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WEED FLORA OF THE MEERUT COLLEGE CAMPUS, WESTERN UTTAR PRADESH, INDIA: A TAXONOMIC INVENTORY AND FLORISTIC ASSESSMENT

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ABSTRACT
Educational campuses can support diverse assemblages of spontaneous vegetation despite frequent mowing, trampling, soil disturbance, construction, horticultural maintenance and seasonal variation in moisture. During the 2024-2025 academic session, we documented the weed flora of the Meerut College campus in western Uttar Pradesh, India, and analysed its taxonomic composition and broad growth-form spectrum. The inventory comprised 98 species, 83 genera and 40 families, including 96 angiosperms and two pteridophytes. Angiosperm families were arranged according to the Angiosperm Phylogeny Group IV system, and nomenclature was checked using Plants of the World Online and the International Plant Names Index. Asteraceae was the most species-rich family (16 species), followed by Amaranthaceae (eight) and Solanaceae (six); Fabaceae and Euphorbiaceae contained five species each. Terrestrial herbs, excluding grasses and sedges, accounted for 69 species (70.4%), reflecting the prevalence of annual, short-lived, prostrate, creeping and disturbance-tolerant growth forms. Shrubs and subshrubs comprised 16 species, climbers five, aquatic plants four, grasses and sedges three, and terrestrial ferns one. Seven photographic figures illustrate 26 taxa included in the checklist. This study provides a voucher-supported baseline for herbarium development, taxonomy teaching, seasonal floristic surveys, invasive-species monitoring and comparative studies of urban and institutional vegetation in the upper Gangetic Plain.

Keywords: *APG IV; campus flora; floristic inventory; Meerut; ruderal vegetation; urban biodiversity; weed diversity*

INTRODUCTION
Weeds are plants whose occurrence conflicts with a particular human objective; however, the term does not represent a natural taxonomic group. A species may be considered a weed in a lawn, crop field, pavement margin, garden bed, drainage channel or aquatic habitat while remaining an ecologically normal component of another plant community. Weed science therefore integrates plant identification, population biology, ecology, dispersal and management rather than relying on a single biological definition (Radosevich *et al.,* 2007; Zimdahl, 2018). Accurate taxonomy is essential because management decisions, ecological interpretations, distribution records and comparisons among sites all depend on correct species identification.

Urban and peri-urban environments create mosaics of habitats through soil disturbance, nutrient enrichment, irrigation, altered drainage, heat, construction, mowing, planting and repeated movement of people and materials. These processes act as environmental and dispersal filters, excluding some species while favouring others with rapid growth, persistent seed banks, vegetative propagation, broad ecological tolerance or efficient dispersal (McKinney, 2002; Williams *et al.,* 2009). Institutional campuses are particularly useful for floristic studies because lawns, gardens, walls, shaded corners, waste ground, pathways, moist depressions and water bodies occur within a compact and repeatedly accessible area.

Floristic checklists are fundamental taxonomic documents. They provide a verifiable account of taxa recorded from a defined area and support subsequent work in ecology, conservation, vegetation monitoring, biosecurity and education. Pyšek *et al.* (2004) emphasized that clear nomenclature and status terminology are essential when taxonomists and ecologists compare alien and invasive floras. The Botanical Survey of India likewise regards systematic enumeration and authenticated collections as central to regional and national floristic documentation (Botanical Survey of India, n.d.).

Meerut lies in the upper Gangetic Plain, a region historically covered by Duthie's Flora of the Upper Gangetic Plain and related northern Indian floras (Duthie, 1903-1929). The flora of the nearby Delhi region also provides a useful comparison because it shares many alluvial-plain habitats and disturbance-adapted species (Maheshwari, 1963). Modern family circumscription, however, differs substantially from that used in these classical works. The APG IV system recognizes monophyletic angiosperm families using phylogenetic evidence and provides the current framework for flowering-plant classification (Angiosperm Phylogeny Group, 2016; Judd *et al.,* 2016).

The objectives of this study were to: (1) document the 98 weed species recorded on the Meerut College campus during the 2024-2025 academic session; (2) quantify species, genus and family richness; (3) analyse the most species-rich families and broad growth-form categories; (4) identify selected nomenclatural and identification changes relevant to the checklist; and (5) assess the value of the campus flora for taxonomy teaching, herbarium work, biodiversity monitoring and weed management.

