

Weed Flora Diversity and Community Structure Across Agricultural and Disturbed Habitats of Davangere District, Karnataka, India

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ABSTRACT

Weed flora was surveyed in and around Davangere taluk (Karnataka, India), with focused sampling across the neighbouring localities of Kurki and Tholahunase. Stratified quadrats were laid in representative habitats, rainfield and irrigated crop fields, fallows, field margins, roadsides, and canal banks during the monsoon and post-monsoon seasons. Specimens were identified using regional floras, and community structure was described using relative frequency, density, and Importance Value Index. The weed assemblage was dominated by Asteraceae, Poaceae, and Amaranthaceae. Widely distributed and persistent species included *Parthenium hysterophorus*, *Ageratum conyzoides*, *Chromolaena odorata*, *Lantana camara* (in shrub thickets), *Cynodon dactylon*, *Echinochloa colona*, *Dactyloctenium aegyptium*, *Cyperus rotundus*, *Commelina benghalensis*, *Trianthema portulacastrum*, *Alternanthera sessilis*, *Amaranthus spinosus*, and *Euphorbia hirta*. Habitat filtering was evident: grasses and sedges predominated in cultivated and intermittently flooded sites, while invasive asters were most abundant along disturbed roadsides and fallows. Seasonal turnover favored fast-growing annuals during kharif, with perennial rhizomatous weeds maintaining a year-round presence. The prevalence of aggressive invasives—especially *P. hysterophorus* and *C. odorata*—poses risks to crop productivity, native understory, and human/animal health. Integrated weed management is recommended, combining timely manual/mechanical removal before flowering, residue mulching, competitive cover crops, optimised crop spacing, and judicious, rotation-based herbicide use. Community awareness and coordinated control along linear habitats (roadsides, canal banks) are critical to reduce reinvasion pressure. This baseline assessment provides site-specific priorities for weed control and a framework for monitoring management effectiveness across the Davangere University landscape, including Kurki and Tholahunase.

Keywords: Rice weeds, Davangere district, Dominating species.

INTRODUCTION

A weed is broadly defined as any plant that grows in an undesired location. Since the advent of plant cultivation, humans have had to contend with the intrusion of weeds into designated crop areas. Over time, it was discovered that some plants initially regarded as unwanted possessed valuable properties that were not previously recognized; consequently, such plants were removed from the weed category and brought under cultivation. Conversely, certain domesticated plants, when introduced into new climatic regions, escaped cultivation and subsequently became weeds or invasive species [1]. Consequently, the classification of weeds is continually evolving, and the term itself is relative. Weeds interfere with various human activities, which has led to the development of numerous methods for their suppression or eradication. The nature of the weed, the available methods of disposal, and the environmental impact of the chosen method all influence the selection of weed management strategies. Typically, due to financial and ecological considerations, methods employed on golf courses or in public parks cannot be applied to rangelands or forest ecosystems. Herbicidal chemicals applied along roadsides to eliminate unattractive weeds that pose fire or traffic hazards are unsuitable for use on agricultural land. Similarly, mulching, which is commonly used for weed suppression in home gardens, is impractical for large-scale agricultural systems.

In any case, weed control has become a task requiring considerable expertise [3]. Courses on weed management are taught at universities and agricultural colleges, while the industry provides the necessary technologies. In agriculture, effective weed management is essential for sustaining high crop yields. As technology continues to advance, the rationale for weed control becomes increasingly complex. The classification of plants as weeds depends on both time and location; for example, before the invention of automobiles, tall roadside plants were unlikely to be considered problematic. However, with the increase in automobile use and road traffic, tall weeds became a hazard by potentially obstructing drivers' visibility, particularly at intersections. In cow pastures, sharp-edged grasses are common nuisances; however, when such areas are converted into golf courses or public parks, these grasses become a more serious problem. In the open countryside, poison oak (*Toxicodendron diversilobum*) can be a rather pleasant shrub on sunny hillsides; however, in campgrounds, it poses a clear health risk. It is possible to provide such examples endlessly to encompass all facets of agricultural practices, forestry, management of highways and waterways, public land stewardship, care of arboreta, parks and golf courses, as well as upkeep of residential landscapes [4]. Weeds compete with crop plants for water, light, and nutrients. Weeds of rangelands and pastures may be unpalatable to animals, or even poisonous;

