Journal of Medicinal Plants Studies
www.PlantsJournal.com

ISSN (E): 2320-3862
ISSN (P): 2394-0530
Impact Factor (RJIF): 5.94
www.plantsjournal.com
JMPS 2025; 13(5): 117-121

Received: 09-05-2025
Accepted: 12-06-2025

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A weed of maize crop of Chhindwara district (M.P.) India

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DOI: https://www.doi.org/10.22271/plants.2025.v13.i5b.1941

Abstract
This study focuses on the weed flora associated with maize (*Zea mays* L.) fields in the Chhindwara district of Madhya Pradesh, India. The research was conducted through extensive and detailed field surveys carried out during different months of the kharif season, beginning in 2024. Fieldwork included plant exploration specifically during the kharif period. For the survey, two sites from each block were selected, with field trips conducted twice a month at each location to collect and document weed species. Weed seeds, once dispersed into natural habitats, grow rapidly and outperform native plants, leading to significant competition with crops. Farmers and agricultural experts from each site were interviewed to gain insights into seasonal weed patterns, their vegetation characteristics, and distribution trends. During the study, 127 weed species from 31 families and 103 genera were identified. Of these, 119 were herbaceous plants, while 8 were climbing species. Among the recorded weed families, Poaceae dominated with 22 species, followed by Compositae (16 species), Malvaceae (15 species), Leguminosae (13 species), Cyperaceae (9 species), and Convolvulaceae and Amaranthaceae with 5 species each.

Keywords: Kharif crops, maize, tribal, Chhindwara

Introduction
Weeds are commonly described as undesirable and often bothersome plants that grow where they are not wanted, disrupting agricultural activities due to their negative impact on crops. *Zea mays* L., commonly known as maize, is the most significant cereal crop in Kharif in the Chhindwara, Seoni, Betul, Barwani and Dhar districts of Madhya Pradesh. These regions account for more than 60 percent and more than 70 percent of the state's corn production, respectively. Cultivation has become important for its many uses as food, fodder, and food (Kumar *et al.* 2023) [1]. Maize ranks as the third most important food grain for Indians, trailing only behind wheat and rice (Murdia *et al*., 2016) [2]. In the Chhindwara district of Madhya Pradesh, India, maize is cultivated across diverse ecological landscapes. Madhya Pradesh spans a geographical area of 44.348 million hectares, with 55.9% (24.804 million hectares) used for major Kharif and Rabi crops. The state primarily relies on rain-fed farming, with irrigated land accounting for only 29.5%. Blessed with favorable agro-climatic conditions, Madhya Pradesh farmers can cultivate various crops throughout the year. During the early growth phases, weeds pose a significant challenge for farmers due to the labor-intensive weeding process. Acting as competitors, they vie with crops for resources such as root space, nutrients, and sunlight. As C4 plants, weeds are particularly efficient in utilizing sunlight for photosynthesis, resulting in greater nutrient consumption compared to crop plants. Consequently, weeds hinder the growth rate, quality, yield, and overall productivity of crops while also reducing available moisture and nutrients in the soil. Additionally, they complicate harvesting operations, as highlighted by Sainkhediya and Pachaya (2015) [3]. It's worth noting that not all weeds are harmful to crops. In low densities, certain weeds may have negligible effects on crop yields and can even positively influence crop growth, as suggested by Thijssen (1991) [4]. To manage weeds effectively, an innovative approach is to utilize them constructively by nurturing them into beneficial plants rather than labeling them entirely undesirable.

Methodology
Chhindwara district was established on November 1, 1956. Situated in the southwestern region

of the Satpura mountain range, it spans latitudes from 21.28° to 22.49° North and longitudes from 78.40° to 79.24° East, covering a total area of 11,815 square kilometers. The district shares its boundaries with the Nagpur plains in Maharashtra to the south, Hoshangabad and Narsinghpur districts to the north, Pandhurna district to the west, and Seoni district to the east.

