

# Alien flora of Turkey: checklist, taxonomic composition and ecological attributes

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Academic editor: I. Kühn | Received 28 February 2017 | Accepted 24 April 2017 | Published 2 June 2017

**Citation:** Uludağ A, Aksoy N, Yazlık A, Arslan ZF, Yazmıŝ E, Üremiŝ I, Cossu TA, Groom Q, Pergl J, Pyšek P, Brundu G (2017) Alien flora of Turkey: checklist, taxonomic composition and ecological attributes. NeoBiota 35: 61–85. <https://doi.org/10.3897/neobiota.35.12460>

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## Abstract

The paper provides an updated checklist of the alien flora of Turkey with information on its structure. The alien flora of Turkey comprises 340 taxa, among which there are 321 angiosperms, 17 gymnosperms and two ferns. Of the total number of taxa, 228 (68%) are naturalized and 112 (32%) are casual. There are 275 neophytes (172 naturalized and 103 casual) and 61 archaeophytes (52 naturalized and 9 casual); four species could not be classified with respect to the residence time. In addition, 47 frequently planted taxa with a potential to escape are also listed. The richest families are *Asteraceae* (38 taxa), *Poaceae* (30), *Fabaceae* (23) and *Solanaceae* (22). As for the naturalized alien plants, the highest species richness is found in *Asteraceae* (31 taxa), *Poaceae* (22), *Amaranthaceae* (18) and *Solanaceae* (15). The majority of alien taxa are perennial (63.8% of the total number of taxa with this life history assigned, including those with multiple life histories), annuals contribute 33.8% and 2.4% are biennial aliens. Among perennials the most common life forms are phanerophytes, of which 20.3% are trees and 12.6% shrubs; woody vines, stem succulents, and aquatic plants are comparatively less represented. Most of the 340 alien taxa introduced to Turkey have their native ranges in Americas (44.7%) and Asia (27.6%). Of other regions, 9.1% originated in Africa, 4.4% in Eurasia, 3.8% in Australia and Oceania and 3.5% in the Mediterranean. The majority of taxa (71.9%) were introduced intentionally, whereas the remaining (28.1%) were introduced

accidentally. Among the taxa introduced intentionally, the vast majority are ornamental plants (55.2%), 10.0% taxa were introduced for forestry and 6.7% as crops. Casual alien plants are most commonly found in urban and ruderal habitats (40.1%) where naturalized taxa are also often recorded (27.3%). Plants that occur as agricultural weeds are typically naturalized rather than casual (16.0% vs 7.1%, respectively). However, (semi)natural habitats in Turkey are often invaded by alien taxa, especially by those that are able to naturalize.

### **Keywords**

Alien flora, Turkey, casual and naturalized alien plants

### **Introduction**

Turkey has a long tradition of floristic research and as a result its native flora is satisfactorily investigated. With more than 12,000 plant taxa (Davis 1965–1985, Davis et al. 1988, Güner et al. 2000, 2012) and new species being continuously described, including new endemics (Güner et al. 2012, Özhatay et al. 2013, 2015), the flora of Turkey is the richest among the Mediterranean, European and neighbouring countries (Ekim and Güner 1986). The majority of this total number is represented by native taxa with 31% of endemics (Güner et al. 2012). Turkey's landscape and ecological diversity has contributed not only to a high floristic richness, but has also allowed for successful introductions and cultivation of a great number of crops, fruit species (Ercisli 2004) and forest trees (Atalay et al. 2014).

On the contrary, up to now there was only limited information on Turkish alien flora. Being located at the crossroads of three continents, there has always been an intense movement of humans and goods across Turkey over the history due to human migration, and in modern Turkey both plants and animals were being introduced intentionally and unintentionally in great quantities. Suitable conditions for the cultivation and use and subsequent naturalization of plants introduced into the country are supported historically. Turkey is a country of special significance in the history of agriculture, with some of the earliest sites of plant domestication nearly 10,000 years ago (Aksoy and Oksar 2015), and today 50% of the country area is agricultural land (FAO 2017).

With this background, it is somewhat surprising that so far, the main source of information about alien flora of Turkey was a checklist generated for the DAISIE project (Delivering Alien Invasive Species Inventories for Europe, 2004–2008; see DAISIE 2008, Lambdon et al. 2008), based on the several decades old flora (Davis 1965–1985) that was rather outdated in terms of inventory of alien species. Therefore, the DAISIE project reported only 220 alien taxa for Turkey, of which only 95 were assigned the naturalization status with certainty (Lambdon et al. 2008), which is an underestimation of the real situation. In fact, it should be taken into account that DAISIE included mainly the European part of Turkey, which represents only 3% of the Turkish territory. More recently, new insights into this aspect were provided by the book “Türkiye İstilacı Bitkiler Kataloğu” (Catalogue of the invasive plants of Turkey) by Önen (2015).

However, such lack of a recent account on the alien flora represents a serious constraint to the management of those plants that are currently invasive or may become so in the future. As generally agreed, alien species lists form the basis for much of the current research on biological invasions, for guiding legislation and code of conducts, as input to decision making and risk assessment and in the formulation of management policies and strategies for nature conservation (Hoffmann and Broadhurst 2016, Woodford et al. 2016, Jacobs et al. 2017). From the scientific point of view, macroecological analyses of alien floras has received much attention recently and improved the understanding of historical flows of alien species among continents (van Kleunen et al. 2015), the dynamics of their accumulation (Seebens et al. 2017) as well as factors driving the variation in regional diversity of alien floras (Pyšek et al. 2009, 2010, 2015, Essl et al. 2011, Seebens et al. 2015).

The aim of this paper is therefore to fill the important gap in the knowledge on alien flora in one of the richest in species countries in Eurasia, by compiling the first comprehensive list of alien plants in Turkey and providing an analysis of its taxonomic composition, origin and ecological structure.

## **Methods**

### **Study area**

Turkey is a large and diverse country located between 25°40' to 44°48'E, and 35°51' to 42°06'N. The total area is 814,578 km<sup>2</sup> of which 97% is located in Asia and 3% in in Europe. It is divided into seven geographical regions: Black Sea, Eastern Anatolia, South Eastern Anatolia, Mediterranean, Aegean, Marmara and Inner Anatolia. The average altitude is 1,141 m a.s.l., and it increases from West to East; 18% of Turkey is below 500 m and 25% between 500 and 1,000 m. Plains up to 2,000 m of altitude and high plateaus up to 2,500 m are another source of biodiversity of native plants while providing potential diverse niches for the naturalization of alien species. Turkey's natural environment is very diverse in terms of climate, ranging from subtropical to cold temperate, as well as topography and geology (Atalay 2002, 2010, 2011), supporting a variety of vegetation types (Akman and Ketenoğlu 1986). Annual precipitation varies from 300 to 2,000 mm, and mean annual temperature from 4 to 19 °C. Some areas are prone to frosts for almost 10 months, while some have frost for only one day in a year. The growing period varies from almost the whole year to less than 140 growing days. Turkey is surrounded by an 8,333 km coastline with Black Sea at the North, Marmara Sea between two peninsulas, and Aegean Sea at West and Mediterranean at South. The coastal areas represent a dynamic, ecologically fragile environment with threatened habitats in which a diverse range of human activities are carried out (Acar et al. 2014). In addition, the majority of Turkey's ever-increasing population resides in coastal areas (Erginöz and Doğan 1997). Among cities that represent important points of entry of alien species into the country, İstanbul with a population of almost 15 million is Turkey's most populated metropolitan area and the economic powerhouse of the country. Its geographical

characteristics and topography allow for the existence of diverse microclimatic zones to exist in a relatively small area of 5,461 km<sup>2</sup> (Güneralp et al. 2013). The 2,875-km long border of Turkey with its neighbours Georgia, Armenia, Azerbaijan, Iran, Iraq, Syria, Greece and Bulgaria is associated with a high probability of entry and occurrence of alien plant species in habitats along adjacent roadside corridors that represent an important pathway for alien plants (Wilson et al. 2016).