they may cause injuries, as with lodging of foxtails (*Alopecurus* species) in horses mouths; they may lower values of animal products, as in the cases of cockleburrs (*Xanthium* species) in wool; they may add to the burden of animal care, as when horses graze in sticky tarweeds (*Madia* species). Many weeds are hosts of plant disease organisms. Examples are prickly lettuce (*Lactuca scariola*) and sow thistle (*Sonchus* species) that serve as hosts for downy mildew; wild mustards (*Brassica* species) that host clubroot of cabbage; and saltbrush (*Atriplex* species) and Russian thistle, in which curly top virus overwinters, to be carried to sugar beets by leafhoppers. Here is a corrected and thesis-appropriate version with improved grammar, clarity, and academic tone, Many weeds serve as hosts for insect pests, and several are invasive species. Davanagere taluk comprises 172 villages, including major villages such as Tholahunase, Kurki, Kandagal, Kashipura, and Lokikere. Weeds growing alongside paddy crops reduce agricultural productivity and constitute a major constraint to rice production by competing for space, water, moisture, sunlight, and nutrients [5]. Weeds extract nutrients from the soil in which they grow, leading to reduced soil fertility in cereal crop systems. They pose a significant challenge to rice production by adversely affecting both yield and market value. Rice serves as a primary source of food for more than half of the world's population. The succession and distribution patterns of weeds in rice fields are inherently dynamic. The composition of weed flora varies with location and environmental conditions. Plants grow in a wide range of soil types and are found almost everywhere, except in soils that are incapable of supporting plant life. Humans cultivate only a small fraction of the plant species required for ecosystem functioning, while many native soil inhabitants are considered undesirable and are therefore classified as weeds [6]. Weeds are plants that readily adapt to disturbed habitats and can adversely affect both the quality and quantity of crop production, as well as resource utilization and human income-generating activities. The majority of weeds are recognized for their medicinal properties. Several studies have focused on weeds in regions adjacent to the study site. This study aims to sample and document the weed flora present within the habitable areas of the University of Davanagere, treating them as part of the normal flora. Weeds are defined as plants that are not desired in a particular location. Within cultivated crop fields, even paddy plants growing outside their intended plots in the university fields are regarded as weeds. Any plant that is not deliberately cultivated is considered an undesired growth. Weeds cause a reduction in crop yields. The weeds found in the Davanagere University campus and college garden exhibit a high ecological amplitude, enabling them to reproduce and survive in a wide range of environments while adapting to changing conditions. Humans have facilitated their proliferation through cultivation [7]. Davanagere is one of the 31 districts of Karnataka in southern India. The college campus is characterized by deciduous vegetation and abundant red soil, which support a large number of phanerogamic plants and consequently promote the growth of numerous weed species on the campus. The present study primarily aimed to record and assess the distribution, ecological impact, and medicinal applications of the weed flora at Karnataka College, Davanagere. The majority of weeds are recognized for their medicinal properties. Davanagere taluk covers a total geographical area of approximately 5,976 sq. km. The taluk is characterized by a predominantly flat topography [8], although some areas contain small hillocks. Davanagere taluk receives an average annual rainfall of 644 mm.

The average monthly temperature is 32 °C, with a relative humidity of 39%. The soil is composed of red sandy and medium black components. The Tungabhadra River, which flows along the border of Davanagere taluk, provides irrigation to the region. The consistently high moisture levels throughout the year contribute to a rich diversity of weeds in the area [9].

MATERIALS AND METHODOLOGY

Study Area:

Davanagere Taluk, approximately 5976 Sq.km and lies between 14°28' 14" N latitude and 75° 54' 50" E longitude. The field investigation was conducted between May June and July 2025.

