

Original Research Article

<https://doi.org/10.20546/ijcmas.2019.804.247>

## Diversity of Weed Flora in Citrus at ICAR-Regional Research Centre for Citrus, Biswanath Chariali, Assam, India

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### ABSTRACT

#### Keywords

Diversity, Weed, flora, Citrus, Assam

#### Article Info

##### Accepted:

15 March 2019

##### Available Online:

10 April 2019

A systemic investigation was undertaken to assess the diversity of weed flora in citrus farm of Regional Research Centre for Citrus and inside the premises of Biswanath College of Agriculture, Biswanath Chariali, Assam during 2017-2018. A total of 134 weeds species belonging to 103 genera and 34 families were identified. Out of these, 104 species were dicotyldones and 30 species were monocotyldones. Among the 34 identified families, 9 families viz., poaceae, fabaceae, amaranthaceae, asteraceae, euphorbicaceae, cyperaceae, convolvulaceae, commilinaceae and solanaceae were represented by more than 5 weed species. *Hibiscus moschetus* was found with high Importance value index of 38.48 followed by *Celosia argentea* (33.18), *Tribulus terrestris* (32.57), *Corchorus trilocularis* (32.12), *Mimosa pudica* (31.25) and *Euphorbia hirta* (30.2). This is the first record of various weed species in citrus farm at RRCC.

### Introduction

Weeds are one of the major deterrents in increasing the crop productivity as they compete with the crop for soil moisture and nutrients, which are the major limiting factors in horticultural farmyards (Anderson, 1983). The horticultural crops, especially young citrus plants are infested with a large number of weeds and increase the risk of insect and disease attack (Linares *et al.*, 2008; Abbas and Fares, 2009; Onyegbule *et al.*, 2014; Kaur and Rattanpal, 2017). Numerous exotic (non-

native) species were entered into India and invading the native flora. Few are introduced as ornamental or economical purposes and in this process seeds of many obnoxious weeds also got mixed up and firmly established and spread widely. Surprisingly the estimates put 18% of Indian flora as alien or non-native, of which about 55% are American, 10% Asian, 20% Asian and Malaysian and 15% European and Central Asian species (Nayar, 1977). In case of citrus, weed flora causing 25-33% yield loss to the farmers (Singh and Sharma, 2008). Therefore, efficient weed management

becomes even more important in horticultural crops, especially in citrus. The losses due to weeds are more during rainy than the post-rainy season. The nature and intensity of weed flora vary depending on agro-ecological conditions and management practices. To develop effective and economical weed management practices in citrus orchards, it is necessary to identify the weed flora, their nature, and intensity. Hence, the present investigation was undertaken to study the diversity of weeds in citrus at Regional Research Centre for Citrus (RRCC) under ICAR-Central Citrus Research Institute (ICAR-CCRI), Biswanath Chariali, Assam.

### Materials and Methods

The study was carried out during 2017-2018 to identify major weed species in research farm of RRCC, ICAR-CCRI, and in the premises of Biswanath College of Agriculture (BNCA), Assam Agricultural University (AAU), Biswanath Chariali, Assam. The weed species encountered were carefully collected and identified using different morphological characters. Random quadrat method was adopted for studying phyto-sociological attributes of weeds. In each field site quadrat of 1m x 1m was laid down in different locations of the campus and a sum of 20 quadrats for each location. These studies were carried in the rainy and post-rainy season.

Vegetation composition was evaluated by analyzing the frequency, density and Importance Value Index (IVI) according to Misra (1968) and Curtis and McIntosh (1950).

IVI (Importance Value Index) = Relative Density + Relative Frequency + Relative Dominance.

All the weeds from each quadrat were collected separately in polythene bags. Every

specimen was carefully studied regarding vegetative and reproductive features. Provisional identification was made following 'Flora of British India' (Hooker 1872-1897) and other state, regional and local floras. All the plant families were arranged in sequence following Bentham and Hooker's classification (1862-83) with certain exceptions to accommodate recent modifications adopted after Cronquist (1968).