MATERIALS AND METHODS

2.1 Study area and source dataset

Meerut College is located in Meerut (28.9875° N, 77.7011° E), western Uttar Pradesh, in the upper Gangetic alluvial plain. The campus contains managed lawns and planted areas as well as path margins, walls, shaded sites, compacted ground, moist depressions, seasonally wet patches, unmanaged corners and aquatic habitats. Qualitative field surveys were conducted during the 2024-2025 academic session. All spontaneously occurring taxa included in the present inventory were recorded, photographed where possible, and represented by herbarium specimens retained in the Department of Botany, Meerut College. For each taxon, the scientific name, family, habit and common name were compiled in a consolidated dataset.

2.2 Taxonomic framework and nomenclature

Angiosperm families were interpreted according to APG IV (Angiosperm Phylogeny Group, 2016), and standard plant-systematics texts were consulted for family characters and phylogenetic context (Judd *et al.,* 2016; Simpson, 2019). Scientific names and author citations were checked against Plants of the World Online, which uses the World Checklist of Vascular Plants taxonomic backbone, and the International Plant Names Index, which provides nomenclatural authorship and publication information (International Plant Names Index, 2026; Royal Botanic Gardens, Kew, 2026). Classical regional floras were also consulted for local identification and historical nomenclature (Duthie, 1903-1929; Maheshwari, 1963).

2.3 Data analysis

Species, genera and families were counted directly from the checklist. Family richness was expressed as the number and percentage of the 98 recorded species. For a broad structural summary, each species was assigned to one of six mutually exclusive operational categories: terrestrial herbs (excluding grasses and sedges), shrubs/subshrubs, climbers, aquatic plants, grasses/sedges, and terrestrial ferns. *Marsilea quadrifolia* was included among aquatic plants, whereas *Adiantum capillus-veneris* represented the terrestrial-fern category. These groupings were used only to summarize growth-form diversity and do not constitute a formal life-form classification.

2.4 Photographic documentation

Representative taxa were photographed in situ or immediately after collection. A contrasting background was used where necessary to show diagnostic vegetative and reproductive characters. Scientific names in the figure captions were standardized according to Table 4. Figures 3-9 illustrate 26 species from the checklist.

RESULTS

3.1 Overall taxonomic composition

During the 2024-2025 academic session, we documented 98 weed species belonging to 83 genera and 40 families (Table 1). Of these, 96 species were angiosperms, whereas *Marsilea quadrifolia* and *Adiantum capillus-veneris* represented the pteridophyte component. The species-to-genus ratio was 1.18, and most genera were represented by a single species. Thirteen genera contained two or more species: *Amaranthus*, *Barleria*, *Boerhavia*, *Calotropis*, *Chenopodium*, *Euphorbia*, *Launaea*, *Lepidium*, *Oxalis*, *Solanum*, *Sonchus*, *Trifolium* and *Zephyranthes*.

Table 1. Summary of the taxonomic composition and broad growth-form structure of the documented weed flora.

Attribute	Number	Interpretation
Species	98	Documented campus inventory
Genera	83	Most genera represented by one species
Families	40	APG IV framework applied to angiosperm families
Angiosperms	96	Major vascular-plant component
Pteridophytes	2	One aquatic fern and one terrestrial fern
Mean species per genus	1.18	Most genera represented by a single species
Mean species per family	2.45	Family richness was strongly uneven

3.2 Family richness and species-rich lineages

Asteraceae was the most species-rich family, with 16 species (16.3%), followed by Amaranthaceae with eight species (8.2%) and Solanaceae with six species (6.1%). Fabaceae and Euphorbiaceae contained five species each (5.1%), whereas Acanthaceae, Lamiaceae and Malvaceae contained four species each (4.1%). Brassicaceae, Cucurbitaceae and Oxalidaceae contained three species each. Together, these 11 families accounted for 62 species (63.3% of the flora) (Table 2; Figure 1). The remaining 29 families contributed 36 species and were mostly represented by one or two taxa.

Table 2. Families represented by three or more species.

