

INVASIVE WEEDS OF SOUTHERN DISTRICTS OF KHYBER PAKHTUNKHWA-PAKISTAN

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ABSTRACT

Invasive weeds are one of the greatest threats to the local biodiversity as invasive weeds reduce the abundance and diversity of native flora and fauna and adversely affect ecosystem processes. Once alien weeds become established in a new region, they are extremely difficult to manage. Therefore, need an urgent and pro-active development of early preventative plans including early detection of alien species, their population size, residence time, number of introduction attempts, ecology, seed spread mechanisms, previously documented invasions and evaluation of similar types of species and possible cost effective management methods. In this regard, an attempt was made to identify invasive weeds in the southern part of Khyber Pakhtunkhwa, conducting a survey in four southern districts i.e. Bannu, Lakki Marwat, Tank and Dera Ismail Khan, during March 2002 to September 2003. Among the total of 50 problematic weeds 12 weeds were reported as highly invasive. These were Avena fatua, Carthamus oxyacantha, Prosopis juliflora, Conyza bonariensis, Eucalyptus camaldulensis, Phragmites australis, Xanthium strumarium, Galium aparine, Asphodelus tenuifolius, Amaranthus viridis, Imperata cylindrica and Trianthema portulacastrum. Among these Prosopis juliflora and E. camaldulensis were purposely introduced, while rest of the species were introduced accidentally or were present in the local flora, but due to ecotypic changes these became aggressive, invasive and suppressed the local flora. Therefore, proactive plan of weed management is required through prevention of new introductions, vigilant detection of new populations and constant efforts to manage the worst invaders.

Key words: Invasive weeds, biodiversity, Khyber Pakhtunkhwa.

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INTRODUCTION

Invasive weeds are one of the prominent threats to the local biodiversity as invasive weeds cause huge health, environmental and economic losses throughout the world (Schmidt and Drake, 2011; Adkins and Navie, 2006). Alien invasive weeds alter ecosystem processes, nutrient dynamics and natural disturbance patterns (Martin *et al.*, 2010; Maguire *et al.*, 2011; Marwat *et al.*, 2010) and once invasive weeds established in the new region, reestablishment of native species is rarely successful (Davies and Sheley, 2011). The impact of invasive species on indigenous species is immense and irreversible on a global level.

Climate change, environmental pollution and habitat degradation are threats resulting from intentional and unintentional introduction of invasive weeds to establish in modified habitats. As many as 10% of the world 300,000 vascular plants, have the potential to invade other ecosystem and affect native biota in a direct or indirect way (Rejmanek, 2000). For example in China a total of 239 invasive alien species have been identified in a variety of agricultural ecosystems and among them 155 species are weeds, which were introduced intentionally through vegetable gardens and orchards or unintentionally mixed with crop seeds, coming from different parts of the world (Qiang *et al.*, 2010).

Pakistan is rich in biodiversity, due to its diversified climatic conditions ranging from sea level up to the second highest point (K-2 at 8611m) of the world. Constituting as many as 18 distinct habitats, and support a rich variety of species (Plants, mammals, reptiles, amphibians, fishes and invertebrates) that contribute to the overall biodiversity.

They have invaded almost every type of native ecosystem and can cause extinction of wild plants. Very limited work has been done to document alien invasive species or their impact on Pakistan's biodiversity. For example, 700 and 4500 species of vascular plants as alien and indigenous, respectively has been enlisted. Among these, some are highly allergens like *Broussonetia papyrifera*, (which is dominant invasive weed in Islamabad and Peshawar University campus) and *Parthenium hysterophorus* (Khalid, 2000).

Prosopis juliflora were purposely introduced through linear plantation along roadsides, which escaped to the agricultural lands. While some invasives are allelopathic like *Eucalyptus spp.* (Hussain *et al.*, 2000). *Xanthium strumarium* L. and *Phragmites australis* are new emerging weeds, which have invaded an area out of their natural habitat, are also considered as invasive (Marwat, 1993).

