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Trabzon Orman Fidanlığındaki Yabancı Ot Türlerinin Bazı Botanik Özellikleri

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ÖZET

Trabzon-Of Orman Fidanlığında bulunan yabancı otların (diri örtü elemanları) belirlenmesi amacıyla yapılan bu çalışma, 2013-2014 yılları arasında gerçekleştirilmiştir. Araştırma alanında eğreltiler (*Pteridophyta*) ve tohumlu bitkiler (*Spermatophyta*) bölümleri dâhil toplamda 53 familya, 121 cinse ait 151 takson belirlenmiştir. *Pteridophyta* bölümüne ait 4 adet ve *Spermatophyta* bölümünün kapalı tohumlular (*Angiospermae*) alt bölümünde bulunan 147 adet takson saptanmıştır. Literatüre göre araştırma alanında 39 (%25,8) taksonun fitocoğrafik bölgesi belirlenmiş olup, bu taksonların tümü Avrupa-Sibirya elementidir. Ayrıca, 16 (%10,6) adet kozmopolit, 18 (%11,9) adet egzotik ve 1 (%0,7) adet nadir takson tespit edilmiştir. Araştırma alanındaki taksonların yoğun çiçeklenme zamanı Haziran, Temmuz ve Ağustos olduğu tespit edilmiştir. Araştırma alanında saptanan taksonlardan 86 (%57) adet takson çok yıllık (perennial), 47 (% 31) adet takson bir yıllık (annual), 8 (% 5) adet takson iki yıllık (biannual) ve 10 (% 7) adet takson odunsu olarak belirlenmiştir. En çok takson içeren familyalar; Compositae 24 (%15,9), Fabaceae 14 (%9,3), Poaceae 11 (%7,3), Polygonaceae 8 (%5,3) ve Lamiaceae 7 (%4,6)' dır. Ayrıca, Raunkiaer bitki hayat formuna göre 80 (%53) adet Hemicryptophyte, 47 (%31) adet Therophyte, 14 (%9) adet Geophyte ve 10 (%7) adet Phanerophyte yabancı ot türü belirlenmiştir.

Anahtar Kelimeler: Botanik özellikleri, yabancı ot, orman fidanlığı, Trabzon

Some Botanical Features of Weed Species Prevailing in Forest Nursery of Trabzon Province

ABSTRACT

This study was conducted in order to determine the prevalence of different weed taxa in forest nursery (Of-Nursery) of Trabzon province, during 2013 and 2014. A total of 53 families and 151 taxa and 121 species belonging to *Pteridophyta* and *Spermatophyta* divisions were identified. Among the identified taxa, 4 belonged to *Pteridophyta* while remaining 147 belonged to *Spermatophyta*. According to literature, phytogeographical analysis of the observed taxa revealed that 39 (25.8%) taxa belonged to Euro-Siberian region. Similarly, 16 (10.6%) taxa were cosmopolitan, 18 (11.9%) exotic and 1 (0.7%) taxa was identified as rare. The months of June, July and August were identified as the intensive flowering period of the identified taxa during the study. According to the season, 86 (57%) taxa consisted of perennial species, 47 (31%) annual, 8 (5%) biannual and 10 (7%) were woody in nature. The plant families having the highest number of taxa were; Compositae 24 (15.9%), Fabaceae 14 (9.3%), Poaceae 11 (7.3%), Polygonaceae 8 (5.3%) and Lamiaceae 7 (4.6%). Moreover, according to Raunkiaer plant life-form 80 (53%) taxa were Hemicryptophyte, 47 (31%) Therophyte, 14 (9%) Geophyte and 10 (7%) were Phanerophyte.

Keywords: Botanical features, weed, forest nursery, Trabzon

INTRODUCTION

Weed is a plant growing where it is not desired (Shaw, 1956). Weeds reduce the value of nursery crops. They compete with crops for nutrients, light and water. Some vine weeds climb nursery crops, requiring excessive labor for hand removal. The most serious problem is perennial weeds, which can be harvested with nursery crops and infest the field or landscape where they are subsequently planted (Altland, 2005).

