doğanşehir, Erkenek, Deveyatağı, calcareous rocky slopes, 1400 m, 28 v 1989, *B Yıldız-8638 & E Aktoklu*. **C7:** Sürgü, Eski Kurucaova village, vineyards, 1500 m, 13 v 1989, *B Yıldız-8472 & E Aktoklu*.
- M. persica* Kunth subsp. *inaequiglumis* (Boiss.) Bor
B7: Bey Da., around Kilizik village, calcareous area, c. 1000 m, 14 vi 1995 *B Yıldız-12720*. **C6:** Sürgü, Reşadiye pass, calcareous area, 1500 m, 28 v 1989, *B Yıldız-8596 & E Aktoklu*.
- M. persica* Kunth subsp. *canescens* (Regel) P.H.Davis
B6: Between Darende and Gürün, 3 km south-east of Yazıköy, calcareous area, 1400-1500 m, 23 vii 1993, *B Yıldız-11021 & E Aktoklu*. **C6:** Doğanşehir, between Erkenek and Radar, steppe, 1600 m, 04 vii 1987, *E Aktoklu-0693*, Ir.-Tur.
- Stipa holosericea* Trin.
B6: Akçadağ, around Doğanlar village, slopes, c. 1000 m 16 vi 2000, *B Yıldız & T Arabacı-1195*. **B7:** Between Venk and Eski Çamurlu villages, wet and deep soiled area, 1600 m, 08 vi 1995, *B Yıldız-12677*. **C6:** Sürgü, Reşadiye pass, calcareous area, 1500 m, 18 v 1989, *B Yıldız-8589 & E Aktoklu*, Ir.-Tur?
- S. arabica* Trin. & Rupr.
B7: Between Konak and A. Karagözlü villages, vineyards, calcareous area, 1100-1200 m, 03 vi 1995, *B Yıldız-12478*, Ir.-Tur.
- S. ehrenbergiana* Trin. & Rupr.
B6: 4 km from Hekimhan in the direction of Hasaңelebi, hill slopes, 1100-1200 m 01 vii 2000, *T Arabacı-1148*. **B7:** Between Gündüzbey and Kozluk, calcareous slopes, 1100-1200 m, 21 v 1995, *B Yıldız-12246*. **C6:** 15 km from Erkenek in the direction of Gölbaşı, gypsum area and deep soiled slopes,

1450 m, 29 vi 1987, *E Aktoklu-0561* & *A Güner*, Ir.-Tur.

S. pulcherrima C. Koch subsp. *epilosa* (Martinovsk) Tzvelev

B6: 3 km from Darıca in the direction of Yukarılupınar village, basalt area, 17 vi 2000, *B Yıldız* & *T Arabacı-1122*. **B7:** Bey Da., south of Kilizik, vineyards and protected area, 1000-1100 m, 14 vi 1995, *B Yıldız-12750*.

Piptatherum holciforme (M.Bieb.) Roemer & Schult. subsp. *holciforme* var. *holciforme*

B6: 12 km from Hekimhan in the direction of Kuluncak, calcareous slopes, 1350-1400 m, 01 vi 1994, *B Yıldız-11437*. **B7:** Between Bey Da. and Konak, calcareous area, 1300 m, 14 v 1994, *B Yıldız-11394*. **C6:** Doğanşehir, Erkenek, east of Büngüldek, steppe and slopes, 1550-1650 m, 14 v 1989, *E Aktoklu-1507*.

Phragmites australis (Cav.) Trin. ex Steud.

B7: Between Malatya and Hekimhan, around Tecirli village, wet places, 900 m, 21 v 2000, *T Arabacı-1037*, Euro.-Sib.

Cynodon dactylon (L.) Pers. var. *villosus* Regel

C6: Doğanşehir, Erkenek, Boğaz place, fallow fields, 1350 m, 21 viii 1987, *E Aktoklu-0931*.

Echinochloa crus-galli (L.) P.Beauv.

B7: İ.U. Campus, wet places, 900 m, 15 x 2000, *T Arabacı-1176*.

E. colonum (L.) Link

B7: İ.U. Campus, wet places, 900 m, 15 x 2000, *T Arabacı-1177*.

Setaria viridis (L.) P.Beauv.

B7: İ.U. Campus, steppe, 900 m, 14 vi 2000, *T Arabacı-1169*. **C6:** Doğanşehir, Erkenek, Boğaz, wet places, 1350 m, 21 viii 1987, *E Aktoklu-0923*.

Pennisetum orientale Rich.

B6: 4 km from Hekimhan in the direction

of Hasançelebi, eroded slopes, 1100-1200 m 26 v 1992, *B Yıldız-9874*. **B7:** Konak, Horata, vineyards, 1000 m, 03 vi 1995, *B Yıldız-12487*, Ir.-Tur.

Sorghum halepense (L.) Pers. var. *halepense*

B7: İ.U. Campus, steppe, 900 m, 14 vi 1986, *T Arabacı-1145*.

Chrysopogon gryllus (L.) Trin. subsp. *gryllus*

B7: İ.U. Campus, steppe, 900 m, 16 vi 1986, *B Yıldız-7693*.

Bothriochloa ischaemun (L.) Keng

B6: 4 km from Hekimhan in the direction of Hasançelebi, hill slopes, 1100-1200 m 01 vii 2000, *T Arabacı-1145*. **B7:** Around Gündüzbey, vineyards, 1100-1200 m, 12 viii 2000, *T Arabacı-1171*. **C6:** Doğanşehir, Erkenek, between Aözü and Karadere, steppe, 1600 m, 14 vii 1987, *E Aktoklu-0800*.