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Diversity of Medicinal Weeds in Kabir Nagar region of Raipur city, Chhattisgarh, Central India

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ABSTRACT

Chhattisgarh is a centre of Biodiversity and also known as Herbal State in India. Among the diversity of species, medicinal plants diversity is of great importance. In this state common crop and waste land weeds are treated as medicinal plants by the natives. Weeds are very common, unwanted dominant plant in nature and spread in not only the crop fields but also in unused lands and competitor of crop plants. But they have played an important role in Ayurvedic medicine which was described by Govindiah (1981). About 95% of the Wild plants are major source for raw materials of pharmaceuticals to develop drugs. Some medicinal weeds are studied in Mohoba Bazar region (Raipur district). The survey revealed that out of 40 weeds, most of weeds were identified as medicinal weed. The different plant parts are used in cure for different disease such as asthma, cold, fever, dysentery, leprosy, arthritis, skin disease etc. Due to innovative practices of researchers, human life expectation is increasing but on the other side that is deteriorating due to environmental factors, such as environmental pollution, fast life and stress so men are suffering with some common diseases which are required to be treated. Among them medicinal plants are majorly utilized by the people to treat many diseases not only in Chhattisgarh but also in all over the world. The escalating utilization of plants such as weeds in medicine they are also decrease in their population, and some of them are Lysimachia arvensis (L.) U. Manns& Anderb., Indigofera longiflora Taub. and Desmodium tortuosum (Sw.) DC., Cynodon dactylon (L.) Pers. and Cyperus sp. in the state.

Keywords: Diversity, Environmental factors, Medicinal weeds, Raipur

INTRODUCTION

Weeds are unwanted plants that grow where they are not required. On agricultural crops, they have an extremely damaging impact. While the term *weed* generally has a negative connotation, many plant species are known as weeds can have beneficial properties. Not all weeds are undesirable, though; for example, many annual grasses that are regarded as weeds in agricultural fields are beneficial to animals as food in land areas. Some weeds draw helpful insects, which can shield crops from damaging pests. Weeds can also prevent pests from finding a crop, because their presence disrupts the incidence of positive cues which pests use to locate their food. Most communities living in forest and urban area use plants and plant parts directly as medicines and they don't have any adverse effects like allopathic drugs. Medicinal plants are used to produce the majority of today's pharmaceuticals in direct and indirect manner. Globally, about 85% of the traditional medicines used for primary health care derived from plants (Farnsworth, 2012). The importance of studying weed species diversity and medicinal uses has been realized and carried out in Bangladesh (Rahman *et al.,* 2007). According to the World Health Organization (WHO), as many as 80% of the world's population depends on traditional system of medicine, and in India, near about 65% of the population in the rural and urban areas use traditional medicines and medicinal plants to help meet their primary health care needs (WHO, 2002). In India, more than 43% of the total flowering plants are reported to be of medicinally importance (Puspagandhan, 1995).

The aim of present study is to identify and document the weeds of medicinally important in urban population and provide baseline information related to medicinal properties of weeds in Kabir Nagar region of Raipur city. This information will be helpful for further research endeavours in the urban area.

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MATERIAL AND METHODS

Study area

Raipur is the capital city of Chhattisgarh state in central India and administrative headquarters of Raipur District. Kabir Nagar is an urban civilization region in western part of Raipur city (Fig. 1). Railway track of South Eastern Central Railways passes through this area, All India Institute of Medical Sciences and various educational institutes, hospitals, housing board colonies are present in this region. It is bounded by Hirapur on the North, Amanaka on the South, Kota on the East and Tatibandh on the West. Total population of the city is 1010087; male 519286 and female 490801 (Census, 2011).