A comprehensive survey of weed flora was conducted in maize fields across the Chhindwara district, focusing on identifying diverse plant species. The study took place during different months of the Kharif season in 2024. Researchers selected ten major agricultural blocks for the survey: Chhindwara, Parasia, Junnardeo, Tamia, Amarwara, Chourai, Bicchua, Harrai, Mohkhed, and Umreth. Within each block, two sites were chosen to examine the weed population systematically. Regular field visits were carried out twice a month at each site to collect weed species, ensuring that all habitats within the study area were thoroughly surveyed. The research paid particular attention to the vegetation types and distribution patterns of the plants across various sites. Throughout the study period, interactions with local farmers and agriculturists provided valuable insights into seasonal weeds, as well as their flowering and fruiting schedules. Plant collection and herbarium preparation followed standardized protocols as outlined by Jain and Rao (1976) [5]. Specimens were preserved using a saturated solution of mercuric chloride mixed with alcohol to maintain their integrity for further analysis. Dry and preserved plants mounted on herbarium sheets by adhesive glue and fevicols. Identification of plants done with the help of flora (Hooker, 1872-1897; Cook, 1903; Hains, 1921-1924; Duthi, 1960; Shah, 1978; Verma *et al.*, 1993; Mudgal *et al.*,1997; Khanna *et al.*, 2001; Muwel and Mehta, 2020) [6-14] and other taxonomic literature. The entire plant specimen was deposited in herbarium of Govt. Girls P.G. College Rewa (M.P.), India.

Results and discussion

The present study represents a pioneering effort to investigate the weed flora associated with major kharif crops, specifically maize (*Zea mays* L.), in the tribal district of Chhindwara, Madhya Pradesh, India. Weeds, often described as unwanted plants, thrive in agricultural fields and compete with crops for resources such as space, moisture, nutrients, carbon dioxide, and sunlight, often overshadowing native vegetation. These invasive plants typically produce an abundance of seeds, enabling their rapid propagation. Their seeds are disseminated through various means, including wind, water systems, machinery, vehicles, birds, animals, and human activity. Weeds generally exhibit faster growth rates compared to native species, allowing them to outcompete crops for essential resources like water, sunlight, and nutrients.

This study provides a comprehensive checklist of weeds identified in the region affecting maize crops and offers significant insights into formulating effective control strategies. Fieldwork consisted of extensive and intensive surveys conducted during different months of the 2024 kharif season. Ten prominent agricultural blocks in Chhindwara district were selected for the surveys: Chhindwara, Parasia, Junnardeo, Tamia, Amarwara, Chourai, Bicchua, Harrai, Mohkhed, and Umreth. In each block, two specific sites were chosen for the documentation of weed species. Periodic field visits were conducted twice a month at these sites to collect data on weed flora.

During the study period, 127 weed species belonging to 31 families and 103 genera were identified. Among these species, 119 were herbs and 8 were climbers. The Poaceae family was the most represented with 22 weed species, followed by Compositae (16 species), Malvaceae (15 species), Leguminosae (13 species), Cyperaceae (9 species), and Convolvulaceae and Amaranthaceae, each with 5 species. These findings are summarized in Table 1 and illustrated in Figure 1. The study contributes valuable knowledge to understanding weed dynamics in the region, thereby aiding in the development of sustainable agricultural practices.

Table 1: Dominant family of the study area

S.No.	Family	No. of species
1.	Poaceae	22
2.	Compositae	16
3.	Malvaceae	15
4.	Leguminosae	13
5.	Cyperaceae	9
6.	Convolvulaceae & Amaranthaceae	5

Table 2: List of weed flora in *Zea maize* L. crops in Chhindwara region of M.P., India