In the northwest province of Pakistan, 16 weeds have been reported as invasive (Marwat *et al.*, 2010). Among these *Robinia pseudo-acacia*, *Broussonetia papyrifera* and *Ailanthus altissima* are trees and were purposely introduced, which became invasive later, while the rest are introduced unintentionally and spread further from infested areas to uninfested areas (Marwat *et al.*, 2010).

Spread of invasive weeds through vegetative parts or through seeds is critical for the success and spread of alien species (Calvino-Cancela, 2011). Invasive weeds spread through different agencies such as water, air, animals, agricultural machinery, vehicles, fodder and seeds lots from their core infestation to uninfested areas (Bohren, 2011, Schmidt and Drake, 2011, Calvino-Cancela, 2011, Wichmann *et al.*, 2009, Mack *et al.*, 2000, Schmidt, 1989, VonDer and Kowarik, 2007).

Trade of agricultural products and the imported agricultural materials are principal sources of exotic weed seeds introduction to new area, from where they spread further (Asai *et al.*, 2007). Therefore, the present study was aimed to identify invasive and aggressive weeds in the southern parts of Khyber Pakhtunkhwa. The proposed study was also aimed to develop long term approaches in protecting the landscape against weed invasion through prevention of new introductions, vigilant detection of new populations with similar characteristics, constant and effective efforts to eradicate the worst invasions (Rejmanek, 2000).

MATERIALS AND METHODS

Ethnobotanical approach of survey was adopted in this research. For this purpose, a questionnaire was prepared and pre tested in Ghazni Khel, Jabu Khel, Mir Hazar Khanzad Khel and Agari Khanzad Khel from District Lakki Marwat. These villages are of the plains rainfed area where few native invasive were reported. The questionnaire was once again modified and presented in all the districts of the two divisions i.e. District Bannu, Lakki Marwat, D.I. Khan and Tank. There are 40, 33, 46 and 16 union councils in District Bannu, Lakki Marwat, D.I. Khan and Tank, respectively. In each union council 3 villages were selected.

In each village, 3 farmers were interviewed. So in each of the four areas farmers were interviewed equally during March 2002 to September 2003. During the survey personal observation were also recorded regarding different weeds. The data obtained from these questionnaires and personal observation was tabulated, analyzed and discussed.

Plants were collected from various sites during the period of research work. The specimens were dried in folded newspapers. The

plants were tagged with signified data, like localities and date of collection etc. The specimens were pressed in a presser with blotting paper between the adjacent specimens. The blotting paper and newspaper were changed from time to time depending upon the weather and succulence of the plants. Dried specimens were poisoned by 2% solution of Mercuric chloride and ethyl alcohol. Mounting of specimen were made on standard herbarium sheets.

The entire collection was processed for screening out the ethnobotanically rich specimens with the help of local people and further indigenous knowledge were extracted from them. Artifact method was followed by this method, which required escorting the informant to the field for further verification., where plants were identified with the help of available literature and Flora of Pakistan (Ali and Qaisar, 1993-2010).

RESULTS AND DISCUSSION

Since invasiveness does not involve sowing and establishment of suspected species on bare land as well as in the established communities, to compare biology and ecology, which is beyond the scope of this study. Therefore, reliance has been made on the data obtained from questionnaires as well as field observations.

A total of 51 problematic weeds were reported from all four districts. These weeds cause troubles in agricultural crops, rangeland and uncultivated or waste lands. Among 51 weeds, 12 were reported as invasive because of their exotic and aggressive nature (Table-1). Majority of these invasive species were reported from the agricultural lands. Some of the plants like *Prosopis juliflora* and *E. camaldulensis* were reported from roadsides. These plants were reported to be the result of the tree plantation campaign of the forest department. In which *Prosopis juliflora* escaped from roadsides to the farming lands and is a big threat to the agro-biodiversity in Pezu area of Lakki Marwat.