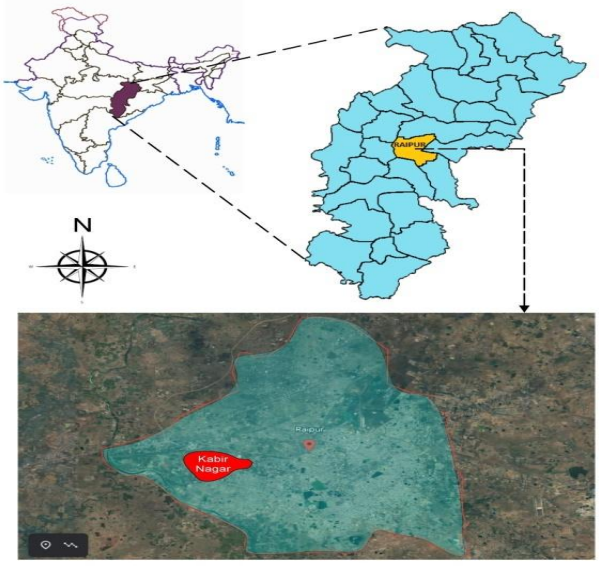


Fig 1: Map showing the study site (Kabir Nagar) In Raipur city map

Survey method

Diversity of weeds growing in Kabir Nagar region was carried out from June 2022 to May 2023. All the weed species were recorded and frequently visited to area in flowering and fruiting seasons. For the morphological study, different species of weeds were examined carefully in order to see if there was any variation or not. Specimens are collected for preparation of e-herbarium and medicinal information was also recorded. A total of 56 informants having an age range 18-65 years were interviewed using semi-structured interviewing method. Among them 15 were female and rest 41 were male. The information about the plants used for various diseases was gathered through interviews and discussion with the head of the household, elderly people and traditional medical practitioners were also consulted. The non-destructive (photographic) collection of the samples was done following the ethical guidelines outlined by ethical committee of Govt. N.P.G. College of Science, Raipur, Chhattisgarh. Necessary permissions were taken from local authorities and community leaders. The study adhered to the principles of minimal environmental impact and respect for local biodiversity.

Data analysis

To test the hypothesis that the distribution of species across plant families and the usage of different plant part(s) are uniform, a chi-square (χ^2) goodness of fit test was performed using following formula:

$$\chi^2 = \sum \frac{(\mathrm{O_i} - \mathrm{E_i})^2}{E_i}$$

Where, Oi is the observed frequency and E_i is the expected frequency.

The expected frequency for each category (plant family and plant part) was calculated by dividing the total number of observations by the number of categories.
Degrees of Freedom (d*f*) = *n* – 1

Where, *n* is the number of categories in each parameter.

The critical value for the χ^2 distribution was obtained from χ^2 tables at a significance level of 0.05. The P-value was calculated to determine the statistical significance of the results.

Plant Identification

The plants were identified and described up to species level with the help of “Flora of Raipur, Durg and Rajnandgaon” Botanical Survey of India, Calcutta (Verma *et al.*, 1985) and “The Flora of British India” (Hooker, 1875-79). For the current name and up-to-date nomenclature an online portal “Plants of the world online (POWO)”, Royal Botanic Garden, Kew were also visited.

RESULTS AND DISCUSSION

Table 1: List of medicinally important weeds in Kabir Nagar region of Raipur city, Chhattisgarh