Forest nurseries have relied heavily on hand weeding for weed management. However, the increasing cost and shortage of labor has urged the need for less expensive and easily accessible methods. Unfortunately, the high crop value and low area under cultivation restrict chemical weed control for forest nurseries (Dill and Carter, 2015). The weeds have massively increased the operating cost of nurseries as 50-70% of the operating cost is incurred on weed management (Yahyaoğlu, 1993). Hand weeding is usually practiced for 2 to 3 times in the nursery by workers (Erdem et al., 2002).

General weeding around nursery compound and seedbeds' area is necessary. Weeds in the containers should be regularly removed to ensure that the seedling grows without competition for resources such as water and nutrients. Weeds are manually uprooted with intensive care to avoid damage to the roots of nursery seedlings grown in the bags (Munjuga, 2006).

Weed competition depends upon the type of weeds, duration of interference, available soil moisture, climatic condition and severity of infestation. Weeds compete with crop plants for space, water, light and nutrients (Pandya, 2009). A thorough understanding of biological characteristics and ecological requirements of weeds is prerequisite for successful weed management program. The researches relating the determination of biological characteristics and ecological requirements of potentially invasive plants and weeds have been progressed rapidly since the last decade (Özer et al., 2001). The studies contributed valuable information for devising reliable and sustainable management programs against different invasive plants and weeds at regional and global scales.

This study was aimed at determining the botanical characteristics such as; life style, flowering time and life cycle of different weed taxa prevailing in forest nursery of Trabzon Province. The results of the study will contribute in devising the management options of most problematic and prevalent weeds in the region.

MATERIALS AND METHODS

Sites of research

Study was conducted in a nursery located in the Of district of Trabzon province (Black Sea Geographic Region of Turkey). The nursery lies North West of the district, geographical locations of the nursery is latitudes 40^0 $58^{'}$ $39^{''}$ and 40^0 $59^{'}$ $03^{''}$ North, and longitudes 40^0 $19^{'}$ $34^{''}$ and 40^0 $20^{'}$ $19^{''}$ East with an altitude of 5 m (Anonim, 2007-2011). It belongs to the Euro-Siberian plant Geography Region and falls within the A8 grid square according to the grid classification system developed by Davis (1965-1985) (Figure 1). The total area of the nursery is 242 m^2. Climate of the region is cool and very rainy in summers, and cold in winters. The nursery is located at the valley floor, nights are colder while, days present Eastern Black Sea climate. The soil is sandy loam with mixture of sand and silt. Being an old creek bed, the nursery area is generally flat. Finland type peat and foam mixture is mostly used as filler material in for seedling growth (Anonim, 2007-2011).