Family	Species	Percentage of flora
Asteraceae	16	16.3%
Amaranthaceae	8	8.2%
Solanaceae	6	6.1%
Fabaceae	5	5.1%
Euphorbiaceae	5	5.1%
Malvaceae	4	4.1%
Lamiaceae	4	4.1%
Acanthaceae	4	4.1%
Brassicaceae	3	3.1%
Oxalidaceae	3	3.1%
Cucurbitaceae	3	3.1%

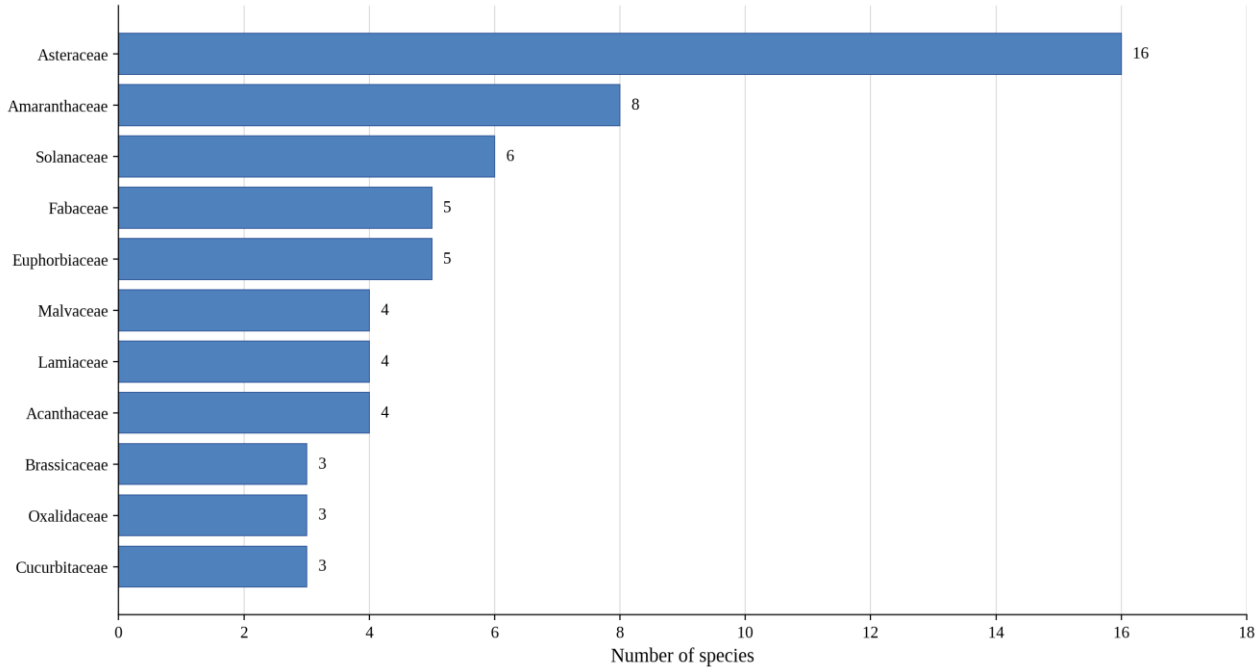

Figure 1. Species richness of the principal weed families recorded on the campus.

3.3 Growth-form spectrum

The largest growth-form category was terrestrial herbs (excluding grasses and sedges), comprising 69 species (70.4%). This operational category included annual, perennial, creeping, prostrate, succulent, bulbous, prickly and aromatic herbs. Shrubs and subshrubs accounted for 16 species (16.3%), climbers for five (5.1%), aquatic plants for four (4.1%), grasses and sedges for three (3.1%), and terrestrial ferns for one

species (1.0%) (Table 3; Figure 2). The prevalence of low-growing and short-lived herbs is consistent with repeated disturbance, open microsites, short vegetation and rapid recolonization in ruderal environments (Radosevich *et al.,* 2007; Zimdahl, 2018).

Table 3. Broad growth-form composition of the campus weed flora.

Growth-form category	Species	Percentage
Terrestrial herbs (excluding grasses/sedges)	69	70.4%
Shrubs/subshrubs	16	16.3%
Climbers	5	5.1%
Aquatic plants (including the aquatic fern)	4	4.1%
Grasses/sedges	3	3.1%
Terrestrial fern	1	1.0%

