Indian Journal of Weed Science (2024) **56**(3): 319–322
http://dx.doi.org/10.5958/0974-8164.2024.00054.5

RESEARCH NOTE

Common ruderals weed diversity along Naag Tibba trek in district Tehri Garhwal, Uttarakhand, India

Manisha Pandey*, S.P Joshi and Sachin Sharma

Received: 4 January 2024 | Revised: 23 July 2024 | Accepted: 27 July 2024

ABSTRACT

A botanical trip was undertaken for collecting information on ruderals weeds along Naag Tibba trek in the district of Tehri, Uttarakhand, India. The weed inventories were done in the year January 2021 – February 2022. A total of 43 weed species, divided into 37 genera, 22 Families, 14 APG-IV Orders and (8) APG-Grades of Angiosperm Phylogeny Group-IV System were located at the study site. The most dominant Grades were Campanulids and supersterids and two dominant Orders were Asterales and Caryophyllales. The study also revealed that most of the recorded species were annuals 57%, followed by perennials and biennials with 36% and 7%, respectively. The analysis of the habitat included Road sites (23 spp., 34%), Mountain slope (15 spp., 19%), Wasteland (13 spp., 19%), moist area (6 spp., 9%), crop fields and the edge of a field (4 spp., 6%). Out of the 43 weed species *Ageratum conyzoides* L., *Oxalis corniculata* L., *Parthenium hysterophorus* L., *Solanum virginianum* L., *Urtica dioica* L. were common weeds showing maximum diversity in the study site. The current study was conducted to generate baseline data on the weeds along the Nag Tibba Trek it could serve as a manual for future weed identification and recognizing their diversity.

Keywords – APG-IV, Grade, Mussoorie, Ruderals, Weed diversity

Weeds are pernicious plants that grow luxuriantly and choke out other plants that have valuable nutritive properties. (Rautela *et al.* 2020). There are an estimated 8,000 weed species worldwide (Holm *et al.* 1979). Out of these, 250 weeds are particularly problematic for crops used in agriculture. These plants are not native to the area and can cause harm or damage to groups of native plants. Ruderals are weed plants that grow along roadsides, waste land etc. in undesirable places. In the early days of intentionally cultivating plants, the concept of a "weed" as an undesirable plant came about (Dangwal *et al.* 2012). Weeds are more aggressive and possess unique characteristics that make them highly competitive compared to other plants (Jim Blackburn 2008). Their ability to spread over long distances and reproduce in large numbers allows them to quickly take over an area, displacing native plant species.

Weeds are more adaptable and have unique traits compared to other plants, making them more competitive (Dangwal *et al.* 2010). As atmospheric CO_2 concentration increases, weeds grow more rapidly than other plant species (Ziska *et al.* 2004). Climate change provides an opportunity for invasive species to establish themselves in native ecosystems (Ziska *et al*. 2004). When climate change and invasive species act together, they become key factors in biodiversity loss and have serious adverse impacts on native biodiversity and ecosystems. Invasive noxious weeds show a larger growth in response to increased atmospheric CO_2 concentration compared to other plant species (Mainka *et al.* 2010). International collaboration is necessary for managing these weeds. Previously, the three main strategies for controlling weed management were preventive, regulated, and eradicative. To effectively tackle the challenges that weeds present, thorough and effective weed control strategies are necessary. Weed management includes various components such as biological, chemical, and allelopathic treatments, mechanical and manual techniques, as well as cultural, ecological, and agricultural approaches (Raj *et al.* 2018).

Study site

The study was conducted along the Naag Tibba route which comes under the Mussoorie Forest Division, which is in the Tehri Garhwal Himalayas. It lies between the latitudes 30°25.002 –30°33.00'N and longitudes 78°3.00'–078°15.00'E and represents a temperate forest. A field survey of the study area

Eco-Taxonomy Research Laboratory, Department of Botany, D.A.V. (P.G) College, Dehradun, Uttarakhand 248001, India

[Hemvati Nandan Bahuguna Garhwal (A Central University) Srinagar, Garhwal, Uttarakhand, India.]

* Corresponding author email: manishapandey614@gmail.com

was done from January 2021 to February 2022. January was the coldest month, and June was the hottest. The highest rainfall was recorded in July. The mean annual maximum temperature is 24.54°C, and the minimum temperature is 16.07°C.

The trek commenced at Pant Wadi Village, situated within the Devalsari Range (**Figure 1**) Naag Tibba, a constituent of the Jaunpur Range, is positioned at an elevation of 2700 m. A distance of 3 km was covered from Naag Tibba to Jhandi (**Figure 2**), which is located at an altitude of 3000 m.