The hasty spread of this weed is due to its evergreen nature/prolific growth and absence of natural enemies because cattle cannot feed on it (except its fruits some time taken by them, which cause their stomach trouble). Plants species such as *Prosopis juliflora* which invade an established community of plants and interfere with the biodiversity, have usually prolific reproduction, wide adoptability and can escape common control measures are considered invasive (Hashim and Marwat, 2002).

The use of same weed control methods, rotation, contaminated crop seed and fertilizing greatly altered weed species population. Based on frequency and density, weed gaining more importance value (aggressive) after a period could be considered as invasive (Mennan

and Isik, 2003). Weeds mentioned in this study are alien invasive and native invasive (aggressive / more importance value). Although the typical definition, which covers the alien invasive, may not be true in this case, as all the weeds which are invasive may or may not be alien (Hashim and Marwat, 2002).

Local name, habitat, distribution and history (of invasion) of invasive weeds

Based on field studies the nature of plant invasion, history of introduction, habitat and distribution are described as follows:

Aizoaceae

1. *Trianthema portulacastrum* L.

Syn. *T. obcordata* Roxb.

Common Name: Urdu; Wisak. Pushto; Insat

Fl. Per. May----August

Distribution and Habitat

Reported commonly in the maize field of the district Lakki, Bannu, D.I. Khan and Tank districts and problematic weed in vegetables. Farmers were confused with Insat during identification.

History of invasion

It is a common weed of Kharif crops throughout the researched area. Since there has been recent trend towards growing vegetable, therefore, continuous vegetable sowing for several years on the same field has given it a chance to become more aggressive than ever before.

Amaranthaceae

2. *Amaranthus viridis* L.

Fl. Per. April---August

Distribution and Habitat

Found throughout the Lakki Marwat, Bannu, D.I. Khan and Tank in farm fields and waste places. Also a weed of maize and turmeric fields in Bannu.

History of invasion

Old introduction may be introduced through birds and spread further mainly through birds and animals.

Asteraceae

3. *Carthamus oxyacantha* M.B., Fl. Taur. Cauc.

Common Name: Pohli (Urdu), Konjel, Kareeza (Pushto).

Fl. Per. March---June

Origin: Native invasive

Distribution and Habitat:

Very common and troublesome weed in the wheat and gram field throughout the research area including irrigated and rainfed areas. All respondents, farmers reported it as very troublesome weed due to its spiny nature especially during the harvesting, which is

aggressive and dominate the crop. In some rainfed areas of Lakki Marwat, this weed along with *Alhajii maurorum* covered 80% of the crop area.

History of invasion

During the survey 73% of the respondents did not know about the history of the weed. Among respondents only 27% were of the opinion that this weed seeds have been transported with wheat seeds 20 –25 years back.

4. *Conyza bonariensis* L. Cronquist in Bull. Tor. Bot. Club,
Syn. *Conyza ambigua* DC.

Distribution and Habitat

Conyza bonariensis is native invasive weed species in the research area which infesting different crops especially sugar cane in the district Banuu and D.I. Khan. Few farmers reported this weed as a problem weed in their crops but their aggressiveness show potential further spread. This weed competes more efficiently with the crops due to its faster growth. Its height goes up to 1 m in a very short time.

History of invasion

Unknown but seems that its seed comes with crop seeds from Punjab through D.I. Khan routs. This is very aggressive in D. I. Khan and spreading in all other districts.

5. *Xanthium strumarium* L.

Common name: Common cocklebur.

Fl. Per: June -----October.

Distribution and Habitat

From plains up to 8000 ft in Northern parts of the province. In Lakki, this is become very dangerous and it may spread in other area too. In Sheikhul Bandi and Nowasher area of Abbotabad, it covers the field in such a way that no plants can compete with it (Marwat, 1984). This is a weed found along the roadside throughout the research area which may escape to the agricultural lands.