S.No.	Botanical name	Local name	Family	PPU	Medicinal uses
1.	*Achyranthus aspera* L.	Chitchita	Amaranthaceae	Lf, Rt	Boils, Asthma, Bleeding, Bronchitis
2.	*Ageratum conyzoides L.*	Bhakumbar	Asteraceae	WP	Wound, Dyspepsia, Headache
3.	*Alternanthera paronychioides* A.St.-Hil.	Gorundi	Amaranthaceae	Lf	Bronchitis, Lung disease
4.	*Amaranthus spinosus L.*	Katili chaulai	Amaranthaceae	Rt	Diarrhoea, Bronchitis
5.	*Argemone mexicana* L.	Peeli kateri	Papaveraceae	Sd	Warts, Inflammations, Rheumatism, Jaundice, Leprosy
6.	*Blumea lacera* (Burm.f.) DC.	Jangli Muli	Asteraceae	Lf	Bronchitis, Fever, Burning sensation
7.	*Boerhaavia diffusa* L.	Punarnava	Nyctaginaceae	Lf, St	Pain relief, Inflammation, Indigestion
8.	*Chenopodium album* L.	Bathua	Amaranthaceae	Lf, Sd	Swollen feet, Urinary problems, Sunburn, Kidney stone
9.	*Cleome viscosa* L.	Hurhur	Cleomaceae	Lf	Wounds, Ulcers, Rheumatism
10.	*Croton bonplandianus* Baill.	Croton	Euphorbiaceae	Sd	Skin infection, Asthma, Jaundice
11.	*Cynodon dactylon* (L.) Pers.	Doob ghas	Poaceae	Lf, St, Rt	Urinary tract infection, Headache, Sores
12.	*Cyperus rotundus* L.	Motha	Cyperaceae	Rt	Inflammation, Body pain, Wounds
13.	*Datura metel* L.	Dhatura	Solanaceae	Rt, Lf, Fl, Sd	Toothache,Inflammation, Skin disorders, Fever, Arthritis, Wounds
14.	*Eclipta prostrata* (L.) L.	Bhringaraj	Asteraceae	Lf	Skin problems, Jaundice, Gastrointestinal problems, Asthma, Fever, Hair loss
15.	*Emilia sonchifolia* (L.) DC.	Kirankuri	Asteraceae	Fl, Lf	Conjunctivitis, Worm infestations
16.	*Euphorbia heterophylla* L.	Dudhi	Euphorbiaceae	Lt, Lf	Constipation, Bronchitis, Asthma
17.	*Euphorbia hirta* L.	Dudhi	Euphorbiaceae	Lf, Lt	Dysentery, Pimples, gonorrhoea, Indigestion
18.	*Heliotropium indicum* L.	Hathisud	Boraginaceae	Lf, Rt, Sd	Wound healing, Skin diseases, Insect bites, Fever
19.	*Indigofera linnaei* L.	Neeli	Fabaceae	Lf, Rt	Sore throat, Ulcers
20.	*Kalanchoe pinnata* (Lam.) Pers.	Patharchatta	Crassulaceae	Lf, St	Headache, External cuts and wounds
21.	*Mimosa pudica* L.	Chhuimui	Fabaceae	Lf, Rt	Diarrhea, Bleeding disorders, Ulcers
22.	*Oxalis corniculata* L.	Tinpatiya	Oxalidaceae	Lf, Fl	Fever, Inflammation, Insomnia
23.	*Phyllanthus niruri* L.	Bhui amla	Phyllanthaceae	Fr, Rt, Lf	High blood pressure, Diabetes
24.	*Physalis angulata* L.	Chirpoti	Solanaceae	Fr, Lf	Malaria, Toothache, Rheumatism
25.	*Portulaca oleracea* L.	Nuni	Portulacaceae	Lf, St, Fl	Boils, Sores, Diarrhea, Hemorrhoids, Cold, Weak digestion
26.	*Senna tora* (L.) Roxb.	Charota	Fabaceae	Rt, Lf	Leprosy, Ringworm, Psoriasis
27.	*Sida cordifolia* L.	Balihari	Malvaceae	Rt	Cough, Cold, Fever, Head ache
28.	*Solanum xanthocarpum* L.	Bhaskatiya	Solanaceae	Fr	Cough, Fever, Heart diseases
29.	*Tridax procumbens* L.	Kanphuli	Asteraceae	St, Lf, Fl	Dysentery, Liver diseases, Cold
30.	*Urena lobata* L.	Lapetua	Malvaceae	Rt, St, Lf	Stomach-ache, Diarrhoea, Dysentery, Headache

Abbreviations: PPU-Plant part used, Lf-Leaf, Rt-Root, St-Stem, Fl-Flower, Fr-Fruit, Sd-Seed, Lt-Latex, WP-Whole plant