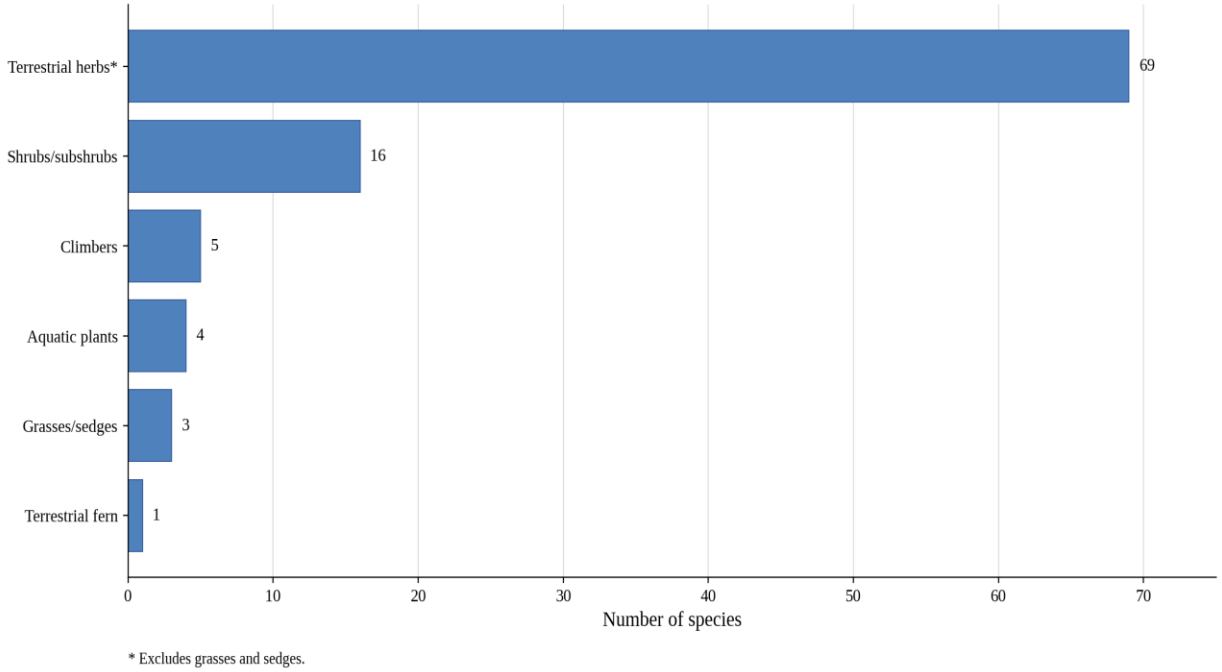

Figure 2. Broad growth-form spectrum of the 98 documented weed species.

3.4 Taxonomic checklist

Table 4 presents the taxonomic checklist of the 98 documented species. Scientific names are the primary taxonomic identifiers; common names are included only as supplementary field aids because vernacular usage varies among regions and may refer to more than one species.

Table 4. Taxonomic checklist of 98 weed species documented from the Meerut College campus, western Uttar Pradesh, India.

No.	Scientific name	Family	Habit	Common name
1	*Abrus precatorius* L.	Fabaceae	Twining climber	Rosary pea / Jequirity / Gunja
2	*Abutilon indicum* (L.) Sweet	Malvaceae	Shrub/herb	Indian mallow
3	*Acalypha indica* L.	Euphorbiaceae	Annual herb	Indian acalypha
4	*Achyranthes aspera* L.	Amaranthaceae	Annual/perennial herb	Prickly chaff flower
5	*Adiantum capillus-veneris* L.	Pteridaceae	Fern	Maidenhair fern
6	*Ageratum conyzoides* L.	Asteraceae	Annual herb	Billy goat weed
7	*Alternanthera sessilis* (L.) R.Br. ex DC.	Amaranthaceae	Creeping herb	Sessile joyweed
8	*Amaranthus spinosus* L.	Amaranthaceae	Spiny herb	Spiny amaranth
9	*Amaranthus viridis* L.	Amaranthaceae	Annual herb	Green amaranth
10	*Anisomeles indica* (L.) Kuntze	Lamiaceae	Aromatic herb	Indian catmint
11	*Argemone mexicana* L.	Papaveraceae	Prickly herb	Mexican poppy
12	*Artemisia annua* L.	Asteraceae	Aromatic annual herb	Sweet wormwood / Sweet Annie
13	*Barleria cristata* L.	Acanthaceae	Shrub	Philippine violet
14	*Barleria prionitis* L.	Acanthaceae	Shrub	Porcupine flower
15	*Bidens pilosa* L.	Asteraceae	Annual herb	Black-jack
16	*Boerhavia diffusa* L.	Nyctaginaceae	Perennial herb	Punarnava
17	*Boerhavia erecta* L.	Nyctaginaceae	Annual herb	Erect spiderling
18	*Calotropis gigantea* (L.) Dryand.	Apocynaceae	Shrub	Crown flower
19	*Calotropis procera* (Aiton) Dryand.	Apocynaceae	Shrub	Apple of Sodom
20	*Cannabis sativa* L.	Cannabaceae	Annual herb	Hemp
21	*Capsella bursa-pastoris* (L.) Medik.	Brassicaceae	Annual herb	Shepherd's purse
22	*Chenopodium album* L.	Amaranthaceae	Annual herb	Bathua/Lamb's quarters
23	*Chenopodium murale* L.	Amaranthaceae	Annual herb	Nettle-leaved goosefoot
24	*Cirsium arvense* (L.) Scop.	Asteraceae	Perennial herb	Canada thistle

