

# Floristic Diversity of Invasive Weeds in Shirpur Taluka of Dhule District, Maharashtra State, India

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**Abstract:** *The present study was aimed to document the floristic diversity of invasive weeds in the Shirpur and its adjacent area (Dhule, Nashik, Maharashtra, India). A total of 111 species of weeds belonging to 81 genera and 35 families was recorded in present study. Out of total recorded families, 31 were dicotyledons and 4 monocotyledons. Fabaceae was the dominant family followed by Convolvulaceae, Euphorbiaceae, Malvaceae, Amaranthaceae, Asteraceae, Poaceae, Commelinaceae, Cucurbitaceae, Solanaceae, Apocynaceae, and Boraginaceae. Ipomoea (with 8 species) was the largest genus followed by Euphorbia (5 species), Indigofera, Phyllanthus, Sida (3 species of each), Alternanthera, Amaranthus, Boerhavia, Calotropis, Commelina, Cynotis, Leucas, Ludwigia, Oxalis, Physalis, Portulaca and Senna (2 species each).*

**Keywords:** Floristic diversity, Crop associated weeds, Invasive species, Nativity, Life-form

## I. INTRODUCTION

A weed is a plant that grows where it is not desired, vying for fertilizer, light, and other resources with cultivated plants. They have characteristic modifications that help in their perpetuation, multiplication, dissemination, stabilization, and overall adaptation (Vasic et al. 2012). The weeds are common dominant, unwanted, undesirable plant that compete with cultivated crop for water, nutrient and sunlight and another several reasons such as, high growth rate, high reproductive rate and produce harmful or beneficial allelopathical effect of cultivated crops (Qasem and Foy 2001). The view of weeds as invasive plants is increasingly shifting around the world as people begin to recognize their importance in broader habitats.

Invasive weed species have characteristics such as being "pioneer species" in different landscapes, being tolerant of a wide range of soil and weather conditions, being a generalist in distribution, producing copious amounts of seed that disperse easily, having aggressive root systems, having a short generation time, high dispersal rates, long flowering and fruiting periods, having a broad native range, and being abundant in their native range. When soil nutrients are lost due to wind and rain, it is these organisms that rapidly establish themselves as the first generation of tough plants in the natural growth of diverse habitats, reducing erosion by the presence of their roots. From the beginning of cultivation, weeds have been called a farmer's worst enemy. Farmers have been fighting them to save their crops for a long time. Invasive weeds inflict dramatic declines in farm, orchard, and grassland production based on their composition and severity. Invasive weeds are the most limiting factors in crop production (Buhler, 1992). Weed exposure is similar to gradual poisoning or disease, with symptoms appearing later in the crop cycle or after harvest. Not only productivity, but also ecological balance, human and animal wellbeing, architectural appeal, and overall economic aspects are all affected. Invasive weed species (IWS) pose a danger to ecosystems, plant species dispersion, and agricultural production.

Weeds, unlike other plants, may withstand severe edaphic, climatic, and biotic conditions. Invasive weed plant research also teaches us about their value, as some of them have a wide range of ethnobotanic applications and may be utilised to produce new pharmaceutical and food items. In other words, 'a weed could be defined a plant out of place or an unwanted plant, or a plant with a negative value, or plants which compete with man for the soil (Muzik, 1970). Many reports are available on the flora of Maharashtra (Singh and Karthikeyan 2000; Singh et al. 2001; Patil 2003, 2010; Sit

et al., 2007). No such report, however, is available on the diversity of weeds of Shirpur, Dhule district in Maharashtra. The primary goal of this research was to document the weed flora existing in the Shirpur as baseline information.

## II. MATERIALS AND METHODS

### 2.1 STUDY AREA

Dhule is district of North Maharashtra (Khandesh area) situated in the lap of Satpura region. Satpura region is well known for its rich biodiversity. The Arunavati river and Tapi river are the rivers flows around the city and fulfill the needs of peoples of Shirpur. Shirpur (21.3496° N latitude; 74.8797° E longitude; 159 m asl altitude) is 50 km from the Dhule. The main profession of the people of the area is agriculture. The main food crops are wheat, barley, maize, finger millet and paddy while sugarcane, cotton, banana, papaya are common cash crops. Besides, the vegetable crops are also cultivated in this region including cucurbits, lady finger, gourd, capsicum, spinach, colocasia, potato, tomato, sugar beet, bean and brinjal.