S.No.	Family	Botanical name	Habit
1.	Menispermaceae	*Cocculus hirsutus* (L.) Theob.	C
2.	Papaveraceae	*Argemone Mexicana* L.	H
3.	Cleomaceae	*Cleome gynandra* L.	H
4.		*Cleome viscosa* L.	H
5.	Polygalaceae	*Polygala arvensis* Willd.	H
6.	Portulacaceae	*Portulaca oleraceae* L.	H
7.		*Portulaca quadrifida* L.	H
8.	Malvaceae	*Abelmoschus ficulneus* (L.) Wight & Arn.	H
9.		*Abutilon indicum* (L.) Sweet	H
10.		*Corchorus fascicularis* Lam	H
11.		*Corchorus trilocularis* L.	H
12.		*Hibiscus caesius* Garcke	H
13.		*Hibiscus lobatus* (Murray) Kuntze	H
14.		*Malachra capitata* (L.) L	H
15.		*Malvastrum coromandelianum* (L.) Garcke	H
16.		*Melochia corchorifolia* L.	H
17.		*Sida acuta* Burm. F.	H
18.		*Sida cordata* (Burm.f.) Borss.Waalk.	H
19.		*Sida cordifolia* L.	H
20.		*Sida rhombifolia* L	H
21.		*Urena lobata* L.	H
22.		*Waltheria indica* L.	H
23.	Linaceae	*Linum mysorense* B.Heyne ex Wall.	H
24.	Zygophyllaceae	*Tribulus terrestris* L.	H

25.	Oxalidaceae	*Biophytum reinwardtii* (Zucc.) Klotzsch.	H
26.		*Biophytum sensitivum* (L.) DC.	H
27.		*Oxalis corniculata* L.	H
28.	Leguminosae	*Alysicarpus monilifer* (L.) DC	H
29.		*Alysicarpus pubescens* J.S.Law	H
30.		*Cajanus platycarpus* (Benth.) Maesen	H
31.		*Clitoria annua* Graham	H
32.		*Clitoria ternatea* L.	C
33.		*Crotalaria prostrata* Willd.	H
34.		*Crotalaria pusilla* DC.	H
35.		*Desmodium dichotomum* (Willd.) DC.	H
36.		*Desmodium triflorum* (L.) DC.	H
37.		*Galactia longifolia* (Jacq.) Benth	H
38.		*Rhynchosia bracteata* Baker	H
39.		*Rhynchosia minima* (L.) DC.	C
40.		*Senna tora* (L.) Roxb.	H
41.		*Tephrosia pumila* (Lam.) Pers.	H
42.	Cucurbitaceae	*Citrullus colocynthis* (L.) Schrad.	H
43.		*Diplocyclos palmatus* (L.) C.Jeffrey	C
44.		*Luffa tuberosa* Roxb	C
45.	Apiaceae	*Centella asiatica* (L.) Urb.	H
46.	Compositae	*Acanthospermum hispidum* DC.	H
47.		*Ageratum conyzoides* (L.) L.	H
48.		*Bidens biternata* (Lour.) Merr. & Sherff	H
49.		*Blumea lacera* (Burm.f.) DC	H
50.		*Blumea oxyodonta* DC.	H
51.		*Caesulia axillaris* Roxb.	H
52.		*Eclipta prostrata* (L.) L.	H
53.		*Elephantopus scaber* L.	H
54.		*Emilia sonchifolia* (L.) DC. ex DC.	H
55.		*Lagascea mollis* Cav.	H
56.		*Parthenium hysterophorus* L.	H
57.		*Pulicaria angustifolia* DC.	H
58.		*Sonchus asper* (L.) Hill	H
59.		*Tridax procumbens* (L.) L.	H
60.		*Xanthium strumarium* L.	H
61.	Primulaceae	*Anagallis arvensis* L.	H
62.	Gentianaceae	*Canscora diffusa* (Vahl) R.Br. ex Roem. & Schult.	H
63.		*Enicostema axillare* (Poir. ex Lam.) A.Raynal	H
64.		*Exacum pedunculatum* L.	H
65.	Convolvulaceae	*Convolvulus prostratus* Forssk.	H
66.		*Evolvulus alsinoides* (L.) L.	H
67.		*Ipomoea hederifolia* L.	C
68.		*Ipomoea obscura* (L.) Ker Gawl.	C
69.		*Ipomoea pes-tigridis* L.	C
70.	Solanaceae	*Physalis minima* L.	H
71.		*Solanum americanum* Mill.	H
72.	Lentibulariaceae	*Utricularia aurea* Lour.	H
73.	Gesneriaceae	*Didymocarpus pygmaeus* C.B.Clarke	H
74.	Martyniaceae	*Martynia annua* L.	H
75.	Acanthaceae	*Andrographis paniculata* (Burm.f.) Nees	H
76.		*Hemigraphis hirta* (Vahl.) Anderson	H
77.		*Lepidagathis cristata* Willd.	H
78.		*Rungia repens* (L.) Nees	H
79.	Verbenaceae	*Phyla nodiflora* (L.) Greene	H
80.	Lamiaceae	*Hyptis suaveolens* (L.) Poit.	H
81.		*Leucas aspera* (Willd.) Link	H
82.		*Ocimum basilicum* L.	H
83.	Nyctaginaceae	*Boerhavia diffusa* L.	H
84.	Amaranthaceae	*Achyranthes aspera* L.	H
85.		*Amaranthus tricolor* L.	H
86.		*Amaranthus viridis* L.	H
87.		*Celosia argentea* L.	H
88.		*Chenopodium murale* L.	H
89.	Polygonaceae	*Persicaria barbata* (L.) H.Hara	H
90.	Euphorbiaceae	*Acalypha indica* L.	H
91.		*Euphorbia chamaesyce* L	H
92.		*Euphorbia hirta* L.	H
93.		*Euphorbia thymifolia* L.	H
94.	Phyllanthaceae	*Phyllanthus amarus* Schumach. & Thonn.	H
95.	Commelinaceae	*Commelina benghalensis* L.	H
96.		*Commelina forsskalii* Vahl	H
97.	Cyperaceae	*Cyperus alulatus* Kern	H
98.		*Cyperus dubius* Rottb.	H
99.		*Cyperus esculentus* L.	H
100.		*Cyperus exaltatus* Retz.	H
101.		*Cyperus haspan* L.	H
102.		*Cyperus iria* L.	H

