



## Diversity and utilization of weed flora in Nainital district, Western Himalaya

Naveen Ch Pandey<sup>1</sup>, Neha Chopra<sup>2</sup>, G. C. Joshi<sup>3</sup>, Lalit M. Tewari<sup>4</sup>, Geeta Tewari<sup>5</sup>

<sup>1, 2, 4</sup> Department of Botany, D.S.B. Campus, Kumaun University, Nainital, India

<sup>3</sup> Regional Ayurvedic Research Institute, (RARI) CCRAS, Thapla, Ranikhet, Uttarakhand, India

<sup>5</sup> Department of Chemistry, D.S.B. Campus, Kumaun University, Nainital, India

### Abstract

Weed identification is useful for determining their importance and harmfulness in crop production system. Present study aimed to describe the diversity and utilization of weeds in Nainital district, Western Himalaya. A total of 157 species belonging to 118 genera and 35 families were recorded. Asteraceae, Fabaceae, Poaceae, Amaranthaceae, Cyperaceae, Lamiaceae, Polygonaceae, Brassicaceae, Caryophyllaceae, Euphorbiaceae and Rubiaceae were the dominant families. The majority of the weed species were used for fodder (101 species) followed by edible (24 spp.), medicinal (13 spp.) and religious (4 spp.) purpose. For each species, botanical and local names, life form, habit, flowering and fruiting period and utilization pattern were provided.

**Keywords:** Weeds, diversity, utilization pattern, Nainital district, Western Himalaya

### 1. Introduction

Weeds are described as unwanted plants that grow in between agricultural crops. The presence of these plants declines the yield of crops due to their competition with other plant species for sunlight, space, nutrients etc. (Dangwal *et al.*, 2010a; Khobragade and Sathawane, 2014) <sup>[5, 18]</sup>. They show allelopathic effects on agricultural crops and inhibit the production of agricultural crops (Oudhia and Tripathi, 1997; 1998) <sup>[24, 25]</sup>. Weeds have special characteristics for adaptation as they survive almost in any environmental conditions (Kasera, 1988) <sup>[17]</sup>. In the world, there are approximately 250 common, dominant and wide spread weed species in the crop fields (Holm *et al.*, 1977) <sup>[13]</sup>. The structure and composition of the native vegetation are affected by the invasive weeds (Pysek and Richardson, 2007; Muhammad *et al.*, 2009) <sup>[28, 21]</sup>.

In the world, the major weed floras belong to certain families like Amaranthaceae, Asteraceae, Fabaceae and Poaceae (Dangwal *et al.*, 2010b) <sup>[6]</sup>. Agro-climatic conditions, altitudinal range and cropping system are the key components that affect the diversity of weed flora of a particular region (Dangwal *et al.*, 2011) <sup>[7]</sup>. A number of studies have been conducted on the weed flora from different regions of Uttarakhand (Pangtey *et al.*, 1982; Melkania and Singh, 1983 a, b; Joshi *et al.*, 1988; Pangtey *et al.*, 1996; Agarwal *et al.*, 1997; Agarwal *et al.*, 1998; Dobhal *et al.*, 2006; Gupta *et al.*, 2008; Dangwal *et al.*, 2011; Tiwari *et al.*, 2016; Chopra *et al.*, 2017; Bisht, 2017; Oli *et al.*, 2018) <sup>[26, 19, 20, 15, 27, 1, 2, 8, 12, 7, 32, 4, 3, 23]</sup>. With this background, the present study was undertaken to achieve the diversity of weed flora in Nainital district, Western Himalaya.

### 2. Material and methods

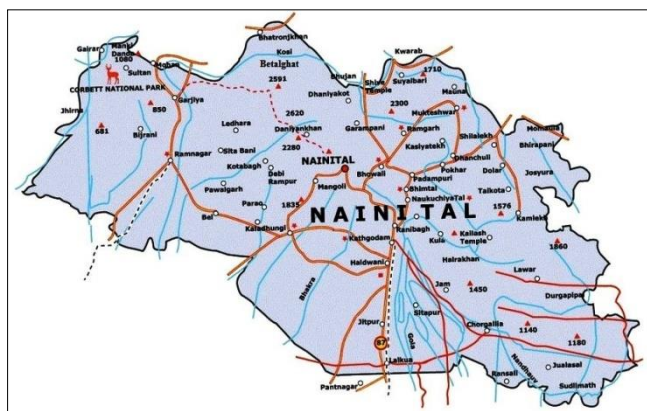
#### 2.1 Study area and its geographical distribution

The present study was done in district Nainital (Year 2016-2018), lies between 29°5'-29°36' North latitude and 78°50'-79°30' East longitude, covering an area of 4064.14 Km<sup>2</sup> with an

altitudinal range of 300-2700 m asl (Figure 1). In the north, the district is surrounded by district Almora, in the south, by district Udham Singh Nagar, in the west by district Pauri Garhwal and in the east by district Champawat. The district is divided into two zones geographically viz. Hilly and Bhabar. Baudhansthal is the highest peak of the district 2623 mts. high near Binayak adjoining Nainital town. The hilly region of the district used to have big and small lakes Bhimtal, Nainital, Naukuchital, Khurpatal, Malwatal, Lokhamtal; Sattal etc. are known lakes of bigger size. The foothill area of the district is known as Bhabhar. Kosi is the main river of the district flowing on the western side of the district. There are number of smaller rivulets like Gaula, Bhakhra, Dabka and Baur flowing southwards.