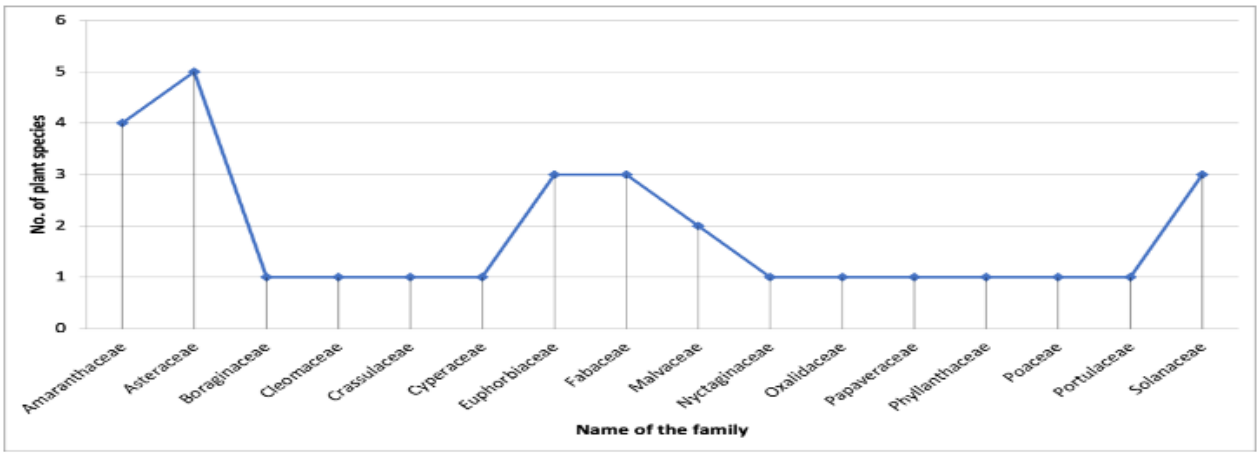


Fig. 2: Family wise distribution of plant species