Data collection

To document the flora of the study area, extensive field studies were conducted throughout the year 2021-22. The herbarium adhered to the standard procedures for collecting, preserving, and maintaining specimens (Jain and Rao 1977). To ensure a comprehensive collection, multiple attempts were made to collect plant specimens during various seasons, specifically targeting those in the flowering and fruiting stages. Additionally, field notes detailing the vernacular names, habits, habitat, flower colour, and the time of flowering and fruiting for each taxon were recorded alongside the plant collection. The collected weed species were cross-verified using authentic herbarium specimens from BSI Herbarium Dehradun, Northern Circle. Plant name citations were validated with the assistance of www.ipni.org.in. Recorded weed species were systematically categorized into different families, orders, and grades according to the APG-IV Grade system (Chase *et al.* 2016).

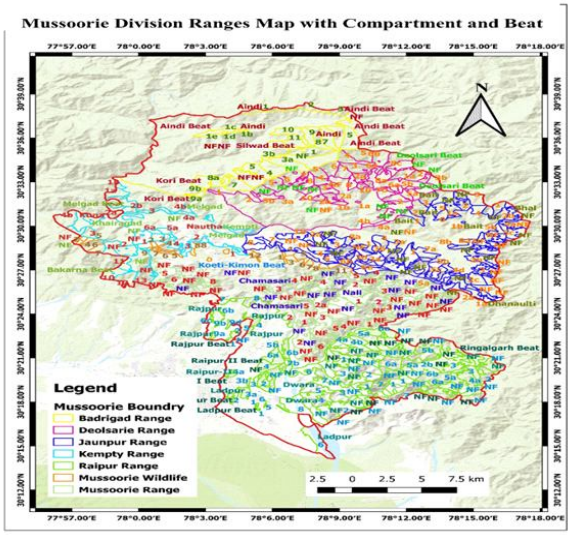

Figure 1. Study Site map

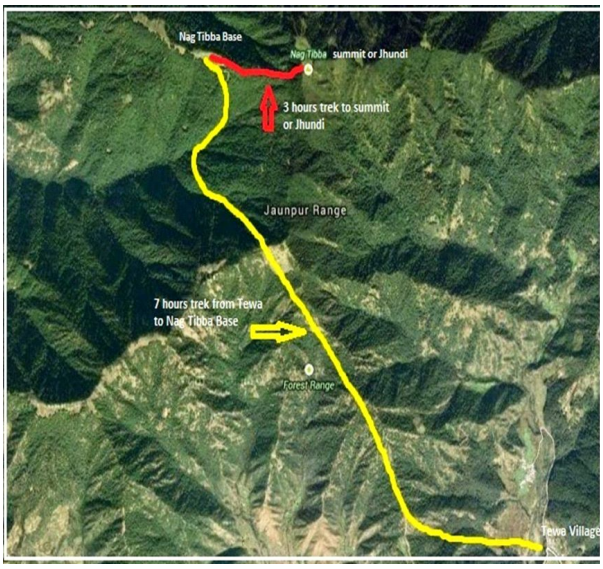

Figure 2. Trekking route of Naag Tibba and Jhandi

There was a total of 43 weed species (**Table 1**), divided into 37 genera, 22 Families, 14 APG-IV orders and (8) APG-Grades of Angiosperm Phylogeny Group-IV System were located at the study site.

The distribution of weed species reported 8 APG IV Grade. The most dominated were Garde Campanulids and supersterids with 10 families each followed by lamiids with 7 families, Fabids with 6 families, Commelinids with 5 families, Eudicots and Malvids with 2 families each and 1 family from Asterids Grades (**Figure 3**).

The distribution of weed species (14) reported weed APG-IV Order, their two dominated Order Asterales and Caryophyllales with 10 (25 %) families each followed by Poales with 5 (12%), Lamiids with 4 (10%), Rosales with 3 (8%), Rananculales and Solanales 2 (6%) each, and Brassicales, Ericales, Fabales, Gentianales, Geraniales, Malpighiales, Oxalidales with 1 (2%) each family.