103.		*Cyperus laevigatus* L.	H
104.		*Eleocharis dulcis* (Burm.f.) Trin. ex Hensch.	H
105.		*Pycreus pumilus* (L.) Nees.	H
106.	Poaceae	*Apluda mutica* L.	H
107.		*Aristida adscensionis* L.	H
108.		*Avena sterilis* L.	H
109.		*Brachiaria reptans* (L.) C.A.Gardner & C.E.Hubb.	H
110.		*Cymbopogon martini* (Roxb.) W.Watson	H
111.		*Cynodon barberi* Rang. & Tadul.	H
112.		*Cynodon dactylon* (L.) Pers.	H
113.		*Dactyloctenium aegyptium* (L.) Willd.	H
114.		*Digitaria ciliaris* (Retz.) Koeler	H
115.		*Echinochloa colona* (L.) Link	H
116.		*Eragrostis ciliaris* (L.) R.Br.	H
117.		*Isachne globosa* (Thunb.) Kuntze	H
118.		*Ischaemum rugosum* Salisb.	H
119.		*Lophopogon tridentatus* (Roxb.) Hack.	H
120.		*Oplismenus burmanni* (Retz.) Beauv	H
121.		*Panicum humile* Steud.	H
122.		*Phalaris minor* Retz.	H
123.		*Setaria intermedia* Roem. & Schult.	H
124.		*Sporobolus capillaris* Miq.	H
125.		*Thelepogon elegans* Roth	H
126.		*Themeda laxa* (Andersson) A.Camus	H
127.		*Tripogon jacquemontii* Stapf	H

Table 3: Number wise distribution of families in the Chhindwara district of Madhya Pradesh