### **Data sources used to compile the inventory**

The first flora dedicated to Turkey is composed of the five volumes of Boissier's *Flora Orientalis* (Boissier 1867–1884) and its supplement (Boissier 1888) where alien species are occasionally reported. However, the basic data source used for the present inventory is the Flora of Turkey and the East Aegean Islands (Davis 1965–1985, Davis et al. 1988, Güner et al. 2000, 2012). This source has been complemented with information extracted from all the available literature, such as, in particular, the papers published after 2000 in the Turkish Journal of Botany and elsewhere. In addition, dedicated studies (Uremis et al. 2014, Arslan et al. 2015) and field surveys (e.g. Brundu et al. 2011) were taken into account as well as herbarium samples stored at the Düzce University Forestry Faculty Herbarium (DUOF) and other herbaria in Turkey (GAZİ, ISTO, AİBO and ISTE). We also screened the GBIF database, which holds 265,818 plant records for Turkey (GBIF 2017); however, alien plant species are significantly underrepresented in this source. We also used information from an ongoing project dedicated to the online flora of Turkey (Tübives – <http://www.tubives.com/index.php>) (Bakis et al. 2011), an initiative for a new Flora of Turkey with illustrations 'Resimli Türkiye Florası Volume 1 (Güner 2014), and 'Bizim Bitkiler' (<http://www.bizimbitkiler.org.tr/v2/index.php>), another online flora of Turkey which includes the last checklist of vascular flora of Turkey by Güner et al. (2012).

### **Classification of taxa and their characteristics**

This inventory focuses on plant species alien to Turkey (synonyms: exotic, introduced, non-indigenous, non-native), i.e. species present in the country because human actions enabled them to overcome fundamental biogeographical barriers (Richardson et al. 2000, Blackburn et al. 2011); they occur in Turkey as a result of intentional or accidental introduction by humans, or as a result of natural spread from other regions where they were introduced by humans. Crosses resulting from hybridization with one or both alien species involved are also considered alien (Pyšek et al. 2004). In addition, we included in this inventory some taxa that are native to a part of the country but introduced elsewhere in Turkey, i.e. alien in Turkey, following an approach proposed by Lambdon et al. (2008) for Europe.

We classified alien plant species according to the stage they reached along the introduction-naturalization-invasion continuum (Richardson and Pyšek 2006, Richardson et al. 2000, 2011, Blackburn et al. 2011). However, due to a lack of data on the rate of spread we did not classify species as invasive and only classified them in two main categories, casual or naturalized. The complete inventory (Suppl. material 1: Table 1) lists also additional species that are presently recorded only in cultivation outside urban areas, but over very large areas, such as tree species in planted forests, and that could start to naturalize in the future due to potentially strong propagule pressure or climate change. These species are, however, not taken into account for data analyses. Taxa were further classified with respect to their residence time, i.e. separated into archaeophytes and neophytes (see e.g. Pyšek et al. 2004, 2012 for delimitation). Affiliation of taxa to families follows the approach of the Angiosperm Phylogeny Group (Stevens 2001 onwards, APG IV 2016). Plant names have been verified using IPNI (International Plant Name Index, <http://www.ipni.org/>), The Plant List (2010, version 1, published on the Internet; <http://www.theplantlist.org/>), WCSP and the African Plants Database (APD, version 3.4.0), updated by the Conservatoire et Jardin botaniques de la Ville de Genève and the South African National Biodiversity Institute, Pretoria, South Africa (<http://www.ville-ge.ch/musinfo/bd/cjb/africa>). We followed, to our best attempt, the accepted and correct nomenclature according to current taxonomic standards.

Information on life history, region of origin, pathway of introduction (intentional vs accidental) and habitat affiliation was extracted from literature and from the above cited sources for each species.

Life forms were classified as follows: therophytes, hydrophytes, chamaephytes, geophytes, hemicryptophytes and phanerophytes (Raunkiaer 1934, 1937). In addition, growth form and life history were assigned according to the Thesaurus of Plant Characteristics for Ecology and Evolution (Garnier et al. 2017) and other specific literature (Pérez-Harguindeguy et al. 2016). Growth-forms reported for aquatic plants follow Brundu (2015).

The checklist has been archived on the Global Biodiversity Information Facility (Uludag et al. 2017).

## **Statistical analysis**

Differences in representation of life forms within casual and naturalized species were tested by contingency tables with control for overdispersion (if needed using quasi-Poisson distribution) (Crawley 2007). To test individual differences among life forms and species groups, adjusted standardized residuals of G-tests were compared with critical values of a normal distribution (Řehák and Řeháková 1986). All analyses were performed in R 3.0.2 (R Core Team 2015).

## Results

### Species numbers and taxonomic composition

The alien flora of Turkey comprises 340 taxa, among which there are 321 angiosperms, 17 gymnosperms and two ferns. Of the total number of taxa, 228 (67.1%) are naturalized and 112 (32.9%) are casual (Appendix 1; for the complete list of taxa, which includes additional 47 frequently planted taxa noted above, see Suppl. material 1). Related to the total plant diversity of ~12,000 species in the Turkish flora, the contribution of alien taxa is ~2.8% and that of naturalized taxa ~1.9%. Of the taxa for which the classification according to residence time was possible, there are 275 neophytes (172 naturalized and 103 casual) and 61 archaeophytes (52 naturalized and 9 casual).

Turkey's alien flora includes representatives of 92 families and 251 genera. There are seven families with at least 10 aliens that together comprise 44.7% of the total alien taxa richness of the country; the richest are *Asteraceae* (38 taxa, corresponding to 11.2% of all aliens), *Poaceae* (30, 8.8%), *Fabaceae* (23, 6.8%) and *Solanaceae* (22, 6.5%). As for the naturalized alien plants, the highest species richness is found in *Asteraceae* (31 taxa, 13.6% of the total number of naturalized aliens), *Poaceae* (22, 9.6%), *Amaranthaceae* (18, 7.9%) and *Solanaceae*. Over a half of the naturalized alien richness (51.8%) is concentrated in eight families that contain more than four naturalized taxa (Table 1).

The most represented genus is *Amaranthus* with 13 taxa that are all naturalized, contributing thus 3.3% and 5.7% to all aliens and naturalized aliens, respectively. *Solanum* is also rather rich in aliens, but of the 11 taxa only five are naturalized. Other genera, that are represented by more than five species and the naturalization success of their representatives is high, are *Euphorbia* (88.9% of all aliens in the genus are naturalized), *Acacia* (83.3%) and *Oxalis* (100%). The 11 genera with at least four alien taxa in Turkey together account for 17.6% of the total alien plant richness and 26.3% of the naturalized richness of the country (Table 2).

### Ecological attributes

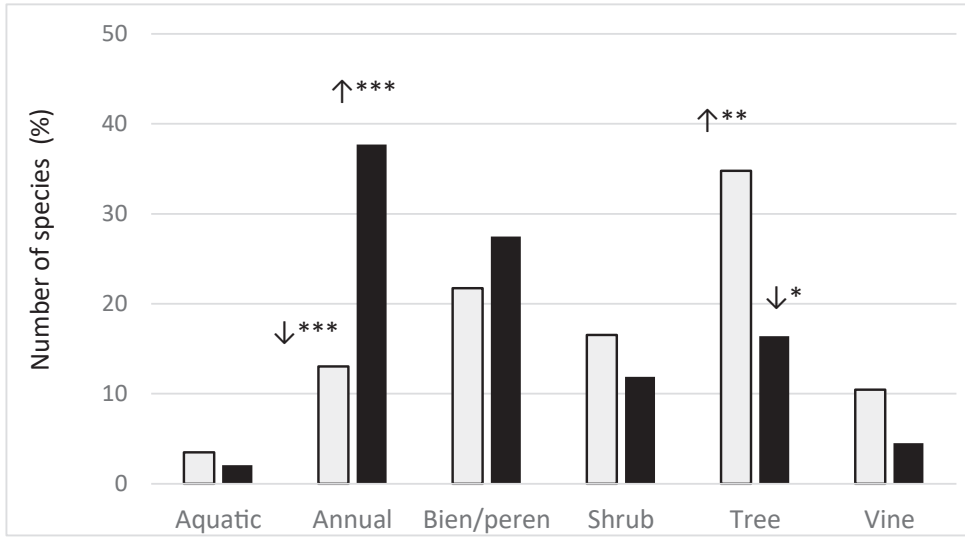
The majority of alien taxa are perennial (63.8% of the total number of taxa with this life history assigned, including those with multiple life histories), annuals are also greatly represented (33.8%) and only 2.4% are biennials. Among perennials the most common life forms are phanerophytes, i.e. trees (20.3%) and shrubs (12.6%); woody vines, stem succulent, bambusoid and aquatic plants are comparatively less represented. There were significant differences in the counts per life history between casuals and naturalized species ( $\chi^2 = 29.85$ , DF = 0,6,  $p < 0.001$ ). This significant difference was due to annuals (therophytes) where the observed counts were higher than expected by chance for naturalized species and lower for casuals and due to woody species (phanerophytes) where the situation was reversed (Figure 1).

**Table 1.** The most represented families in the alien flora of Turkey, ranked according to the total number of alien taxa, with their representatives classified according to their status. For each family, the number of casual and naturalized taxa and the percentage of naturalized among total aliens are provided. Family names follow APG classification (Stevens 2001 onwards, APG IV 2016).

