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**Review Article**

# Species Diversity and Floristic Analysis of the Family Poaceae in Libya Depending on the Flora of Libya

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**Abstract:** The goal of this research was to investigate the species diversity and floristic analysis of the family Poaceae in Libya depending on the data provided from the Flora of Libya series. 3 species (*Bromus unioloides* (Willd.) H. B. K., *Eriochloa fatmensis* (Hochst. & Steud.) Clayton and *Chloris gayana* Kunth.) were added as a new record to the family Poaceae in Libya. Results revealed that the family Poaceae in Libya is composed of 229 species belonging to 92 genera. Simpson's Diversity index showed that the Family Poaceae has high diversity. The largest genera in the Family Poaceae in the flora of Libya are *Stipagrostis* and *Bromus*, which include 13 species. There are (13 species) of *Stipagrostis* in Libya (26%) of 50 species in the world. The life forms and chorological spectra of plant species were determined. There are no trees and shrubs species in our data, this due to the difficulties for the species to grow in dry habitat. It appears that annual and perennial life forms are the preferable strategy in the temperate deserts of Libya. Therophytes showed the maximum number of species (62.2%), followed by Hemicryptophytes (19.65%), Geophytes (13.5%) and Therophytes - Hemicryptophytes (2.62%). The results obtained from the geographical distribution of the species showed that the highest percentage is (31.88%) for the Mediterranean region, followed by (14.85%) Mediterranean / Irano-Turanian regions. Distribution of species clearly shows that the majority of species of the family Poaceae are located within the Mediterranean region.

**Keywords:** Flora of Libya, Poaceae, Species Diversity, Floristic Analysis, Life Forms-Chorotype

## 1. Introduction

The grasses (Poaceae) are certainly the most important plant family for food production [1] to mankind agriculturally, economically and ecologically. The Family Poaceae contains approximately 11 000 species [2] distributed among about 750–770 genera [3-4] worldwide and is the fifth largest flowering plant family [5, 6, 7]. It covers about 40% of the Earth's surface [8]. Poaceae members are annual or perennial herbs with fibrous roots and often rhizomes [9]. It provides the major cereal crops and most of the grazing for wild and domestic herbivores such as, wheat (*Triticum aestivum*), rice (*Oryza sativa*), maize (*Zea mays*), sugar cane (*Saccharum officinarum*), [10], and barley (*Hordeum vulgare*) [11], which is the fourth most important cereal crop in terms of planting area and is mainly used in brewing industries and as forage [12]. Grasses have adapted to conditions in rain forests, dry deserts, and cold mountain steppes, and are now the most widespread plant type [9], which make up 20% of the world's vegetation coverage and are composed of Poaceae members [13-14].

Libya is a country in the North African region. It lies along the southern coast of the Mediterranean, approximately between latitude 18° and 33° North and 9° and 25° East (Figure 1) and occupies an area of about 1, 759, 540 square kilometres [15], more than 90% of which is deserted, except the coastal strip and Al Jabal El-Akhdar and Jabal Nafousa regions [16]. According to Boulos [17], the coastal belt which extends from the Tunisian to the Egyptian borders is about 5.2% of the whole country. This area is quite fertile and receives an

adequate amount of rainfall in winter, particularly in the east and west, thus a great part of this belt exhibits the typical Mediterranean flora. In Libya, four Biogeographical regions are recognized, which are Sudanian region, Saharo- Arabian region, the Mediterranean region and Mauritanian steppe of Irano-Turanian region [18]. The climate is typical of the Mediterranean, characterized by the cool, rainy winter season and a hot dry summer. The climate over most of the country is that of the hot, arid Sahara, but it is moderated along the coastal littoral by the Mediterranean Sea [19]. This study is based on the analysis of the family Poaceae (Graminae) by [20] in Flora of Libya series.


***Figure 1.*** *Map of Libya. (Via https://www.google.co.uk/map of Libya).*

## 2. Species Diversity

Species diversity is one of the most important indices which are used for the evaluation of ecosystems at different scales [21]. Biodiversity measurement typically focuses on the species level and local diversity can be studied with various indices [22]; such as species richness or Simpson's index which are commonly used to evaluate different trends in plant diversity. Simpson's index of Diversity values range between 0 and 1; when the value closer to 1 it is more diverse and when it closer to 0 it is less diverse [23-24].

In this study, Simpson's diversity index calculates a diversity score for the family Poaceae; it is based on both the number of different species of each genus and the number of individuals present for each of those species (Table 1). The formula for calculating Simpson's index is:

$$D = 1 - \frac{\sum ni(ni-1)}{N(N-1)} \quad (1)$$

Where N = the total number of all species in the family Poaceae.

ni = the numbers of species of each genus.