Origin: Northern Afghanistan

History of invasion

It is omnipresent weed and appears to be an old introduction. Widely distributed in plains of Pakistan now a days. The patches of *Xanthium strumarium*. Along the roadside and local people of the area suggest that this weed has been transported from Afghanistan through the sheep and goats of the nomad Afghans, which they keep. They were use to stay along the roadsides. It is because of spiny nature of fruit, which adhere to the wool of sheep and goats, their seeds germinated over there. This resulted in small to large patches. This is in agreement with the (Hashim and Marwat, 2002).

Family Liliaceae**6. *Asphodelus tenuifolius* Cavan. L.:****Common Name:** Lewani Piaz, Piazakai (Pushto): Piaz, (Urdu).**Fl. Per:** March-June**Distribution and Habitat**

One of the hateful weeds of gram field in the sandy areas of the Lakki Marwat and Bannu districts. But some of the farmers from Pacca areas of Lakki Marwat (Langer Khel, Ghazi Khel and Tabbi Murad) and from Bannu (Bazar Ahmad Khan, Domel and Kotka Ghazi Marjan) have also reported that *Asphodelus tenuifolius* has been transported from Sandy to semi sandy fields during last 5-7 years. It is also found throughout India and Pakistan, Westward to the Canary Islands.

History of invasion

In sandy area, its history is unknown and is an old weed of gram, which is transported with the gram seeds but in Pacca its invasion, took place during last 5-7 years through gram seeds.

Family Myrtaceae**7. *Eucalyptus camaldulensis*****Alien invasive:****Common name:** Pushto, Lachi**Distribution and Habitat**

Personally observed in Titter Khel and Shehbaz Khel of district Lakki Marwat. People also planted this plant in their houses along the walls. Commonly planted on farmland and along the roadside. Strongly allelopathic producing allelochemicals i.e. phenolic terpenes that have deleteriously affected the biodiversity.

Origin: Native to Australia**History of introduction**

Introduced in undivided India in 1860. In 1911, again tried in Botanical garden at Lahore. In May 1913, several species of *Eucalyptus* were planted. Experiment has established that *E. rostrata* (Syn. *E. camaldulensis*) could grow anywhere in Pakistan. In 1962, seed of *Eucalyptus* including *E. camaldulensis* was procured from Australia and planted to introduce *E. camaldulensis* for afforestation and reclaiming high sub-soil water table areas in Pakistan.

E. camaldulensis has established itself in Pakistan and can be seen everywhere from the mountains to the seacoast. The species is also found in the linear land strips, village surroundings and grazing lands. Most of the man-made irrigated plantation has sizeable areas under *E. camaldulensis*.

In the research area it has been seen along the road side and people grown it in their houses along the walls. According to the respondents, *E. camaldulensis* is serving as windbreaks.

Family Papilionaceae**7. *Prosopis juliflora* L.**

Common name: Mesquite, *Local Name:* Kikrai.

Origin: A native of West Indies, Southwestern United States and Mexico.

Distribution and Habitat

Common and aggressive stand in Pezu area of Lakki Marwat and escaped to the farming lands. It is present throughout the investigated area and is real threat to the agro biodiversity.

This invasive plant contains allelochemicals, because local herbivores cannot feed upon this species, forms almost pure stand and prevent the growth of indigenous plant species in the vicinity. It is a highly invasive species established in Pakistan and can be seen everywhere from mountains to seacoast.

History of Invasion

It was introduced in 1878 desert of Sindh and Southern Punjab (Parker, 1956).

Family Poaceae**9. *Avena fatua* L.**

Common Name: Kiranrra, (Pushto), Jai (Urdu).

Syn; *A sativa* L. Var. *sericea* hook. f.

Origin: Native invasive

Distribution and Habitat

Found in wheat field throughout the research area. About all the respondents reported this weed as invasive and aggressive in the wheat crop. *Avena fatua* is the dominant and aggressive with high importance value and in some cases completely dominated the wheat crop, therefore, is considered as local invasive (Mennan and Isik, 2003).