Family	Total no. of alien taxa	No. of casual taxa	No. of naturalized taxa	% of naturalized taxa
<i>Asteraceae</i>	38	7	31	81.6
<i>Poaceae</i>	30	8	22	73.3
<i>Fabaceae</i>	23	11	12	52.2
<i>Solanaceae</i>	22	7	15	68.2
<i>Amaranthaceae</i>	18	0	18	100.0
<i>Euphorbiaceae</i>	11	1	10	90.9
<i>Rosaceae</i>	10	6	4	40.0
<i>Cupressaceae</i>	9	3	6	66.7
<i>Pinaceae</i>	8	4	4	50.0
<i>Oxalidaceae</i>	7	0	7	100.0
<i>Sapindaceae</i>	7	2	5	71.4
<i>Convolvulaceae</i>	6	2	4	66.7
<i>Aizoaceae</i>	5	0	5	100.0
<i>Apocynaceae</i>	5	2	3	60.0
<i>Moraceae</i>	5	3	2	40.0

**Table 2.** The most represented genera in the alien flora of Turkey, classified according to their status. For each genus, number of casual and naturalized taxa and percentage of naturalized among total aliens in the genus are provided. Genera are ranked according the total number of alien taxa.

Genus	Total no. of alien taxa	No. of casual taxa	No. of naturalized taxa	% of naturalized taxa
<i>Amaranthus</i>	13	0	13	100.0
<i>Solanum</i>	11	6	5	45.5
<i>Euphorbia</i>	9	1	8	88.9
<i>Oxalis</i>	7	0	7	100.0
<i>Acacia</i>	6	1	5	83.3
<i>Acer</i>	4	1	3	75.0
<i>Bidens</i>	4	0	4	100.0
<i>Cotoneaster</i>	4	1	3	75.0
<i>Erigeron</i>	4	0	4	100.0
<i>Ipomoea</i>	4	0	4	100.0
<i>Paulownia</i>	4	4	0	0.0
<i>Physalis</i>	4	0	4	100.0



**Figure 1.** Frequency of alien species in the flora of Turkey categorized according to their Raunkiaer's life forms, shown separately for casuals (white bars, n = 112) and naturalized taxa (black bars, n = 228). Bars indicate the percentage contribution of each life form to the total numbers of incidences within casual and naturalized. Significant differences and their directions are indicated above bars ( $. < 0.1$ ,  $* < 0.05$ ,  $** < 0.01$ ,  $*** < 0.001$ ).

**Table 3.** Structure of the alien flora of Turkey according to origin and number of casual and naturalized species, with percentages of naturalized taxa among total aliens.

Native range	Total no. of alien taxa	No. of casual taxa	No. of naturalized taxa	% of naturalized taxa
America	152	48	104	30.6
Asia	94	33	61	17.9
Africa	31	13	18	5.3
Eurasia	15	2	13	3.8
Australia & Oceania	13	8	5	1.5
Mediterranean	12	1	11	3.2
Europe	9	1	8	2.4
Garden origin & hybrids	8	5	3	0.9
Other & unknown	6	1	5	1.5

Most of the 340 alien taxa introduced to Turkey have their native ranges in Americas (44.7%) and Asia (27.6%). Of other regions, 9.1% originated in Africa, 4.4% in Eurasia, 3.8% in Australia and Oceania, and 3.5% in the Mediterranean (see Table 3 for species numbers with respect to the area of origin).

The majority of taxa in the Turkish alien flora (71.9%) were introduced intentionally, whereas the remaining (28.1%) were introduced accidentally. Among the taxa

**Table 4.** Habitats in which the alien plant taxa are found in Turkey, shown separately for casual and naturalized taxa, with percentages of the total shown for each category. Natural/semi-natural habitats include the categories of the CORINE Land cover class 3 (Forest and semi-natural areas).

Habitat	Casual alien	%	Naturalized alien	%
Natural/semi-natural habitats	56	28.4	145	28.3
Urban/ruderal habitats	79	40.1	140	27.3
Coastal habitats	34	17.3	96	18.7
Agricultural land	14	7.1	82	16.0
Riparian habitats/wetlands/lakes	14	7.1	50	9.7

introduced intentionally, the vast majority are ornamental plants (55.2%), 10.0% taxa were introduced for forestry (planted forest, reforestation, sand dune stabilization or soil protection) and 6.7% as crops (i.e. plant taxa cultivated for the production of food, forage, fruit, fibre, dye or drugs).

Casual alien plants are most commonly found in urban and ruderal habitats (40.1% of their total number) where naturalized taxa are also often recorded (27.3%). Plants that occur as agricultural weeds are typically naturalized rather than casual (16.0% vs 7.1%, respectively). However, (semi)natural habitats in Turkey are often invaded by alien taxa, especially by those that are able to naturalize (Table 4).

## Discussion and conclusions

This is the first comprehensive compilation and analysis of all available records on alien plant taxa in Turkey. It provides the first assessment of their status, introduction purposes and main types of invaded habitats. It also pinpoints knowledge gaps in the geographic and biogeographic distribution and the quantification of environmental and economic impacts.

The total number of the alien taxa reported for Turkey here (340) is relatively low compared to other Mediterranean and Southern European countries, namely France (1,258 taxa), Italy (1,023), Spain (933) and Portugal (547) (Lambdon et al. 2008, Celesti-Grapow et al. 2009) and numerically comparable with Greece (343; Arianoutsou et al. 2010, Dimopoulos et al. 2016). The same is true for the naturalized species richness in Turkey (228 taxa), for which higher numbers are reported for e.g. France (732), Spain (495) or Italy (440), but comparable numbers for Portugal (261) and lower for Greece (134) (Lambdon et al. 2008). This fact, together with the remarkably high richness of native flora of Turkey, makes the contribution of alien species to the total plant diversity of the country relatively low, with the values between 1.9 and 2.8% being by an order of magnitude lower than in some other European countries (e.g. Pyšek et al. 2012) or this continent as a whole. Europe, with a comparable native plant diversity as Turkey, ~10,000 native species (Winter et al. 2009), harbours 1,780 naturalized aliens from overseas and if one considers also intracontinental aliens

the number reaches 3,749 taxa (Lambdon et al. 2008) or 4,140 according to the most recent account in GloNAF database (van Kleunen et al. 2015).

This is the first comprehensive catalogue for Turkey and it is based mainly on literature and herbarium data, with only a limited number of dedicated field surveys. Other Mediterranean countries such as France, Italy or Spain have a longer tradition of floristic research on alien plants, whose appearance and establishment have long been documented by botanists there (e.g., by Saccardo 1909). It is therefore possible that casual species are underestimated in the dataset, as casuals in general, and escaped ornamentals in particular (Pergl et al. 2016b), are rarely recorded in botanical works nor are they often collected in herbaria. Another possible explanation for the lower number of alien plants than in some other European countries is that although cultivation of ornamental plants dates back to ancient times, there has been rapid development and change in the ornamental plants sector in Turkey only after the 1980s and this development has gained speed only in the 2000s (Çelik and Arisoy 2013).

The rate of naturalization (proportion of naturalized to all aliens) is 67% in Turkey, i.e. the same as in Cyprus but higher than in Greece (41%), Spain (53%), Portugal (47%) and Italy (51%) (Arianoutsou et al. 2010). On the contrary, with the exception of Bulgaria, there is only very limited knowledge on the alien flora of Georgia, Armenia, Azerbaijan, Iran, Iraq, Syria which impedes comparisons between these countries and, at the same time, forecasting of future trends for the entire Mediterranean region.

National inventories of alien plants are one of the key components for evaluating the status of biodiversity in a given country, as well as threats to endangered species, and provide source data for creating relevant indicators (Lambdon et al. 2008, Celesti-Grapow et al. 2010, Pyšek et al. 2012, van Kleunen et al. 2015, Latombe et al. 2017). Such data are needed for early warning systems, prioritization of management and implementation of effective policy measures (Brunel et al. 2010). The publication of checklists also helps neighbouring countries and trading partners to assess the threat from potential invasions of new species to arrive and checklists can contribute to so-called horizon scanning exercises looking for potential new threats (Roy et al. 2014, Latombe et al. 2017).

Identifying those species that represent potential or future threats, while still at an early stage of invasion, represents a major challenge for prediction (Lambdon et al. 2008, Brunel et al. 2010). Detailed knowledge of the pool of alien naturalized species from which emerging invaders recruit can provide national authorities in Turkey with an instrument for prioritization of management measures and allocation of resources to those species where future spread, and environmental and socioeconomic impacts are likely to occur (Brunel et al. 2010, Pergl et al. 2016a, Rumlerová et al. 2016). The results of the present research will increase the awareness of alien plant taxa in Turkey and neighbouring countries and trigger further dedicated specialized studies, such as assessment of the impact by using standard scoring systems (e.g. Blackburn et al. 2014, Nentwig et al. 2016). New alien species are bound to arrive and spread in Turkey and we hope that publication of this list will encourage further recording so that the impacts of these species can be minimized.