No.	Scientific name	Family	Habit	Common name
25	*Cissampelos pareira* L.	Menispermaceae	Climber	Patha/Velvetleaf
26	*Cleome viscosa* L.	Cleomaceae	Annual herb	Asian spiderflower
27	*Coccinia grandis* (L.) Voigt	Cucurbitaceae	Climber	Ivy gourd
28	*Commelina forskaolii* Vahl	Commelinaceae	Annual herb	Dayflower
29	*Convolvulus arvensis* L.	Convolvulaceae	Twining/creeping herb	Field bindweed
30	*Cucumis maderaspatanus* L.	Cucurbitaceae	Climber	Madras pea pumpkin
31	*Cyanthillium cinereum* (L.) H.Rob.	Asteraceae	Annual herb	Little ironweed
32	*Cynodon dactylon* (L.) Pers.	Poaceae	Perennial grass	Doob grass/Bermuda grass
33	*Cyperus rotundus* L.	Cyperaceae	Perennial sedge	Nut grass/Nagarmotha
34	*Datura metel* L.	Solanaceae	Annual herb/shrub	Thorn apple
35	*Dicliptera paniculata* (Forssk.) I.Darbysh.	Acanthaceae	Herb	Peristrophe
36	*Digera muricata* (L.) Mart.	Amaranthaceae	Annual herb	False amaranth
37	*Echinops cornigerus* DC.	Asteraceae	Prickly herb	Globe thistle
38	*Eclipta prostrata* (L.) L.	Asteraceae	Annual herb	False daisy/Bhringraj
39	*Erigeron bonariensis* L.	Asteraceae	Annual herb	Flaxleaf fleabane / Hairy fleabane
40	*Euphorbia hirta* L.	Euphorbiaceae	Annual herb	Asthma weed
41	*Euphorbia prostrata* Aiton	Euphorbiaceae	Prostrate annual herb	Prostrate spurge
42	*Euphorbia thymifolia* L.	Euphorbiaceae	Creeping herb	Small-leaved spurge
43	*Evolvulus nummularius* (L.) L.	Convolvulaceae	Creeping herb	Round-leaved bindweed
44	*Fumaria indica* (Hausskn.) Pugsley	Papaveraceae	Annual herb	Indian fumitory
45	*Gomphrena celosioides* Mart.	Amaranthaceae	Annual herb	Gomphrena weed
46	*Heliotropium indicum* L.	Heliotropiaceae	Annual herb	Indian heliotrope
47	*Lantana camara* L.	Verbenaceae	Shrub	Lantana
48	*Launaea nudicaulis* (L.) Hook.f.	Asteraceae	Herb	Wild lettuce relative

No.	Scientific name	Family	Habit	Common name
49	*Launaea procumbens* (Roxb.) Ramayya & Rajagopal	Asteraceae	Prostrate herb	Creeping launaea
50	*Lemna minor* L.	Araceae	Floating aquatic herb	Duckweed
51	*Leonotis nepetifolia* (L.) R.Br.	Lamiaceae	Erect annual herb	Lion's ear / Christmas candlestick
52	*Lepidium didymum* L.	Brassicaceae	Annual herb	Lesser swine-cress
53	*Lepidium sativum* L.	Brassicaceae	Annual herb	Garden cress
54	*Lysimachia arvensis* (L.) U.Manns & Anderb.	Primulaceae	Annual herb	Scarlet pimpernel
55	*Malvastrum coromandelianum* (L.) Garcke	Malvaceae	Herb/subshrub	False mallow
56	*Marsilea quadrifolia* L.	Marsileaceae	Aquatic fern	Water clover
57	*Mazus japonicus* (Thunb.) Kuntze	Mazaceae	Small herb	Japanese mazus
58	*Melilotus indicus* (L.) All.	Fabaceae	Annual herb	Indian sweet clover
59	*Nepeta hindostana* (B.Heyne ex Roth) Haines	Lamiaceae	Aromatic herb	Indian catmint
60	*Nicotiana plumbaginifolia* Viv.	Solanaceae	Annual herb	Wild tobacco
61	*Oldenlandia corymbosa* L.	Rubiaceae	Annual herb	Diamond flower
62	*Oxalis corniculata* L.	Oxalidaceae	Creeping herb	Creeping woodsorrel
63	*Oxalis debilis* Kunth	Oxalidaceae	Herb	Pink woodsorrel
64	*Oxalis latifolia* Kunth	Oxalidaceae	Bulbous herb	Broadleaf woodsorrel
65	*Parthenium hysterophorus* L.	Asteraceae	Annual herb	Congress grass
66	*Paspalum distichum* L.	Poaceae	Perennial grass	Knotgrass
67	*Phyllanthus niruri* L.	Phyllanthaceae	Annual herb	Bhui amla/Stonebreaker
68	*Physalis minima* L.	Solanaceae	Annual herb	Wild gooseberry
69	*Pilea microphylla* (L.) Liebm.	Urticaceae	Small annual/biennial herb	Artillery plant
70	*Pistia stratiotes* L.	Araceae	Floating aquatic herb	Water lettuce
71	*Plumbago zeylanica* L.	Plumbaginaceae	Perennial herb/shrub	Ceylon leadwort / Chitrak

