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Study of weeds in Sethu Bhaskara agricultural college and research foundation, Karaikudi, Tamil Nadu

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Abstract

Weeds are nothing but plants. We call them weeds because they grow unnecessarily in the fields instead of crops. Such weeds bring many evils and benefits to this world in various ways. So identification of weeds is very important to destroy harmful weeds and use beneficial weeds. This study was taken with objectives that included preparing a checklist of weeds, knowing their biology, and identifying medicinally important weeds at Sethu Bhaskara Agricultural College and Research Foundation, Karaikudi. A total of 126 species belonging to 36 families were recorded in the survey carried out from April 2023 to July 2023. The majority of weeds in the Poaceae family consist of a maximum of 14 species. Another dominant family, Malvaceae, consists of 10 weed species, followed by Asteraceae, Amaranthaceae, and Fabaceae, which consist of 9 weed species; Euphorbiaceae, which consists of 8 weed species; Cyperaceae, which consists of 7 weed species; Rubiaceae, which consists of 6 weed species; Solanaceae, which consists of 5 weed species; Convolvulaceae, and Lamiaceae, which consist of 4 weed species; followed by Acanthaceae, Nyctaginaceae, Cleomaceae, Commelinaceae, Boraginaceae, and Phyllanthaceae, which consist of 2 weed species. Among 36 families, 18 are represented by 1 weed species. Among the 126 weed species, 50% belong to Annual weeds, 80.15% belong to broad-leaved weeds, 60.31% are of exotic origin, 57.14% belong to non-cropped land weeds, 38.09% belong to Dryland weeds, and 11% are used by local communities as highly medicinal weeds. Therefore, this research lays the foundation for the identification of weeds, the utilisation of beneficial weeds, and the control of harmful weeds.

Keywords: Weeds, Sethu Bhaskara, medicinal weeds, Poaceae, identification of weeds

1. Introduction

Weeds are nothing but plants. We call them weeds because they are sprouting unnecessarily on agricultural lands instead of crops. The term "weed" was first used by Jethro Tull in his book "Horse Hoeing Husbandry" in 1931. According to Jethro Tull, weed is an undesired plant that may live in bad climatic conditions, grows in an Unfavorable position, obstructs the utilization of natural resources, is aggressive, persistent, harmful, or even poisonous in nature. There are about 30,000 species in the world. Out of which, 18000 weed species have been found to be highly detrimental to agricultural production. Weeds are disturbances in all stages of crop cultivation like sowing, irrigation, fertilization, spraying, and harvesting. According to Klingman and Ashton (1975) [5], weeds can successfully compete with crop species, reduce yields, demand more labour, and ultimately drive up food prices for consumers. Weeds compete with crops primarily for water, light, nutrients, and carbon dioxide (Andreson, 1996) [2]. Weeds are plants that disrupt agricultural plant growth and development. They are known to impair crop yield, resulting in significant losses in grain, seed, and fruit output (Chaudhri, 1992) [3]. Weeds cause more losses than any other group of agricultural pests, including insects, nematodes, and rodents. Weeds account for 45% of the overall yearly losses of agricultural products caused by pests, followed by insects for 30%, diseases for 20%, and other pests for 5% (Rao, 2000) [11]. Thus, noxious weeds provide various benefits to humans. Weeds are used as food, and green leaves are used as manure, fuel, and fodder crops. Weeds are used for various medicinal purposes, like jaundice, asthma, wound healing, etc. Weeds serve an essential function as a resource in medications and animal nutrition. Weeds have a role in supporting biodiversity in agro ecosystems. Weed biology is concerned with plant characteristics such as morphology, seed dormancy and germination, physiology of growth, competitive abilities, and reproductive biology. The identification of weeds is the first step towards understanding their biology. Knowing which weeds compete with attractive crops is essential for understanding how to manage their populations.

Correct identification can sometimes suggest that no action is required. If the recognized plant is not a bothersome weed, foreshadowing can be used to protect economically important weeds and conserve biodiversity (Naidu, 2012) ^[8]. Thus, it is necessary to identify species of weeds that cause different impacts. So this weed survey study was carried out at Sethu Bhaskara Agricultural College and Research Foundation (SBAC & RF), Karaikudi.