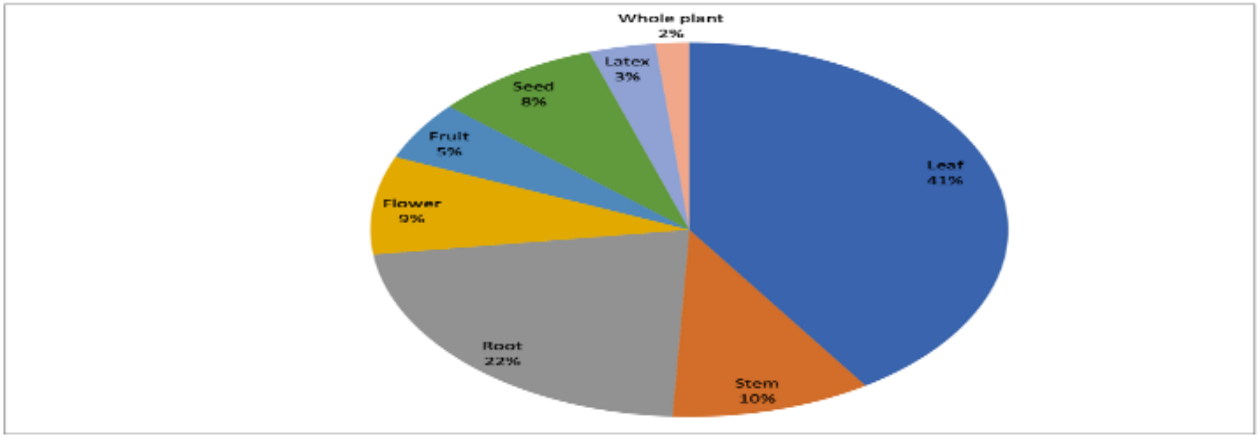
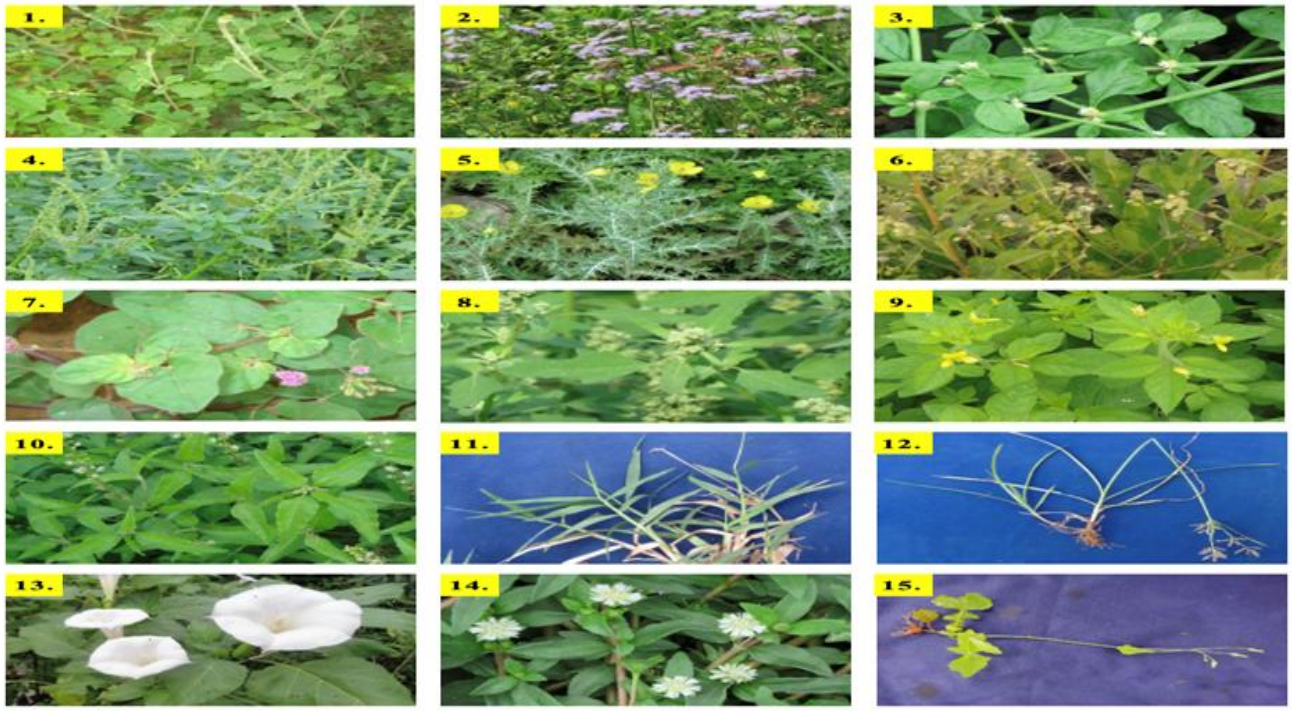