## Acknowledgments

PP and JP were supported by long-term research development project RVO 67985939 and Premium Academiae award to PP from The Czech Academy of Sciences. The authors also acknowledge support from the COST Action TD1209 “Alien Challenge” and FA1203 “SMARTER”. AU and NA have been supported partly by the ESENIAS-TOOLS project which is funded by the Financial Mechanism of the European Economic Area (2009–2014). We gratefully acknowledge G. Domina and two anonymous reviewers whose comments and suggestions greatly helped to improve the present research.

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## Appendix I

**Table AI.** List of naturalized and casual alien taxa in the flora of Turkey. Taxa are ordered alphabetically. Each taxon is listed together with its family, residence time (Res: Arc = archaeophyte, Neo = neophyte); invasion status (Stat: Cas = casual, Nat = naturalized), simplified growth form and native range.

Taxa	Family	Res	Stat	Simplified growth form	Native range
<i>Abutilon theophrastii</i> Medik.	<i>Malvaceae</i>	Arc	Nat	Herb	Asia
<i>Acacia dealbata</i> Link	<i>Fabaceae</i>	Neo	Cas	Tree	Australia
<i>Acacia karroo</i> Hayne	<i>Fabaceae</i>	Neo	Nat	Tree	Africa
<i>Acacia longifolia</i> (Andrews) Willd.	<i>Fabaceae</i>	Neo	Nat	Tree	Australia
<i>Acacia mearnsii</i> De Wild.	<i>Fabaceae</i>	Neo	Nat	Tree	Australia
<i>Acacia retinodes</i> Schldtl.	<i>Fabaceae</i>	Neo	Nat	Tree	Australia
<i>Acacia saligna</i> (Labill.) H.L.Wendl.	<i>Fabaceae</i>	Neo	Nat	Tree	Australia
<i>Acalypha australis</i> L.	<i>Euphorbiaceae</i>	Neo	Nat	Herb	Asia
<i>Acer buergerianum</i> Miq.	<i>Sapindaceae</i>	Neo	Nat	Tree	Asia
<i>Acer negundo</i> L.	<i>Sapindaceae</i>	Neo	Nat	Tree	America
<i>Acer palmatum</i> Thunb.	<i>Sapindaceae</i>	Arc	Nat	Tree	Asia
<i>Acer saccharum</i> Marsh.	<i>Sapindaceae</i>	Neo	Cas	Tree	America
<i>Acorus calamus</i> L.	<i>Acoraceae</i>	Arc	Nat	Aquatic	Asia
<i>Actinidia deliciosa</i> (A.Chev.) C.F.Liang & A.R.Ferguson	<i>Actinidiaceae</i>	Neo	Cas	Vine	Asia
<i>Aesculus carnea</i> J.Zeyh.	<i>Sapindaceae</i>	Neo	Nat	Tree	Garden/Hybrid
<i>Aesculus hippocastanum</i> L.	<i>Sapindaceae</i>	Neo	Nat	Tree	Europe
<i>Agave americana</i> L. var. <i>americana</i>	<i>Asparagaceae</i>	Neo	Nat	Succulent	America
<i>Agave americana</i> var. <i>striata</i> Trel.	<i>Asparagaceae</i>	Neo	Nat	Succulent	America
<i>Agrostemma githago</i> L.	<i>Caryophyllaceae</i>	Arc	Nat	Herb	Mediterranean
<i>Ailanthus altissima</i> (Mill.) Swingle	<i>Simaroubaceae</i>	Neo	Nat	Tree	Asia
<i>Albizia julibrissin</i> Durazz	<i>Fabaceae</i>	Neo	Nat	Tree	Asia
<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	<i>Amaranthaceae</i>	Neo	Nat	Herb	Asia
<i>Amaranthus albus</i> L.	<i>Amaranthaceae</i>	Arc	Nat	Herb	America
<i>Amaranthus blitoides</i> S.Watson	<i>Amaranthaceae</i>	Arc	Nat	Herb	America
<i>Amaranthus blitum</i> L. subsp. <i>blitum</i>	<i>Amaranthaceae</i>	Arc	Nat	Herb	Eurasia
<i>Amaranthus blitum</i> subsp. <i>emarginatus</i> (Salzm. ex Uline & Bray) Carretero, Muñoz Garm. & Pedrol	<i>Amaranthaceae</i>	Arc	Nat	Herb	Eurasia
<i>Amaranthus blitum</i> subsp. <i>oleraceus</i> (L.) Costea	<i>Amaranthaceae</i>	Arc	Nat	Herb	Eurasia
<i>Amaranthus cruentus</i> L.	<i>Amaranthaceae</i>	Neo	Nat	Herb	America
<i>Amaranthus deflexus</i> L.	<i>Amaranthaceae</i>	Neo	Nat	Herb	America
<i>Amaranthus graecizans</i> L.	<i>Amaranthaceae</i>	Neo	Nat	Herb	Mediterranean
<i>Amaranthus hybridus</i> L.	<i>Amaranthaceae</i>	Neo	Nat	Herb	America
<i>Amaranthus hypochondriacus</i> L.	<i>Amaranthaceae</i>	Neo	Nat	Herb	America
<i>Amaranthus retroflexus</i> L.	<i>Amaranthaceae</i>	Neo	Nat	Herb	America
<i>Amaranthus spinosus</i> L.	<i>Amaranthaceae</i>	Neo	Nat	Herb	America
<i>Amaranthus viridis</i> L.	<i>Amaranthaceae</i>	Neo	Nat	Herb	America
<i>Ambrosia artemisiifolia</i> L.	<i>Asteraceae</i>	Neo	Nat	Herb	America
<i>Ambrosia tenuifolia</i> Spreng.	<i>Asteraceae</i>	Neo	Nat	Herb	America