### 2.2 METHODOLOGY

Intensive field studies were conducted to record the maximum number of weeds species in different habitats, i.e., agricultural lands, wastelands, protected areas, river banks and reserve forests of Shirpur during August, 2019 to December, 2022. Villages/ localities visited during the survey include Tarhadi, Shirpur, Warwade, Amode, Abhanpur, Tarhad, Boradi, Dahiwad, Aner, Anturli, Mukhed, Dabhapada, Vakwad, Thalner, Holnanthe and Ziranipada. Plant specimens were collected during the surveys and processed as per the standard method given by Jain and Rao (1976). Small herbs were collected as whole with intact root, stem, leave, flower, and fruit, whereas larger shrubs were sampled as twigs with leave, flower, and fruit. The collected plant specimens were identified with help of available literature, i.e., Hook.f. 1876; Singh and Karthikeyan (2000), Singh et al. (2001) and Patil (2003, 2010) while current nomenclature of plants was adopted from 'Plants of the World Online' database. The nativity of recorded weed species determined following authenticated literature and Plants of the World Online' (2022).

## III. RESULTS AND DISCUSSION

A total of 111 invasive weed species belonging to 81 genera and 35 families were recorded from the Shirpur Taluka of Dhule district (**Table 1**). Among 35 families, 31 belong to dicotyledon and 4 to monocotyledon. *Argemone mexicana* L., *Boerhavia diffusa* L., *Cleome viscosa* L., *Croton bonplandianus* Baill., *Datura innoxia* Mill., *Euphorbia heterophylla* L., *Euphorbia serpens* Kunth, *Tribulus terrestris* L., *Turnera ulmifolia* L., *Tridax procumbens* (L.) L., *Amaranthus viridis* L., *Cyperus rotundus* L., *Digitari longiflora* (Retz.) Pers., *Cleome viscosa* L., *Ludwigia octovalvis* (Jacq.) P.H. Raven, *Phyllanthus urinaria* L., *Senna obtusifolia* (L.) H.S. Irwin & Barneby, *Sonchus asper* (L.) Hill and *Xanthium strumarium* L. were the common weeds in the study area. Some of the plants photographs are shown in below **photoplate 1**. Weeds like *Parthenium hysterophorus* contain several allelochemicals that inhibit the seed germination and growth of other plants (Kumar and Varshney 2007).

Fabaceae is dominant family, followed by Convolvulaceae, Euphorbiaceae, Malvaceae, Amaranthaceae, Asteraceae, Poaceae, Commelinaceae, Cucurbitaceae, Solanaceae, Apocynaceae, Boraginaceae, Brassicaceae, Lamiaceae, Nyctaginaceae, Phyllanthaceae, Onagraceae, Oxalidaceae, Passifloriaceae, Portulacaceae, Verbenaceae, Acanthaceae, Aizoaceae, Amaryllidaceae, Cleomaceae, Cuscutaceae, Cyperaceae, Linderniaceae, Loganiaceae, Martyniaceae, Papaveraceae, Plantaginaceae, Rubiaceae, Scrophulariaceae, Solanaceae and Zygophyllaceae.

The largest genera was *Ipomoea* represented by 8 species, followed by *Euphorbia* (5 species), *Indigofera*, *Phyllanthus*, *Sida* (3 species each), *Alternanthera*, *Amaranthus*, *Boerhavia*, *Calotropis*, *Commelina*, *Cynotis*, *Leucas*, *Ludwigia*, *Oxalis*, *Physalis*, *Portulaca* and *Senna* (2 species each).

Most of weeds were introduced un-intentionally, some introduced due their food values and ornamental purposes from Africa, America, Asia, Mediterranean, Australia, Egypt, Chad, Arabian Peninsula, West Indies, Peru, etc. (**Table 2**).