$\sum$ ni (ni-1) = (156 x2) + (56 x3) + 42+ (30 x6) + 20 + (12x 4) + (6x13) + (2x14) + (48x 0)

= 312+ 168+ 42+180+20+48+78+28

= 876

N (N-1) = 229 (229-1) =52212

Simpson's Diversity Index (D) = 1- (876/52212) = 1- 0.02 = 0.98

The value of (D) ranges between 0 and 1. With this index, 1 represents very high diversity, and 0 no diversity. The Poaceae is highly diverse depending on the (D) value obtained from calculating Simpson's diversity index.

***Table 1.*** *Shows the number of species depending on the genus in the Family Poaceae.*

| Genus | number of species ($n_i$) | ($n_i$-1) | $n_i(n_i-1)$ |
|---|---|---|---|
| Stipagrostis | 13 | 12 | 156 |
| Bromus | 13 | 12 | 156 |
| Avena | 8 | 7 | 56 |
| Poa | 8 | 7 | 56 |
| Vulpia | 8 | 7 | 56 |
| Phalaris | 7 | 6 | 42 |
| Aegilops | 6 | 5 | 30 |
| Eragrostis | 6 | 5 | 30 |
| Hordeum | 6 | 5 | 30 |
| Setaria | 6 | 5 | 30 |
| Stipa | 6 | 5 | 30 |
| Triticum | 6 | 5 | 30 |
| Lophochloa | 5 | 4 | 20 |
| Aristida | 4 | 3 | 12 |
| Lolium | 4 | 3 | 12 |
| Pennisetum | 4 | 3 | 12 |
| Trisetaria | 4 | 3 | 12 |
| Catapodium | 3 | 2 | 6 |
| Cutandia | 3 | 2 | 6 |
| Cynosurus | 3 | 2 | 6 |
| Desmazeria | 3 | 2 | 6 |
| Eleusine | 3 | 2 | 6 |
| Elytrigia | 3 | 2 | 6 |
| Panicum | 3 | 2 | 6 |
| Parapholis | 3 | 2 | 6 |
| Piptatherum | 3 | 2 | 6 |
| Polypogon | 3 | 2 | 6 |
| Saccharum | 3 | 2 | 6 |
| Sorghum | 3 | 2 | 6 |
| Sporobolus | 3 | 2 | 6 |
| Aeluropus | 2 | 1 | 2 |
| Aira | 2 | 1 | 2 |
| Alopecurus | 2 | 1 | 2 |
| Ammochloa | 2 | 1 | 2 |
| Asthenatherum | 2 | 1 | 2 |
| Briza | 2 | 1 | 2 |
| Cenchrus | 2 | 1 | 2 |
| Chloris | 2 | 1 | 2 |
| Dichanthium | 2 | 1 | 2 |
| Digitaria | 2 | 1 | 2 |
| Gastridium | 2 | 1 | 2 |
| Schismus | 2 | 1 | 2 |
| Secale | 2 | 1 | 2 |
| Sphenopus | 2 | 1 | 2 |
| Other 48 genus | 1 | 0 | 0 |

## 3. Floristic

This paper provides an overview of the Family Poaceae depending on the analysis of the flora of Libya, with life form patterns, distribution of species and chorotype.

According to [25], [26], there are 2088 species belonging to 844 genera and 145 families in the flora of Libya as angiosperms. The second dominant family in the flora of Libya is Poaceae with 226 species of 91 genera [20] (Appendix). In addition to *Bromus unioloides* (Willd.) H. B. K.

recorded by [27], *Eriochloa fatmensis* (Hochst. & Steud.) Clayton. recorded by [28] and *Chloris gayana* Kunth. recorded by [29], the Family Poaceae in Libya became 229 species belonging to 92 genera. The largest genera in the Family Poaceae in the flora of Libya are *Stipagrostis* and *Bromus*, which include 13 species, followed by *Vulpia* and *Poa with* 8 species each, *Phalaris* (7 species), *Aegilops*, *Eragrostis*, *Hordeum*, *Setaria*, *Stipa* and *Triticum* (6 species each), *Lophochloa* (5 species), Aristida, Lolium, *Pennisetum* and *Trisetaria* with (4 species each). There are (13 species) of *Stipagrostis* in Libya (26%) of 50 species in the world [15].