#### 2.2 Collection of weed species

The study was conducted in eight sites namely Betalghat, Bhowali, Garampani, Haldwani, Lalkuan, Nainital, Ramgarh and Ramnagar of Nainital district. Participatory Rural Appraisal (PRA) tools were used to collect the information. The herbariums were prepared following the method of Jain and Rao (1976) <sup>[14]</sup>. The collected plant specimens were identified with the help of different floras and available literatures (Gupta, 1968; Naithani, 1984-1985; Gaur, 1999; Joshi *et al.*, 2018) <sup>[11, 22, 10, 16]</sup>. The species are arranged in alphabetical order and families are updated on the basis of tropicos <sup>[34]</sup>. For each species, botanical and local names, life forms, habit, flowering and fruiting time and utilization (Fodder, edible, medicinal and religious) were provided. The well-preserved plant specimens were deposited in the Herbarium of Department of Botany, D.S.B. Campus, Kumaun University, Nainital (Table 1).



Source: <http://www.uttaranchal.org.uk>

Fig 1: Map of the study area

### 3. Results and Discussion

Weed identification are useful for determining their importance and harmfulness in crop production systems (Thomas 1985; Frick and Thomas, 1992) [33,9]. The present study recorded 157 species belonging to 118 genera and 35 families. Out of 35 families, 11 dominant families were Asteraceae (28 spp.), followed by Fabaceae (17 spp.), Poaceae (17 spp.), Amaranthaceae (11 spp.), Cyperaceae (8 spp.), Lamiaceae (8 spp.), Polygonaceae (8 spp.), Brassicaceae (5 spp.), Caryophyllaceae (4 spp.), Euphorbiaceae (4 spp.) and Rubiaceae (4 spp.) (Figure 2). *Cyperus* and *Euphorbia* were the dominant genera (4 spp.) followed by *Conyza*, *Crotalaria*, *Eragrostis* and *Persicaria* (3 spp. each), *Achyranthes*, *Ageratum*, *Amaranthus*, and *Chenopodium* (2 spp. each). The majority of weed species were used for fodder purposes (101 spp.) followed by edible (24 spp.), medicinal (13 spp.), and religious (4 spp.) (Table 1; Figure 3). Annuals comprised about 66% (102 spp.) and the remaining were perennials.

The weed flora was indigenous as well as some exotic weed species like *Eupatorium adenophorum* Spreng., *Parthenium hysterophorus* L., and *Lantana camara* L., which infested the larger area of study. These are well known weeds infesting in many countries (Williams and Grovers, 1980) [35]. Earlier, Joshi *et al.*, (1988) [15] have reported 164 species of weed belonging to 39 families from saffron farming, Ranikhet (Almora). Singh *et al.*, (2007) [30] reported 116 species of weeds belonging to 3 monocot and 27 dicot families in wheat fields of Rajauri district,

Jammu and Kashmir. Gupta *et al.*, (2008) [12] reported 151 weed species belonging to 118 genera and 31 families from Doon valley, Uttarakhand. Dangwal *et al.*, (2011) [7] reported 72 species of weed belonging to 56 genera and 27 families from S.R.T. Campus, Theri Garhwal. The seasonal diversity of weeds of Chunkatta and Bhilai area of Chhattisgarh, India were studied by Shrivastava *et al.*, (2014) [29] and recorded 46 species of weed belonging to 42 genera and 21 families. Tiwari *et al.*, (2014) [31] reported 69 species of weed belonging to 57 genera and 22 families from Bilaspur district, Chhattisgarh and Tiwari *et al.*, (2016) [32] reported 107 species of weed from Bharsar, Pauri Garhwal (Uttarakhand), India.

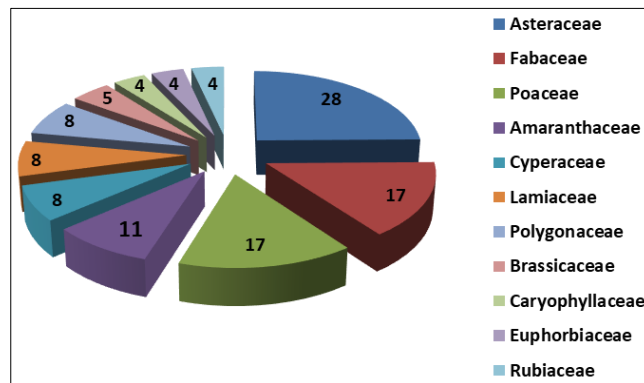


Fig 2: The distribution pattern of weed species among different families

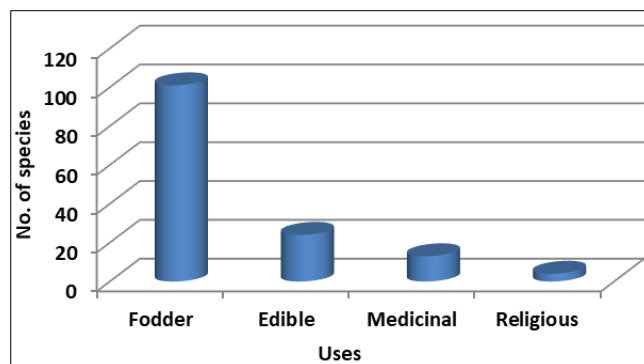


Fig 3: Utilization pattern of collected weed species

Table 1: Diversity and utilization of weed flora in Nainital district, Western Himalaya