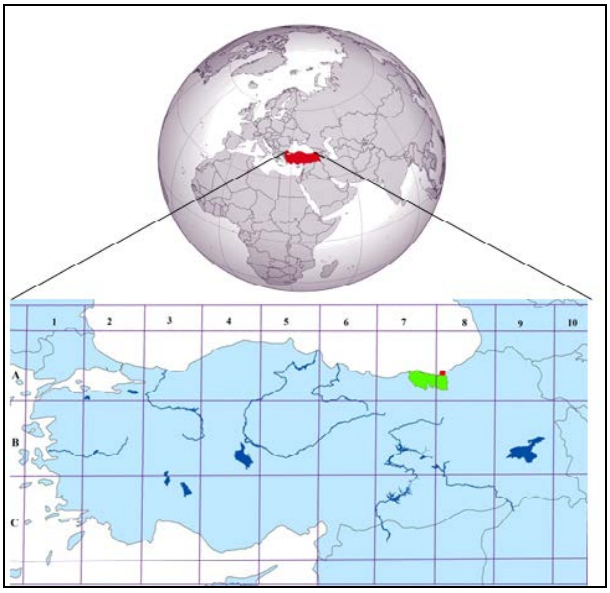

Figure1. Geographical location of the study area

Plant survey

Floristic observation of materials and plant sampling was started in June 2013 and continued till July 2014. Photographs of plant samples were taken in every 15 days from experimental area. Furthermore, the ecological features of the nursery from where plant sampling was done were noted and are given in Table 1. A total of 151 vascular plant taxa were collected during the study. The herbariums of the plants were made for identification. Identification of the collected plants was done according to "Flora of Turkey and the East Aegean Islands" (ed: Davis, 1965-1985). Additionally, life forms, flowering time and chorological type were also noted. The identified plants have been preserved in the Herbarium of the Karadeniz Technical University, Faculty of Forestry, Department of Forest Botany (KATO). Moreover, the species exotic to Turkey were identified as invasive following Önen (2015).

RESULT AND DISCUSSION

The plants recorded during the study, their life cycle, and some botanical features are summarized in Table 1. The Latin names of the plants are given and sorted in alphabetic order (Table 1).

A total of 53 families and 151 taxa were identificated in this study. The most dominant families in the nursery were Compositae 24 (15.9%), Fabaceae 14 (9.3%), Poaceae 11 (7.3%), Polygonaceae 8 (5.3%) and Lamiaceae 7 (4.6%). Gökdemir (1998) also listed Compositae and Gramineae as most prevalent plant families in a similar floristic study carried out in other nurseries. The findings of the study are in accordance with earlier studies that Compositae and Gramineae are the most dominant families in terms of species number. The rankings determined in these studies are identical and most prevalent species consist of cosmopolitan plant species.

Floristic regions of 39 taxa were determined according to "Flora of Turkey". The region of 27 taxa are (18%) Euro-Siberian, 10 (7%) Euxine element, 2 (1%) Hyrcano-Euxine element, while the regions of 112 taxa (74%) were not identified. Additionally, 16 (10.6%) cosmopolitan, 18 (11.9%) exotic and 1 (0.7%) rare plants were found in the nursery.

The more number of taxa were expected to have Euro-Siberian geographic region as the study site (Eastern Black Sea Region) is also located in the similar geographic region. Most of the identified plants were cosmopolitan and exhibit presence in a number of geographic regions. Moreover, the cosmopolitan nature of the most prevalent plants made the identification the geographic regions difficult as the plants show occurrence in multiple geographic zones. Because weeds have high ecological tolerance, they can naturally occur in one two, or even multiple zones. The heterogeneous characteristic of different plant species in geography have been reported by several researchers (Kinch, 1936; Thornton and Harrington, 1960; Hanf, 1983).

According to the life cycle of the identified plants; 86 (57%) were perennial, 47 (31%) annual, 8 (5%) biannual and 10 (7%) were woody plants. The taxa can also be classified according to their life forms. Raunkiaer's life forms spectrum acts as an indicator of the climate or region (Raunkiaer, 1934). The life forms of the taxa, according to Raunkiaer classification system were; Hemicryptophytes 80 (53%), Therophytes 47 (31%) and Geophytes 14 (9%). The similar distribution of plants according to different life forms has also been reported in earlier studies (Gökdemir, 1998). The prevalence order of Hemicryptophytes, Therophytes and Geophytes life forms of the weed taxa, is also in agreement with the study (Gökdemir, 1998). Any taxa belonging to the life form of Phanerophyte was not identified by the study of Gökdemir (1998). In addition, unlike Gökdemir's study, this study has given important findings about the flowering time of the weed species causing damage in the nursery, and tried to put forward effective control time against them.

The temporal variation in the blooming of the identified taxa was determined based on the Flora of Turkey and is represented in Table 1. According to the results, peak flowering in the all identified taxa (151) occurs in the month of July followed by August (96) and June (94) months. Flowering time of the weed taxa also represented in Figure 2 according to the number of taxa.