Farmers have significant challenges in eliminating and managing invasive weeds in their agricultural systems. To remove weeds from agriculture farms, several chemical, biological, and mechanical approaches are used. Weed control can only be successful if the identification, characterisation, and life cycle of weeds are thoroughly understood. Many invasive plants are nevertheless appreciated by individuals who are unaware of their weedy characteristics. Others are

identified as weeds, yet property owners do little to stop them from spreading. Some species do not become invasive until they have been ignored for an extended period of time. Invasive plants aren't all created equal. Identification of invasive weeds at the seedling stage is also critical for the successful implementation of an eradication campaign. Weeds' both detrimental and beneficial characteristics must be addressed in any eradication plan. Leguminous weeds, for example, can improve soil fertility by fixing atmospheric nitrogen with the help of some bacteria present in root nodules of these leguminous plants that is beneficial for the crops. Similarly, we must consider how to make appropriate use of weeds that have been removed for diverse purposes. Weeds having therapeutic qualities might be sold to pharmaceutical firms for further research and development. Farmers' income will be increased, either directly or indirectly.

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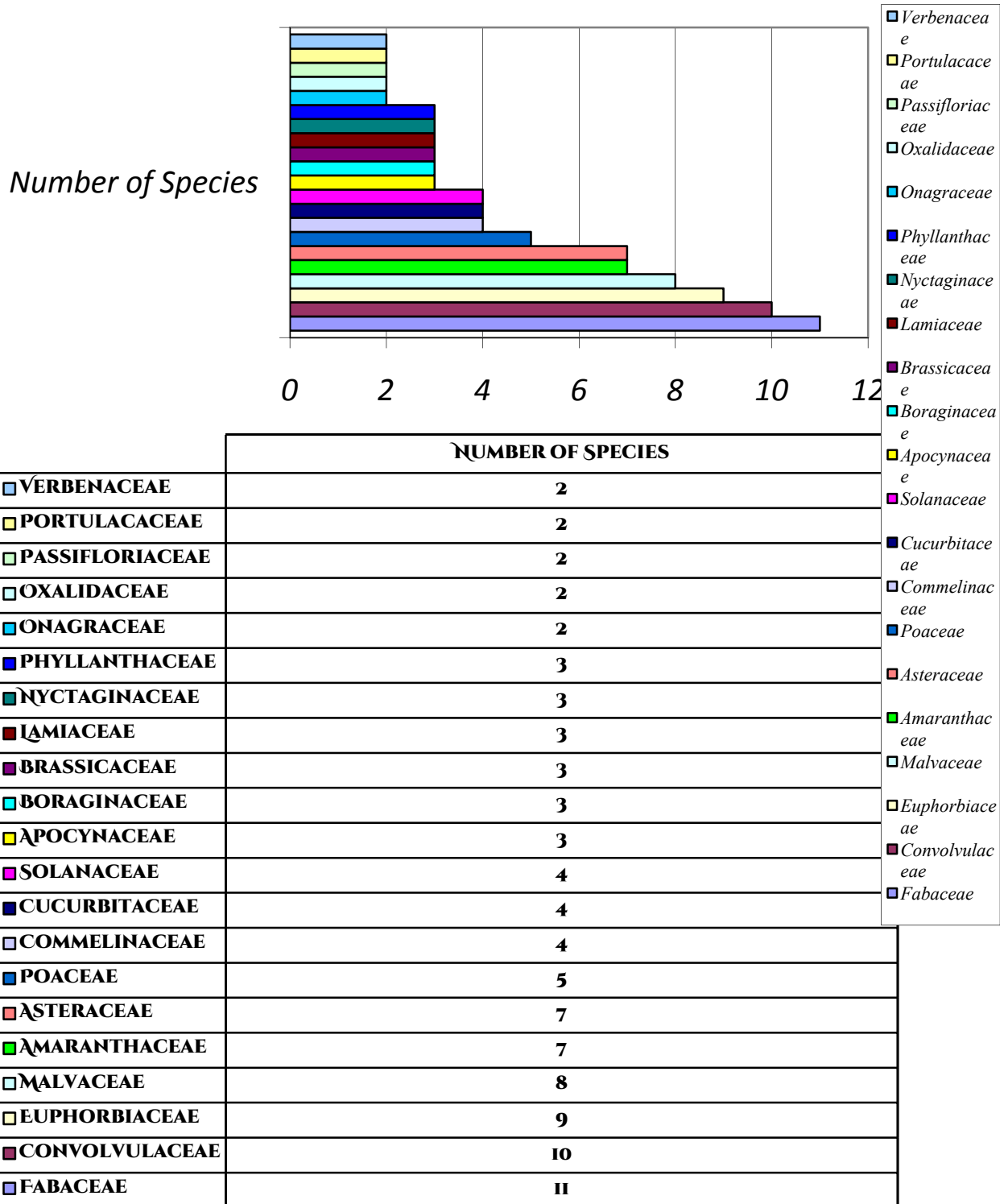
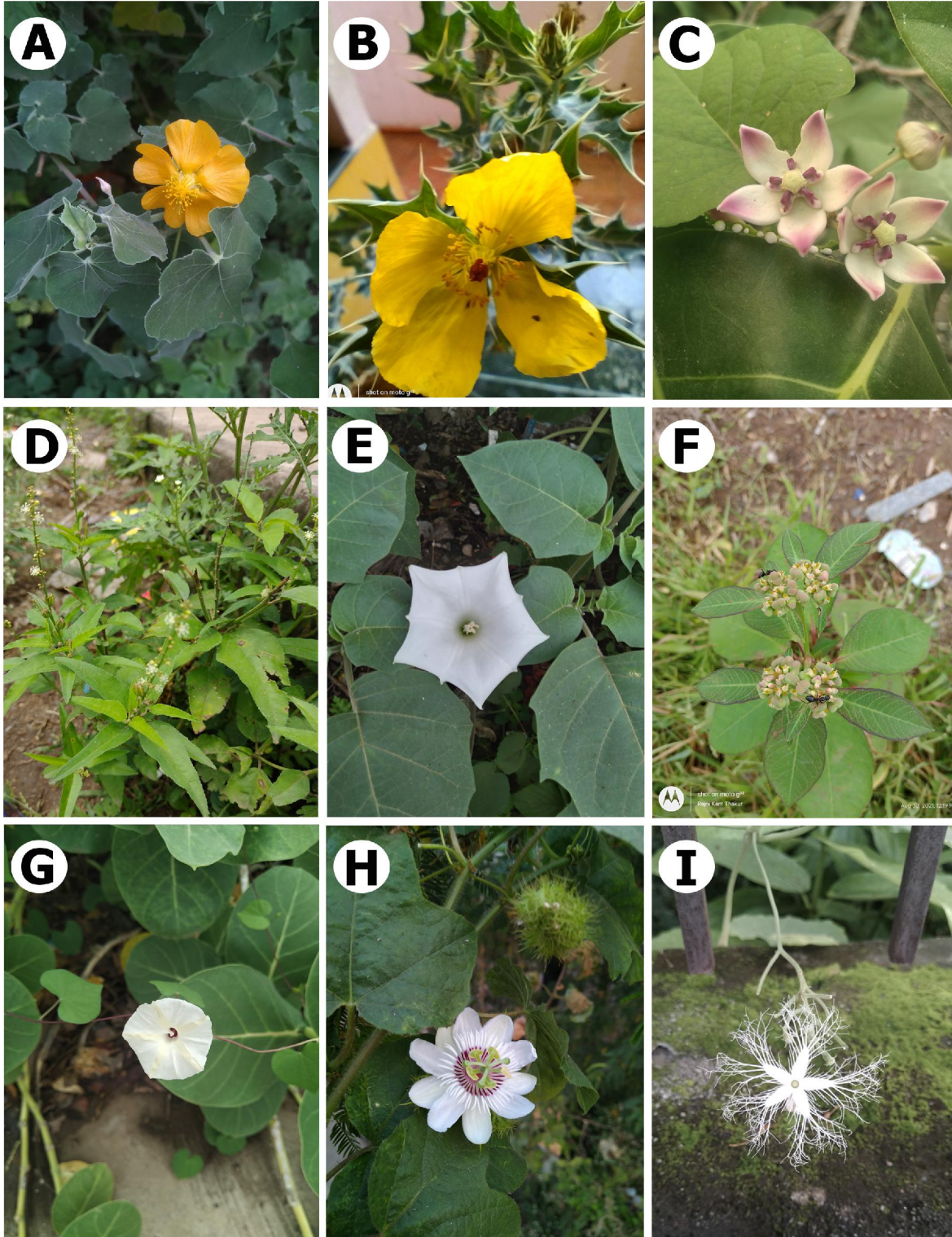