S. No.	Local Name	Botanical Name	Family	Life Form	Habit	Fl. & Fr. Time	Uses	Voucher No
1.	Saji	<i>Achyranthes aspera</i> L.	Amaranthaceae	H	P	Sep-Mar	Fo	NP153
2.	Chirchira	<i>Achyranthes bidentata</i> Blume.	Amaranthaceae	H	P	Aug-Nov	Fo	NP184
3.	-	<i>Aerva sanguinolenta</i> (L.) Blume.	Amaranthaceae	H	P	Aug-May	Fo	NP100
4.	Bhubani Jahr	<i>Ageratum conyzoides</i> L.	Asteraceae	H	A	Jan-Dec	M	NP101
5.	Bhubani Jahr	<i>Ageratum houstonianum</i> Mill	Asteraceae	H	A	Aug-Sep	-	NP102
6.	Ratpati	<i>Ajuga parviflora</i> Benth.	Lamiaceae	H	A	Feb-Apr	M	NP106
7.	-	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Amaranthaceae	H	A	Mar-Dec	-	NP108
8.	-	<i>Alysicarpus vaginalis</i> (L.) DC.	Fabaceae	H	A	Aug-Oct	Fo	NP109
9.	Jangali Chua	<i>Amaranthus spinosus</i> L.	Amaranthaceae	H	A	Aug-Oct	Fo, Ed	NP129
10.	Sagoti	<i>Amaranthus viridis</i> L.	Amaranthaceae	H	A	Jan-Dec	Fo, Ed	NP130
11.	-	<i>Anagallis arvensis</i> L.	Primulaceae	H	A	Feb-Apr	Fo	NP131
12.	Bakol	<i>Anaphalis busua</i> (Buch.-Ham. ex D. Don) DC.	Asteraceae	H	A	Jul-Nov	M	NP180
13.	Bakol	<i>Anaphalis contorta</i> (D.Don) Hook.f.	Asteraceae	H	A	Jul-Nov	-	NP121