Field work:

Conducted the survey in the taluk to document and collect the weeds. Visited the villages in the taluk viz, Kurki, Kandagal, Kashipura, Attigere, Hadadi, Kadlebal, Budihal Devarahatti, Chandrenahalli etc.

Collection and Identification:

Visited the crop fields like Paddy, maize, Sugarcane, groundnut growing areas and recorded the weeds and unidentified species were collected and identified later in the department by using regional floras like Flora of Davanagere district [10], Flora of Eastern Karnataka [11], Flora of the Madras Presidency [12], Flora of Karnataka, Flora of South Canara district.

Preparation of Herbarium:

The collected specimens were identified with the help of regional floras, and these were pressed, dried and prepared herbarium specimens by wet method. The voucher specimens were deposited in the Herbaria of Davanagere University, Davanagere (HDUD).

Eradication of weeds:

Interaction with formers:

During field visit, interactions were made with few farmers regarding identification of weeds, eradication of weeds. Usually, farmers eradicate the weeds by two methods

- i. Mechanical method: Removing the weeds by hand picking or by using agricultural tools.
- ii. Chemical method: Weeds are removed by spraying some weedicides like Round off

REUSLTS AND DISCUSSION

Davanagere is one among the 6 taluks in the district and has rich flora (Manjunath et al, 2004), due to the canals and streams running throughout the year. Topography (plain) rich soil, moderate rainfall, and temperature enhance the biodiversity in the taluk [13][14].

Collection and Identification:

Several field visits were made in the Davanagere taluk and collected the weeds in the crop fields such as Paddy fields, maize and sugarcane fields. Totally 52 weed species were collected from the different areas, these 52 species belong to 49 genera and 20 families. The dominant families like Poaceae (11), Asteraceae (9), Fabaceae (6), Euphorbiaceae (3), Verbenaceae (2) etc.

Table 1 shows that 52 weed species from 20 families and 49 genera were found during the study and survey of weed plants in paddy, maize and sugarcane fields in Davanagere district [15].

Weed species dicot/monocot ratio is 23/18, while genera' species ratio is 32/20.

Dominant weeds families are Poaceae, Cyperaceae, Asteraceae, Amaranthaceae, Euphorbiaceae and with genus *Echinochloa*, *Cynodon*, *Eleusine*, *Cyperus*, *Ageratum*, *Eclipta*, *Alternanthera*, *Phyllanthus*, *Euphorbia* and their species are dominant. Among the monocot Poaceae family is the most dominating family have 11 genera and 11 species and in dicot Asteraceae is second dominating family have 9 genera and 9 species and followed by Fabaceae family have 6 genera and 6 species and Verbenaceae family have 2 genera and 2 species Euphorbiaceae have 2 genera 3 species and Cyperaceae have 1 genera and 3 species which is shown in the table 1. The paddy field's weed problem is discussed in the report of all of these. A recurring issue in agricultural production systems, weeds raise production costs and cause significant financial losses [16][17].