## 4. Life Forms

According to Raunkiaer's method [30] which was modified by [31], a high proportion of herbs (annuals then perennials). There are no woody (trees and shrubs) species in our data (Table 2). This can be referred to the difficulties for the species to grow in dry habitat.

Figure 2 shows that the highest life form recorded was for the Therophytes which constituted 147 species representing (62.2%) of the total species followed by the Hemicryptophytes with 45 species representing (19.65%), Geophytes 31 species (13.5%) and Therophytes - Hemicryptophytes 6 species (2.62%). Therophytes and Hemicryptophytes are the most frequent life forms which may indicate typical desert spectrum vegetation.

***Table 2.*** *Life forms of species.*

| Life forms | No. of species | % of total species |
|---|---|---|
| Therophytes (T) | 147 | 62.2 |
| Hemicryptophytes (He) | 45 | 19.65 |
| Therophytes / Hemicryptophytes (T/He) | 6 | 2.62 |
| Geophytes (Ge) | 31 | 13.50 |

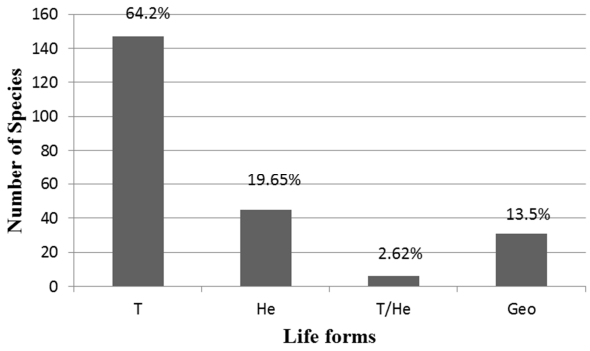
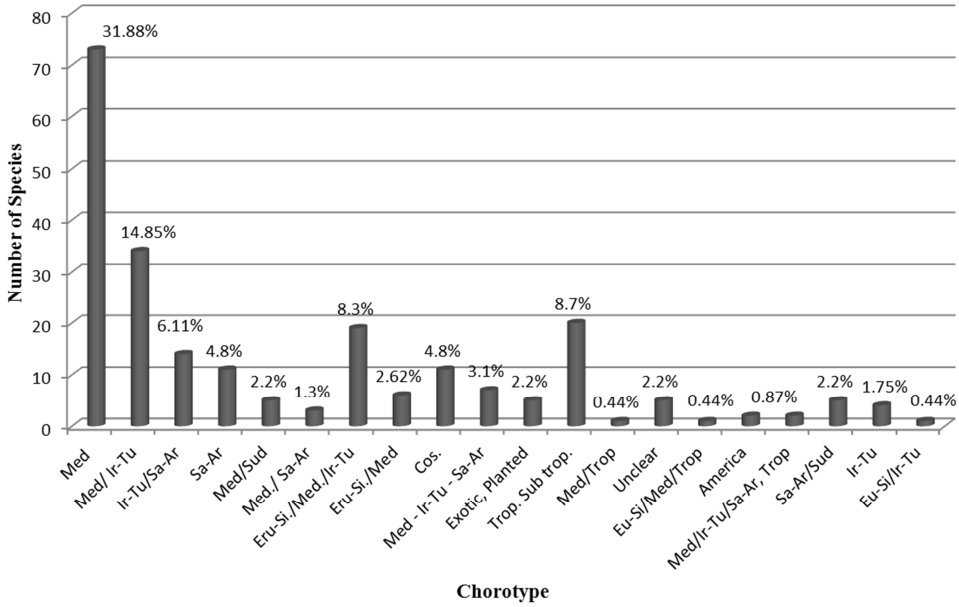



***Figure 2.*** *Shows the number of species and percentage of Life forms in the Family Poaceae.*

## 5. Geographical Elements of Species Level (Chorotype)

The results of the geographical distribution of the species showed that 73 species (31.88%) are dominated in the Mediterranean region (Figure 3). A ratio of 14.85% (34 species out of the total) belongs to Mediterranean /Irano-Turanian regions, 8.7% (20 species) belong to tropical / sub-tropical region, 8.3% (19 species) belongs to Euro - Siberian / Mediterranean / Irano -Turanian regions, 14 species (6.11%) belong to Mediterranean / Saharo-Arabian regions, 4.8% (11 species) belong to Saharo-Arabian region, 11 species with a ratio of 4.8% belong to Cosmopolitan, 2.62% (6 species) belong to Euro – Siberian / Mediterranean regions. Figure 4 shows species distribution of Poaceae members depending on coordinates have been given by the flora of Libya.