14.	Char Ghas	<i>Apluda mutica</i> L.	Poaceae	H	P	Aug-Oct	Fo	NP103
15.	–	<i>Arabidopsis thaliana</i> (L.) Heynh.	Brassicaceae	H	A	Mar-Apr	–	NP104
16.	–	<i>Argemone maxicana</i> L.	Papaveraceae	H	A	Feb-Jul	–	NP111
17.	Pati	<i>Artemisia nilagirica</i> (Cl.) Pamp.	Asteraceae	H	P	Aug-Nov	Fo, M, Re	NP112
18.	Jawat	<i>Avena fatua</i> L.	Poaceae	H	A	Feb-Apr	Fo	NP116
19.	Kumraiya	<i>Bidens biternata</i> (Lour.) Merr. & Sherff	Asteraceae	H	A	Jul-Oct	Fo,	NP118
20.	Kumraiya	<i>Bidens pillosa</i> L.	Asteraceae	H	A	Aug-Oct	Fo	NP119
21.	–	<i>Blumea mollis</i> (D. Don) Merr.	Asteraceae	H	A	Feb-Jun	–	NP120
22.	–	<i>Bupleurum hamiltonii</i> Balak.	Apiaceae	H	A	Jul-Nov	Fo	NP136
23.	–	<i>Campanula pallida</i> Wall.	Campanulaceae	H	P	Jan-Nov	–	NP137
24.	Bhang	<i>Cannabis sativa</i> L.	Cannabaceae	H	P	Sep-Oct	Ed, Re	NP138
25.	Katri	<i>Capsella bursa-pastoris</i> (L.) Medik.	Brassicaceae	H	A	Jan-Dec	Fo, Ed	NP139
26.	Methi Jhar	<i>Cardamine impatiens</i> L.	Brassicaceae	H	A	Sep-Mar	Fo	NP159
27.	–	<i>Carex nubigena</i> Tilloch & Taylor	Cyperaceae	H	P	Aug-Dec	–	NP165
28.	–	<i>Cassia mimosoides</i> L.	Fabaceae	H	A	Aug-Oct	Fo	NP173
29.	Banar	<i>Cassia tora</i> L.	Fabaceae	H	A	Apr-Dec	Fo, Ed	NP179
30.	Gadrya	<i>Celosia argentea</i> L.	Amaranthaceae	H	A	Aug-Nov	Fo, Ed	NP186
31.	Bathua	<i>Chenopodium album</i> L.	Amaranthaceae	H	A	Jan-Dec	Fo, Ed	NP189
32.	Jangli Bathua	<i>Chenopodium ambrosioides</i> L.	Amaranthaceae	H	A	Jan-Dec	–	NP208
33.	Jangli Bathua	<i>Chenopodium botrys</i> L.	Amaranthaceae	H	A	Jan-Dec	–	NP98
34.	Jakhia	<i>Cleome viscosa</i> L.	Cleomaceae	H	A	Aug-Oct	Fo, Ed	NP229
35.	–	<i>Clinopodium umbrosum</i> (M. Bieb.) C. Koch	Lamiaceae	H	P	Jun-Sep	Fo	NP234
36.	Kanya	<i>Commelina benghalensis</i> L.	Commelinaceae	H	A	Aug-Sep	Fo, Ed	NP235
37.	Kanya	<i>Commelina diffusa</i> Burm.f.	Commelinaceae	H	A	Aug-Sep	Fo	NP238
38.	–	<i>Conyza bonariensis</i> (L.) Cronq.	Asteraceae	H	A	May-Oct	Fo	NP239
39.	–	<i>Conyza canadensis</i> (L.) Cronq.	Asteraceae	H	A	May-Oct	Fo	NP241
40.	–	<i>Conyza stricta</i> Willd.	Asteraceae	H	A	Jul-Oct	–	NP246
41.	–	<i>Crepis foetida</i> L.	Asteraceae	H	A	Apr-Sep	–	NP252
42.	–	<i>Crotalaria bialata</i> Schrank.	Fabaceae	H	A	Aug-Dec	Fo	NP253
43.	–	<i>Crotalaria calycina</i> Schrank.	Fabaceae	H	A	Aug-Sep	–	NP125
44.	–	<i>Crotalaria prostrata</i> Rottl. ex Willd.	Fabaceae	H	P	Jul-Sep	–	NP144
45.	Doob Ghas	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	H	P	Sep-Oct	Fo, Re, M	NP114
46.	–	<i>Cynoglossum lanceolatum</i> Forsk.	Boraginaceae	H	A	Jul-Oct	–	NP124
47.	–	<i>Cyperus compressus</i> L.	Cyperaceae	H	A	Aug-Sep	Fo	NP190
48.	–	<i>Cyperus iria</i> L.	Cyperaceae	H	A	Aug-Sep	Fo	NP191
49.	–	<i>Cyperus pilosus</i> Vahl	Cyperaceae	H	P	Jul-Sep	Fo	NP122
50.	–	<i>Cyperus rotundus</i> L.	Cyperaceae	H	P	Jul-Dec	Fo	NP251
51.	–	<i>Dactyloctenium aegyptium</i> (L.) P. Beauv.	Poaceae	H	A	Aug-Oct	Fo	NP123
52.	Datura	<i>Datura stramonium</i> L.	Solanaceae	H	P	Jun-Sep	M	NP155
53.	Sakina	<i>Desmodium heterocarpon</i> (L.) DC.	Fabaceae	Sh	P	Aug-Dec	Fo	NP230
54.	Sakina	<i>Desmodium podocarpum</i> DC.	Fabaceae	Sh	P	Aug-Oct	Fo	NP231
55.	Kawgori	<i>Dicliptera bupleuroides</i> Nees.	Acanthaceae	H	P	Mar-Sep	Fo, M	NP237
56.	–	<i>Digitaria setigera</i> Roth ex Roem. & Schult.	Poaceae	H	A	Aug-Oct	Fo	NP132
57.	–	<i>Drymaria cordata</i> (L.) Willd. ex Roem. & Schult.	Caryophyllaceae	H	A	Feb-Oct	Fo	NP134
58.	Bhikafal	<i>Duchesnea indica</i> (Andr.) Focke.	Rosaceae	H	P	Mar-Jun	Fo, Ed	NP135
59.	–	<i>Echinochloa colona</i> L.	Poaceae	H	A	Jul-Oct	Fo	NP182
60.	–	<i>Echinochloa crus-galli</i> (L.) P. Beauv.	Poaceae	H	A	Jul-Oct	Fo	NP183
61.	Bhringraj	<i>Eclipta prostrata</i> (L.) L.	Asteraceae	H	A	Mar-Jul	M	NP126
62.	–	<i>Eleocharis congesta</i> D. Don	Cyperaceae	H	P	Aug-Sep	–	NP145
63.	Jharwa	<i>Eleusine indica</i> (L.) Gaertn	Poaceae	H	A	Sep-Oct	Fo	NP146
64.	–	<i>Eragrostis nigra</i> Nees ex Steud.	Poaceae	H	P	Jul-Sep	–	NP147
65.	–	<i>Eragrostis pilosa</i> (L.) P. Beauv.	Poaceae	H	A	Jul-Sep	–	NP148
66.	–	<i>Eragrostis tenella</i> (L.) P. Beauv.	Poaceae	H	A	Jul-Sep	–	NP160
67.	Kala Bansa	<i>Eupatorium adenophorum</i> Spreng.	Asteraceae	H	P	Mar-Aug	Fo	NP170
68.	Dhudhi	<i>Euphorbia heterophylla</i> L.	Euphorbiaceae	H	A	Aug-Sep	Fo	NP193
69.	Dhudhi	<i>Euphorbia hirta</i> L.	Euphorbiaceae	H	A	May-Aug	Fo, M	NP166
70.	Dhudhi	<i>Euphorbia hypericifolia</i> L.	Euphorbiaceae	H	A	Jul-Nov	Fo	NP167
71.	Dhudhi	<i>Euphorbia prolifera</i> Buch.-Ham. ex D. Don	Euphorbiaceae	H	A	Mar-Jun	Fo	NP168
72.	–	<i>Fimbristylis dichotoma</i> (L.) Vahl	Cyperaceae	H	P	Aug-Nov	–	NP169
73.	–	<i>Flemingia strobilifera</i> (L.) R. Br.	Fabaceae	Sh	A	Aug-Oct	Fo	NP107
74.	Pittaphra	<i>Fumaria indica</i> (Hausskn.) Pugsley.	Papaveraceae	H	A	Jan-Mar	Fo	NP127
75.	Marchi Ghas	<i>Galinsoga parviflora</i> Cav.	Asteraceae	H	A	Aug-Nov	Fo	NP128
76.	Kuri	<i>Galium asperifolium</i> Wall. ex Roxb.	Rubiaceae	Sh	P	Jul-Sep	Fo	NP140
77.	–	<i>Galium elegans</i> Wall. ex Roxb.	Rubiaceae	H	A	Jul-Sep	Fo	NP141