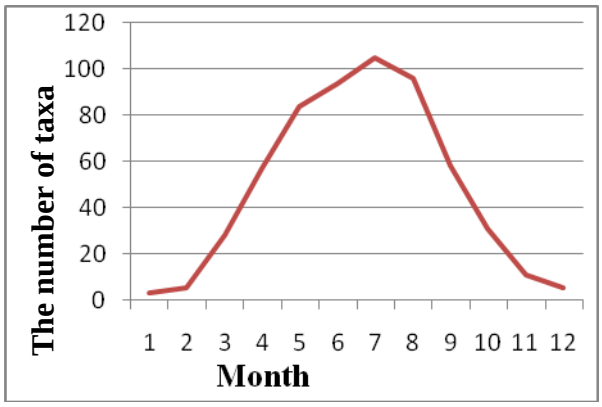

Figure 2. Flowering time of the weed taxa.

The months of June and July not only favor the flowering of the identified taxa but also the peak density of the taxa is observed in these months. The land managers involved in the management of nurseries must have the sufficient knowledge of biological and ecological characteristics of weeds to eradicate them from nurseries. The plants reproducing through seeds must be removed prior to flowering or seed set. The removal of plants producing through seeds ensures the successful eradication and also reduces the input costs incurred on the weed control. Weed control should be done in June, July and August, when there is maximum flowering, or initiated even before, for example in March or April, if needed. The species with bulbs, tubers and rhizomes, stolon and root parts as well as the subsoil fragments of the herbaceous plants having vegetative reproduction habit should be carefully removed during the processing of the grassy soil.

It is known that nurseries consist of herbaceous species and presence of woody species create almost no living vegetation due to shading. The presence of woody

species in the study area such as *Rubus sanctus*, *Frangula alnus* subsp. *alnus* and *Smilax excelsa* might be an indicator that the nursery was previously a forest area.

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Table 1. List of the weed species identified during the study

Weed Species	**Family**	**Life Cycle**	**Life Form***	**Flowering Period (month)**	**Phytogeographical Regions**	**Nursery area***				
						O	**PT**	**T**	**W**	**R**
Acalypha australis L.	Euphorbiaceae	Annual	Th	8-10	-	×	×	×		
Achillea millefolium L. subsp. *pannonica* (Scheele) Hayek	Asteraceae	Perennial	H	6-8	Euro-Siberian	×				
Alisma plantago-aquatica L.	Alismataceae	Perennial	H	6-9	Euro-Siberian				×	
Amaranthus retroflexus L.	Amaranthaceae	Annual	Th	5-7	Invasive	×	×	×		
Anagallis arvensis L. var. *arvensis.*	Primulaceae	Annual	Th	4-9	-	×	×			×
Angelica sylvestris L. var. *sylvestris*	Apiaceae	Perennial	H	7-8	Euro-Siberian	×				
Anthemis tinctoria L. var. *tinctoria*	Asteraceae	Perennial	H	5-9	-	×				
Artemisia verlotiorum Lamotte	Asteraceae	Perennial	G	10	Exotic, Invasive	×				×
Arum maculatum L.	Araceae	Perennial	G	4-6						×
Bellis perennis L.	Asteraceae	Perennial	H	3-8	Euro-Siberian	×	×			
Bidens frondosa L.	Asteraceae	Annual	Th	7-9	Exotic, Invasive	×	×			
Bidens tripartita L.	Asteraceae	Annual	Th	7-9	-	×	×			
Bromus sterilis L.	Poaceae	Annual	Th	4-7	-	×	×			
Calystegia sylvatica (Kit.) Griseb	Convolvulaceae	Perennial	H	4-8	-	×	×			
Camellia sinensis (L.) O. Kuntze.	Theaceae	Woody	Ph	4-10	Exotic					×
Campanula rapunculoides L. subsp. *cordifolia* (K.Koch) Damboldt	Campanulaceae	Perennial	H	7-8	-	×				
Capsella bursa-pastoris (L.) Medik	Brassicaceae	Biennial	H	1-12	Cosmopolitan	×	×			×
Cardamine hirsuta L.	Brassicaceae	Annual	Th	3-4	Cosmopolitan		×		×	
Carex pallescens L. var. *chalcodeta* (V. Krecz.) Ö.Nilsson	Cyperaceae	Perennial	H	6-7	Euxine element	×	×			
Carex pendula Huds.	Cyperaceae	Perennial	H	5-6	-				×	
Centaurium pulchellum (Swartz) Druce	Gentianaceae	Annual	Th	4-7	-	×	×			×
Cerasus avium (L.) Moench	Rosaceae	Woody	Ph	3-5	-	×	×			