Table 1: Families wise Genera and Species ratio of weed flora in rice fields

FAMILYS	PLANTS	Genera	Species
1)Amaranthaceae	1.Achyranthes aspera	2	2
	2.Alternanthera sessilis		
2)Asclepiadaceae	3.Wattakaka volubilis	1	1
3)Asteraceae	4.Ageratum conyzoides	9	9
	5.Blumea lacera		
	6.Chromolaena odorata		
	7.Eclipta alba		
	8.Parthenium hysterophorus		
	9.Spilanthes acmella		
	10.Synedrella nodiflora		
	11.Tridax procumbens		
4)Commelinaceae	12.Xanthium strumarium	1	1
	13.Cyanotis fasciculata		
5)Convolvulaceae	14.Ipomoea obscura	2	2
	15.Merremia gangetica		
6)Cyperaceae	16.Cyperus alternifolius	1	3
	17.Cyperus involucreatus		
	18.Cyperus rotundus		
7)Euphorbiaceae	19.Euphorbia hirta	2	3
	20Euphorbia reticulata		
	21.Kirganelia reticulata		
	22.Cassia tora		
8)Fabaceae	23.Clitoria ternatea	6	6
	24.Desmodium gangeticum		
	25.Mimosa pudica		
	26.Rhynchosia minima		
	27.Terprosia pumila		
9)Gentianaceae	28.Enicostemma littorale	1	1
10)Heliconiaceae	29.Heliconia psittacorum	1	1
11)Juncaceae	30.Juncus effusus	1	1
12)Lamiaceae	31.Ocimum sanctum	1	1
13)Lythraceae	32.Amannia baccifera	1	1
14)Malvaceae	33.Abutilon indicum	3	3
	34.Malvastrum coromandeli		
	35.Urena lobate		
15)Phyllathceae	36.Phyllanthus aianthus	1	2
	37.Phyllanthus amaranthus		
16)Poaceae	38.Brachiaria plantiginea	11	11
	39.Chloris barbata		
	40.Cynodon dactylon		
	41. Dichanthium annulatum		
	42.Dinebra retroflexa		
	43.Echinochloa crusgalli		
	44.Eleusine indica		
	45.Eragrostis tenella		
	46.Leptochloa mucronata		
17)Pontederiaceae	47.Panicum virgatum	1	1
	48.Eichornia crassipes		
18)Sapindaceae	49.Cardiospermum haliacabum	1	1
19)Scrophularoaceae	50.Bacopa monnieri	1	1
20)Verbenaceae	51.Lantana camara	2	2
	52.Phyla nodiflora		

Herbarium preparation:

The following species were collected, identified and prepared herbarium specimens by wet method and these voucher specimens were deposited in the Herbaria Department of Botany, Davanagere University (HDUD). There are 52 voucher specimens were deposited.

Eradication of weeds:

Weeds removal is one of the biggest problems for the farmers, it is known that growing of weeds drastically reduce the crop production and it adversely effect on the country's economy. The farmers remove the weeds periodically by different methods. During field visit the farmers were interacted and collected the information [18][19].

i. Mechanical methods:

Most of the farmers removing the weeds by using mechanical methods by agricultural tools, doing inter cultivation, the tools used are sickles etc. this is the most common method but laborious and costliest methods and time consuming [20].

ii. Chemical methods:

Recently some of the developed farmers using chemical methods to kill and remove the weeds. Farmers using two types of pesticides were used which are available in the market. There are two types weedicides such dicot and monocot weedicides. The common decided like Roundoff, Butachlor, atrazine, pendimethalin and metribuzin were used to remove mono cot weeds and 2-4 Dichloroacetic acid is used to remove dicot weeds. The following weeds were enumerated and given the details of the weeds such as botanical description, uses, chemical constituents and eradication of the weeds [21][22].

Table 2: Davanagere (2024) Rainfall and Temperature Data

Months	High. Temperature (°C)	Low Temperature (°C)	Rainfall (mm)
January	30.1	18.2	6.48
February	32.9	19.5	5.41
March	35.9	21.6	4.56
April	37.3	23.4	45.38
May	35.9	24	85.89
June	30.4	22.7	150.57
July	27.6	21.8	133.1
August	27.8	21.1	148.79
Average Data	32.23	18.9	73.085