Fig. 1. Comparative percentage of weed families of Tehsil Shirpur, District Dhule (Maharashtra), India





**Photoplate 1: Photos of Some Invasive Weeds (A-I) of Shirpur Taluka of Dhule District, Maharashtra.**

- A. *Abutilon indicum*(L.) Sweet      B. *Argemone mexicana* L.      C. *Calotropis gigantea* (L.) W.T.Aiton  
 D. *Croton bonplandianus* Baill.      E. *Datura metel* L.      F. *Euphorbia heterophylla* L.  
 G. *Ipomoea obscura* (L.) Ker Gawl.      H. *Passiflora foetida* L.      I. *Trichosanthes cucumerina* L.



Table 1: Invasive weeds in Shirpur taluka of Dhule district, Maharashtra state, India

Sr. No.	Name of the Plant	Family	Nativity	Life form	Habit	Mode of Introduction
1	<i>Abutilon indicum</i> (L.) Sweet	Malvaceae	Africa	Shrub	Perennial	Ornamental
2	<i>Acalypha indica</i> L.	Euphorbiaceae	Tropical & Subtropical Asia.	Herb	A	Un-intentional
3	<i>Achyranthes aspera</i> L.	Amaranthaceae	Tropical and sub-tropical Old world	Herb	A	Un-intentional
4	<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Amaranthaceae	Trop. America	Herb	A	Un-intentional
5	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Amaranthaceae	Trop. America	Herb	A	Un-intentional
6	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Trop. America	Herb	A	Vegetable
7	<i>Amaranthus viridis</i> L.	Amaranthaceae	Trop. America	Herb	A	Vegetable
8	<i>Argemone mexicana</i> L.	Papaveraceae	S.America	Herb	A	Un-intentional
9	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Tropics & Subtropics.	Herb	Perennial	Medicinal
10	<i>Boerhavia erecta</i> L.	Nyctaginaceae	Tropical & Subtropical America.	Herb	Perennial	Un-intentional
11	<i>Brassica napus</i> L.	Brassicaceae	S. Europe.	Herb	A	Un-intentional
12	<i>Buglossoides arvensis</i> (L.) I.M.Johnst	Boraginaceae	Africa	Herb	A	Un-intentional
13	<i>Cajanus scarabaeoides</i> (L.) Thouars	Fabaceae	Asia	Climber	A	Un-intentional
14	<i>Calotropis gigantea</i> (L.) Dryand.	Apocynaceae	Trop. America	Shrub	A	Medicinal
15	<i>Calotropis procera</i> (Aiton) Dryand.	Apocynaceae	Trop. America	Shrub	A	Medicinal
16	<i>Celosia argentea</i> L.	Amaranthaceae	Trop. Africa	Herb	A	Ornamental
17	<i>Chrozophora plicata</i> (Vahl) A.Juss. ex Spreng.	Euphorbiaceae	Africa	Herb	A	Un-intentional
18	<i>Cleome viscosa</i> L.	Cleomaceae	Trop. America	Herb	A	Vegetable
19	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Africa	Climber	A	Vegetable
20	<i>Commelina benghalensis</i> L.	Commelinaceae	Tropical & Subtropical Old World	Herb	A	Un-intentional
21	<i>Commelina forskoalii</i> Vahl	Commelinaceae	Africa	Herb	A	Un-intentional
22	<i>Convolvulus arvensis</i> L.	Convolvulaceae	Temp. & Subtropical Old World	Climber	A	Un-intentional
23	<i>Corchorus olitorius</i> L.	Malvaceae	Tropical & Subtropical Old World.	Herb	A	Un-intentional
24	<i>Crotalaria medicaginea</i> Lam.	Fabaceae	Asia	Herb	A	Un-intentional
25	<i>Croton bonplandianus</i> Baill.	Euphorbiaceae	S.America	Herb	Perennial	Un-intentional
71	<i>Cucumis maderaspatanus</i> L.	Cucurbitaceae	Tropical & Subtropical Old World	Climber	A	Un-intentional
26	<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	Mediterranean	Climber	A	Un-intentional
27	<i>Cyanotis axillaris</i> (L.) D.Don ex Sweet	Commelinaceae	India to Australia	Herb	A	Un-intentional
28	<i>Cyanotis cristata</i> (L.) D.Don	Commelinaceae	NE	Herb	A	Un-intentional
29	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Trop. America	Herb	Perennial	Un-intentional
30	<i>Cyperus rotundus</i> L.	Cyperaceae	Tropical & Subtropical Old World	Herb	A	Un-intentional
31	<i>Dactyloctenium aegyptium</i> (L.) Willd.	Poaceae	Tropical & Subtropical Old World.	Herb	A	Un-intentional
32	<i>Datura innoxia</i> Mill.	Solanaceae	Trop. America	Shrub	Perennial	Noxious