2. Materials and Methods

This investigation, comprising weeds survey was conducted during April 2023 to July 2023 in Karaikudi at Sethu Bhaskara Agricultural College and Research Foundation, Kalam Kavi Gramam, Visalayankottai, Sivagangai district, Tamil Nadu. Total area of the college is 234 acres and for the purpose of weed surveying the campus total area was mapped into two types of habitats, *i.e.*, College area and Farm area. Different methods were used to identify the species of weeds. Familiar weeds directly Identified. The unknown species of weeds and their local names, economic value was collected through oral interviews with ethnic people, as they are more involved in the management of weeds. The species of medicinal weeds and their medicinal properties data was collected from the medicinal practitioners inhabiting the villages of Visalayankottai Sivagangai district, Tamil Nadu. And other weeds were identified by various websites, mobile applications, different literature sources and experts. All the weeds were photographed and verified with the help of Naidu (2012) ^[8] weed identification book. The medicinal weeds enumerated alphabetically by botanical name along with their respective family, vernacular names.

3. Results and Discussion

3.1. Survey of weeds

The results revealed that, so far 126 weeds belong to 36 families were recorded during four month study period during April to July 2023 in Sethu Bhaskara Agricultural College and Research Foundation, Karaikudi, Sivagangai district, Tamil Nadu (Table 1). The majority of weeds in the Poaceae family consist of a maximum of 14 species. Another dominant family, Malvaceae, consists of 10 weed species, followed by Asteraceae, Amaranthaceae, and Fabaceae, which consist of 9 weed species; Euphorbiaceae, which consists of 8 weed species; Cyperaceae, which consists of 7 weed species; Rubiaceae, which consists of 6 weed species; Solanaceae, which consists of 5 weed species; Convolvulaceae; and Lamiaceae, which consist of 4 weed species; followed by Acanthaceae, Nyctaginaceae, Cleomaceae, commelinaceae, Boraginaceae, and Phyllanthaceae, which consist of 2 weed species. Among 36 families, 18 are represented by 1 weed species, *i.e.*, Lytharaceae, Oxalidaceae, Apocynaceae, Sapindaceae, Vitaceae, Apiaceae, Onargaceae, Marsileaceae, Molluginaceae, Cactaceae, Asclepiadaceae, Passifloraceae, Pedaliaceae, Plantaginaceae, Aizoaceae, Zygophyllaceae, Typhaceae, and Verbanaceae. (Fig.1)

3.2. Based on morphology

Out of 126 weed species, 80.15% are broadleaf weeds (101 species), 12.69% are grasses (16 species), and 5.55% are

sedges (7 species). The weed composition of a site depends on the morphology, whereas broadleaved weeds are more persistent in soil than grassy weeds and they can only emerge successfully within top 3 cm soil (Peter Lutman *et al.* 2009) ^[9].

3.3. Based on origin

Out of 126 weed species, 60.31% are exotic, with 76 weed species, and 39.68% are indigenous, with 50 species. Based on origin, exotic species are dominant over indigenous because exotic species are capable of rapid spread of their populations from the original source populations, over considerable distances. Exotic species may have a greater capacity to respond with rapid growth to disturbance that increases resource availability, such as light, soil nutrients or soil moisture (Michelle Leishman *et al.*, 2003) ^[7].

3.4. Based on lifespan

Among the 126 weed species, 50% are annuals with 63 species, 49.20% are perennials with 62 species, and 0.7% are biennials with 1 species. In our survey annual and perennial weeds are higher in population compared to biennials because they have different pattern of spread and due to their dispersal strategy Maria Licznar-Małańczuk *et al.*, (2020) ^[6]. whereas Perennials generally obtained low scores for control success. They are difficult to control perennial weeds (Ewald Weber *et al.*, 2005) ^[4]. Similarly Sirajam Monira *et al.*, (2022) ^[12] reported that annual and perennial weeds having high abundance.