History of invasion

Unknown, transported with wheat seeds since long time ago.

10. *Imperata cylindrica* (L.)

Common Name: Engl. Sword grass, Blady grass.

Distribution

Found mainly orchards and wetlands in Mama Khel and Gambilla area of Lakki Marwat.

History of invasion

Unknown but likely to be an old invasive.

11. *Phragmites australis* (Cav.) Trin. ex Stued.:

Common Name: Common Ditch Reed, **Local Name:** Nal.

Fl. Per. April -----November

Distribution and Habitat

It is reported in the water logged and saline areas of Lakki Marwat i.e. Kot Kashmir and Chandu Khel belt. It is also the problematic weed in the Nar area and spread further.

History of invasion

Phragmites australis has emerged as noxious weed of waterlogged and saline soils (Marwat, 1993), However, its history of invasion is unknown. It is found in the wet soil in wheat and onion fields in Pakistan.

Family Rubiaceae**12. *Gallium aparine* L.**

Common name: Catch weed, Bedstraw.

Fl. Per. March----May

Distribution and Habitat

Widely distributed in Pakistan from plains to 12000 feet. It is a danger weed in winter crop, mainly in wheat and sugarcane fields of the area. It interfere with harvesting, encourages lodging and some time smoother an entire crop. This is new alien weed in the research area but their further spread is threatening.

Origin: Native of Europe

History of Invasion

It is a native of Europe. Apparently, an old introduction probably came with crop seeds. The small size of the seeds enhancing mixing with crop seeds. Small hooks on the seed coat also provide a special mechanism for attachment to fur, bags and clothing, which help in transportation of weed seeds from one place to another place.

Widly distributed in Pakistan from plains to 12000 feet. In Lakki, it is arising as important weed in Nar area where along the water availability people use fertilizers as well. Due to nitrophilous nature, application of fertilizers (NPK) encouraged species such as *G.aparine*, *Echinochloa crussgalli* and *A. myosoroides* (Ellenberg, 1979) and is real big threat to the local agro biodiversity in future.

It is a weed of agricultural importance. The small size of their seed enhances their mixing with crop seeds. Small hooks on the seed coat also provide a special mechanism for the attachment to fur; bags and clothing which help in the transportation of weed seeds from one to another place.

It is troublesome weed in winter crop. It interfere with harvesting, encourage lodging, and some time smoothers an entire crop. It is also considers alternate host of crop pests competes with crops for nutrients and water and results in decrease in crop yield.

Table-1. Major weeds in southern parts of Khyber Pakhtunkhwa, Pakistan.