Asteraceae was found to be the most dominant APG – IV family at the study =site contributing 11 (23%) species followed by Amaranthaceae with 5

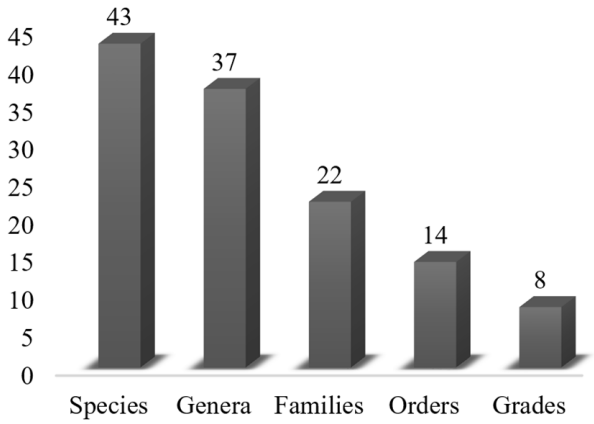

Figure 3. Complete distribution of the weed species

(14%) Poaceae and polygonaceae with 3 (7%), cyperaceae Plantaginaceae and Ranunculaceae with 2 (5%) species. The remaining families i.e., Primulaceae, Cannabinaceae, Brassicaceae, Rosaceae, Acanthaceae, Geraniaceae, Convolvulaceae, Verbenaceae, Oxalidaceae, Rubiaceae, Solanaceae, Caryophyllaceae, Fabaceae, Urticaceae, Violaceae contributed collectively 1 (2%) species each. (**Figure 4**).

During trekking observation revealed that most of the species were annual (24 spp., 57%) in occurrence to the study area followed by perennial (16 spp., 36%) and biennial (3spp., 7%). The number of the weed species that come from the highest herb were 41, and it was followed by 2 climber and 1 shrub. The analysis of the habitat comprised of as follows; roadside (23 spp., 34%), Mountain's slope (15 spp., 22%), wasteland (13 spp., 19%), moist area (6 spp.,9%), crop field and edges of field (4 spp., 6% each), dry place and all over (1 spp., 2%).

The plants collected from the study area are distributed based on their period of fruiting and flowering. The study revealed the maximum fruiting season is December and the minimum fruiting season is January and March (in these months no fruit was available on the studied weeds). The maximum flowering was found in March and the minimum flowering was in December month.

The present investigation is the first attempt from the study site to investigate and identify the primary Ruderals weeds. Additionally, this paper will