3.5. Based on Occurrence

Out of 126 weed species, 57.14% are non-cropped land weeds, which include 72 species. Next, 34.92% are both cultivated and non-cultivated land weeds, which include 44 species. Finally, 7.93% are cropped land weeds, which include 10 species. Weeds can reproduce faster than cultivated plants because of features such as a deep root system, resistance to drought and frost, and high nutrient use efficiency. Moreover, weeds can release allelopathic substances into the soil, and support the development of pests and crop pathogens. These properties make them competitive with arable crops. Whereas There is no competition in non-cultivable land (Agnieszka Wolna-Maruwka., 2022) ^[1]

3.6. Based on habitat

Among the 126 weed species, dryland weeds make up 38.09% of the total, with 48 species. Wetland weeds make up 16.66% of the total, with 21 species, while garden weeds make up 10.31% of the whole, with 13 species. Weeds have the ability survive under adverse condition, as they extract more water and nutrients from the soil in even dry condition (Raj Singh *et al.*, 2016) ^[10].

3.7. Medicinal importance of weeds

In addition to being damaging to us, weeds can also be employed for medical purposes and in other contexts. Most of the 126 species of weeds have medical properties, but 11% of them (15 species) (table 2) are used as high-value medicines by the locals that reside near our campus.

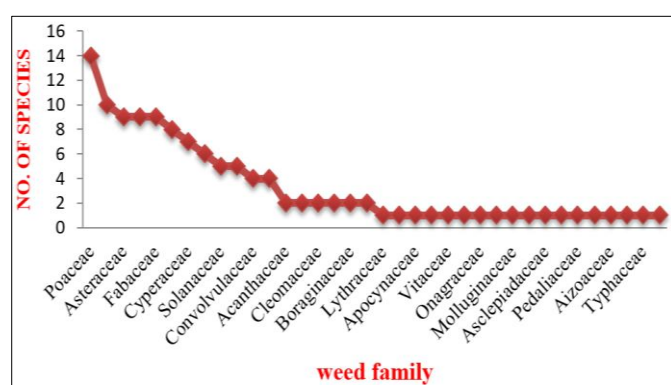
Table 1: Checklist of weeds observed in Sethu Bhaskara Agricultural College and Research Foundation, Karaikudi, Tamil Nadu