| Names of Major Weeds | Family | Number of respondents (%) | | | | Weed behavior recorded by locals |
|--|----------------|---------------------------|-------|-------|-------|---|
| | | Bannu | Lakki | D.I.K | Tank | |
| <i>Alhagii maurorum</i> L. | Papilionaceae | 32.8 | 64.5 | 27.8 | 0.0 | Deep tap rooted, old spiny weed |
| <i>Anagallis arvensis</i> L. | Primulaceae | 61.1 | 50.2 | 84.5 | 93.8 | Old but increasing |
| <i>Aerua javanica</i> (Burm. f.) juss. | Amaranthaceae | 9.7 | 17.9 | 2.2 | 0.0 | Decreasing |
| <i>Asphodelus tenuifolius</i> Cavan.* | Liliaceae | 81.9 | 62.7 | 51.9 | 52.1 | Problematic and increasing (invasive) |
| <i>Astragalus bakaliensis</i> Bunge | Papilionaceae | 47.8 | 38.7 | 36.2 | 31.3 | Old and closely resembling chick pea |
| <i>Amaranthus viridis</i> L.* | Amaranthaceae | 44.2 | 32.3 | 64.0 | 61.8 | Increasing (invasive) |
| <i>Avena fatua</i> L.* | Poaceae | 83.6 | 96.8 | 98.3 | 100.0 | Used as fodder and a major weed of wheat (invasive) |
| <i>Carthamus oxyacantha</i> M. B.* | Asteraceae | 86.4 | 97.5 | 96.9 | 96.5 | Noxious weed of wheat and invasive |
| <i>Convolvulus arvensis</i> L. | Convolvulaceae | 87.5 | 60.9 | 96.9 | 86.8 | Perennial and noxious weed of wheat |
| <i>Chenopodium album</i> L. | Chenopodiaceae | 47.2 | 21.5 | 51.9 | 60.4 | Used as green vegetable and Increasing |
| <i>Chenopodium murale</i> L. | Chenopodiaceae | 49.7 | 16.1 | 65.2 | 38.9 | Green vegetable and old |
| <i>Cirsium arvense</i> (L.) Scop. | Compositae | 34.7 | 26.2 | 45.7 | 31.3 | Compositae member and increasing |
| <i>Coronopus didymus</i> (L.) Sm. | Brassicaceae | 58.6 | 36.2 | 51.2 | 66.0 | Broad leaf and Increasing |
| <i>Conyza bonariensis</i> (L.) Cronquist* | Compositae | 27.2 | 20.4 | 93.5 | 29.9 | Major weed of sugar cane and increasing (invasive) |
| <i>Cucumis melo</i> L. Var. <i>agretis</i> Naud. | Cucurbitaceae | 30.3 | 19.7 | 27.1 | 46.5 | Prostate growth habit |
| <i>Cyperus rotundus</i> L. | Cyperaceae | 69.4 | 60.9 | 83.3 | 84.7 | Triangular stem and grass like perennial |

| Names of Major Weeds | Family | Number of respondents (%) | | | | Weed behavior recorded by locals |
|--|---------------|---------------------------|-------|-------|------|--|
| | | Bannu | Lakki | D.I.K | Tank | |
| <i>Cymbopogon jawarabacusa</i> (Jones) Schult. | Poaceae | 28.3 | 50.2 | 21.7 | 16.0 | Old but decreasing |
| <i>Cynodon dactylon</i> (L.) Pers. | Poaceae | 89.4 | 68.1 | 94.2 | 95.8 | Grassy perennial |
| <i>Digera muricata</i> (L.) Mart. | Amaranthaceae | 70.6 | 44.8 | 48.6 | 27.1 | Increasing |
| <i>Datura alba</i> Nees. | Solanaceae | 24.2 | 20.8 | 24.6 | 16.0 | Old and poisonous |
| <i>Dichanthium annulatum</i> (Forssk.) Stapf | Poaceae | 52.8 | 60.9 | 31.9 | 32.6 | Increasing |
| <i>Digiteria sanguinalis</i> | Poaceae | 82.5 | 60.9 | 76.6 | 13.9 | Becoming aggressive |
| <i>Echinochloa crusgalli</i> (L.) P. Beauv. | Poaceae | 89.2 | 58.1 | 76.3 | 69.4 | Annual grassy Increasing |
| <i>Echinochloa colonum</i> (L.) Link | Poaceae | 51.7 | 7.2 | 10.9 | 25.7 | Increasing |
| <i>Eucalyptus camaldulensis</i> * | Myrtaceae | 40.8 | 28.7 | 51.7 | 3.5 | New invading tree (invasive) |
| <i>Euphorbia helioscopia</i> L. | Euphorbiaceae | 77.8 | 30.1 | 27.1 | 16.0 | Mostly found in fields of wheat and Increasing |
| <i>Fumaria indica</i> (Hauskn) H. N. | Fumariaceae | 55.6 | 16.8 | 67.6 | 8.3 | Originated in India and increasing |
| <i>Galium aparine</i> L.* | Rubiceae | 49.2 | 31.9 | 43.5 | 16.0 | New but increasing (invasive) |
| <i>Heliotropium aucheri</i> D C. Prodr. | Poaceae | 52.5 | 37.6 | 74.6 | 7.6 | Old but decreasing |
| <i>Imperata cylindrica</i> (L.) P. Beauv. L* | Poaceae | 40.3 | 36.9 | 56.3 | 23.6 | Suit wet Habitats (invasive) |
| <i>Laptochloa spp</i> | Poaceae | 45.3 | 43.0 | 48.6 | 23.6 | New in the area and increasing |
| <i>Malva neglecta</i> Wallr. | Malvaceae | 61.1 | 39.4 | 60.4 | 38.9 | Broad leaf annual weed |
| <i>Malvastrum coromendelianum</i> (L.)Garcke | Malvaceae | 40.6 | 68.1 | 78.0 | 16.0 | Ethnobotanical value and increasing |
| <i>Medicago polymorpha</i> L. | Papilionaceae | 33.1 | 57.3 | 77.8 | 61.8 | Leguminous weed and increasing |