33	<i>Descurainia sophia</i> (L.) Webb ex Prantl	Brassicaceae	Temp. Eurasia	Herb	A	Un-intentional
34	<i>Digera muricata</i> (L.) Mart.	Amaranthaceae	SW Asia	Herb	A	Un-intentional
35	<i>Digitaria longiflora</i> (Retz.) Pers.	Poaceae	Tropical & Subtropical Old World	Herb	A	Un-intentional
36	<i>Diplocyclos palmatus</i> (L.) C.Jeffrey	Cucurbitaceae	Africa and Asia	Climber	A	Un-intentional
37	<i>Emilia sonchifolia</i> (L.) DC. ex DC.	Asteraceae	Trop. America	Herb	A	Un-intentional
38	<i>Euphorbia heterophylla</i> L.	Euphorbiaceae	Trop. America	Herb	A	Un-intentional
39	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Trop. America	Herb	A	Un-intentional
40	<i>Euphorbia hypericifolia</i> L.	Euphorbiaceae	Tropical & Subtropical America	Herb	A	Un-intentional
41	<i>Euphorbia prostrata</i> Aiton	Euphorbiaceae	Tropical & Subtropical America	Herb	A	Un-intentional
42	<i>Euphorbia serpens</i> Kunth	Euphorbiaceae	Tropical & Subtropical America	Herb	A	Un-intentional
43	<i>Euphorbia thymifolia</i> L.	Euphorbiaceae	Trop. America	Herb	Perennial	Un-intentional
44	<i>Heliotropium indicum</i> L.	Boraginaceae	S.America	Herb	A	Un-intentional
45	<i>Hyptis suaveolens</i> (L.) Poit.	Lamiaceae	Trop. America	Shrub	A	Noxious
46	<i>Indigofera cordifolia</i> Roth	Fabaceae	Asia	Herb	A	Un-intentional
47	<i>Indigofera linnaei</i> Ali	Fabaceae	Trop. America	Shrub	A	Un-intentional
48	<i>Indigofera trita</i> L.f.	Fabaceae	Tropical & Subtropical Old World	Climber	A	Un-intentional
49	<i>Ipomoea triloba</i> L.	Convolvulaceae	Mexico to Brazil, Caribbean	Climber	A	Un-intentional
50	<i>Ipomoea cairica</i> (L.) Sweet	Convolvulaceae	Africa and Asia	Climber	A	Un-intentional
51	<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	Trop. America	Shrub	Perennial	Un-intentional
52	<i>Ipomoea nil</i> (L.) Roth	Convolvulaceae	Tropical & Subtropical America	Climber	A	Un-intentional
53	<i>Ipomoea obscura</i> (L.) Ker-Gaw	Convolvulaceae	Trop. Africa	Climber	Perennial	Un-intentional
54	<i>Ipomoea pes-tigridis</i> L.	Convolvulaceae	Trop. East Africa	Climber	A	Un-intentional
55	<i>Ipomoea purpurea</i> (L.) Roth	Convolvulaceae	Tropical & Subtropical America	Climber	A	Un-intentional
56	<i>Ipomoea quamoclit</i> L.	Convolvulaceae	Trop. America	Climber	Perennial	Un-intentional
57	<i>Lantana camara</i> L.	Verbenaceae	Trop. America	Shrub	Perennial	Ornamental
58	<i>Launaea procumbens</i> (Roxb.) Ramayya & Rajagopal	Asteraceae	Egypt to Central Asia	Herb	A	Un-intentional
59	<i>Lepidagathis trinervis</i> Nees	Acanthaceae	Pakistan to India	Herb	A	Un-intentional
60	<i>Leucaena leucocephala</i> (Lam.) de Wit	Fabaceae	Trop. America	Tree	Perennial	Fuel
61	<i>Leucas aspera</i> (Willd.) Link	Lamiaceae	Asia	Herb	A	Un-intentional
62	<i>Leucas longifolia</i> Benth.	Lamiaceae	W. India, Sri Lanka	Herb	A	Un-intentional
63	<i>Lindenbergia muraria</i> (Roxburgh ex D. Don) Brühl	Plantaginaceae	Africa and Asia	Herb	A	Un-intentional
64	<i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven	Onagraceae	Trop. America	Herb	A	Un-intentional
65	<i>Ludwigia perennis</i> L.	Onagraceae	Trop. America	Herb	A	Un-intentional
66	<i>Malvastrum coromandelianum</i> (L.) Garcke	Malvaceae	Trop. America	Herb	A	Un-intentional
67	<i>Martynia annua</i> L.	Martyniaceae	Trop. America	Herb	A	Un-intentional
68	<i>Melilotus officinalis</i> subsp. <i>alba</i> (Medik.)	Fabaceae	Europe to China, N. Africa	Herb	A	Un-intentional