Abbreviations: Med = Mediterranean, SaAr = Saharo-Arabain, IrTu = Irano-Turanian, EuSi = European Siberia, Cos = Cosmopolitan.

***Figure 3.*** *Geographical distribution of species showing number & percentage of species in each Chorotype in Family Poaceae.*

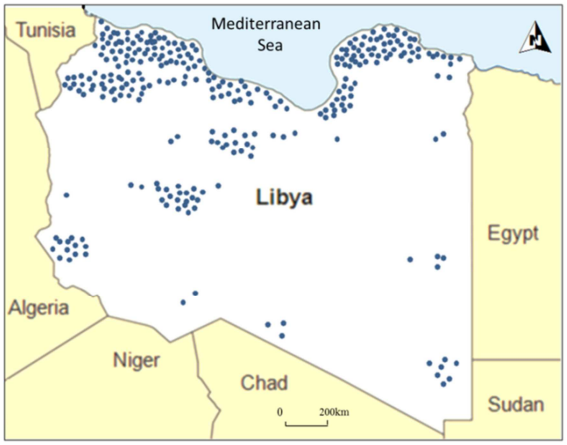



***Figure 4.*** *Distribution of Poaceae species depending on the coordinate's flora of Libya.*

## 6. Discussion

The results obtained from the calculation of Simpson's index showed that the value of the index is high, the family Poaceae is highly diverse due to the fact that about 52% of the genera of the Family Poaceae have only one species. The Chorotype of plant species in a region reflects the influence of the different vegetation areas [32]. Our finding showed that chorological characteristic of the Poaceae species showed that Mediterranean region elements recorded the highest percentage (31.88%) followed by Mediterranean /Irano-Turanian regions elements (14.85%). The life forms of plants indicate their taxonomy features and reflect their adaptation with the environmental conditions. According to Raunkiaer's method, the plant life form classes along Family Poaceae indicated the clear dominance of Therophytes (62.2%) followed by the Hemicryptophytes (19.65%). The structure of plant life forms shows their compatibility with habitat conditions for the use of environmental resources in the habitat [33]. The dominance of Therophytes is due to the long dry periods during the year in Libya [15]. It appears that annual and perennial life forms are the preferable strategy in the temperate deserts of Libya. Distribution of species clearly shows that the majority of species of the Family Poaceae are located within the Mediterranean region.

## 7. Conclusion

This study set out to present the first species diversity and floristic study of the family Poaceae in Libya. Simpson's Diversity index showed that it has high diversity; there are 13 species of *Stipagrostis* in Libya (26%) out of 50 species in the world. Due to the species' difficulty in growing in dry habitats, there are no trees and shrubs species in our data.

It appears that annual and perennial life forms are the preferable strategy in the temperate deserts of Libya. Therophytes showed the maximum number of species (62.2%). Results revealed that the distribution of species clearly shows that the majority of species of the family Poaceae are located within the Mediterranean region.

## Appendix

List of species, Chorotype and Life From based on Sherif and Siddiqi (1988)

| **Species** | **Chorotype** | **Life form** |
|---|---|---|
| *Abdropogon distachyos* L. | Plurireginalbor-trop | He |
| *Aegilops geniculata* Roth. | Med | T |
| *Aegilops kotschyi* Boiss. | Ir-Tu/Sa-Ar | T |
| *Aegilops neglecta* Reg. ex Bertol. | Med | T |
| *Aegilops peregrina* (Hack.) Maire et Weiller. | Med | T |
| *Aegilops triuncialis* L. | Med/ Ir-Tu | T |
| *Aegilops ventricosa* Tausch. | Med | T |
| *Aeluropus lagopoides* (L.) Trin. Ex Thw. | Ir-Tu/Sa-Ar | He |
| *Aeluropus littoralis* (Gouan) Parl. | Med/ Ir-Tu | Geo |
| *Aira cupaniana* Guss. | Med | T |
| *Aira tenorii* Guss. | Med | T |
| *Alopecurus mysuroides* Huds. | Eru-Si./Med./Ir-Tu | T |
| *Alopecurus urticulatus* Banks et Sol. | Med | T |
| *Ammochloa palaestina* Boiss. | Med - Ir-Tu - Sa-Ar | T |
| *Ammochloa pungens* (Schreb.) Boiss. | Med | T |
| *Ammophila australis* (Mabille) Porta et Rigo. | Med | Geo |
| *Ampelodesmos mauritanica* (Poiret) Th. Dur. & Schinz. | Med | Geo |
| *Antinoria insularis* Parl. | Med | T |
| *Aristida adscensionis* L. | Med - Ir-Tu - Sa-Ar | T/hemicry |
| *Aristida funiculata* Trin. et Rupr. | Ir-Tu/Sa-Ar | T |
| Aristida *meccana* Hochst. | Sa-Ar | T |
| *Aristida mutabilis* Trin. Et Rupr. | Ir-Tu/Sa-Ar | T |