Fig. 3: Plant parts used by people

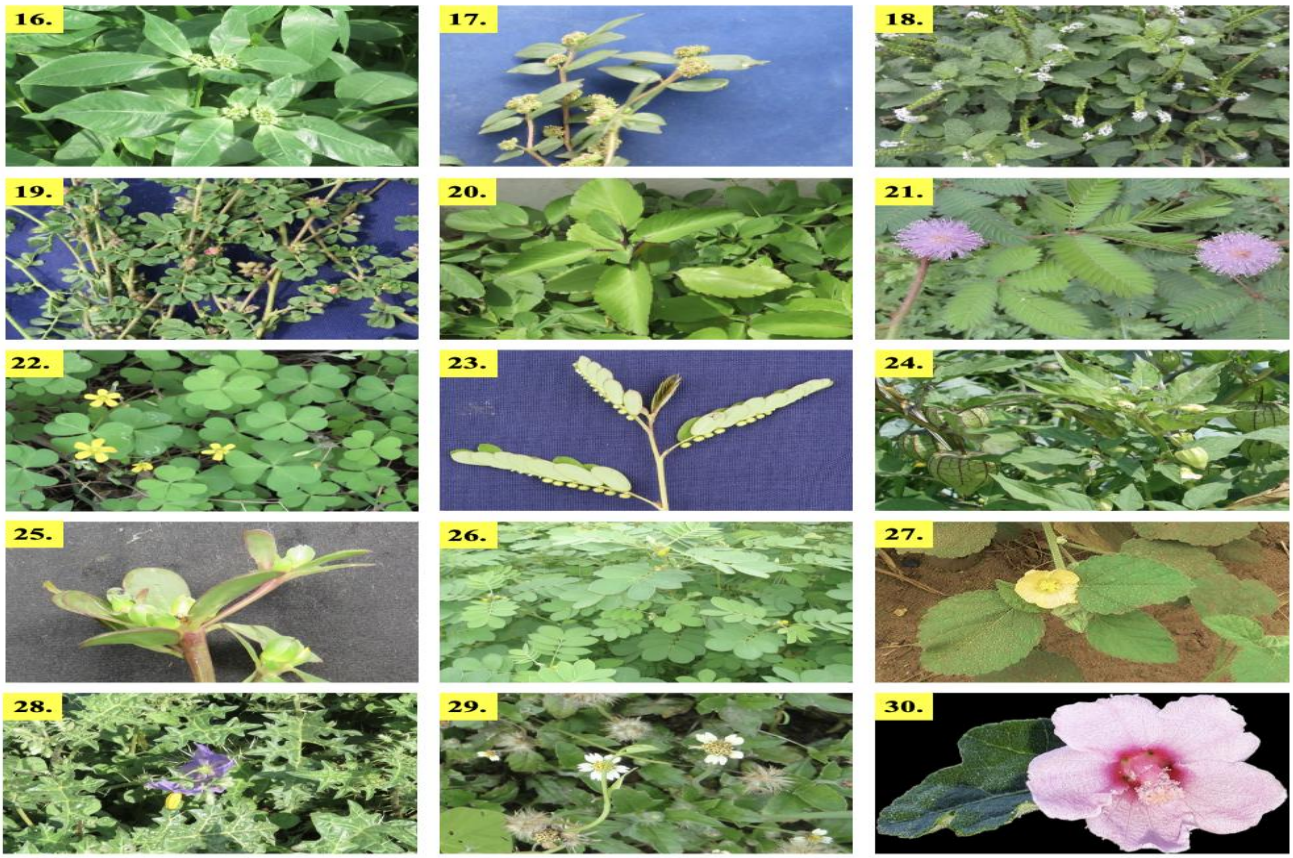
Based on this study, medicinal uses of weed species in Kabir Nagar region of Raipur city, Chhattisgarh was made that included 30 species under 29 genera and 16 families (Fig. 2). Distribution of weed species in the families shows variation viz. Family Asteraceae is represented by 5 species. Family Amaranthaceae is represented by 4 species. Family Euphorbiaceae, Fabaceae and Solanaceae are represented by 3 species in each. Family Malvaceae is represented by 2 species, rest of the families are represented by 1 species each. Mean value was found to be 1.88 for number of species in each family with standard deviation of 1.31. The P-value for distribution of plant species among different families will be greater than 0.05, indicating that we do not reject the null hypothesis and the observed distribution of species across families is not significantly different from an equal distribution. The chi-square goodness of fit test indicates that there is no statistically significant difference in the number of species among plant groups, implying that the distribution is rather uniform (Table 2). Asteraceae is the most frequently observed family, followed by Amaranthaceae, while Boraginaceae, Cleomaceae, Crassulaceae, Cyperaceae, Nyctaginaceae, Oxalidaceae, Papaveraceae, Phyllanthaceae, Poaceae, and Portulaceae are the least common. Similarly, P-value for plant part(s) used will be very small (much less than 0.05), indicating that the observed distribution of plant parts usage is significantly different from an equal distribution. The chi-square goodness of fit test for plant part(s) used indicates that there is a statistically significant difference (Table 2). The most widely used plant part is the leaf, followed by the root, and the least used is the whole plant (Fig. 3). This approach aids the understanding of the richness and distribution of species in various families and better understanding the preferences for various plant parts in medicinal properties.

Plate 1: Photographs of studied weeds



1. *Achyranthus aspera* L., 2. *Ageratum conyzoides* L., 3. *Alternanthera paronychioides* A.St.-Hil., 4. *Amaranthus spinosus* L., 5. *Argemone mexicana* L., 6. *Blumea lacera* (Burm. *f.*) DC., 7. *Boerhaavia diffusa* L., 8. *Chenopodium album* L., 9. *Cleome viscosa* L., 10. *Croton bonplandianus* Baill., 11. *Cynodon dactylon* (L.) Pers., 12. *Cyperus rotundus* L., 13. *Datura metel* L., 14. *Eclipta prostrata* (L.) L., 15. *Emilia sonchifolia* (L.) DC.