	H.Ohashi & Tateishi		to Myanmar, Ethiopia to S. Africa			
69	<i>Merremia emarginata</i> (Burm. f.) Hallier f.	Convolvulaceae	Tropical Africa, S. China to Tropical Asia	Herb	A	Un-intentional
70	<i>Mirabilis jalapa</i> L.	Nyctaginaceae	Peru	Herb	A	Ornamental
72	<i>Oxalis corniculata</i> L.	Oxalidaceae	Europe	Herb	A	Medicinal
73	<i>Oxalis latifolia</i> Kunth	Oxalidaceae	Tropical & Subtropical America	Herb	A	Medicinal
74	<i>Parthenium hysterophorus</i> L.	Asteraceae	Trop. America	Climber	A	Un-intentional
75	<i>Passiflora foetida</i> L.	Passifloriaceae	Trop. S. America	Herb	A	Ornamental
76	<i>Pergularia daemia</i> (Forssk.) Chiov.	Apocynaceae	Africa and Asia	Climber	A	Ornamental
77	<i>Phyllanthus maderaspatensis</i> L.	Phyllanthaceae	Africa and Asia	Herb	A	Un-intentional
78	<i>Phyllanthus tenellus</i> Roxb.	Phyllanthaceae	Tanzania to Mozambique, SW. Arabian Peninsula, W. Indian Ocean	Herb	A	Un-intentional
79	<i>Phyllanthus urinaria</i> L.	Phyllanthaceae	Tropical & Subtropical Asia to N. Australia.	Herb	A	Medicinal
80	<i>Physalis angulata</i> L.	Solanaceae	Trop. America	Herb	A	Un-intentional
81	<i>Physalis pruinosa</i> L.	Solanaceae	Trop. America	Herb	A	Un-intentional
82	<i>Poa annua</i> L.	Poaceae	Temp. Old World to Tropical	Herb	A	Un-intentional
83	<i>Portulaca oleracea</i> L.	Portulacaceae	Trop. S. America	Herb	A	Vegetable
84	<i>Portulaca quadrifida</i> L.	Portulacaceae	Trop. America	Herb	A	Un-intentional
85	<i>Prosopis juliflora</i> (Sw.) DC.	Fabaceae	Mexico	Shrub	Perennial	Un-intentional
86	<i>Rorippa dubia</i> (Pers.) H.Hara	Brassicaceae	Indian Subcontinent to China	Herb	A	Un-intentional
87	<i>Senna alata</i> (L.) Roxb.	Fabaceae	SW. Mexico to Tropical America	Shrub	Perennial	Ornamental
88	<i>Senna obtusifolia</i> (L.) H.S. Irwin & Barneby	Fabaceae	Tropical & Subtropical America	Shrub	A	Un-intentional
89	<i>Setaria verticillata</i> (L.) P.Beauv.	Poaceae	Tropical & Subtropical Old World	Herb	A	Un-intentional
90	<i>Sida acuta</i> Burm.f.	Malvaceae	Trop. America	Herb	A	Un-intentional
91	<i>Sida cordifolia</i> L.	Malvaceae	Tropical & Subtropical Asia to N. Australia	Herb	A	Un-intentional
92	<i>Sida rhombifolia</i> L.	Malvaceae	Tropical & Subtropical Old World	Shrub	A	Un-intentional
93	<i>Solanum virginianum</i> L.	Solanaceae	Tropical Africa, Arabian Peninsula, S. Iran to S. Central China and Indo-China.	Herb	A	Un-intentional
94	<i>Sonchus asper</i> (L.) Hill	Asteraceae	Mediterranean	Herb	A	Un-intentional
95	<i>Spermacoce pusilla</i> Wall.	Rubiaceae	Indian Subcontinent to S. China and Philippines	Herb	A	Un-intentional
96	<i>Spigelia anthelmia</i> L.	Loganiaceae	Tropical & Subtropical America	Herb	A	Un-intentional
97	<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Verbenaceae	SE. U.S.A. to Tropical America	Herb	A	Un-intentional
98	<i>Synedrella nodiflora</i> (L.) Gaertn.	Asteraceae	West Indies	Herb	A	Un-intentional
99	<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	S. Egypt to Chad, Arabian Peninsula to NW. India	Shrub	A	Un-intentional
100	<i>Torenia fournieri</i> Linden ex E. Fourn.	Linderniaceae	India to S. China and Indo-China, Taiwan	Herb	A	Ornamental