78.	–	<i>Geranium nepalense</i> Sweet.	Geraniaceae	H	P	May-Sep	Fo	NP142
79.	–	<i>Geranium ocellatum</i> Camb.	Geraniaceae	H	A	Mar-Apr	Fo	NP151
80.	–	<i>Girardinia diversifolia</i> (Link.) Friis	Urticaceae	H	P	Aug-Sep	–	NP152
81.	–	<i>Gnaphalium luteoalbum</i> L.	Asteraceae	H	A	Aug-Oct	–	NP171
82.	–	<i>Gomphrena celosioides</i> Mart.	Amaranthaceae	H	A	Mar-Dec	–	NP188
83.	–	<i>Hedyotis corymbosa</i> (L.) Lam.	Rubiaceae	H	A	Sep-Oct	Fo	NP199
84.	–	<i>Ipomoea eriocarpa</i> R.Br.	Convulvulaceae	H	A	Sep-Dec	–	NP99
85.	–	<i>Ipomoea pes-tigridis</i> L.	Convulvulaceae	H	A	Sep-Dec	Fo	NP200
86.	–	<i>Ipomoea purpurea</i> (L.) Roth.	Convulvulaceae	H	A	Aug-Dec	Fo	NP232
87.	–	<i>Justicia diffusa</i> Will.	Acanthaceae	H	P	Mar-Sep	Fo	NP242
88.	–	<i>Kohautia coccinea</i> Royle	Rubiaceae	H	A	Jul-Sep	–	NP249
89.	–	<i>Lactuca dissecta</i> D. Don	Asteraceae	H	A	Apr-Oct	Fo	NP250
90.	Kuri	<i>Lantana camara</i> L.	Verbenaceae	Sh	P	Most part of the year.	–	NP254
91.	–	<i>Lathyrus aphaca</i> L.	Fabaceae	H	A	Feb-May	Fo	NP176
92.	–	<i>Launaea procumbens</i> (Roxb.) Ramayya & Rajagopal	Asteraceae	H	P	Feb-May	Fo	NP177
93.	Halan	<i>Lepidium sativum</i> L.	Brassicaceae	H	A	Jun-Oct	Fo, Ed	NP105
94.	–	<i>Lepidium virginicum</i> L.	Brassicaceae	H	A	Jun-Nov	Fo, Ed	NP133
95.	–	<i>Leucas cephalotes</i> (Roth) Spreng.	Lamiaceae	H	A	Aug-Sep	Fo	NP202
96.	–	<i>Leucas lanata</i> Benth.	Lamiaceae	H	P	May-Jul	Fo, M	NP192
97.	–	<i>Lipocarpha chinensis</i> (Osbeck) Kern	Cyperaceae	H	P	Sep-Dec	–	NP195
98.	–	<i>Lolium temulentum</i> L.	Poaceae	H	P	Feb-Apr	Fo	NP201
99.	–	<i>Lysimachia alternifolia</i> Wall.	Primulaceae	H	A	Jul-Oct	–	NP205
100.	–	<i>Malva parviflora</i> L.	Malvaceae	H	A	May-Dec	–	NP214
101.	–	<i>Mazus pumilus</i> (Burm. f.) Steen.	Mazaceae	H	A	Mar-Jun	Fo	NP197
102.	–	<i>Medicago lupulina</i> L.	Fabaceae	H	A	Mar-Sep	Fo	NP228
103.	Banmethi	<i>Melilotus indica</i> (L.) All.	Fabaceae	H	A	Mar-May	Fo	NP243
104.	–	<i>Micromeria biflora</i> (Buch.-Ham. ex D.Don.) Benth.	Lamiaceae	H	P	Mar-Sep	–	NP198
105.	–	<i>Nepeta leucophylla</i> Benth.	Lamiaceae	H	P	Jul-Oct	–	NP204
106.	Roseberi	<i>Nicandra physalodes</i> (L.) Gaertner.	Solanaceae	H	A	Jul-Sep	Fo, Ed	NP206
107.	–	<i>Oenothera roesa</i> L. Herit. ex Aiton	Onagraceae	H	P	Apr-Sep	–	NP207
108.	Vantulsi	<i>Origanum vulgare</i> L.	Lamiaceae	H	P	Aug-Oct	M	NP115
109.	Chalmori	<i>Oxalis corniculata</i> L.	Oxalidaceae	H	P	Jan-Dec	Fo, Ed	NP172
110.	Chalmori	<i>Oxalis dehradunensis</i> Raizada	Oxalidaceae	H	P	Jul-Sep	Fo, Ed	NP213
111.	Gajar Ghas	<i>Parthenium hysterophorus</i> L.	Asteraceae	H	A	Aug-Sep	–	NP247
112.	–	<i>Persicaria capitata</i> (Buch.-Ham. ex D. Don) H. Gross	Polygonaceae	H	P	Mar-Jun	Fo	NP248
113.	–	<i>Persicaria hydropiper</i> (L.) Spach.	Polygonaceae	H	A	Aug-Sep	–	NP113
114.	–	<i>Persicaria nepalensis</i> (Meisner) H. Gross	Polygonaceae	H	A	Jul-Sep	Fo	NP117
115.	Gulidanda	<i>Phalaris minor</i> Retz.	Poaceae	H	A	Feb-Jun	Fo	NP143
116.	Luhurya	<i>Plantago erosa</i> Wall.	Plantaginaceae	H	P	Jun-Oct	Fo	NP149
117.	–	<i>Plectranthus mollis</i> (Aiton) Sprengel.	Lamiaceae	H	A	Aug-Sep	–	NP154
118.	–	<i>Poa annua</i> L.	Poaceae	H	A	Jan-Jun	Fo	NP157
119.	–	<i>Polygala persicariifolia</i> DC.	Polygalaceae	H	A	Jul-Oct	–	NP158
120.	–	<i>Polygonum plebeium</i> R. Br.	Polygonaceae	H	P	Aug-Sep	Fo	NP161
121.	–	<i>Polygonum recumbens</i> Royle ex Bab.	Polygonaceae	H	P	Aug-Sep	Fo	NP162
122.	Kulfa	<i>Portulaca oleracea</i> L.	Portulacaceae	H	A	Jul-Oct	Fo, Ed	NP163
123.	–	<i>Potentilla sundaica</i> (Blume) O. Kuntze.	Rosaceae	H	A	Jun-Oct	Fo	NP164
124.	–	<i>Pouzolzia hirta</i> (Blume) Hassk	Urticaceae	H	P	Jul-Sep	Fo	NP194
125.	Chambul	<i>Ranunculus arvensis</i> L.	Ranunculaceae	H	A	Jan-Apr	Fo	NP212
126.	Shim	<i>Ranunculus sceleratus</i> L.	Ranunculaceae	H	A	Jan-Mar	Fo	NP215
127.	Bhilmora	<i>Rumex hastatus</i> D. Don	Polygonaceae	H	P	Mar-Jun	Fo, Ed	NP226
128.	Jangali Palak	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	H	P	Apr-Jun	Fo, Ed	NP227
129.	Jangoli Koni	<i>Setaria glauca</i> (L.) P. Beauv.	Poaceae	H	A	Jan-Jun	Fo	NP236
130.	–	<i>Setaria verticillata</i> (L.) P. Beauv.	Poaceae	H	A	Jul-Oct	Fo	NP216
131.	–	<i>Sida cordata</i> (Burm.f.) Borss. Waalk.	Malvaceae	H	A	Sep-Dec	–	NP209
132.	Lickura	<i>Siegesbeckia orientalis</i> L.	Asteraceae	H	A	Aug-Oct	–	NP210
133.	–	<i>Silene conoidea</i> L.	Caryophyllaceae	H	A	Feb-Apr	–	NP211
134.	–	<i>Silene falconeriana</i> Royle ex Benth.	Caryophyllaceae	H	P	Aug-Oct	–	NP217
135.	–	<i>Smithia ciliata</i> Royle	Fabaceae	H	A	Jul-Sep	Fo	NP218
136.	Makoi	<i>Solanum nigrum</i> L.	Solanaceae	H	A	Mar-Sep	Ed, M	NP224
137.	Dhudhi	<i>Sonchus asper</i> (L.) Hill.	Asteraceae	H	A	Feb-Apr	Fo	NP225
138.	Dhudhi	<i>Sonchus oleraceus</i> L.	Asteraceae	H	A	May-Sep	Fo	NP219