Plate 2: Photographs of studied weeds



16. *Euphorbia heterophylla* L., 17. *Euphorbia hirta* L., 18. *Heliotropium indicum* L., 19. *Indigofera linnaei* L., 20. *Kalanchoe pinnata* (Lam.) Pers., 21. *Mimosa pudica* L., 22. *Oxalis corniculata* L., 23. *Phyllanthus niruri* L., 24. *Physalis angulata* L., 25. *Portulaca oleracea* L., 26. *Senna tora* (L.) Roxb., 27. *Sida cordifolia* L., 28. *Solanum xanthocarpum* L., 29. *Tridax procumbens* L., 30. *Urena lobata* L.

Table 2: Statistical analysis of observed data

S. No.	Parameters	Expected value±SD	Chi-square value (χ^2)	Degrees of freedom (d*f*)	Critical Value	P-Value
1.	Family wise distribution	1.88±1.31	13.59	15	25.00	>0.05
2.	Plant part(s) used	7.38±7.65	55.60	7	14.07	<0.05

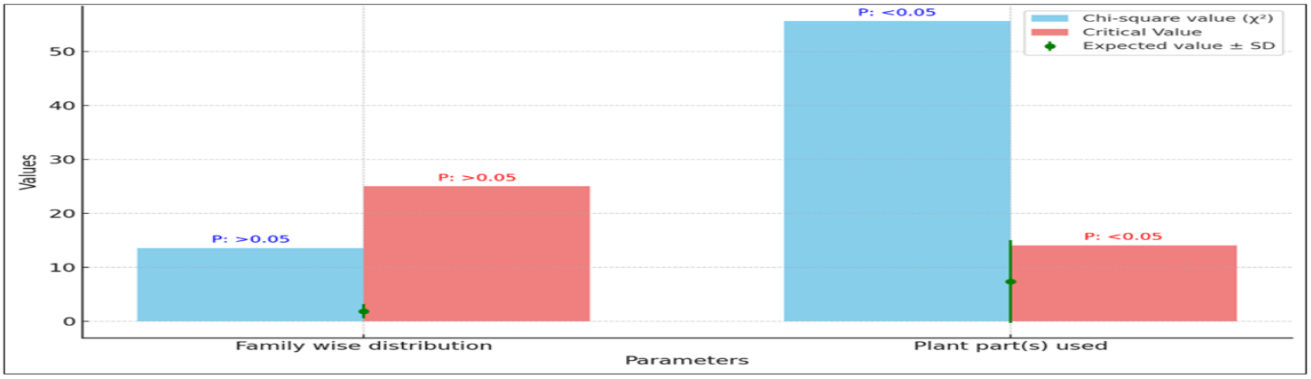


Fig. 4: Comparison of χ^2 values and critical values with expected values

The collected information is comparable with the result of other studies in India and abroad i.e. a total of 37 weed species belonged to 36 genera and 20 families are documented in Mulberry field of Rajshahi University Campus, Bangladesh (Rahman and Mamun, 2017). A total of 56 species of weeds belonging to 17 families was identified in five different rice field around Vanurtaluk of Villupuram district, Tamil Nadu, India (Nithyaand Ramamoorthy, 2015). 22 weed species belonging to 12 families were found dominant in greengram and blackgram in Haryana, India (Punia *et al.*, 2013). A total of 39 weed species belonging to 37 genera and 19 families were recorded in mixed winter crop of Uttar Pradesh, India (Singh *et al.*, 2012).

CONCLUSION

The results of the current study suggest that, despite the fact that weeds are generally seen as undesirable and unwanted plants, they can actually play a crucial role when used properly. During this study, 30 common weeds species were reportedly used by the urban people for medicinal purposes. This study also implied that traditional knowledge of medicinal and restorative plants may be preserved, providing valuable information for pharmacological research that could lead to the development of novel medications. This article just touches on a small portion of the many medical applications of the weeds. Therefore, increasing public awareness of the medicinal value of weeds; some of which may be found in homes, farms, and office buildings will help to mitigate the damage weeds cause to tree species in urban region, forests and reserve areas.

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