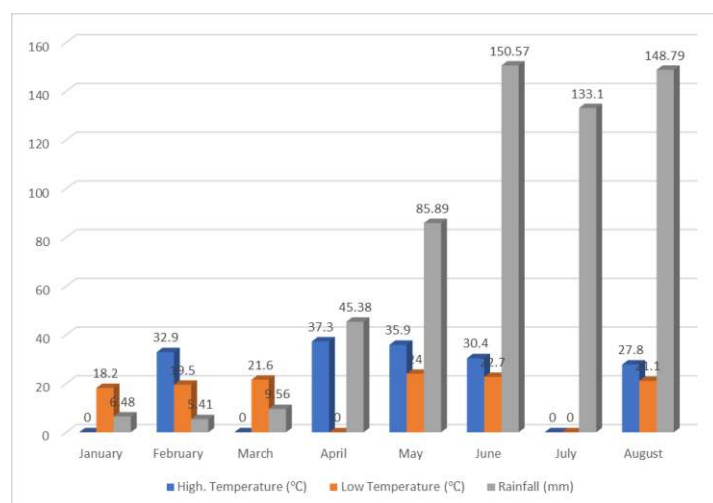


Chart 1: Graph of Davanagere Rainfall and Temperature

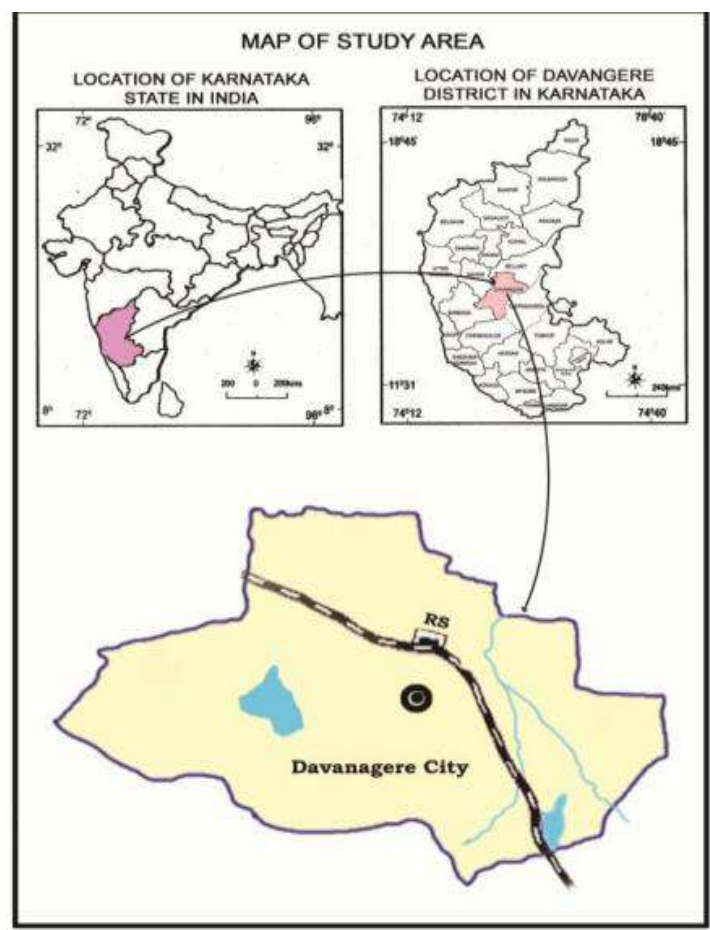


Fig 1: Davangere Map



Fig:1 Ipomoea obscura

Fig:2 Echina clova



Fig:3 Cynodon dactylon

Fig:4 Ammannia baccifera

CONCLUSION

Weeds are unwanted plant in any agriculture land. Weeds compete with paddy crop plant for resources - nutrition, water, mineral's etc. and reduce their production. The result of the survey provides knowledge of study area to explore and identify the weeds of paddy crop [23][24]. This will help the farmers and agriculturists of the study area to identify the weeds and thus help in planning a suitable strategy for their control. Weeds are unwanted plant from any agriculture land. Weeds compete with paddy crop plant for resources - nutrition, water, mineral's etc. and reduce their production. The result of the survey provides knowledge of study area to explore and identify the weeds of the paddy crop [25][26]. This will help the farmers and agriculturists of the study area to identify the weeds and thus help in the planning a suitable strategy for their control [27]. The present review aims to understand the biodiversity of the weeds growing in the rice-based crop fields and their significant effects on the fields especially on production of rice along with other crops [28]. Though there are much usefulness of weeds grows in such fields have been discussed in, but yet their high growth rate becoming a serious issue for the increasing rate of loss in yield per year. Though several control measures have been practiced around the world, but no specific high impact control measure has been available and practiced due to several inherent problems and limitation [2].

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