| Names of Major Weeds | Family | Number of respondents (%) | | | | Weed behavior recorded by locals |
|--|-----------------|---------------------------|-------|-------|------|---|
| | | Bannu | Lakki | D.I.K | Tank | |
| <i>Melilotus parviflora</i> Desf. | Papilionaceae | 45.3 | 25.8 | 32.4 | 52.8 | Leguminous weed |
| <i>Malcomia africana</i> (L.) R. Br. | Brassicaceae | 47.8 | 28.7 | 74.4 | 23.6 | Increasing |
| <i>Phalaris minor</i> Retz. | Poaceae | 58.3 | 39.4 | 61.4 | 7.6 | Noxious weed of wheat crop |
| <i>Portulaca oleracea</i> L. | Portulacaceae | 63.9 | 7.2 | 47.1 | 46.5 | Used as green vegetable & common weed of maize |
| <i>Prosopis Juliflora</i> L. * | Mimosaceae | 11.7 | 22.9 | 22.2 | 33.3 | Allelopathic and invasive |
| <i>Phragmites australis</i> (Cav.) Trin. ex Stued. * | Poaceae | 12.5 | 43.0 | 70.0 | 0.0 | New invasive and suit wet places |
| <i>Poa annua</i> L. | Poaceae | 50.0 | 28.7 | 53.9 | 38.9 | Very common grassy weed of winter crops |
| <i>Plantago lanceolata</i> L. | Plantaginaceae | 52.8 | 36.6 | 29.7 | 22.2 | Medicinal and increasing |
| <i>Plantago major</i> L. | Plantaginaceae | 36.7 | 37.3 | 91.1 | 22.2 | Increasing |
| <i>Rumex crispus</i> L. | Polygonaceae | 28.3 | 53.8 | 35.0 | 70.8 | Used as salad |
| <i>Sisymbrium irrio</i> L. | Brassicaceae | 69.4 | 32.3 | 29.7 | 47.2 | Resembling Brassica increasing |
| <i>Silybum marianum</i> Gearth. | Asteraceae | 8.3 | 53.8 | 47.1 | 0.0 | Leaves are white spotted |
| <i>Spergula arvensis</i> L. | Caryophyllaceae | 71.1 | 32.3 | 66.4 | 0.0 | Medicinal plant and increasing |
| <i>Trianthema portulacastrum</i> L. * | Aizoaceae | 50.6 | 20.1 | 60.4 | 0.0 | problematic weeds increasing quickly (invasive) |
| <i>Tribulus terrestris</i> L. | Zygophyllaceae | 83.3 | 36.9 | 25.4 | 68.1 | Round spiny fruits and medicinal |
| <i>Vicia sativa</i> L. | Papilionaceae | 61.4 | 26.5 | 25.8 | 0.0 | Climbing growth habit |
| <i>Xanthium strumarium</i> L. * | Asteraceae | 28.6 | 46.6 | 24.4 | 39.6 | Spiny fruited invasive usually along the roads (invasive) |

* Invasive weeds

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