Continuation of Table 1

Chenopodium album L. subsp.album var. microphyllum	Chenopodiaceae	Annual	Th	5-8	-	×	×	×		×
Cichorium intybus L.	Asteraceae	Perennial	H	(4) 6- 9	Cosmopolitan	×				×
Cirsium arvense (L.) Scop. subsp.*arvense.*	Asteraceae	Perennial	G	(5) 6-9			×			
Commelina communis L.	Commelinaceae	Perennial	H	8-9	Exotic, Invasive	×	×			×
Convolvulus arvensis L.	Convolvulaceae	Perennial	H	4-9	Cosmopolitan	×				
Conyza canadensis (L.) Cronquist	Asteraceae	Annual	Th	7-12	Exotic, Invasive		×			×
Cornus sanguinea L. subsp. *australis* (C.A. Meyer) Jáv	Cornaceae	Woody	Ph	5-6	-					×
Coronilla varia L.subsp. *varia*	Fabaceae	Perennial	H	5-8	Euro-Siberian	×				
Crassocephalum crepidioides (Bentham) S. Moore	Asteraceae	Annual	Th	8-11	Exotic, Invasive	×	×			×
Crepis foetida L. subsp. *foetida*	Asteraceae	Annual	Th	5-10	-	×				
Cyperus esculentus L.	Cyperaceae	Perennial	G	9	-	×			×	
Cystopteris fragilis (L.) Bernh.	Athyriaceae	Perennial	G	-	-	×	×			
Dactylis glomerata L. subsp. *glomerata*	Poaceae	Perennial	H	5-7	Euro-Siberian	×				
Daucus carota L.	Apiaceae	Biennial	H	6-9	-	×				
Digitaria sanguinalis (L.) Scop.	Poaceae	Annual	Th	6-10	-	×				
Echinochloa crus-galli (L.) P. Beauv.	Poaceae	Annual	Th	6-10	-	×				
Eleusine indica (L.) Gaertner	Poaceae	Annual	Th	8-10	Exotic, Invasive	×				
Epilobium hirsutum L.	Onagraceae	Perennial	H	7-9	-		×			
Equisetum arvense L.	Equisetaceae	Perennial	G	-	-		×		×	
Equisetum palustre L.	Equisetaceae	Perennial	G	-	-		×		×	
Erigeron acer L.subsp. *acer*	Asteraceae	Perennial	H	6-8	-					×
Erigeron annuus (L.) Pers.	Asteraceae	Biennial	H	6-9	Exotic, Invasive					×
Eupatorium cannabinum L.	Asteraceae	Perennial	H	7-10	Euro-Siberian	×				×
Euphorbia peplus L.var. *peplus*	Euphorbiaceae	Annual	Th	2-8	-	×	×			
Euphorbia supina Rafin	Euphorbiaceae	Annual	Th	7	-		×			
Fragaria vesca L.	Rosaceae	Perennial	G	4-6	-	×				
Frangula alnus Miller subsp. *alnus*	Rhamnaceae	Woody	Ph	6-7	Euro-Siberian					×
Galinsoga parviflora Cav.	Asteraceae	Annual	Th	5-10	Cosmopolitan, Exotic	×	×			×
Galium odoratum (L.) Scop.	Rubiaceae	Perennial	H	5-7	Euro-Siberian		×		×	
Geranium molle L. subsp. molle	Geraniaceae	Annual	Th	3-4	-	×	×			