Scientific Name	Common Name	Tamil Vernacular Name
<i>Abelmoschus ficulneus</i>	White wild musk mallow	Nari vendai
<i>Abelmoschus moschatus</i>	Musk mallow	Kanthu kasthuri
<i>Abutilon indicum</i>	County mallow	Thuthi
<i>Acalypha indica</i>	Indian nettle	Kuppaimeni
<i>Acanthospermum hispidum</i>	Horn spine	Kombumul sedi
<i>Achyranthes aspera</i>	Devils horsewhip	Naauruvi
<i>Aerva lanata</i>	Mountain knotgrass	Poolai poo
<i>Aeschynomene indica</i>	Indian jointvetch	Nettivagai
<i>Alternanthera pungens</i>	Khaki weed	Mul ponnangkanni
<i>Alternanthera sessilis</i>	Sissoo spinach	Ponnangkanni
<i>Alysicarpus monilifer</i>	Necklace pod alyce clove	Kaasukodi
<i>Alysicarpus rugosus</i>	Alyce clover	Naama poondu
<i>Amaranthus minutes</i>	Minute amaranth	-
<i>Amaranthus viridis</i>	Amaranthus slender	Kuppai keerai
<i>Ammannia baccifera</i>	Blistering ammannia	Neermel neruppu
<i>Anisomeles indica</i>	Indian catmint	-
<i>Anisomeles malabarica</i>	Malabar catmint	Perum tumpai
<i>Apluda mutica</i>	Mauritian grass	Moongil pul
<i>Aristida adscensionis</i>	Common needle grass	Seevam pul
<i>Arthraxon hispidus</i>	Small carpet grass	-
<i>Asteracantha longifolia</i>	Water leaf	Neermulli
<i>Biophytum sensitivum</i>	Little tree plant	Thindanali
<i>Boerhavia diffusa</i>	Spreading hogweed	Mookkiratai
<i>Boerhavia erecta</i>	Erect spiderling	Seemai Mookkiratai
<i>Borreria hispida</i>	Shaggy button weed	Natthai choori
<i>Calotropis procera</i>	Milk weed	Erukku
<i>Cardiospermum halicacabum</i>	Balloon vine	Mudakathaan keerai
<i>Cassia occidentalis</i>	Coffee senna	Pei avarai
<i>Cassia tora</i>	Sickle pod	Oosithagarai
<i>Cayratia trifolia</i>	Bush grap	Kaattu pirandai
<i>Centella asiatica</i>	Indian pennywort	Vallarai
<i>Chloris barbata</i>	Purple chloris	Mayil kondai
<i>Chrozophora plicata</i>	Giradol	Purapirakai
<i>Chrysopogon fulvus</i>	Guria grass	-
<i>Citrullus colocynthis</i>	Colocynth	Komattikaai
<i>Cleome gynandra</i>	Spider plant	Naaivelai
<i>Cleome viscosa</i>	Tick weed	Manja kadugu
<i>Clitoria ternatea</i>	Butterflypea	Sangu poo
<i>Coccinia grandis</i>	Ivy gourd	Kovai
<i>Commelina benghalensis</i>	Benghal dayflower	Kana vaalai
<i>Corchorus aestuans</i>	East Indian mallow	Kaattu thuthi
<i>Corchorus trilocularis</i>	Cotton weed	Thalaikaai poondu
<i>Croton bonplandianum</i>	Three leafed caper	Aathupoondu
<i>Cucumis melo var. agrestis</i>	Wild melon	Sukkangkaai
<i>Cyanotis cristata</i>	Crested cat ears	Kuthirai kulampadi
<i>Cyathula prostrate</i>	Pasture weed	Sivappu naauruvi
<i>Cynodon dactylon</i>	Bermuda grass	Arugampul
<i>Cyperus compressus</i>	Annual sedge	Kunna korai
<i>Cyperus difformis</i>	Variable flatsedge	Korai
<i>Cyperus iria</i>	Rice flat sedge	Yaanaikitti
<i>Cyperus rotundus</i>	Purple nut sedge	Korai kilangu
<i>Dactyliandra welwitschii</i>	Dactyliandra	-
<i>Dactyloctenium aegyptium</i>	Crow foot grass	Kakkakaal poondu
<i>Datura metel</i>	Indian thorn apple	Oomathai
<i>Desmodium dichotomum</i>	Tick trefoil desmodium	Ottadai sedi
<i>Digera arvensis</i>	False amaranth	Thoyil keerai
<i>Digitaria ciliaris</i>	Southern crab grass	Arisi pul
<i>Echinochloa colona</i>	Jungle rice	Nel mirati
<i>Eclipta prostrate</i>	False daisy	Karisilang kanni
<i>Elytraria acaulis</i>	Asian scalystem	Pumi katampam
<i>Eragrostis tenella</i>	Japanese lovegrass	-
<i>Euphorbia hirta</i>	Asthma plant	Amman pachcharisi