| Species | Chorotype | Life form |
|---|---|---|
| *Arundo donax* L. | Med/ Ir-Tu | Geo |
| *Asthenatherum forskalii* (Vahl.) Nevski. | Ir-Tu/Sa-Ar | He |
| *Asthenatherum fragile* (Guinet. et Souvage) Monod. | Med/Sud | He |
| *Avellinia michelii* (Savi) Parl. | Med | T |
| *Avena barbata* Pott ex Link. | Med | T |
| *Avena eriantha* Durieu. | Eru-Si./Med./Ir-Tu | T |
| *Avena fatua* L. | Unclear | T |
| *Avena longiglumis* Durieu. | Med./ Sa-Ar | T |
| *Avena sativa* L. | Exotic, Planted, Escaped from cultivation | T |
| *Avena sterilis* L. | Med./ Ir-Tu. | T |
| *Avena ventricosa* Balansa ex Cosson. | Med/Ir-Tu | T |
| *Avenula bromoides* (Gouan) H. Scholz. | Med | He |
| *Brachypodium retusum* (Pers.) P. Beauv. | Med | Geo |
| *Briza maxima* L. | Med | T |
| *Briza minor* L. | Eu-Si/Med/Ir-Tu | T |
| *Bromus alopecuros* Poir. | Med | T |
| *Bromus caroli-henrici* Greuter. | Med | T |
| *Bromus chrysopogon* Viviani. | Med/Ir-Tu | T |
| *Bromus diandrus* Roth. | Med | T |
| *Bromus fasciculatus* C. Presl. | Med | T |
| *Bromus intermedius* Guss. | Med/Ir-Tu | T |
| *Bromus lanceolatus* Roth. | Med./ Ir-Tu. | T |
| *Bromus madritensis* L. | Med./ Ir-Tu. | T |
| *Bromus molliformis* Lloyd. | Eru-Si./Med | T |
| *Bromus rigidus* Roth. | Med | T |
| *Bromus rubens* L. | Med/Ir-Tu/Sa-Ar | T |
| *Bromus scoparius* L. | Med/Ir-Tu | T |
| *Bromus unioloides* (Willd.) H. B. K. | Eu-Si- Med - Ir-Tu | T |
| *Castellia tuberculosa* (Moris) Bor in Ind. | Unclear | T |
| *Catabrosa aquatica* (L.) P. Beauv. | Eu-Si/Med/Ir-Tu | Geo |
| *Catapodium hemipoa* (Delile ex Spreng.) Lainz. | Med | T |
| *Catapodium marinum* (L.) C. E. Hub. | Med | T |
| *Catapodium rigidum* (L.) C. E. Hub. | Med | T |
| *Cenchrus ciliaris* L. | Sa-Ar | He |
| *Cenchrus incertus* M. A. Curtis. | N. and C. America | T |
| *Chloris gayana* Kunth | Trop. Africa | He |
| *Chloris virgata* Swartz. | Subtropical-Tropical | T |
| *Corynephorus divaricatus* (Pourr.) Breistr. | Med | T |
| *Crithopsis delileana* (Schultes) Rozhev. | Med./Ir-Tu | T |
| *Crypsis schoenoides* (L.) Lam. | Eu-Si/Med/Ir-Tu | T |
| *Ctenopsis pectinella* (Del.) De Not. | Sa-Ar | T |
| *Cutandia dichotoma* (Forsk.) Trabut. | Ir-Tu/Sa-Ar | T |
| *Cutandia maritima* (L.) Barbey. | Med | T |
| *Cutandia memphitica* (Sreng.) Richter. | Ir-Tu/Sa-Ar | T |
| *Cymbopogon schoenanthus* (L.) Spreng. | Sa-Ar | He |
| *Cynodon dactylon* (L.) Pers. | Plurireginalbor-trop | Geo |
| *Cynosurus coloratus* Lehm. Ex Steud. | Med | T |
| *Cynosurus elegans* Desf. | Med./ Ir-Tu. | T |
| *Cynosurus junceus* Murb. | Med | He |
| *Dactylis glomerata* L. | Med | Geo |
| *Dactyloctenium aegyptium* (L.) P. Beauv. | Tropical | T |
| *Desmazeria lorentii* H. Scholz. | Med | T |
| *Desmazeria philistaea* (Boiss.) H. Scholz. | Med | T |
| *Desmazeria sicula* (Jacq.) Dumort. | Med | T |
| *Desmostachya bipinnata* (L.) Stapf. | Tropical | Geo |
| *Dichanthium annulatum* (Forsk.) Stapf. | Subtropical-Tropical | He |