Taxa	Family	Res	Stat	Simplified growth form	Native range
<i>Ammannia coccinea</i> Rottb.	<i>Lythraceae</i>	Neo	Nat	Herb	America
<i>Amorpha fruticosa</i> L.	<i>Fabaceae</i>	Neo	Cas	Shrub	America
<i>Araujia sericifera</i> Brot.	<i>Apocynaceae</i>	Neo	Nat	Vine	America
<i>Armeria maritima</i> (Mill.) Willd.	<i>Plumbaginaceae</i>	Arc	Cas	Herb	Europe
<i>Artemisia annua</i> L.	<i>Asteraceae</i>	Neo	Nat	Herb	Asia
<i>Artemisia verlotiorum</i> Lamotte	<i>Asteraceae</i>	Neo	Nat	Herb	Asia
<i>Arundo donax</i> L.	<i>Poaceae</i>	Arc	Nat	Bambusoid	Asia
<i>Aster subulatus</i> (Michx.) Hort. ex Michx.	<i>Asteraceae</i>	Neo	Nat	Herb	America
<i>Avena byzantina</i> K.Koch	<i>Poaceae</i>	Arc	Cas	Herb	Garden/Hybrid
<i>Azolla filiculoides</i> Lam.	<i>Azollaceae</i>	Arc	Nat	Aquatic	America
<i>Bauhinia variegata</i> L.	<i>Fabaceae</i>	Neo	Nat	Tree	Asia
<i>Berberis veitchii</i> C.K.Schneid.	<i>Berberidaceae</i>	Arc	Nat	Shrub	Asia
<i>Berberis thunbergii</i> DC.	<i>Berberidaceae</i>	Arc	Nat	Shrub	Asia
<i>Bidens bipinnata</i> L.	<i>Asteraceae</i>	Neo	Nat	Herb	Asia
<i>Bidens campylotheca</i> Sch.Bip.	<i>Asteraceae</i>	Neo	Nat	Herb	America
<i>Bidens cernua</i> L. s.l.	<i>Asteraceae</i>	Neo	Nat	Herb	America
<i>Bidens frondosa</i> L.	<i>Asteraceae</i>	Neo	Nat	Herb	America
<i>Bougainvillea buttiana</i> Holttum & Standl.	<i>Nyctaginaceae</i>	Neo	Nat	Vine	America
<i>Bougainvillea glabra</i> Choisy	<i>Nyctaginaceae</i>	Neo	Cas	Vine	America
<i>Bougainvillea spectabilis</i> Willd.	<i>Nyctaginaceae</i>	Neo	Nat	Vine	America
<i>Brachychiton populneus</i> (Schott & Endl.) R.Br.	<i>Sterculiaceae</i>	Neo	Nat	Tree	Australia
<i>Bromus tectorum</i> L.	<i>Poaceae</i>	N/A	Nat	Herb	Eurasia
<i>Broussonetia papyrifera</i> (L.) L'Hér. ex Vent.	<i>Moraceae</i>	Neo	Nat	Tree	Asia
<i>Bryophyllum delagense</i> (Eckl. & Zeyh.) Druce	<i>Crasulaceae</i>	Neo	Cas	Succulent	Africa
<i>Buddleja davidii</i> Franch.	<i>Scrophulariaceae</i>	Neo	Nat	Shrub	Asia
<i>Caesalpinia gilliesii</i> (Hook.) D.Dietr.	<i>Fabaceae</i>	Neo	Nat	Shrub	America
<i>Calendula officinalis</i> L.	<i>Asteraceae</i>	Arc	Nat	Herb	Eurasia
<i>Callistemon citrinus</i> (Curtis) Skeels	<i>Myrtaceae</i>	Neo	Cas	Tree	Australia
<i>Callistemon viminalis</i> (Sol. ex Gaertn.) G.Don	<i>Myrtaceae</i>	Neo	Cas	Tree	Australia
<i>Camellia japonica</i> L.	<i>Theaceae</i>	Arc	Nat	Shrub	Asia
<i>Canna indica</i> L.	<i>Cannaceae</i>	Neo	Nat	Bambusoid	America
<i>Caragana arborescens</i> Lam.	<i>Fabaceae</i>	Neo	Nat	Shrub/Tree	Asia
<i>Carex vulpinoidea</i> Michx.	<i>Cyperaceae</i>	Neo	Nat	Herb	America
<i>Carpobrotus acinaciformis</i> (L.) L.Bolus	<i>Aizoaceae</i>	Neo	Nat	Succulent	Africa
<i>Carpobrotus edulis</i> (L.) N.E.Br.	<i>Aizoaceae</i>	Neo	Nat	Succulent	Africa
<i>Carthamus tinctorius</i> L.	<i>Asteraceae</i>	Arc	Cas	Herb	Asia
<i>Cascabela thevetia</i> (L.) Lippold	<i>Apocynaceae</i>	Neo	Cas	Tree	America
<i>Catalpa bignonioides</i> Walter	<i>Bignoniaceae</i>	Neo	Nat	Tree	America
<i>Cedrus atlantica</i> (Endl.) Carrière	<i>Pinaceae</i>	Neo	Cas	Tree	Africa
<i>Cedrus deodara</i> (Roxb. ex D.Don) G.Don	<i>Pinaceae</i>	Neo	Nat	Tree	Asia
<i>Ceiba speciosa</i> (A.St.-Hil.) Ravenna	<i>Malvaceae</i>	Neo	Nat	Tree	America
<i>Cenchrus incertus</i> M.A.Curtis	<i>Poaceae</i>	Arc	Nat	Herb	America
<i>Centaurea pullata</i> L.	<i>Asteraceae</i>	Arc	Nat	Herb	Mediterranean
<i>Chaenomeles japonica</i> (Thunb.) Lindl. ex Spach	<i>Rosaceae</i>	Neo	Cas	Shrub	Asia
<i>Chenopodium album</i> L.	<i>Amaranthaceae</i>	Arc	Nat	Herb	Eurasia

Taxa	Family	Res	Stat	Simplified growth form	Native range
<i>Chenopodium giganteum</i> D.Don	Chenopodiaceae	Arc	Nat	Herb	Asia
<i>Cichorium endivia</i> L.	Asteraceae	Arc	Cas	Herb	Asia
<i>Citrullus colocynthis</i> (L.) Schrad.	Cucurbitaceae	Arc	Cas	Vine	Eurasia
<i>Citrus trifoliata</i> L.	Rutaceae	Neo	Cas	Tree	Asia
<i>Coix lacryma-jobi</i> L.	Poaceae	Neo	Nat	Herb	Asia
<i>Commelina communis</i> L.	Commelinaceae	Neo	Nat	Herb	Asia
<i>Convolvulus tricolor</i> L.	Convolvulaceae	Arc	Cas	Vine	Mediterranean
<i>Cortaderia selloana</i> (Schult. & Schult.f.) Asch. & Graebn.	Poaceae	Neo	Cas	Bambusoid	America
<i>Cosmos bipinnatus</i> Cav.	Asteraceae	Neo	Cas	Herb	America
<i>Cotoneaster adpressus</i> Bois	Rosaceae	Neo	Cas	Shrub	Asia
<i>Cotoneaster franchetii</i> Bois	Rosaceae	Neo	Nat	Shrub	Asia
<i>Cotoneaster horizontalis</i> Decne.	Rosaceae	Neo	Nat	Shrub	Asia
<i>Cotoneaster salicifolius</i> Franch.	Rosaceae	Arc	Nat	Shrub	Asia
<i>Crassocephalum crepidioides</i> (Benth.) S.Moore	Asteraceae	Neo	Nat	Herb	Africa
<i>Cryptomeria japonica</i> (Thunb. ex L.f.) D.Don	Cupressaceae	Neo	Cas	Tree	Asia
<i>Cupressus arizonica</i> Greene	Cupressaceae	Neo	Nat	Tree	America
<i>Cupressus macrocarpa</i> Hartw.	Cupressaceae	Neo	Nat	Tree	America
<i>Cuscuta campestris</i> Yunck.	Cuscutaceae	Neo	Nat	Herb	America
<i>Cymbalaria muralis</i> P.Gaertn., B.Mey. & Scherb.	Plantaginaceae	Arc	Nat	Herb	Mediterranean
<i>Cynoglossum wallichii</i> var. <i>glochidiatum</i> (Wall. ex Benth.) Kazmi	Boraginaceae	Arc	Nat	Herb	Asia
<i>Cyperus congestus</i> Vahl	Cyperaceae	Neo	Nat	Herb	Africa
<i>Cyperus esculentus</i> L.	Cyperaceae	Arc	Nat	Herb	Unknown
<i>Cyperus rotundus</i> L.	Cyperaceae	Arc	Nat	Herb	Eurasia
<i>Dalbergia sissoo</i> DC.	Fabaceae	Neo	Cas	Tree	Asia
<i>Datura innoxia</i> Mill.	Solanaceae	Neo	Nat	Herb	America
<i>Datura metel</i> L.	Solanaceae	Neo	Cas	Herb	Asia
<i>Datura stramonium</i> L.	Solanaceae	Neo	Nat	Herb	America
<i>Deutzia gracilis</i> Siebold & Zucc.	Hydrangeaceae	Arc	Nat	Shrub	Asia
<i>Deutzia scabra</i> Thunb.	Hydrangeaceae	Neo	Nat	Shrub	Asia
<i>Dichondra repens</i> J.R.Forst. & G.Forst.	Convolvulaceae	Neo	Cas	Herb	Asia
<i>Dichrocephala integrifolia</i> (L.f.) Kuntze	Asteraceae	Neo	Nat	Herb	Africa & Asia
<i>Dieffenbachia seguine</i> (Jacq.) Schott	Araceae	Neo	Nat	Herb	America
<i>Digitaria sanguinalis</i> (L.) Scop.	Poaceae	Neo	Nat	Herb	Europe & Africa
<i>Diplachne fusca</i> (L.) P.Beauv.	Poaceae	Neo	Nat	Herb	Unknown
<i>Duchesnea indica</i> (Jacks.) Focke	Rosaceae	Neo	Cas	Herb	Asia
<i>Duranta erecta</i> L.	Verbenaceae	Neo	Nat	Shrub/Tree	America
<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants	Amaranthaceae	Neo	Nat	Herb	America
<i>Dysphania botrys</i> (L.) Mosyakin & Clemants	Amaranthaceae	Arc	Nat	Herb	Eurasia
<i>Dysphania multifida</i> (L.) Mosyakin & Clemants	Amaranthaceae	Neo	Nat	Herb	America
<i>Echinochloa colonum</i> (L.) Link	Poaceae	Neo	Nat	Herb	Unknown
<i>Echinochloa oryzoides</i> (Ard.) Fritsch	Poaceae	Arc	Nat	Herb	Asia
<i>Echinopsis chamaecereus</i> H.Friedrich & Glaetzle	Cactaceae	Neo	Nat	Succulent	America