101	<i>Trianthema portulacastrum</i> L.	Aizoaceae	Tropics & Subtropics	Herb	A	Un-intentional
102	<i>Tribulus terrestris</i> L.	Zygophyllaceae	Trop. America	Herb	A	Medicinal
103	<i>Trichodesma indicum</i> (L.) Lehm.	Boraginaceae	Trop. Central America	Herb	A	Un-intentional
104	<i>Trichosanthes cucumerina</i> L.	Cucurbitaceae	Asia	Climber	A	Un-intentional
105	<i>Tridax procumbens</i> (L.) L.	Asteraceae	Trop. America	Herb	A	Un-intentional
106	<i>Triumfetta rhomboidea</i> Jacq.	Malvaceae	Trop. America	Herb	A	Un-intentional
107	<i>Turnera ulmifolia</i> L.	Passifloriaceae	Asia	Herb	A	Un-intentional
108	<i>Verbascum coromandelianum</i> (Vahl) Hub.-Mor.	Scrophulariaceae	Asia	Herb	A	Un-intentional
109	<i>Waltheria indica</i> L.	Malvaceae	Trop. America	Herb	A	Un-intentional
110	<i>Xanthium strumarium</i> L.	Asteraceae	Trop. America	Shrub	A	Un-intentional
111	<i>Zephyranthes citrina</i> Baker	Amaryllidaceae	Central America	Herb	A	Ornamental