### Results and Discussion

A total of 134 weeds species belonging to 103 genera and 34 families have been recorded from the study sites. Out of which 104 species belongs to dicotyledones and 30 species belongs to monocotyledons (Table 1). Among 34 families, nine families i.e. poaceae, fabaceae, amaranthaceae, asteraceae, euphorbiaceae, cyperaceae, convolvulaceae, commelinaceae and solanaceae were represented by more than 5 weed species (Fig. 1). A critical study on the flora of Assam and recent additions revealed the presence of 3895 species which are 2823 species of dicots under 190 families with 1006 genera + interspecific and 1072 species of monocots under 42 families with 332 genera + interspecific taxa. Out of which there are nearly 40% of the taxa considered as weeds in many crop fields (Kanjilal *et al.*, 1931 and 1938).

Results depicted in Table 1 showed that *Hibiscus moschatus* (2.29 plants/m<sup>2</sup>) followed by *Corchorus trilocularis* (2.23 plants/m<sup>2</sup>), *Celosia argentea* (2.11 plants/m<sup>2</sup>), *Mimosa pudica* (2.1 plants/m<sup>2</sup>), *Euphorbia hirta* (2.03 plants/m<sup>2</sup>) and *Scoparia dulcis* (2 plants/m<sup>2</sup>) were dominant in the citrus farm. The Important Value Index of individual weed species reported that *Hibiscus moschatus* (38.48) is the most important species followed by *Celosia argentea* (33.18), *Corchorus trilocularis* (32.12), *Tribulus terrestris*

(32.57), *Mimosa pudica* (31.25) and for *Scoparia dulcis* and *Euphorbia hirta* (30.2) in the citrus farm at RRCC, Biswanath Chariali. Deka and Baruah, 2015 reviewed the

distribution of weeds in major agricultural, horticultural, forest and wetland ecosystems in North Eastern regions of India.

**Table.1** Checklist of weed species with density (D) and Importance Value Index (IVI) found during 2017-2018 in citrus farm and surrounding premises at RRCC, Biswanath Chariali, Assam