Taxa	Family	Res	Stat	Simplified growth form	Native range
<i>Egeria densa</i> Planch.	Hydrocharitaceae	Neo	Nat	Aquatic	America
<i>Eichhornia crassipes</i> (Mart.) Solms	Pontederiaceae	Neo	Nat	Aquatic	America
<i>Elatine ambigua</i> Wight	Elatinaceae	Neo	Nat	Aquatic	Asia
<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	Neo	Nat	Herb	Africa
<i>Elodea canadensis</i> Michx.	Hydrocharitaceae	Neo	Nat	Aquatic	America
<i>Elsholtzia ciliata</i> (Thunb.) Hyl.	Lamiaceae	Neo	Nat	Herb	Asia
<i>Eragrostis curvula</i> (Schrad.) Nees	Poaceae	Arc	Nat	Herb	Africa
<i>Erigeron annuus</i> (L.) Pers.	Asteraceae	Neo	Nat	Herb	America
<i>Erigeron bonariensis</i> L.	Asteraceae	Neo	Nat	Herb	America
<i>Erigeron canadensis</i> L.	Asteraceae	Neo	Nat	Herb	America
<i>Erigeron sumatrensis</i> Retz.	Asteraceae	Neo	Nat	Herb	America
<i>Erythrina crista-galli</i> L.	Fabaceae	Neo	Cas	Tree	America
<i>Erythrina flabelliformis</i> Kearney	Fabaceae	Neo	Cas	Tree	America
<i>Eucalyptus camaldulensis</i> Dehnh.	Myrtaceae	Neo	Cas	Tree	Australia
<i>Eucalyptus grandis</i> W.Hill	Myrtaceae	Neo	Cas	Tree	Australia
<i>Euonymus fortunei</i> (Turcz.) Hand.-Mazz.	Celastraceae	Arc	Nat	Shrub	Asia
<i>Euonymus japonicus</i> Thunb.	Celastraceae	Arc	Nat	Shrub/Tree	Asia
<i>Eupatorium cannabinum</i> L.	Asteraceae	Arc	Nat	Herb	Europe
<i>Euphorbia chamaesyce</i> L.	Euphorbiaceae	Neo	Nat	Herb	America
<i>Euphorbia heterophylla</i> L.	Euphorbiaceae	Neo	Cas	Herb	America
<i>Euphorbia humifusa</i> Willd.	Euphorbiaceae	Arc	Nat	Herb	Asia
<i>Euphorbia lagascae</i> Spreng.	Euphorbiaceae	Arc	Nat	Herb	Mediterranean
<i>Euphorbia lathyris</i> L.	Euphorbiaceae	Arc	Nat	Herb	Mediterranean
<i>Euphorbia nutans</i> Lag.	Euphorbiaceae	Neo	Nat	Herb	America
<i>Euphorbia prostrata</i> Aiton	Euphorbiaceae	Neo	Nat	Herb	America
<i>Euphorbia serpens</i> Kunth	Euphorbiaceae	Neo	Nat	Herb	America
<i>Euphorbia supina</i> Rafin.	Euphorbiaceae	Neo	Nat	Herb	America
<i>Fallopia aubertii</i> (L.Henry) Holub	Polygonaceae	Neo	Nat	Vine	Asia
<i>Fatsia japonica</i> (Thunb.) Decne. & Planch.	Araliaceae	Neo	Nat	Shrub/Tree	Asia
<i>Ficus elastica</i> Roxb. ex Hornem.	Moraceae	Neo	Cas	Tree	Asia
<i>Ficus macrophylla</i> Desf. ex Pers.	Moraceae	Neo	Cas	Tree	Australia
<i>Ficus microcarpa</i> L.f.	Moraceae	Neo	Cas	Tree	Asia
<i>Forsythia</i> × <i>intermedia</i> Zabel	Oleaceae	Neo	Cas	Shrub	Garden/Hybrid
<i>Fragaria</i> × <i>ananassa</i> (Duchesne ex Weston) Duchesne ex Rozier	Rosaceae	Neo	Cas	Herb	America
<i>Gaillardia pulchella</i> Foug.	Asteraceae	Neo	Cas	Herb	America
<i>Galinsoga ciliata</i> (Rafin) S.F. Blake	Asteraceae	Neo	Nat	Herb	America
<i>Galinsoga parviflora</i> Cav.	Asteraceae	Neo	Nat	Herb	America
<i>Galinsoga quadriradiata</i> Ruiz & Pav.	Asteraceae	Neo	Nat	Herb	America
<i>Gasteria obliqua</i> (Aiton) Duval	Xanthorrhoeaceae	Neo	Cas	Succulent	Africa
<i>Gazania rigens</i> (L.) Gaertn.	Asteraceae	Neo	Cas	Herb	Africa
<i>Geranium pusillum</i> L.	Geraniaceae	Neo	Nat	Herb	Eurasia
<i>Gleditsia triacanthos</i> L.	Fabaceae	Neo	Cas	Tree	America
<i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton	Apocynaceae	Neo	Nat	Herb	Africa
<i>Gypsophila elegans</i> M.Bieb.	Caryophyllaceae	Arc	Nat	Herb	Eurasia

Taxa	Family	Res	Stat	Simplified growth form	Native range
<i>Gypsophila pilosa</i> Huds.	Caryophyllaceae	Arc	Nat	Herb	Asia
<i>Heliotropium curassavicum</i> L.	Boraginaceae	Neo	Nat	Herb	America
<i>Hemerocallis fulva</i> (L.) L.	Hemerocallidaceae	Neo	Nat	Herb	Asia
<i>Hibiscus trionum</i> L.	Malvaceae	Arc	Nat	Herb	Africa
<i>Homalocladium platycladum</i> (F.Muell.) L.H.Bailey	Polygonaceae	Neo	Cas	Shrub	Oceania
<i>Hoya carnosia</i> (L.f.) R.Br.	Apocynaceae	Neo	Cas	Vine	Asia
<i>Hydrangea macrophylla</i> (Thunb.) Ser.	Hydrangeaceae	Neo	Nat	Herb	Asia
<i>Hydrocotyle ramiflora</i> Maxim.	Umbelliferae	Neo	Nat	Aquatic	Asia
<i>Imperata cylindrica</i> (L.) Rausch.	Poaceae	Neo	Nat	Herb	Asia
<i>Ipomoea nil</i> (L.) Roth	Convolvulaceae	Neo	Nat	Vine	America
<i>Ipomoea purpurea</i> (L.) Roth	Convolvulaceae	Neo	Nat	Vine	America
<i>Ipomoea tricolor</i> Cav.	Convolvulaceae	Neo	Nat	Vine	America
<i>Ipomoea triloba</i> L.	Convolvulaceae	Neo	Nat	Vine	America
<i>Jacaranda mimosifolia</i> D.Don	Bignoniaceae	Neo	Cas	Tree	America
<i>Juncus tenuis</i> Willd.	Juncaceae	Neo	Nat	Herb	America
<i>Juniperus chinensis</i> L.	Cupressaceae	Neo	Nat	Shrub/Tree	Asia
<i>Juniperus horizontalis</i> Moench	Cupressaceae	Neo	Nat	Shrub	America
<i>Justicia brandegeana</i> Washh. & L.B.Sm.	Acanthaceae	Neo	Cas	Shrub	America
<i>Kalanchoe blossfeldiana</i> Poelln.	Crassulaceae	Neo	Cas	Succulent	Africa (Madagascar)
<i>Kerria japonica</i> (L.) DC.	Rosaceae	Neo	Cas	Shrub	Asia
<i>Kniphofia uvaria</i> (L.) Oken	Liliaceae	Neo	Cas	Succulent	Africa
<i>Koelreuteria paniculata</i> Laxm.	Sapindaceae	Neo	Cas	Tree	Asia
<i>Lagerstroemia indica</i> L.	Lythraceae	Neo	Cas	Tree	Asia
<i>Lantana camara</i> L.	Verbenaceae	Neo	Cas	Shrub	America
<i>Lepidium virginicum</i> L.	Brassicaceae	Neo	Nat	Herb	America
<i>Leucaena leucocephala</i> (Lam.) de Wit	Fabaceae	Neo	Cas	Tree	America
<i>Ligustrum ovalifolium</i> Hassk.	Oleaceae	Neo	Cas	Shrub/Tree	Asia
<i>Liquidambar styraciflua</i> L.	Altingiaceae	Neo	Cas	Tree	America
<i>Livistona mariae</i> F.Muell.	Arecaceae	Neo	Cas	Palm	Australia
<i>Lonicera japonica</i> Thunb.	Caprifoliaceae	Neo	Cas	Vine	Asia
<i>Lonicera ligustrina</i> var. <i>yunnanensis</i> Franch.	Caprifoliaceae	Neo	Cas	Vine	Asia
<i>Lonicera periclymenum</i> L.	Caprifoliaceae	Neo	Nat	Vine	Europe & NW Africa
<i>Ludwigia peploides</i> (Kunth) P.H.Raven s.l.	Onagraceae	Neo	Cas	Aquatic	America
<i>Lycianthes rantonnei</i> (Carrière) Bitter	Solanaceae	Neo	Nat	Shrub	America
<i>Lysimachia japonica</i> Thunb.	Primulaceae	Neo	Nat	Herb	Asia
<i>Maclura pomifera</i> (Raf.) C.K.Schneid.	Moraceae	Neo	Nat	Tree	America
<i>Magnolia grandiflora</i> L.	Magnoliaceae	Neo	Cas	Tree	America
<i>Malus floribunda</i> Siebold ex Van Houtte	Rosaceae	Arc	Nat	Shrub/Tree	Asia
<i>Matricaria discoidea</i> DC.	Asteraceae	Neo	Nat	Herb	America
<i>Matricaria matricarioides</i> (Less.) Porter	Asteraceae	Neo	Nat	Herb	America
<i>Melia azedarach</i> L.	Meliaceae	Neo	Nat	Tree	Asia
<i>Mesembryanthemum cordifolium</i> L.f.	Aizoaceae	Neo	Nat	Succulent	Africa
<i>Mesembryanthemum crystallinum</i> L.	Aizoaceae	Neo	Nat	Succulent	Africa