139.	–	<i>Sporobolus fertilis</i> (Steud.) W.D. Clayton	Poaceae	H	P	Jun-Oct	–	NP110
140.	Badyav	<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	H	A	Jan-Dec	Fo, Ed	NP196
141.	Jangali Hazri	<i>Tagetes minuta</i> L.	Asteraceae	H	A	Sep-Oct	–	NP222
142.	–	<i>Taraxacum officinale</i> Weber.	Asteraceae	H	P	Mar-Nov	Fo, Ed	NP223
143.	Makar Ghag	<i>Thalictrum javanicum</i> Blume	Ranunculaceae	H	P	Jul-Sep	Fo	NP240
144.	Khanphul	<i>Tridax procumbens</i> L.	Asteraceae	H	P	Jan-Dec	–	NP156
145.	Tipatiya	<i>Trifolium repens</i> L.	Fabaceae	H	P	Mar-Jul	Fo	NP220
146.	–	<i>Triumfetta rhomboidea</i> Jacq.	Malvaceae	H	A	Aug-Nov	–	NP174
147.	Bichu Ghass	<i>Urtica ardens</i> Link	Urticaceae	H	P	Feb-Jul	Fo,Ed, M, Re	NP175
148.	Akalbir	<i>Verbascum thapsus</i> L.	Scrophulariaceae	H	P	Mar-Sep	–	NP181
149.	–	<i>Vernonia cinerea</i> (L.) Less.	Asteraceae	H	A	Aug-Nov	–	NP185
150.	–	<i>Veronica biloba</i> L.	Plantaginaceae	H	A	Jul-Nov	Fo	NP245
151.	–	<i>Veronica javanica</i> Blume.	Plantaginaceae	H	A	Mar-Jun	Fo	NP150
152.	–	<i>Vicia hirsuta</i> (L.) Gray.	Fabaceae	H	A	Feb-Apr	Fo, Ed	NP203
153.	Machali	<i>Vigna vexillata</i> (L.) Rich.	Fabaceae	H	P	Aug-Oct	Fo, Ed	NP233
154.	–	<i>Wahlenbergia marginata</i> (Thunb.) A. DC.	Campanulaceae	H	A	Mar-Jul	–	NP178
155.	Gokhru	<i>Xanthium indicum</i> Koenig	Asteraceae	H	A	Aug-Oct	–	NP221
156.	–	<i>Youngia japonica</i> (L.) DC.	Asteraceae	H	A	Jul-Dec	Fo	NP244
157.	–	<i>Zornia gibbosa</i> Span.	Fabaceae	H	A	Jun-Sep	–	NP187