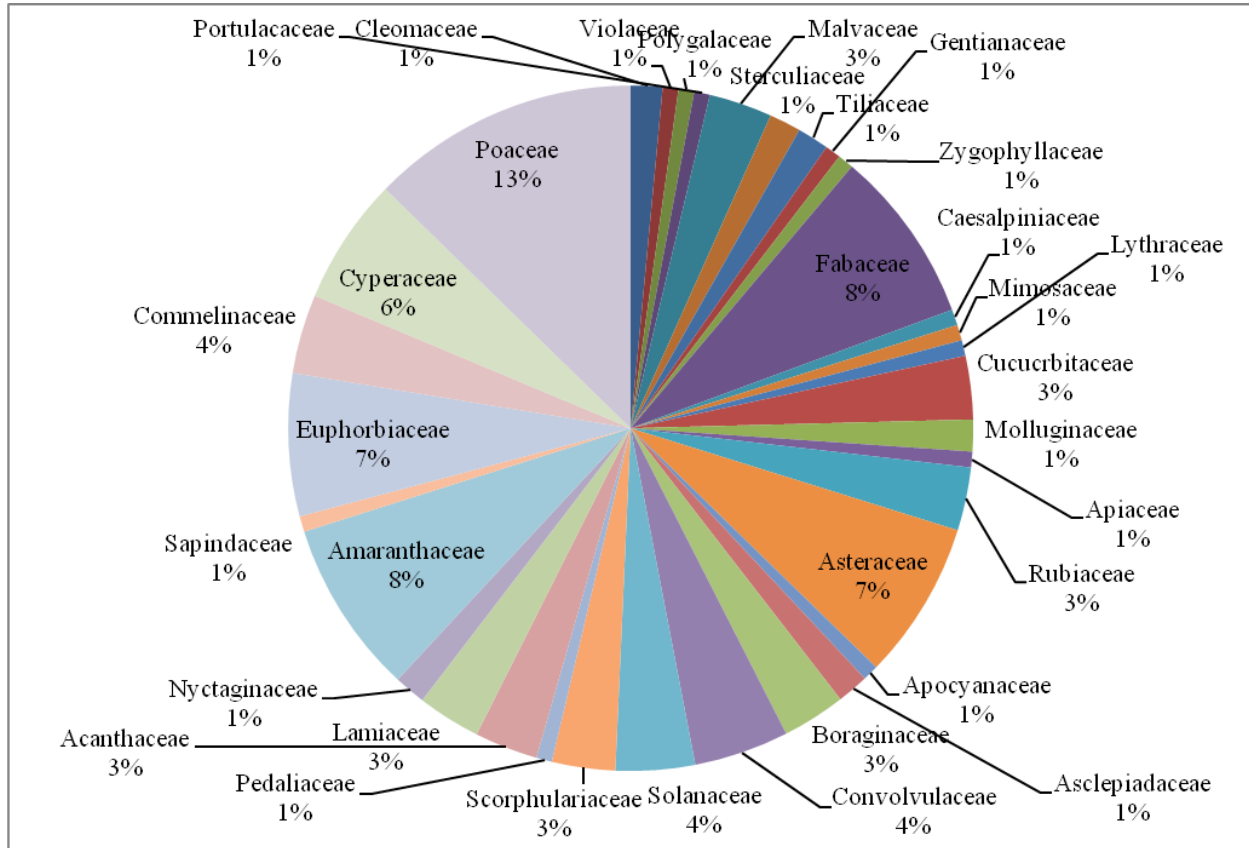
S.No	Scientific Name	Family	D	IVI
1	<i>Cleome aspera</i>	Cleomaceae	0.71	3
2	<i>C. viscosa</i>	Cleomaceae	1.3	22.69
3	<i>Hybanthus enneaspermus</i>	Violaceae	1.22	10.8
4	<i>Polygala elongata</i>	Polygalaceae	1.08	6.45
5	<i>Portulaca oleraceavar. Oleracea</i>	Portulacaceae	1.5	20.84
6	<i>Abutilon indicum</i>	Malvaceae	1.03	6.05
7	<i>Hibiscus moschatus</i>	Malvaceae	2.29	38.48
8	<i>Sida acuta</i>	Malvaceae	1.15	16.93
9	<i>S. cordata</i>	Malvaceae	0.83	7
10	<i>Melochia corchorifolia</i>	Sterculiaceae	0.71	6.74
11	<i>Waltheria indica</i>	Sterculiaceae	0.61	3.65
12	<i>Corchorus aestuans</i>	Tiliaceae	0.65	7.34
13	<i>C. trilocularis</i>	Tiliaceae	2.23	33.12
14	<i>Enicostema axillare</i>	Gentianaceae	0.57	6.43
15	<i>Tribulus terrestris</i>	Zygophyllaceae	1.9	32.57
16	<i>Alysicarpus bupleurifolius</i>	Fabaceae	1.1	5.3
17	<i>A. rugosus</i>	Fabaceae	0.82	9.65
18	<i>Aeschynomene indica</i>	Fabaceae	1.2	10.6
19	<i>Clitoria ternatea</i>	Fabaceae	0.28	5.61
20	<i>Indigofera linifolia</i>	Fabaceae	0.8	3.06
21	<i>I. linnaei</i>	Fabaceae	1.3	5.17
22	<i>Macroptilium atropurpureum</i>	Fabaceae	0.34	0.96
23	<i>Rhynchosia minima</i>	Fabaceae	0.72	3.01
24	<i>Tephrosia pumila</i>	Fabaceae	0.51	4.53
25	<i>T. purpurea</i>	Fabaceae	0.59	10.12
26	<i>Vigna aconitifolia</i>	Fabaceae	0.56	2.73
27	<i>Cassia pumila</i>	Caesalpinaceae	0.22	0.56
28	<i>Mimosa pudica</i>	Mimosaceae	2.1	31.06
29	<i>Ammania baccifera var. Baccifera</i>	Lythraceae	0.8	2.23
30	<i>Citrullus colycinchus</i>	Cucurbitaceae	0.72	10.49