Table 1. Weed diversity along Naag- Tibba trek

Botanical Name	APG-IV Family	APG-IV Order	APG-IV Grade	Growth Form	Elevation	Life Forms	Habitat characteristics	Flowering and fruiting seasons
Achyranthes aspera L.	Amaranthaceae	Caryophyllales	Superasterids	H	1000-2000m	Bi	Dry place and Roadside	Aug-Dec.
Achyranthes bidentata Blume	Amaranthaceae	Caryophyllales	Superasterids	H	1200-2400m	Bi	Along roade side	Aug-Dec
Ageratum conyzoides L.	Asteraceae	Asterales	Campanulids	H	up to 900m	An	Along the side and wasteland	Sept-Oct.
Amaranthus tricolor L.	Amaranthaceae	Caryophyllales	Superasterids	H	up to 1000m	An	fields, along roadsides	Aug-Nov.
Amaranthus viridis L.	Amaranthaceae	Caryophyllales	Superasterids	H	600-1000m	An	fields, along roadsides	Jan-Dec.
Lysimachia arvensis (L.) U.Manns & Anderb.	Primulaceae	Ericales	Asterids	H	600-1000m	An	fields, along roadsides	Jul-Aug
Artemisia nilagirica (C.B.Clarke) Pamp.	Asteraceae	Asterales	Campanulids	H	Up to 2400m	An	Road Side, Waste land, Mountains	Jul- Sep
Avena fatua L.	Poaceae	Poales	Commelinids	H	Up to 2000m	An	Crop field	Apr-May
Bidens pilosa L.	Asteraceae	Caryophyllales	Superasterids	H	Up to 2500m	An	Road side, mountain slopes	Mar-Aug
Cannabis sativa L.	Cannabaceae	Rosales	Fabids	H	800- 3000m	Pe	Road Side, Waste land, Mountains	Jul-Sep
Cardamine impatiens L.	Brassicaceae	Brassicales	Malvids	H	1700-3000m	Bi	Moist area	Mar-jul
Chenopodium album L.	Amaranthaceae	Caryophyllales	Superasterids	H	up to 2500m	An	growing in waste sites, farmland	Jan-Dec.
Erigeron bonariensis L.	Asteraceae	Asterales	Campanulids	H	up to 2000m	An	Along road side	Feb- Sept.
Erigeron canadensis L.	Asteraceae	Asterales	Campanulids	H	up to 2000m	An	Along road side	Feb- Sept.
Cynodon dactylon (L.) Pers.	Poaceae	Poales	Commelinids	H	up to 3000m	Pe	Road Side, Waste land, Mountains	Apr-Jul
Cyperus compressus L.	Cyperaceae	Poales	Commelinids	H	900- 1200m	Pe	Road side, mountain slopes	Jul-Nov
Cyperus rotundus L.	Cyperaceae	Poales	Commelinids	H	900-1200m	Pe	Road side, mountain slopes	Jul-Dec.
Dicliptera bupleuroides Nees	Acanthaceae	Lamiales	Lamiids	H	Up to 2200m	An	Road side, mountain slopes	Jan-Dec
Potentilla indica (Andrews) Th.Wolf	Rosaceae	Rosales	Fabids	H	Up to 1800m	Pe	Moist area.	Mar-Sept
Eleusine indica (L.) Gaertn.	Poaceae	Poales	Commelinids	H	up to 2300m	An	Waste field and Road side	Jul-Nov
Erigeron annuus (L.) Desf	Asteraceae	Asterales	Campanulids	H	up to 3000m	An	Road side, edges of mountains	Jun-Dec
Ageratina adenophora (Spreng.) R.M.King & H.Rob.	Asteraceae	Asterales	Campanulids	H	up to 3000m	Pe	Road side, mountain slopes	Feb-Aug
Galinsoga parviflora Cav.	Asteraceae	Asterales	Campanulids	H	up to 2000m	An	Road side	Apr-Oct
Geranium ocellatum Jacquem. ex Cambess.	Geraniaceae	Geraniales	Malvids	H	up to 1800m	An	Road side	Mar- Apr
Ipomoea nil (L.) Roth	Convolvulaceae	Solanales	Lamiids	CL	up to 1800m	An	Road side, mountain slopes	Mar-Dec
Lantana camara L.	Verbenaceae	Lamiales	Lamiids	S	up to 2000m	An	waste land, road side.	Jan-Dec
Oxalis corniculata L.	Oxalidaceae	Oxalidales	Fabids	H	up to 3000m	Pe	agricultural fields	Feb-Nov
Parthenium hysterophorus L.	Asteraceae	Asterales	Campanulids	H	up to 2500m	An	fields, along roadsides	Jan-Dec
Plantago major L.	Plantaginaceae	Lamiales	Lamiids	H	900-2500m	Pe	fields, along roadsides	Apr-Oct
Persicaria barbata (L.) H.Hara	Polygonaceae	Caryophyllales	Superasterids	H	1600-1700m	Pe	Moist area and Hill	Jun-Dec
Persicaria maculosa Gray	Polygonaceae	Caryophyllales	Superasterids	H	1600- 1900m	An	Moist area and Hill	Feb-Nov
Ranunculus muricatus L.	Ranunculaceae	Ranunculales	Eudicots	H	1000-2500m	An	Edges of fields	Mar- Jun
Rubia cordifolia L.	Rubiaceae	Gentianales	Lamiids	CL	1000-2000m	Pe	Mountain slopes	Jul-Nov
Rumex hastatus D.Don	Polygonaceae	Caryophyllales	Superasterids	H	800- 2400m	Pe	Road side and Edges of fields	Feb- Oct
Solanum virginianum L.	Solanaceae	Solanales	Lamiids	H	up to 2000m	An	Road side	Nov-May
Stellaria media (L.) Vill.	Caryophyllaceae	Caryophyllales	Superasterids	H	900-2500m	An	Moist area, Edges of fields	May- Oct
Taraxacum sect. Taraxacum F.H.Wigg.	Asteraceae	Asterales	Campanulids	H	up to 1000m	Pe	road side and waste field	Feb-Oct
Thalictrum foliolosum DC.	Ranunculaceae	Ranunculales	Eudicots	H	1000-3000m	Pe	Hill	Jun-Oct
Tridax procumbens L.	Asteraceae	Asterales	Campanulids	H	1000-2000m	Pe	Field, crop land and road side	Jan-Dec
Trifolium repens L.	Fabaceae	Fabales	Fabids	H	900 -2200m	Pe	Waste field	Jan-Dec
Urtica dioica L.	Urticaceae	Rosales	Fabids	H	Up to 2500m	An	Found all over	Mar- Nov
Veronica persica Poir.	Plantaginaceae	Lamiales	Lamiids	H	Up to 2000m	An	Moist area, Edges of fields	Nov-Feb
Viola pilosa Blume	Violaceae	Malpighiales	Fabids	H	900- 3000m	Pe	Edges of field, grasslands	Mar- Jul