| Species | Chorotype | Life form |
|---|---|---|
| *Dichanthium foveolatum* (Del.) Roberty. | Sa-Ar/Sud | Geo |
| *Digitaria bicornis* (Lam.) Roem. et Schult. | Tropical | T |
| *Digitaria sanguinalis* (L.) Scop. | Plurireginalbor-trop | T |
| *Dinebra retroflexa* (Vahl) Panz. | Tropical | T |
| *Echinaria capitata* (L.) Desf. | Med | T |
| *Echinochloa colona* (L.) Link. | Subtropical-Tropical | T |
| *Eleusine compressa* (Forsk.) Aschers. & Schw. ex | Med/Ir-Tu | He |
| *Eleusine coracana* (L.) Gaertn. | Tropical | T |
| *Eleusine indica* (L.) Gaertn. | Subtropical-Tropical | T |
| *Elytrigia juncea* (L.) Nevski. | Med | Geo |
| *Elytrigia littoralis* (Host) Hyl. | Eur-Si/Med | Geo |
| *Elytrigia repens* (L.) Desv. Ex Nevski. | Eur-Si/Med/Ir-Tu | Geo |
| *Enneapogon desvauxii* P. Beauv. | Ir-Tu/Sa-Ar | He |
| *Eragrostis aegyptiaca* (Willd.) Link. | Med/Sud | T |
| *Eragrostis barrelieri* Dav. | Med/Sa-Ar | T |
| *Eragrostis cilianensis* (All.) Vign.-Lutati malpighia | Plurireginalbor-trop | T |
| *Eragrostis ciliaris* (L.) R. Br. | Med/Sud | T |
| *Eragrostis pilosa* (L.) P. Beauv. | Borealo-Trop | T |
| *Eragrostis tef* (Zucc.) Trotter. | Unclear | T |
| *Eriochloa fatmensis* (Hochst. & Steud.) Clayton | Sa-Ar | He |
| *Festuca arundinacea* Schreb. | Eu-Si/Med/Ir-Tu | Geo |
| *Gastridium scabrum* C. Presl. | Med | T |
| *Gastridium ventricosum* (Gouan) Schinz et Thell. | Med | T |
| *Gaudinia fragilis* (L.) P. Beauv. | Med | T |
| *Hainardia cylindrica* (Willd.) Greuter. | Med | T |
| *Hordeum bulbosum* L. | Med/Ir-Tu | Geo |
| *Hordeum distichon* L. | Exotic, Planted, Escaped from cultivation | T |
| *Hordeum geniculatum* All. | Med/Ir-Tu | T |
| *Hordeum marinum* Huds. | Med/Ir-Tu | T |
| *Hordeum spontaneum* C. Koch. | Med./ Ir-Tu. | T |
| *Hordeum vulgare* L. | Exotic, Planted, Escaped from cultivation | T |
| *Hyparrhenia hirta* (L.) Stapf. | Med/Ir-Tu/Sa-Ar | He |
| *Imperata cylindrica* (Linn.) Raeuschel. | Med/Ir-Tu/Sa-Ar, Trop | Geo |
| *Lagurus ovatus* L. | Med | T |
| *Lamarckia aurea* (L.) Moench. | Med/Ir-Tu | T |
| *Lasiurus hirsutus* (Forssk.) Boiss. | Sa-Ar/Sud | He |
| *Leersia hexandra* Swartz. | M./Ir-Tu/Sa-ar/Trop | He |
| *Libyella cyrenaica* (Durand & Barratte) Pamp. | Med | T |
| *Lolium loliaceum* (Bory & Chaub) Hand Mazz. | Med | T |
| *Lolium multiflorum* Lam. | Med | T/He |
| *Lolium perenne* L. | Eu-Si/Med/Ir-Tu | He |
| *Lolium rigidum* Gaud. | Med./ Ir-Tu. | T |
| *Lophochloa cristata* (L.) Hyl. | Med/Ir-Tu | T |
| *Lophochloa pubescens* (Lam.) H. Scholz. | Med | T |
| *Lophochloa pumila* (Desf.) Bor. | Ir-Tu/Sa-Ar | T |
| *Lophochloa rohlfsii* (Ascherson) H. Scholz. | Sa-Ar | T |
| *Lophochloa salzmannii* (Boiss.) H. Scholz. | Med | T |
| *Lygeum spartum* Loefl. ex Linn. | Med | Geo |
| *Melica minuta* L. | Med | He |
| *Micropyrum tenellum* (L.) Link. | Eur-Si/Med | T |
| *Milium vernale* M. Beib. | Med | T |
| *Oryza sativa* L. | Ir-Tu | T |
| *Panicum miliaceum* L. | Eu-Si/Med/Ir-Tu | T |
| *Panicum repens* L. | Subtropical-Tropical | Geo |
| *Panicum turgidum* Forsk. | Sa-Ar/Sud | Geo |
| *Parapholis incurva* (L.) C. E. Hub. | Med/ Ir-Tu | T |