Continuation of Table 1

Geranium purpureum Vill.	Geraniaceae	Annual	Th	3-4 (-7)	-	×	×			
Gnaphalium affine D. Don	Asteraceae	Biennial	H	4-6	-		×			
Holcus lanatus L.	Poaceae	Perennial	H	5-8	Euro-Siberian	×				
Hydrocotyle ramiflora Maximow.	Apiaceae	Perennial	H	7	Exotic				×	
Hypericum perforatum L.	Clusiaceae	Perennial	H	(4)5-8 (-9)	-	×	×			
Hypochoeris radicata L.	Asteraceae	Perennial	H	4-10	Euro-Siberian	×				
Impatiens noli-tangere L.	Balsaminaceae	Annual	Th	7-9	Euro-Siberian				×	
Ipomoea purpurea (L.)Roth.	Convolvulaceae	Perennial	H	7-9	Exotic					×
Iris pseudacorus L.	Iridaceae	Perennial	G	4-5	-				×	
Juncus bufonius L.	Juncaceae	Annual	Th	3-9	Cosmopolitan		×		×	
Juncus effusus L.	Juncaceae	Perennial	H	4-7	Cosmopolitan				×	
Lactuca serriola L.	Asteraceae	Biennial	H	7-9	Euro-Siberian	×				
Lamium album L.	Lamiaceae	Perennial	H	5-8	Euro-Siberian	×	×			
Lamium garganicum L.subsp. *reniforme*	Lamiaceae	Perennial	H	4-9	-	×				
Lamium purpureum L.var.*purpureum*	Lamiaceae	Annual	Th	3-5 (-6)	Euro-Siberian	×	×			
Lapsana communis L. subsp. *intermedia* (M.Bieb.) Hayek	Asteraceae	Perennial	H	(5)6-8(10)	-	×				
Lonicera japonica L.	Caprifoliaceae	Woody	Ph	6-9	Exotic, Invasive					×
Lotus corniculatus L.var. *tenuifolius* L.	Fabaceae	Perennial	H	6-8	-	×	×			
Ludwigia palustris (L.) Elliott.	Onagraceae	Perennial	H	7-8	-				×	
Lycopus europaeus L.	Lamiaceae	Perennial	H	6-10	Euro-Siberian				×	
Lysimachia japonica Thunb.	Primulaceae	Perennial	H	5-7	Exotic	×				
Lysimachia verticillaris Sprengel.	Primulaceae	Perennial	H	6-9	Hyr.Euxine element	×				
Lythrum hyssopifolia L.	Lythraceae	Annual	Th	6-8					×	
Lythrum salicaria L.	Lythraceae	Perennial	H	6-8	Euro-Siberian				×	
Medicago lupulina L.	Fabaceae	Perennial	H	5-7	-	×	×			
Medicago polymorpha L.var. *vulgaris* (Benth.)	Fabaceae	Annual	Th	3-5	-	×				
Medicago sativa L.subsp. sativa	Fabaceae	Perennial	H	4-9	-	×				
Melilotus officinalis (L.) Desr	Fabaceae	Perennial	H	5-9	-	×				
Mentha aquatica L.	Lamiaceae	Perennial	H	8-10	-				×	
Mercurialis annua L.	Euphorbiaceae	Annual	Th	2-7	-	×	×			×
Microstegium vimineum (Trin.) Camus	Poaceae	Annual	Th	8-11	Invasive	×				
Myosotis lazica M. Popov	Boraginaceae	Biennial	H	7-9	Euxine element, Rare	×	×			×
Ornithogalum sigmoideum Freyn & Sint.	Liliaceae	Perennial	G	3-6	Euro-Siberian					×