<i>Euphorbia serpens</i>	Matted sand mat	-
<i>Euphorbia thymifolia</i>	Gulf sand mat	Amu pachaiarisi
<i>Euphorbia geniculata</i>	Wild poinsettia	Pachaiarisi
<i>Evolvulus alsinoides</i>	Slender dwarf morning glory	Vishnu kiranthi
<i>Fimbristylis cymosa</i>	Tropical fimbry	-
<i>Fimbristylis dichotoma</i>	Forked fimbry	-
<i>Fimbristylis miliacea</i>	Lesser fimbry	-
<i>Gomphrena celosoides</i>	Bachelor's button	Neervaadaa malli
<i>Heliotropium indicum</i>	Indian heliotrope	Thelkodukki
<i>Heliotropium ovalifolium</i>	Grey leaf heliotrope	Yaanaikundamani
<i>Hemidesmus indicus</i>	False sarsaparilla	Naanari
<i>Heteropogon contortus</i>	Spear grass	Oosipul
<i>Hexasepalum teres</i>	Rough button weed	-
<i>Hibiscus vitifolius</i>	Tropical rose mallow	Siruthuthi
<i>Hyptis suaveolens</i>	Pignut	Naai thumbai
<i>Ipomoea obscura</i>	Obscure morning glory	Sirutali
<i>Ipomoea pes-tigridis</i>	Tiger foot morning glory	Pulisuvadi
<i>Jatropha gossypifolia</i>	Belly ache bush	Kaattu amanakku
<i>Lantana camara</i>	West Indian lantana	Unni sedi
<i>Launaea sarmentosa</i>	Beach launaea	Sentham
<i>Leptochloa chinensis</i>	Red sprangle top	-
<i>Leptochloa panicoides</i>	Sprangle top	-
<i>Leucas Aspera</i>	Common leucas	Thumbai
<i>Ludwigia parviflora</i>	Water prime rose	Mayilkaathu ilai
<i>Malvastrum coromandelianum</i>	Three lobe false mallow	-
<i>Marsilea quadrifolia</i>	Water clover	Alai keera
<i>Merremia emarginata</i>	Kidney leaf morning glory	Eli kaathu keera
<i>Mitracarpus villosus</i>	Tropical girdle pod	Kaaya poondu
<i>Mollugo nudicaulis</i>	Naked stem carpet weed	Parpaadagam
<i>Morinda tinctoria</i>	Indian mulberry	Nuna
<i>Mukia maderaspatana</i>	Madras pea pumpkin	Musumusukai
<i>Ocimum tenuiflorum</i>	Holy basil	Thulasi
<i>Oldenlandia biflora</i>	Two flower millegrains	-
<i>Oldenlandia umbellata</i>	Choy root	Saayaver
<i>Opuntia dillenii</i>	Erect prickly pear	Chappathi kalli
<i>Oxystelma esculentum</i>	Rosy milk weedvine	Oosipaalai
<i>Parthenium hysterophorus</i>	Congress grass	Visa poondu
<i>Paspalidium flavidum</i>	Yellow watercrown	-
<i>Passiflora foetida</i>	Passion flower	Siru poonaikaali
<i>Pedaliium murex</i>	Large caltropis	Yaanaik nerunji
<i>Phaseolus trilobus</i>	Jungle mat bean	Nari payir
<i>Phyllanthus maderaspatensis</i>	Madras leaf flower	Melaa nelli
<i>Phyllanthus niruri</i>	Stone breaker	Keelaa nelli
<i>Physalis minima</i>	Native gooseberry	Sodakku thakkali
<i>Prosopis juliflora</i>	Mesquite	Karuvela maram
<i>Rhynchosia minima</i>	Least snout bean	Kaliyan thuvurai
<i>Saccharum spontaneum</i>	Wild sugarcane	Naanal
<i>Sida acuta</i>	Morning mallow	Arivaalmanai poondu
<i>Sida cordifolia</i>	Heart leaf sida	Nilathuthi
<i>Solanum nigrum</i>	Black night shade	Manathakkali
<i>Solanum trilobatum</i>	Red pea egg plant	Thuthuvai
<i>Solanum xanthocarpum</i>	Yellow fruit night shade	Kantang Kathiri
<i>Sonchus oleraceus</i>	Smooth sow thistle	Siruvaanaik Chuvadi
<i>Stemodia viscosa</i>	Sticky blue rod	-
<i>Tephrosia purpurea</i>	Wild indigo	Kolinji
<i>Tragia involucrata</i>	Indian stinging nettle	Senthatti
<i>Trianthema protulacastrum</i>	Desert horse purslane	Saaranai
<i>Tribulus terrestris</i>	Puncture vine	Nerunji
<i>Tridax procumbens</i>	Coat button	Vettukaaya Poondu
<i>Triumfetta rotundifolia</i>	Round leaf burr bush	Adayodi
<i>Typha angustata</i>	Southern cattail	Sambu
<i>Vernonia cinerea</i>	Little iron weed	Mookkuthi poondu
<i>Vicoa indica</i>	Sonkadi	Manja Mookkuthi poondu
<i>Xanthium strumarium</i>	Rough cocklebur	Marulumathai