31	<i>Coccinia grandis</i>	Cucurbitaceae	0.56	4.27
32	<i>Cucumis melo</i>	Cucurbitaceae	0.25	2.03
33	<i>C. sativus</i>	Cucurbitaceae	0.42	3.9
34	<i>Mollugo nudicaulis</i>	Molluginaceae	0.64	2.08
35	<i>M. pentaphylla</i>	Molluginaceae	0.63	1.87
36	<i>Centella asiatica</i>	Apiaceae	0.5	2.08
37	<i>Borreria articularis</i>	Rubiaceae	0.58	5.03
38	<i>B. pusilla</i>	Rubiaceae	1.1	14.21
39	<i>Hedyotis corymbosa</i>	Rubiaceae	0.76	2.86
40	<i>H. puberula</i>	Rubiaceae	0.82	3.21
41	<i>Ageratum conyzoides</i>	Asteraceae	0.56	10.28
42	<i>Bidens pilosa</i>	Asteraceae	0.92	10.4
43	<i>Blumea mollis</i>	Asteraceae	0.6	1.84
44	<i>Conyza ambigua</i>	Asteraceae	0.61	5.42
45	<i>Echinops echinatus</i>	Asteraceae	0.55	4.71
46	<i>Eclipta prostrata</i>	Asteraceae	0.65	5.52
47	<i>Parthenium hysterophorus</i>	Asteraceae	1.41	15.16
48	<i>Tridax procumbens</i>	Asteraceae	1.21	12.32
49	<i>Vernonia cineria</i>	Asteraceae	1.09	12.08
50	<i>Xanthium strumarium</i>	Asteraceae	0.19	0.93
51	<i>Catheranthus pusillus</i>	Apocyanaceae	0.6	4.22
52	<i>Calotropis gigantia</i>	Asclepiadaceae	0.25	2.02
53	<i>C. procera</i>	Asclepiadaceae	0.26	1.89
54	<i>Coldenia procumbens</i>	Boraginaceae	0.26	0.75
55	<i>Heliotropium indicum</i>	Boraginaceae	0.71	2.08
56	<i>H. ovalifolium</i>	Boraginaceae	0.66	3
57	<i>Trichodesma indicum</i>	Boraginaceae	1.68	18.13
58	<i>Convolvulus arvensis</i>	Convolvulaceae	0.59	6.37
59	<i>Cuscuta reflexa</i>	Convolvulaceae	0.48	5.2
60	<i>Evolvulus alsinoides</i>	Convolvulaceae	1.03	3.41
61	<i>Ipomoea pes-tigridis</i>	Convolvulaceae	0.32	1.21
62	<i>Merremia gangetica</i>	Convolvulaceae	1.03	4.47
63	<i>M. tridentata</i>	Convolvulaceae	0.56	2.07
64	<i>Datura metel</i>	Solanaceae	0.28	4.1
65	<i>D. stramonium</i>	Solanaceae	0.21	0.95
66	<i>Physalis minima</i>	Solanaceae	0.2	1.2
67	<i>Solanum nigrum</i>	Solanaceae	0.23	2.02
68	<i>S. surratens</i>	Solanaceae	1.02	10.28

69	<i>Scoparia dulcis</i>	Scrophulariaceae	2	30.2
70	<i>Striga asiatica</i>	Scrophulariaceae	0.56	2.85
71	<i>S. gesneroides</i>	Scrophulariaceae	0.32	0.82
72	<i>Verbascum chinense</i>	Scrophulariaceae	0.28	1.41
73	<i>Sesamum alatum</i>	Pedaliaceae	0.22	0.91
74	<i>Asystasia gangetica</i>	Acanthaceae	0.34	1.85
75	<i>Indoneesiella echioides</i>	Acanthaceae	0.46	3.11
76	<i>Lepidagathis cristata</i>	Acanthaceae	0.22	0.37
77	<i>Rungia repens</i>	Acanthaceae	0.41	1.21
78	<i>Hyptis suaveolens</i>	Lamiaceae	0.34	2.8
79	<i>Leucas aspera</i>	Lamiaceae	0.67	3.08
80	<i>L. cephalotes</i>	Lamiaceae	0.72	4.1
81	<i>Ocimum americanum</i>	Lamiaceae	0.75	3.6
82	<i>Boerhavia diffusa</i>	Nyctaginaceae	1	17.31
83	<i>B. erecta</i>	Nyctaginaceae	0.82	3.21
84	<i>Achyranthus aspera</i>	Amaranthaceae	0.3	3.87
85	<i>Aerva javanica</i>	Amaranthaceae	0.15	0.41
86	<i>A. lanata</i>	Amaranthaceae	0.37	1.93
87	<i>Allmania nodiflora</i>	Amaranthaceae	0.55	4.12
88	<i>Alternanthera pungens</i>	Amaranthaceae	0.92	2.1
89	<i>A. sessilis</i>	Amaranthaceae	1.11	10.29
90	<i>A. pungens</i>	Amaranthaceae	0.56	10.57
91	<i>Amaranthus viridis</i>	Amaranthaceae	1.16	12.82
92	<i>Celosia argentea</i>	Amaranthaceae	2.11	33.18
93	<i>Digera muricata</i>	Amaranthaceae	1.02	28.77
94	<i>Gomphrena serrata</i>	Amaranthaceae	0.49	2.8
95	<i>Cardiospermum halicacabum</i>	Sapindaceae	0.49	5.2
96	<i>Acalypha ciliata</i>	Euphorbiaceae	0.52	8.26
97	<i>Acalypha indica</i>	Euphorbiaceae	0.3	2.17
98	<i>Croton bonplandianum</i>	Euphorbiaceae	0.83	6.15
99	<i>Chrozophora tinctoria</i>	Euphorbiaceae	0.92	16.58
100	<i>Euphorbia geniculata</i>	Euphorbiaceae	1.3	22.56
101	<i>Euphorbia hirta</i>	Euphorbiaceae	2.03	30.2
102	<i>Phyllanthus amarus</i>	Euphorbiaceae	0.65	2.08
103	<i>P. maderaspatensis</i>	Euphorbiaceae	0.34	0.8
104	<i>Tragia involucrata</i>	Euphorbiaceae	0.55	2.21
105	<i>Commelina benghalensis</i>	Commelinaceae	1.08	12.91
106	<i>Cynotis axillaris</i>	Commelinaceae	0.42	6.12