Abbreviations Used-H-Herb; Sh-Shrub; A-Annual; P-Perennial; Fl-Flowering; Fr-Fruiting; Fo-Fodder; Ed-Edible; M-Medicinal; Re-Religious.

#### 4. Conclusion

This study will provide the baseline information about the weeds of the study area. It will be beneficial to the students, researchers, agriculturists and gardeners for identification of desirable and undesirable plants. Further study is required for distribution and quantification of weeds for ecological management.

#### 5. Acknowledgment

Authors are grateful to the Director, Regional Ayurvedic Research Institute (RARI), CCRAS, Thapla, Ranikhet and Head, Department of Botany, D.S.B. Campus, Kumaun University, Nainital for providing infrastructure, facilities and encouragement.

#### 6. References

- Agarwal AR, Agnihotri RK, Rao PB. 1997. Diversity and phytosociology of weed Species in Pantnagar Agriculture Complex. Nature Biosphere. 1997; 2:57-67.
- Agarwal AR, Rao BB, Sengar RS. Diversity and allelopathy of weed species on certain varieties of wheat. Indian Farm. Dig. 1998; 31(12):28-19.
- Bisht AS. Weed floral diversity of medicinal value in terraces of horticulture crop fields in Bharsar, Uttarakhand, India. Indian J. Plant Genet. Resour. 2017; 30(2):153-161.
- Chopra N, Tewari G, Tewari LM, Upreti B, Pandey, N. Allelopathic effect of *Echinochloa colona* L. and *Cyperus iria* L. weed extracts on the seed germination and seedling growth of rice and soyabean. Advances in Agriculture. 2017; 1-5.
- Dangwal LR, Singh A, Singh T, Sharma A, Sharma C. Effect of weeds on the yield of wheat crop in Tehsil Nowshera. Journal of American Science. 2010a; 6(10): 405-407.
- Dangwal LR, Singh A, Singh T, Sharma A, Sharma C. Common weeds of Rabi (winter) crops of tehsil nowshera, District Rajouri (Jammu and Kashmir), India. Pak. J. Weed Sci. Res. 2010b; 16(1):39-45.
- Dangwal LR, Sharma A, Singh A, Rana CS, Singh T. Weed flora of S.R.T. Campus Badshahi Thaul Tehri Garhwal (H.N.B. Garhwal Central University, Uttarakhand), India. Pak. J. Weed Sci. Res. 2011; 17(4): 387-396.
- Dobhal U, Bhandari S, Bisht NS. Some medicinal weeds associated with terraces of crop fields of Pauri, India. Ethnobot. Leaflets. 2006; 10: 281-284.
- Frick B, Thomas AG. Weed surveys in different tillage systems in southwestern Ontario field crops. Can. J. Plant Sc. 1992; 72: 1337-1347.
- Gaur RD. Flora of District Garhwal North West Himalaya (with Ethnobotanical Notes). Trans Media House, Shri Nagar (Garhwal), India, 1999.
- Gupta RK. Flora Nainitalensis: A Handbook of the Flowering Plants of Nainital. Navayug Traders, New Delhi, 1968.
- Gupta A, Joshi SP, Manahas RK. Multivariate analysis of diversity and composition of weeds communities of wheat fields in doon valley India. Trop. Ecol. 2008; 49: 103-112.
- Holm L, Plucknett D, Pancho J, Herberger J. The World's Worst Weeds: Distribution and Biology. University of Hawaii Press, Honolulu, 1997.
- Jain SK, Rao RR. A Handbook of Field and Herbarium Method. New Delhi, 1976.
- Joshi GC, Kabdal PB, Tiwari KC, Issar RK. Weeds Associated with Saffron Farming at Ranikhet Hills (U.P.). B.M.E.B.R. 1988; 12(1-2):91-101.
- Joshi GC, Tewari LM, Pandey NC, Upreti BM. Flora of Ranikhet, West Himalaya. Indu Book Services, New Delhi. 2018.
- Kasera PK. Arid Agro-ecosystem: Weed Biology and Weed Management. Ph.D. Thesis, University of Jodhpur, Jodhpur, India. 1988.
- Khobragade DP, Sathawane KN. Weed diversity in rabi wheat crop of Bhandara District (MS), India. International Journal of Life Sciences. 2014; A2:128-131.
- Melkania NP, Singh, JS. Weeds of monsoon crop in Western Himalaya and Tarai Region. Ind. J. Weeds Sci. 1983a; 15 (1): 87-93.