Table 2: Most important weeds used as medicine by local peoples

S. No	Common Name	Scientific Name	Vernacular Name	Part Used	Medicinal Uses
1.	Indian nettle	<i>Acalypha indica</i>	Kuppaimeni	Leaf	Anthelmintic, Anti-inflammation
2.	Sissoo spinach	<i>Alternanthera sessilis</i>	Ponnang kanni	Leaves and shoot	Hepatitis, tight chest
3.	Balloon vine	<i>Cardiospermum halicacabum</i>	Mudakathaan keera	Leaves	Cough, skin diseases, menstrual cramps
4.	Bush grap	<i>Cayratia trifolia</i>	Kaattu pirandai	The whole plant	Astringent medicine.
5.	Indian pennywort	<i>Centella asiatica</i>	Vallarai	Leaves	Treat stomach and urinary tract infections
6.	Bermuda grass	<i>Cynodon dactylon</i>	Arugam pul	Leaves	Anasarca, cancer, convulsions
7.	False daisy	<i>Eclipta prostrata</i>	Karisilang Kanni	The whole plant	Hair growth, anti-diabetic
8.	Holy basil	<i>Ocimum tenuiflorum</i>	Thulasi	Leaves	Cough, asthma, diarrhea, fever
9.	Passion flower	<i>Passiflora foetida</i>	Siru ponaikaali	Leaves	Dietary supplement for anxiety and sleep problems
10.	Large caltropis	<i>Pedaliu murex</i>	Yaana nerunji	The whole Plant	Kidney stone formation, incontinence of urine
11.	Stone breaker	<i>Phyllanthus niruri</i>	Keelaa nelli	Leaves	Cure for kidney stones.
12.	Native gooseberry	<i>Physalis minima</i>	Sodakku thakkali	The whole Plant	High cholesterol, "hardening of the arteries"
13.	Black night shade	<i>Solanum nigrum</i>	Manathakkali	Leaves	Anti-insulin resistance and anti-obesogenic effects
14.	Red pea egg plant	<i>Solanum trilobatum</i>	Thuthuvalai	Leaves and root	Tuberculosis, Bronchial asthma, difficulty in breathing
15.	Coat button	<i>Tridax procumbens</i>	Vettukaaya poondu	Leaves	Jaundice, bronchial catarrh

**Fig 1:** Weed families with respective numbers of species

4. Conclusion

This study concluded that a total of 126 species in 36 families were recorded during a short period of time in and around Sethu Bhaskara Agricultural College and Research Foundation, Karaikudi, Sivagangai district, Tamil Nadu. The study was completed with objectives including the preparation of a checklist of weeds, knowledge of their biology, and identification of medicinally important weeds. As a result, research into these weeds is critical for the systematic identification of dangerous weeds and their effective eradication, as well as the identification and utilisation of beneficial and therapeutic weeds. This research will also help safeguard valuable weeds for future generations.

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References

1. Agnieszka Wolna-Maruwka. Review The Problem of Weed Infestation of Agricultural Plantations vs. the Assumptions of the European Biodiversity Strategy. MDPI Journals. 2022;50:60-656.

2. Andreson C, Stryhn H, Streibig JC. Decline of the flora in Danish arable fields. Journal of Applied Ecology. 1996;33(3):619-626.
3. Chaudhri MN. Weeds and their identification. In: Identification and control of weeds manual. Pakistan Journal of weed science; c1992. p. 14.
4. Ewald Weber, Daniel. A survey of weeds that are increasingly spreading in Europe. Agronomy for Sustainable Development. 2005, 25(1).
5. Klingman GC, Ashton FM. Weed Science: Principles and Practices. Encyclopedia of Life Support Systems. 1975, 3.
6. Maria Licznar Małańczuk, Piotr Sugier, Maria Curie. Occurrence of Weeds in an Orchard due to Cultivation of Long-Term Perennial Living Mulches. Polish Botanical Society; c2020. p. 73.
7. Micelle Leishman R, Janet C. Invasion success of exotic plants in natural ecosystems: the role of disturbance, plant attributes and freedom from herbivores. Biological conservation. 2003;117(2):215-226.
8. Naidu VSGR. Hand Book on Weed Identification, Directorate of Weed Science Research. E Flora of India; c2012. p. 354.
9. Peter Lutman, Jonathan Storkey, Helen Martin, John Holland. Abundance of weeds in arable fields in southern England. Aspects of Applied Biology. 2009;91:163-168
10. Raj Singh, Das TK, Ramanjit Kaur, Rishi Raj, Kapila Shekhawat. Weed Management in Dryland Agriculture in India for Enhanced Resource Use Efficiency and Livelihood. Proceedings of the National Academy of Sciences India. Section B, Biological Sciences. 2018;88:1309-1322
11. Rao VS. Principles of weed Science. Oxford and IBH Publishing Co. Pvt. Ltd. 2000, 427-436.
12. Sirajam Monira, Md. Imran Ali, Uttam Kumar Sarker, Mahfuza Begum, et al. Floristic divergence of weeds in rice fields under subtropical conditions. Archives of Agriculture and Environmental Science. 2022;7(3):450-462.