| Species | Chorotype | Life form |
|---|---|---|
| *Parapholis marginata* Runemark. | Med | T |
| *Parapholis strigosa* (Dumort.) C. E. Hub. | Med | T |
| *Paspalidium geminatum* (Forsk.) Stapf. | Tropical | He |
| *Paspalum paspalodes* (Michx.) Scribn. | American | Geo |
| *Pennisetum americanum* (L.) Schumann. | Tropical | T |
| *Pennisetum divisum* (Forsk. ex Gmel.) Henr. | Sa-Ar | He |
| *Pennisetum elatum* Hochst. ex Steud. | Med | T |
| *Pennisetum setaceum* (Forssk.) Chiov. | Sudanian-African | He |
| *Phalaris aquatica* L. | Med | He |
| *Phalaris brachystachys* Link. | Med | T |
| *Phalaris canariensis* L. | Med | T |
| *Phalaris coerulescens* Desf. | Med | He |
| *Phalaris minor* Retz. | Med/ Ir-Tu | T |
| *Phalaris paradoxa* L. | Med/ Ir-Tu | T |
| *Phalaris truncata* Guss. | Med | He |
| *Phleum subulatum* (Savi) Aschers. et Graebn. | Med | T |
| *Phragmites australis* (Cav.) Trin. ex Steud. | Plurireginalbor-trop | Geo |
| *Piptatherum coerulescens* (Desf.) P. Beauv. | Med/Ir-Tu | He |
| *Piptatherum holciforme* (Bieb.) Roem. Et Schult. | Med/ Ir-Tu | He |
| *Piptatherum miliaceum* (L.) Cosson. | Med | He |
| *Poa annua* L. | Eu-Si/Med/Ir-Tu | T |
| *Poa bulbosa* L. | Eru-Si./Med./Ir-Tu | Geo |
| *Poa infirma* Kunth. | Med | T |
| *Poa pentapolitana* H. Scholz. | Med | T |
| *Poa pratensis* L. | Eur-Si/Med | T/He |
| *Poa sinaica* Steud. | Ir-Tu | Geo |
| *Poa trivialis* L. | Eu-Si/Med/Ir-Tu | He |
| *Poa vaginata* Pamp. In Arch. Bot. | Med | Geo |
| *Polypogon maritimus* Willd. | Med/ Ir-Tu | T |
| *Polypogon monspeliensis* (L.) Desf. | Med/ Ir-Tu/ Sa-Ar | T |
| *Polypogon semiverticillatus* (Forsk.) Hyl. | Med/Ir-Tu | He |
| *Psilurus incurvus* (Gouan) Shinz et Thell. | Med/ Ir-Tu | T |
| *Saccharum officinarum* L. | Tropical | He |
| *Saccharum ravennae* (L.) Murr. | Med/ Ir-Tu | He |
| *Saccharum spontaneum* L. | Med/ Ir-Tu/ Sa-Ar | Geo |
| *Schismus arabicus* Nees. | Ir-Tu/Sa-Ar | T |
| *Schismus barbatus* (L.) Thell. | Ir-Tu/Sa-Ar | T |
| *Secale cereale* L. | Eu-Si/Med/Ir-Tu | T |
| *Secale montanum* Guss. | Med/ Ir-Tu | He |
| *Setaria adhaerens* (Forsk.) Chiov. | Plurireginalbor-trop | T |
| *Setaria glauca* (L.) P. Beauv. | Plurireginalbor-trop | T |
| *Setaria italica* (L.) P. Beauv. | Eu-Si/Med/Ir-Tu | T |
| *Setaria verticillata* (L.) Beauv. | Plurireginalbor-trop | T |
| *Setaria verticillata* **x** viridis Lloyd. | Eu-Si/Med | T |
| *Setaria viridis* (L.) P. Beauv. | Eu-Si/Med/Ir-Tu | T |
| *Sorghum bicolor* (L.) Moench. | Ir-Tu | T/He |
| *Sorghum halepense* (L.) Pers. | Subtropical-Tropical | Geo |
| *Sorghum sudanense* (Piper) Stapf. | Tropical/Sud | T |
| *Sphenopus divaricatus* (Gouan) Reichenb. | Med/ Ir-Tu/ Sa-Ar | T |
| *Sphenopus ehrenbergii* Hausskn. | Med | T |
| *Sporobolus helvolus* (Trin.) Th. | Tropical | Geo |
| *Sporobolus spicatus* (Vahl) Kunth. | Med/Trop | Geo |
| *Sporobolus virginicus* (L.) Kunth. | Ir-Tu, ES Eu-Sib, M Med, | He |
| *Stipa barbata* Desf. | Ir-Tu/Sa-Ar | He |
| *Stipa capensis* Thumb. | Ir-Tu/Sa-Ar | T |
| *Stipa lagascae* Roem. et Schult. | Med/ Ir-Tu | He |