20. Melkania NP, Singh JS. Weeds of winter crops. Ind. J. Weeds Sci. 1983b; 15(1):38-42.
21. Muhammad SZ, Khan T, Cheema A. Distribution of weeds in wheat, maize and potato fields of Tehsil Gojra, District Toba Tek Singh, Pakistan. Pakistan Journal of Weed Science Research. 2009; 15(1):91-105.
22. Naithani BD. Flora of Chamoli. Vols. I–II. Botanical Survey of India, Calcutta. 1984-1985.
23. Oli S, Chopra N, Tewari LM, Mohan B, Pandey N, Bharti M, Bohra N, Tewari G. Phytotoxic effect of the extracts of *Parthenium hysterophorus* L. on the germination, seedling growth and biomass of some agricultural crops G-Journal of Environmental Science and Technology. 2018; 5(4):152-157.
24. Oudhia P, Tripathi RS. Allelopathic potential of *Calotropis gigantea* R.Br. World Weeds. 1997; 4:109-119.
25. Oudhia P, Tripathi RS. Allelo-pathic effects of *Parthenium hysterothorus* L. on kodo, mustard and problematic weeds. In: Proceeding First International Conference on *Parthenium* Management (Vol. II), UAS, Dharwad, India, 1998, 6-9 October, 136-139.
26. Pangtey YPS, Rawat GS, Kalakoti BS. A note on recently introduced field and garden weeds of Kumaun. Seeds and Farms. 1982; 8:39-42.
27. Pangtey YPS, Samant SS, Rawal RS. Diversity of introduced weeds in the flora of Nainital (Kumaun Himalaya). New Botanist. 1996; 23:45-53.
28. Pysek P, Richardson DM. Traits Associated with Invasiveness in Alien Plants: where do we Stand? In: Nentwig W (ed.) Biological invasions. Springer, Berlin, 2007, 97-126.
29. Shrivastava AK, Tikariha A, Patra S. Seasonal and Floristic Biodiversity of Weeds growing in Chunkatta and Bhilai area of Chhattisgarh, India. Int. J. Curr. Microbiol. App. Sci. 2014; 3(6):318-326.
30. Singh KN, Ara S, Wani, GA, Hasan, B, Khanday BA. A phyto-sociological association of weeds in winter crops of Kashmir valley. Indian J. Weed Sci. 2007; 39(1-2):33-40.
31. Tewari A, Sahu PK, Shrivastava AK, Thomas M. Plant diversity and distribution of weeds in winter season crops of agro-ecosystems in Bilaspur district, Chhattisgarh. Journal of Biodiversity and Environmental Sciences (JBES). 2014; 5(2):251-259.
32. Tiwari D, Upadhyay S, Paliwal A. Diversity of weed flora of Bharsar, Pauri Garhwal (Uttarakhand), India. IOSR J. Agric. Vet. Sci. 2016; 9(11):01-09.
33. Thomas AG. Weed survey system used in Saskatchewan for cereal and oilseed crops. Weed Sci. 1985; 33:34-43.
34. Tropicos.org. Missouri Botanical Garden. www.tropicos.org. (Accessed March 2018). 2014.
35. Williams DJ, Groves RH. The influence of temperature and photoperiod on growth and development of *Parthenium hysterophorus* L. Weed Res. 1980; 20(1):47-50.