Continuation of Table 1

Orobanche minor Sm.	Orobanchaceae	Annual	Th	4-6	-	×				
Oxalis corniculata L.	Oxalidaceae	Perennial	H	3-8	Cosmopolitan	×	×			
Parietaria judaica L.	Urticaceae	Perennial	H	4-8	-		×			×
Paspalum thunbergii Kunth ex Steudel	Poaceae	Perennial	H	7-10	Euro-Siberian, Invasive	×				
Phytolacca americana L.	Phytolaccaceae	Perennial	H	6-9	Exotic, Invasive	×	×			×
Pimpinella peregrina L.	Apiaceae	Biennial	H	4-8	-	×				
Plantago lanceolata L.	Plantaginaceae	Perennial	H	4-10	-					×
Plantago major L. subsp. *intermedia* (Gilib.) Lange.	Plantaginaceae	Perennial	H	4-9	-		×			×
Poa pratensis L.	Poaceae	Perennial	H	5-8	-	×	×			
Poa trivialis L.	Poaceae	Perennial	H	5-8	-	×	×			
Polygonum aviculare L.	Polygonaceae	Perennial	H	7-11	Cosmopolitan					×
Polygonum hydropiper L.	Polygonaceae	Annual	Th	8	-					×
Polygonum nepalense Meissn	Polygonaceae	Annual	Th	5-10	Exotic	×			×	
Polygonum perfoliatum L.	Polygonaceae	Perennial	H	8	Euxine element					×
Polygonum persicaria L.	Polygonaceae	Annual	Th	8-12	-	×	×			
Polygonum thunbergii Sieb.&Zucc.	Polygonaceae	Annual	Th	10	Euxine element	×				
Portulaca oleracea L.	Portulacaceae	Annual	Th	7-11	-	×	×			
Potentilla reptans L.	Rosaceae	Perennial	G	5-8		×				
Primula vulgaris Hudson *subsp. sibthorpii* (Hoffmanns.) W.W.Sm. & Forrest.	Primulaceae	Perennial	H	3-5	Euxine element	×				
Prunella vulgaris L.	Lamiaceae	Perennial	H	5-9	Euro-Siberian	×				
Prunus divaricate Ledeb. var. divaricata	Rosaceae	Woody	Ph	4-5	-					×
Pteridium aquilinum (L.)Kuhn	Hypolepidaceae	Perennial	G	-	-		×			×
Ranunculus ficaria L. subsp.bulbifera	Ranunculaceae	Perennial	G	3-4	-				×	
Ranunculus repens L.	Ranunculaceae	Perennial	H	5-7	-		×		×	
Raphanus raphanistrum L.	Brassicaceae	Annual	Th	3-5	-					×
Rorippa sylvestre (L.) Bess.	Brassicaceae	Perennial	H	6-9	-					×
Rubus sanctus Schreber	Rosaceae	Woody	Ph	6-8	-					×
Rumex acetosella L.	Polygonaceae	Perennial	H	5-8	Cosmopolitan	×	×			
Rumex crispus L.	Polygonaceae	Perennial	H	5-8	Cosmopolitan	×	×			
Salix caprea L.	Salicaceae	Woody	Ph	4-5	Euro-Siberian		×			×
Salsola tragus L.	Chenopodiaceae	Annual	Th	5-7			×			
Salvia verticillata L.subsp. verticillata	Lamiaceae	Perennial	H	6-8	Euro-Siberian	×				
Sambucus ebulus L.	Caprifoliaceae	Perennial	H	7-8	Euro-Siberian					×