107	<i>Cynotis culculata</i>	Commelinaceae	0.59	7.28
108	<i>Cyanotis fasciculata</i>	Commelinaceae	0.72	10.51
109	<i>Tonningia axillaris</i>	Commelinaceae	0.82	7.02
110	<i>Cyperus compressus</i> ssp. <i>Compressus</i>	Cyperaceae	0.65	12.32
111	<i>C. difformis</i>	Cyperaceae	0.55	2.9
112	<i>C. rotundus</i>	Cyperaceae	0.58	4.8
113	<i>C. iria</i>	Cyperaceae	1.01	12.3
114	<i>C. nutans</i>	Cyperaceae	0.56	10.1
115	<i>C. polystachyos</i>	Cyperaceae	0.52	2.32
116	<i>C. rotundus</i>	Cyperaceae	0.75	3.56
117	<i>C. tenuiculmis</i>	Cyperaceae	0.66	5.74
118	<i>Apluda mutica</i>	Poaceae	1.08	7.16
119	<i>Aristida hystrix</i>	Poaceae	0.72	2.84
120	<i>Arundinella setosa</i>	Poaceae	0.81	4.25
121	<i>Chloris inflata</i>	Poaceae	1.48	14.95
122	<i>Chrysopogon fulvus</i>	Poaceae	0.75	3.19
123	<i>Cynodon dactylon</i>	Poaceae	1.53	20.46
124	<i>Heteropogon contortus</i>	Poaceae	0.84	3.42
125	<i>Ischaemum indicum</i>	Poaceae	0.56	4.28
126	<i>Iseilema laxum</i>	Poaceae	0.47	5.32
127	<i>Panicum flavidum</i>	Poaceae	0.28	3.75
128	<i>P. repens</i>	Poaceae	0.78	10.21
129	<i>Paspalum disticum</i>	Poaceae	0.3	5.16
130	<i>Perotis indica</i>	Poaceae	0.83	4.32
131	<i>Phalaris minor</i>	Poaceae	0.62	4.08
132	<i>Setaria verticillata</i>	Poaceae	0.67	3.08
133	<i>Tragus roxburghii</i>	Poaceae	0.46	3.57
134	<i>Urochloa panicoides</i>	Poaceae	0.26	0.82

**Fig.1** Proportion of weed species in each family presented as percentage to the total species collected from the citrus farm and other premises at RRCC, Biswanath Chariali, Assam



In conclusion, the present study aimed to investigate the diversity of weed flora in citrus farm of RRCC and in the premises of BNCA. The number of weed species reported in the study was relatively high. It is recommended that intensive ecological studies should be carried out to better understanding the drivers of the weeds species distribution and diversity. This necessary information will be useful for future effective management of these undesirable plants.

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**How to cite this article:**

Kiran Kumar, K. and Kiran Babu, P. 2019. Diversity of Weed Flora in Citrus at ICAR-Regional Research Centre for Citrus, Biswanath Chariali, Assam, India. *Int.J.Curr.Microbiol.App.Sci.* 8(04): 2100-2107. doi: <https://doi.org/10.20546/ijcmas.2019.804.247>