| Species | Chorotype | Life form |
|---|---|---|
| *Stipa nitens* Ball. | Med | He |
| *Stipa parviflora* Desf. | Ir-Tu | He |
| *Stipa tenacissima* L. | Unclear | Geo |
| *Stipagrostis acutiflora* (Trin. et Rupr.) de Winter. | Med | T/He |
| *Stipagrostis ciliata* (Desf.) de Winter. | Sa-Ar | He |
| *Stipagrostis foexiana* (Marie et Wilczek) de Winter. | Med/Sud | He |
| *Stipagrostis libyca* (H. Scholz) H. Scholz. | Med | T |
| *Stipagrostis multinerva* H. Scholz. | Med/ Ir-Tu | He |
| *Stipagrostis obtusa* (Delile) Nees. | Sa-Ar/Sud | He |
| *Stipagrostis plumosa* (L.) Munro ex T. Anders. | Ir-Tu/Sa-Ar | He |
| *Stipagrostis pungens* (Desf.) de Winter. | Unclear | Geo |
| *Stipagrostis rigidifolia* H. Scholz. | med/Sud | He |
| *Stipagrostis scoparia* (Trin. Et Rupr.) de Winter. | Sa-Ar | He |
| *Stipagrostis shawii* (H. Scholz) H. Scholz. | Sudanian | T |
| *Stipagrostis vulnerans* (Trin. Et Rupr.) de Winter. | Sud | Geo |
| *Stipagrostis zittelii* (Aschers.) de Winter. | Med | T/He |
| *Tetrapogen villosus* Desf. | Sa-Ar/Sud | He |
| *Trachynia distachya* (L.) Link. | Med/Ir-Tu | T |
| *Tragus racemosus* (L.) All. | Eu-Si/Med | T |
| *Triplachne nitens* (Guss.) Link. | Med | T |
| *Trisetaria glumacea* (Boiss) Marie. | Sa-Ar | T |
| *Trisetaria linearis* Forsk. | Med/Sa-Ar | T |
| *Trisetaria macrochaeta* (Boiss.) Marie. | Sa-Ar | T |
| *Trisetaria vaccariana* (Marie et Weiller) Marie. | Med | T |
| *Triticum aestivum* L. | Exotic, Planted, Escaped from cultivation | T |
| *Triticum bicorne* Forsk. | Med | T |
| *Triticum compactum* Host. | Trop | T |
| *Triticum durum* Desf. | Exotic, Planted, Escaped from cultivation | T |
| *Triticum polonicum* L. | Med/Ir-Tu | T |
| *Triticum spelta* L. | Eu-Si/Ir-Tu | T |
| *Vulpia bromoides* (L.) S. F. Gray. | Eu-Si/Med/Trop | T |
| *Vulpia ciliata* Dumort. | Eu-Si/Med/Ir-Tu | T |
| *Vulpia gracilis* H. Scholz in | Med | T |
| *Vulpia inops* (Del.) Hackel. | Med | T |
| *Vulpia ligustica* (All.) Link. | Med | T |
| *Vulpia membranacea* (L.) Dumort. | Med | T |
| *Vulpia myuros* (L.) C. C. Gmel. | Eru-Si./Med./Ir-Tu | T |
| *Vulpiella tenuis* (Tineo) Kerguelen. | Med | T |
| *Zea mays* L. | Cos | T |

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