Continuation of Table 1

Scrophularia scopolii Hoppe ex Pers. var. *adenocalyx* Sommier & Levier	Scrophulariaceae	Perennial	H	4-8	Euxine element		×			
Sedum pallidum M.Bieb. var. *bithynicum* (Boiss.) Chamberlain	Crassulaceae	Perennial	H	6-8	Euxine element					
Sedum stoloniferum Gmelin	Crassulaceae	Perennial	H	7-8	Hyr.Euxine element	×				
Senecio vulgaris L.	Asteraceae	Annual	Th	3-8	-	×	×	×		
Setaria glauca (L.) P. Beauv	Poaceae	Annual	Th	7-10	-	×				
Sicyos angulatus L.	Cucurbitaceae	Annual	Th	7-10	Exotic, Invasive	×				
Silene gallica L.	Caryophyllaceae	Annual	Th	4-6	Cosmopolitan	×				
Sinapis arvensis L.	Brassicaceae	Annual	Th	4-6	-					
Smilax excelsa L.	Smilacaceae	Woody	Ph	5	Euxine element	×				
Solanum nigrum L.subsp. *nigrum*	Solanaceae	Annual	Th	6-11	Cosmopolitan		×			
Sonchus asper (L.) Hill. subsp. *glaucescens* (Jordan) B.J.Linn	Asteraceae	Biennial	H	3-8	-	×	×	×		
Sparganium emersum Rehmann in Verh.	Sparginiaceae	Perennial	H	5-8	-				×	
Sparganium erectum L. subsp. neglectum (Beeby) K. Reichter.	Sparginiaceae	Perennial	H	(5)6-8	Euro-Siberian				×	
Spergularia media (L.) C. Presl	Caryophyllaceae	Perennial	H	5-8	-		×			
Stellaria media (L.) Vill. subsp. media	Caryophyllaceae	Annual	Th	4-6	-		×			×
Symphytum ibericum Steven	Boraginaceae	Perennial	H	3-7	Euxine element	×				
Taraxacum scaturiginosum G.Hagl.	Asteraceae	Perennial	H	3-6	-	×	×			×
Trachystemon orientalis (L.) G.Don.	Boraginaceae	Perennial	G	3-5	Euxine element	×				
Trifolium arvense L.var. arvense	Fabaceae	Annual	Th	3-5	-	×				
Trifolium aureum Poll.	Fabaceae	Annual	Th	7-8	Euro-Siberian	×	×			
Trifolium pratense L.var. pratense	Fabaceae	Perennial	H	5-9	Cosmopolitan	×	×			
Trifolium repens L.var. repens	Fabaceae	Perennial	H	3-9	-	×	×			
Tussilago farfara L.	Asteraceae	Perennial	H	3-4	Euro-Siberian					×
Urtica dioica L.	Urticaceae	Perennial	H	6-9	Euro-Siberian	×	×			×
Verbena officinalis L.	Verbenaceae	Perennial	H	6-8	Cosmopolitan	×	×			×
Veronica anagallis-aquatica L.	Scrophulariaceae	Perennial	H	3-9 (-11)	Cosmopolitan		×		×	
Veronica persica Poiret	Scrophulariaceae	Perennial	H	1-12	-		×			
Vicia cracca L. subsp. cracca	Fabaceae	Perennial	H	4-8	Euro-Siberian	×				
Vicia hirsuta (L.) S. F. Gray	Fabaceae	Annual	Th	5	-	×	×			

Continuation of Table 1

Vicia hirsuta (L.) S. F. Gray	Fabaceae	Annual	Th	5	-	×	×			
Vicia sativa L. subsp. *nigra* (L.) Ehrh. var. *nigra*	Fabaceae	Annual	Th	3-5 (6)	-	×				
Viola odorata L.	Violaceae	Perennial	H	4-5	-	×	×			
Wisteria sinensis (Sims) D.C.	Fabaceae	Woody	Ph	4-5	Exotic		×			×
Xanthium strumarium L. subsp. *cavanillesii* (Schouw)	Asteraceae	Annual	Th	(6)7-10	Invasive	×				

*G: Geophyte, H: Hemicryptophyte, O: Open grasslands outside the production parcels, (PT) Plug Trays: All kinds of indoor plant propagation material, Ph: Phanerophyte, R: The main and secondary roads with nursery plot routes, T: Transplant beds, Th: Therophyte, W: Wetland

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