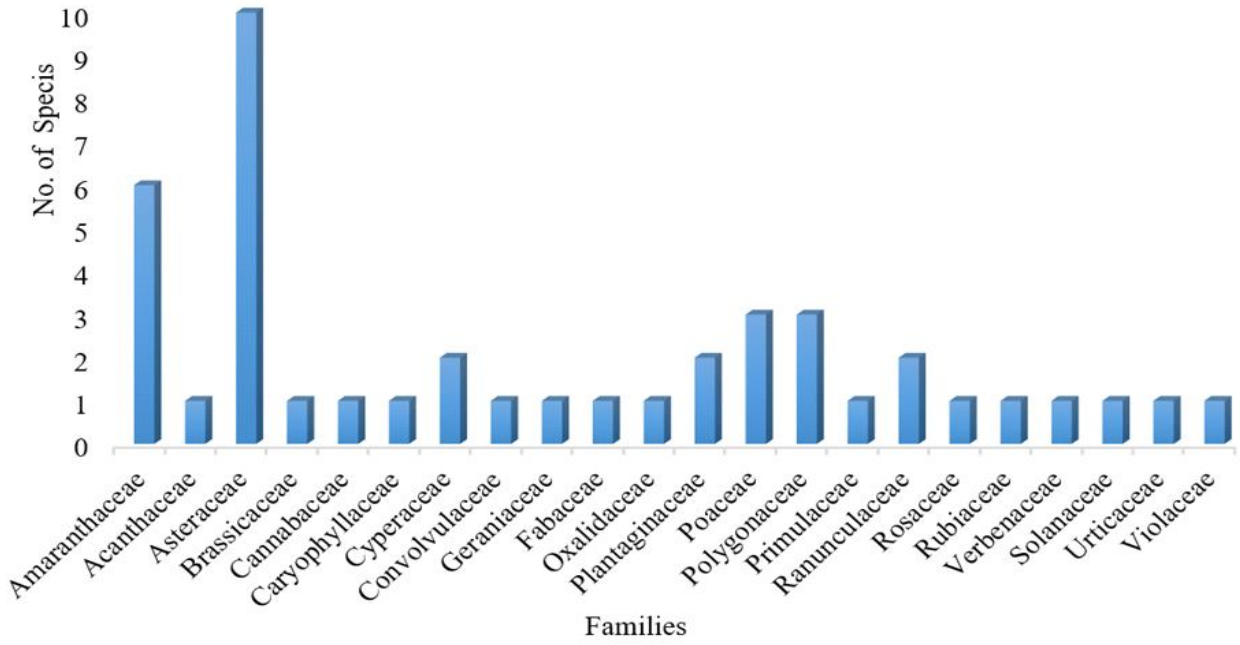

Figure 4. Representing the number of weed species in each family

serve as a guide for identifying and recognizing Ruderals weeds in future. Farmers may find it useful to identify weeds to create an effective control strategy. It will be valuable for researchers as well as those working in grades APG–IV.

REFERENCES

Dangwal LR, Singh A and Sharma A. 2012. Major weeds of rabi crops in block Chamba district Tehri Garhwal (Uttarakhand) India. *Journal of Plant Development Sciences* **4**(2): 201–205.

Dangwal LR, Singh A, Singh T and Sharma C. 2010. Effect of weeds on the yield of wheat crop in Tehsil Nowshera. *Journal of American Sciences* **6**(10): 405–407.

Holm L, Pancho JV, Herberger JP and Plucknett DL. 1979. *A Geographical Atlas of World Weeds*. John Wiley and Sons, 1391p.

http://uttarakhandexplorer.blogspot.com/2015/03/nagtibba-trek-1213-th-march2015-iam_13.html.

https://en.wikipedia.org/wiki/Weed.

Jain SK and Rao RR. 1976. *A Handbook of Field and Herbarium Methods*. Today and Tomorrow's Printers and Publishers, New Delhi, 157p.

Chase MW, Christenhusz MJM, Fay MF, Byng JW, Judd WS, DE Soltis, Mabberley DJ, Sennikov AN, Soltis PS and Stevens PF. 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Botanical Journal of the Linnean Society* 181(1): 1–20. https://doi.org/10.1111/boj.12385

Mainka SA and Howard GW. 2010. Climate change and invasive species: double jeopardy. *Integrative Zoology* **5**(2):102–111.

Raj R, Das TK, Kaur R, Singh R and Shekhawat K. 2018. Invasive noxious weed management research in India with special reference to *Cyperus rotundus, Eichhornia crassipes* and *Lantana camara*. *Indian Journal of Agricultural Sciences* **88**(2):181–196.

Rautela B and Tiwari P. 2020. Weed flora of district Rudraprayag, Uttarakhand, India. *International Journal of Botany Studies* **5**(6): 361–367.

Ziska LH and George K. 2004. Rising carbon dioxide and invasive, noxious plants: potential threats and consequences. *World Resource Review***16**(4): 427–447.