S.No.	Family	No. of species	S.No.	Family	No. of species
Dicotyledons					
1.	Menispermaceae	1	17.	Solanaceae	2
2.	Papaveraceae	1	18.	Lentibulariaceae	1
3.	Cleomaceae	2	19.	Gesneriaceae	1
4.	Polygalaceae	1	20.	Martyniaceae	1
5.	Portulacaceae	2	21.	Acanthaceae	4
6.	Malvaceae	15	22.	Verbenaceae	1
7.	Linaceae	1	23.	Lamiaceae	3
8.	Zygophyllaceae	1	24.	Nyctaginaceae	1
9.	Oxalidaceae	3	25.	Amaranthaceae	5
10.	Leguminosae	13	26.	Polygonaceae	1
11.	Cucurbitaceae	3	27.	Euphorbiaceae	4
12.	Apiaceae	1	28.	Phyllanthaceae	1
13.	Compositae	16	**Monocotyledons**		
14.	Primulaceae	1	1.	Commelinaceae	2
15.	Gentianaceae	3	2.	Cyperaceae	9
16.	Convolvulaceae	5	3.	Poaceae	22

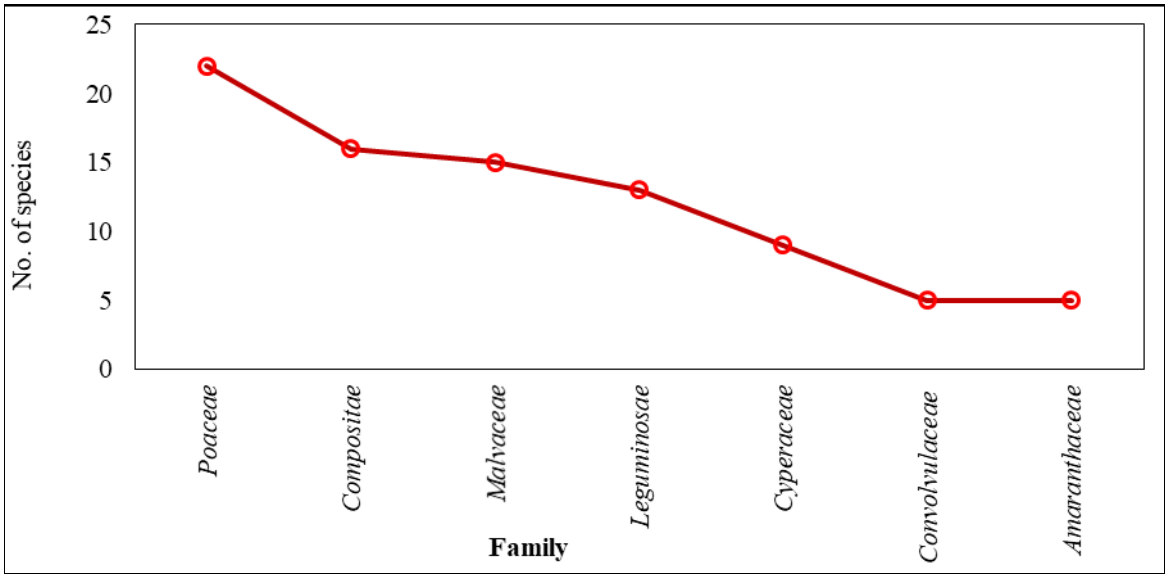

Fig 1: Graph Analysis in Dominant Family of Chhindwara District

Conclusion

A total of 127 weed species were documented in major kharif crop fields, specifically maize, within the tribal district of Chhindwara, Madhya Pradesh, India. The prevalence and density of weeds were notably high in fields cultivated with *Zea maize* L. These weeds significantly alter soil pH and

impact the nitrogen-to-phosphorus (N:P) ratio, influencing the germination process of *Zea maize* L. The findings of this study are expected to aid researchers and professionals working to identify and manage weeds across diverse agro-ecosystems. Understanding the critical period of weed competition can also help reduce labor demands for weeding tasks while optimizing economic returns.

Acknowledgement
The authors are very thankful to authority of Govt. Girls P.G. College Rewa (M.P.) to carry out this work.

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