Taxa	Family	Res	Stat	Simplified growth form	Native range
<i>Mesembryanthemum nodiflorum</i> L.	<i>Aizoaceae</i>	Arc	Nat	Succulent	Mediterranean & S Africa
<i>Microstegium vimineum</i> (Trin.) A.Camus	<i>Poaceae</i>	Neo	Nat	Herb	Asia
<i>Minabilis jalapa</i> L.	<i>Nyctaginaceae</i>	Neo	Cas	Herb	America
<i>Miscanthus sinensis</i> Andersson	<i>Poaceae</i>	Neo	Cas	Bambusoid	Asia
<i>Myriophyllum spicatum</i> L.	<i>Haloragaceae</i>	Neo	Cas	Aquatic	Eurasia
<i>Myriophyllum verticillatum</i> L.	<i>Haloragaceae</i>	Neo	Cas	Aquatic	Circumboreal
<i>Nandina domestica</i> Thunb.	<i>Berberidaceae</i>	Neo	Cas	Bambusoid	Asia
<i>Nephrolepis exaltata</i> (L.) Schott	<i>Nephrolepidaceae</i>	Neo	Cas	Fern	America
<i>Nicotiana glauca</i> Graham	<i>Solanaceae</i>	Neo	Nat	Shrub/Tree	America
<i>Oenothera biennis</i> L.	<i>Onagraceae</i>	Neo	Nat	Herb	America
<i>Oenothera glazioviana</i> Micheli	<i>Onagraceae</i>	Neo	Nat	Herb	Garden/Hybrid
<i>Oenothera parodiana</i> Munz	<i>Onagraceae</i>	Neo	Nat	Herb	America
<i>Oldenlandia capensis</i> L.f. var. <i>capensis</i>	<i>Rubiaceae</i>	Neo	Nat	Herb	Africa
<i>Oldenlandia capensis</i> var. <i>pleiosepala</i> Bremek.	<i>Rubiaceae</i>	Neo	Cas	Herb	Africa
<i>Opuntia ficus-indica</i> (L.) Mill.	<i>Cactaceae</i>	Neo	Nat	Succulent	America
<i>Opuntia microdasys</i> (Lehm.) Pfeiff.	<i>Cactaceae</i>	Neo	Nat	Succulent	America
<i>Oryza sativa</i> L.	<i>Poaceae</i>	Arc	Cas	Herb	Asia
<i>Oxalis articulata</i> Savigny	<i>Oxalidaceae</i>	Neo	Nat	Herb	America
<i>Oxalis corniculata</i> L. s.l.	<i>Oxalidaceae</i>	Arc	Nat	Herb	America
<i>Oxalis debilis</i> var. <i>corymbosa</i> (DC.) Lourteig	<i>Oxalidaceae</i>	Neo	Nat	Herb	America
<i>Oxalis floribunda</i> Lehm.	<i>Oxalidaceae</i>	Neo	Nat	Herb	America
<i>Oxalis pes-caprae</i> L.	<i>Oxalidaceae</i>	Neo	Nat	Herb	Africa
<i>Oxalis pes-caprae</i> f. <i>pleniflora</i> (Lowe) Sunding	<i>Oxalidaceae</i>	Neo	Nat	Herb	Africa
<i>Oxalis stricta</i> L.	<i>Oxalidaceae</i>	Neo	Nat	Herb	America
<i>Panicum capillare</i> L.	<i>Poaceae</i>	Neo	Nat	Herb	America
<i>Panicum miliaceum</i> L.	<i>Poaceae</i>	Arc	Nat	Herb	Asia
<i>Parkinsonia aculeata</i> L.	<i>Fabaceae</i>	Neo	Cas	Tree	America
<i>Parthenocissus quinquefolia</i> (L.) Planch.	<i>Vitaceae</i>	Neo	Cas	Vine	America
<i>Paspalum dilatatum</i> Poir.	<i>Poaceae</i>	Neo	Nat	Herb	America
<i>Paspalum distichum</i> L.	<i>Poaceae</i>	Neo	Nat	Herb	America
<i>Paspalum thunbergii</i> Kunth ex Steud	<i>Poaceae</i>	Arc	Cas	Herb	Asia
<i>Passiflora caerulea</i> L.	<i>Passifloraceae</i>	Neo	Cas	Vine	America
<i>Paulownia elongata</i> S. Y. Hu.	<i>Paulowniaceae</i>	Neo	Cas	Tree	Asia
<i>Paulownia fortunei</i> (Seem.) Hemsl.	<i>Paulowniaceae</i>	Neo	Cas	Tree	Asia
<i>Paulownia fortunei</i> x <i>Paulownia tomentosa</i>	<i>Paulowniaceae</i>	Neo	Cas	Tree	Garden/Hybrid
<i>Paulownia tomentosa</i> Steud.	<i>Paulowniaceae</i>	Neo	Cas	Tree	Asia
<i>Pelargonium zonale</i> (L.) L'Hér. ex Aiton	<i>Geraniaceae</i>	Neo	Nat	Shrub	Africa
<i>Perilla frutescens</i> (L.) Britton	<i>Lamiaceae</i>	Neo	Cas	Herb	Asia
<i>Phacelia tanacetifolia</i> Benth.	<i>Hydrophyllaceae</i>	Neo	Cas	Herb	America
<i>Phaseolus vulgaris</i> L.	<i>Fabaceae</i>	Neo	Cas	Vine	America
<i>Phyla canescens</i> (Kunth) Greene	<i>Verbenaceae</i>	Neo	Nat	Herb	America
<i>Phyla nodiflora</i> (L.) Greene	<i>Verbenaceae</i>	Neo	Nat	Herb	America
<i>Phyllostachys bambusoides</i> Siebold & Zucc.	<i>Poaceae</i>	Neo	Nat	Bambusoid	Asia
<i>Physalis alkekengi</i> L. s.l.	<i>Solanaceae</i>	Neo	Nat	Herb	Eurasia

Taxa	Family	Res	Stat	Simplified growth form	Native range
<i>Physalis angulata</i> L.	Solanaceae	Neo	Nat	Herb	America
<i>Physalis philadelphica</i> var. <i>immaculata</i> Waterf.	Solanaceae	Neo	Nat	Herb	America
<i>Physalis pubescens</i> L.	Solanaceae	Neo	Nat	Herb	America
<i>Phytolacca americana</i> L.	Phytolaccaceae	Neo	Nat	Herb	America
<i>Picea glauca</i> (Moench) Voss	Pinaceae	Neo	Nat	Tree	America
<i>Pinus pinaster</i> Aiton	Pinaceae	Arc	Nat	Tree	Mediterranean
<i>Pinus ponderosa</i> Douglas ex C.Lawson	Pinaceae	Neo	Nat	Tree	America
<i>Pinus radiata</i> D.Don	Pinaceae	Neo	Cas	Tree	America
<i>Pittosporum tobira</i> (Thunb.) W.T.Aiton	Pittosporaceae	Neo	Cas	Shrub	Asia
<i>Platycladus orientalis</i> (L.) Franco	Cupressaceae	Neo	Nat	Tree	Asia
<i>Plumbago auriculata</i> Lam.	Plumbaginaceae	Neo	Cas	Shrub	Africa
<i>Polygala myrtifolia</i> L.	Polygalaceae	Neo	Cas	Shrub	Africa
<i>Polygonum perfoliatum</i> L.	Polygonaceae	Neo	Nat	Vine	Asia
<i>Polygonum thunbergii</i> Siebold & Zucc.	Polygonaceae	Arc	Nat	Herb	Asia
<i>Populus</i> × <i>canadensis</i> Moench	Salicaceae	Neo	Nat	Tree	Garden/Hybrid
<i>Populus deltoides</i> Bartr. ex Marsh.	Salicaceae	Neo	Nat	Tree	America
<i>Portulaca grandiflora</i> Hook.	Portulacaceae	Neo	Cas	Herb	America
<i>Portulaca oleanacea</i> L. s.l.	Portulacaceae	Arc	Nat	Herb	Mediterranean
<i>Pseudosasa japonica</i> (Steud.) Makino	Poaceae	Neo	Cas	Bambusoid	Asia
<i>Pseudotsuga menziesii</i> (Mirb.) Franco var. <i>menziesii</i>	Pinaceae	Neo	Cas	Tree	America
<i>Pseudotsuga menziesii</i> (Mirb.) Franco var. <i>glauca</i> (Beissn.) Franco	Pinaceae	Neo	Cas	Tree	America
<i>Quercus rubra</i> L.	Fagaceae	Neo	Cas	Tree	America
<i>Rhapis excelsa</i> (Thunb.) Henry	Arecaceae	Neo	Nat	Palm	Asia
<i>Ricinus communis</i> L.	Euphorbiaceae	Arc	Nat	Shrub	Africa
<i>Robinia hispida</i> L.	Fabaceae	Neo	Cas	Tree	America
<i>Robinia pseudoacacia</i> L.	Fabaceae	Neo	Nat	Tree	America
<i>Rudbeckia hirta</i> L.	Asteraceae	Neo	Cas	Herb	America
<i>Russelia equisetiformis</i> Schldl. & Cham.	Plantaginaceae	Neo	Cas	Shrub	America
<i>Salix babylonica</i> L.	Salicaceae	Neo	Nat	Tree	Asia
<i>Santolina chamaecyparissus</i> L.	Asteraceae	Arc	Nat	Herb	Mediterranean
<i>Saponaria officinalis</i> L.	Caryophyllaceae	Arc	Nat	Herb	Eurasia
<i>Schefflera arboricola</i> (Hayata) Merr.	Analiaceae	Neo	Cas	Shrub	Asia
<i>Schinus molle</i> L.	Anacardiaceae	Neo	Cas	Tree	America
<i>Schinus terebinthifolius</i> Raddi	Anacardiaceae	Neo	Cas	Tree	America
<i>Scopolia carniolica</i> Jacq.	Solanaceae	Arc	Nat	Herb	Europe
<i>Sequoia sempervirens</i> (D.Don) Endl.	Cupressaceae	Neo	Cas	Tree	America
<i>Sequoiadendron giganteum</i> (Lindl.) J.Buchholz	Cupressaceae	Neo	Cas	Tree	America
<i>Setaria faberi</i> R.A.W.Herrm.	Poaceae	Neo	Nat	Herb	Asia
<i>Setaria italica</i> (L.) P.Beauv.	Poaceae	N/A	Nat	Herb	Unknown
<i>Setaria viridis</i> (L.) P.Beauv.	Poaceae	Neo	Nat	Herb	Eurasia
<i>Sicyos angulatus</i> L.	Cucurbitaceae	Neo	Nat	Vine	America
<i>Sida spinosa</i> L.	Malvaceae	Neo	Nat	Herb	America
<i>Sigesbeckia pubescens</i> (Makino) Makino	Asteraceae	Neo	Cas	Herb	Asia
<i>Solanum americanum</i> Mill.	Solanaceae	N/A	Nat	Herb	Unknown

Taxa	Family	Res	Stat	Simplified growth form	Native range
<i>Solanum angustifolium</i> Mill.	Solanaceae	Neo	Cas	Herb	America
<i>Solanum elaeagnifolium</i> Cav.	Solanaceae	Neo	Nat	Herb	America
<i>Solanum jasminoides</i> J.Paxton	Solanaceae	Neo	Cas	Vine	America
<i>Solanum luteum</i> Mill. s.l.	Solanaceae	N/A	Nat	Herb	Mediterranean & E Asia
<i>Solanum lycopersicum</i> L.	Solanaceae	Neo	Cas	Herb	America
<i>Solanum pseudocapsicum</i> L.	Solanaceae	Neo	Cas	Herb	America
<i>Solanum pseudocapsicum</i> var. <i>diflorum</i> (Vell.) Bitter	Solanaceae	Neo	Cas	Herb	America
<i>Solanum sisymbriifolium</i> Lam.	Solanaceae	Neo	Nat	Herb	America
<i>Solanum sodomaecum</i> L.	Solanaceae	Neo	Nat	Shrub	Africa
<i>Solanum tuberosum</i> L.	Solanaceae	Neo	Cas	Herb	America
<i>Solidago canadensis</i> L.	Asteraceae	Neo	Nat	Herb	America
<i>Sorghum</i> × <i>drummondii</i> (Nees ex Steud.) Millsp. & Chase	Poaceae	Neo	Cas	Bambusoid	Garden/Hybrid
<i>Sorghum bicolor</i> (L.) Moench	Poaceae	Arc	Cas	Bambusoid	Africa
<i>Spiraea</i> × <i>vanhouttei</i> (Briot) Zabel	Rosaceae	Neo	Cas	Shrub	Garden/Hybrid
<i>Sporobolus fertilis</i> (Steud.) Clayton	Poaceae	Neo	Nat	Herb	Asia
<i>Sporobolus indicus</i> (L.) R.Br.	Poaceae	Neo	Nat	Herb	America
<i>Strelitzia reginae</i> Banks	Strelitziaceae	Neo	Cas	Herb	Africa
<i>Syphnolobium japonicum</i> (L.) Schott	Fabaceae	Neo	Cas	Tree	Asia
<i>Symphotrichum laeve</i> (L.) Á.Löve & D.Löve	Asteraceae	Neo	Nat	Herb	America
<i>Symphotrichum squamatum</i> (Spreng.) G.L.Nesom	Asteraceae	Neo	Nat	Herb	America
<i>Syringa vulgaris</i> L.	Oleaceae	Neo	Nat	Shrub	Europe
<i>Tagetes erecta</i> L.	Asteraceae	Neo	Nat	Herb	America
<i>Tagetes minuta</i> L.	Asteraceae	Neo	Nat	Herb	America
<i>Tecoma capensis</i> (Thunb.) Lindl.	Bignoniaceae	Neo	Cas	Vine	Africa
<i>Thuja plicata</i> Donn ex D.Don	Cupressaceae	Neo	Nat	Tree	America
<i>Tradescantia fluminensis</i> Vell.	Commelinaceae	Neo	Nat	Herb	America
<i>Tradescantia pallida</i> (Rose) D.R.Hunt	Commelinaceae	Neo	Cas	Herb	America
<i>Tropaeolum majus</i> L.	Tropaeolaceae	Neo	Nat	Vine	America
<i>Ulex europaeus</i> L.	Fabaceae	Neo	Nat	Shrub	Europe
<i>Veronica persica</i> Poir.	Plantaginaceae	Neo	Nat	Herb	Asia
<i>Vinca minor</i> L.	Apocynaceae	Arc	Nat	Herb	Europe
<i>Vitis riparia</i> Michx s.l.	Vitaceae	Neo	Cas	Vine	America
<i>Washingtonia robusta</i> H.Wendl.	Arecaceae	Neo	Cas	Palm	America
<i>Weigela florida</i> (Bunge) A.DC.	Caprifoliaceae	Neo	Nat	Shrub	Asia
<i>Wisteria sinensis</i> (Sims) Sweet	Fabaceae	Neo	Nat	Vine	Asia
<i>Withania somnifera</i> (L.) Dunal	Solanaceae	Arc	Nat	Shrub	Asia
<i>Xanthium spinosum</i> L.	Asteraceae	Neo	Nat	Herb	America
<i>Xanthium strumarium</i> L. s.l.	Asteraceae	Arc	Nat	Herb	America
<i>Yucca gloriosa</i> L.	Asparagaceae	Neo	Cas	Succulent	America
<i>Zantedeschia aethiopica</i> (L.) Spreng.	Araceae	Neo	Cas	Herb	Africa
<i>Zizyphus mauritiana</i> Lamk.	Rhamnaceae	Arc	Nat	Shrub/Tree	Asia

## **Supplementary material I**

### **Alien flora of Turkey: checklist, taxonomic composition and ecological attributes**

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Data type: List of alien plants

Explanation note: List of alien taxa in the flora of Turkey. Taxa are ordered alphabetically. Each taxon is listed together with its family, residence time, invasion status, life-form according to Raunkiaer, growth form according to the Thesaurus of Plant Characteristics for Ecology and Evolution, simplified growth-form, life history, reasons for intentional and accidental introduction. The last five columns on the right list habitats where the species is found in Turkey. This list includes also 47 frequently planted taxa.

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