No.	Scientific name	Family	Habit	Common name
72	*Pontederia crassipes* Mart.	Pontederiaceae	Floating aquatic herb	Water hyacinth
73	*Portulaca oleracea* L.	Portulacaceae	Succulent herb	Purslane
74	*Ranunculus sceleratus* L.	Ranunculaceae	Annual herb	Celery-leaved buttercup
75	*Ricinus communis* L.	Euphorbiaceae	Shrub	Castor
76	*Rivina humilis* L.	Petiveriaceae	Herb/subshrub	Bloodberry
77	*Ruellia simplex* C.Wright	Acanthaceae	Perennial herb	Mexican petunia
78	*Sida cordifolia* L.	Malvaceae	Herb/subshrub	Bala
79	*Solanum nigrum* L.	Solanaceae	Annual herb	Black nightshade
80	*Solanum virginianum* L.	Solanaceae	Prickly herb	Kantakari
81	*Sonchus asper* (L.) Hill	Asteraceae	Annual herb	Prickly sow thistle
82	*Sonchus oleraceus* L.	Asteraceae	Annual herb	Common sow thistle
83	*Spergula arvensis* L.	Caryophyllaceae	Annual herb	Corn spurrey
84	*Stellaria media* (L.) Vill.	Caryophyllaceae	Annual herb	Chickweed
85	*Taraxacum officinale* F.H.Wigg.	Asteraceae	Perennial herb	Dandelion
86	*Tephrosia purpurea* (L.) Pers.	Fabaceae	Herb/subshrub	Wild indigo
87	*Trianthema portulacastrum* L.	Aizoaceae	Annual herb	Horse purslane
88	*Tribulus terrestris* L.	Zygophyllaceae	Prostrate herb	Puncture vine/Gokhru
89	*Trichosanthes cucumerina* L. subsp. *anguina* (L.) Duyfjes & Pruesapan	Cucurbitaceae	Climber	Snake gourd
90	*Tridax procumbens* L.	Asteraceae	Perennial herb	Coat buttons
91	*Trifolium repens* L.	Fabaceae	Creeping herb	White clover
92	*Trifolium resupinatum* L.	Fabaceae	Annual herb	Persian clover
93	*Urena lobata* L.	Malvaceae	Shrub/herb	Caesarweed
94	*Vitex trifolia* L.	Lamiaceae	Aromatic shrub	Three-leaved chaste tree
95	*Withania somnifera* (L.) Dunal	Solanaceae	Shrub/subshrub	Ashwagandha / Indian ginseng
96	*Xanthium strumarium* L.	Asteraceae	Annual herb	Cocklebur
97	*Zephyranthes citrina* Baker	Amaryllidaceae	Bulbous herb	Yellow rain lily
98	*Zephyranthes rosea* Lindl.	Amaryllidaceae	Bulbous herb	Pink rain lily

3.5 Photographic documentation of representative taxa

Figures 3-9 present original field photographs of 26 taxa recorded during the 2024-2025 survey. Each photographed taxon is included in Table 4, and the images provide visual documentation of diagnostic habits, leaves, inflorescences, flowers, fruits, aquatic rosettes or fern fronds.

Figure 3. Representative weed taxa recorded on the Meerut College campus: (A) *Nepeta hindostana*; (B) *Boerhavia diffusa*; (C) *Dicliptera paniculata* (syn. *Peristrophe bicalyculata*); (D) *Cleome viscosa*. Original field photographs.

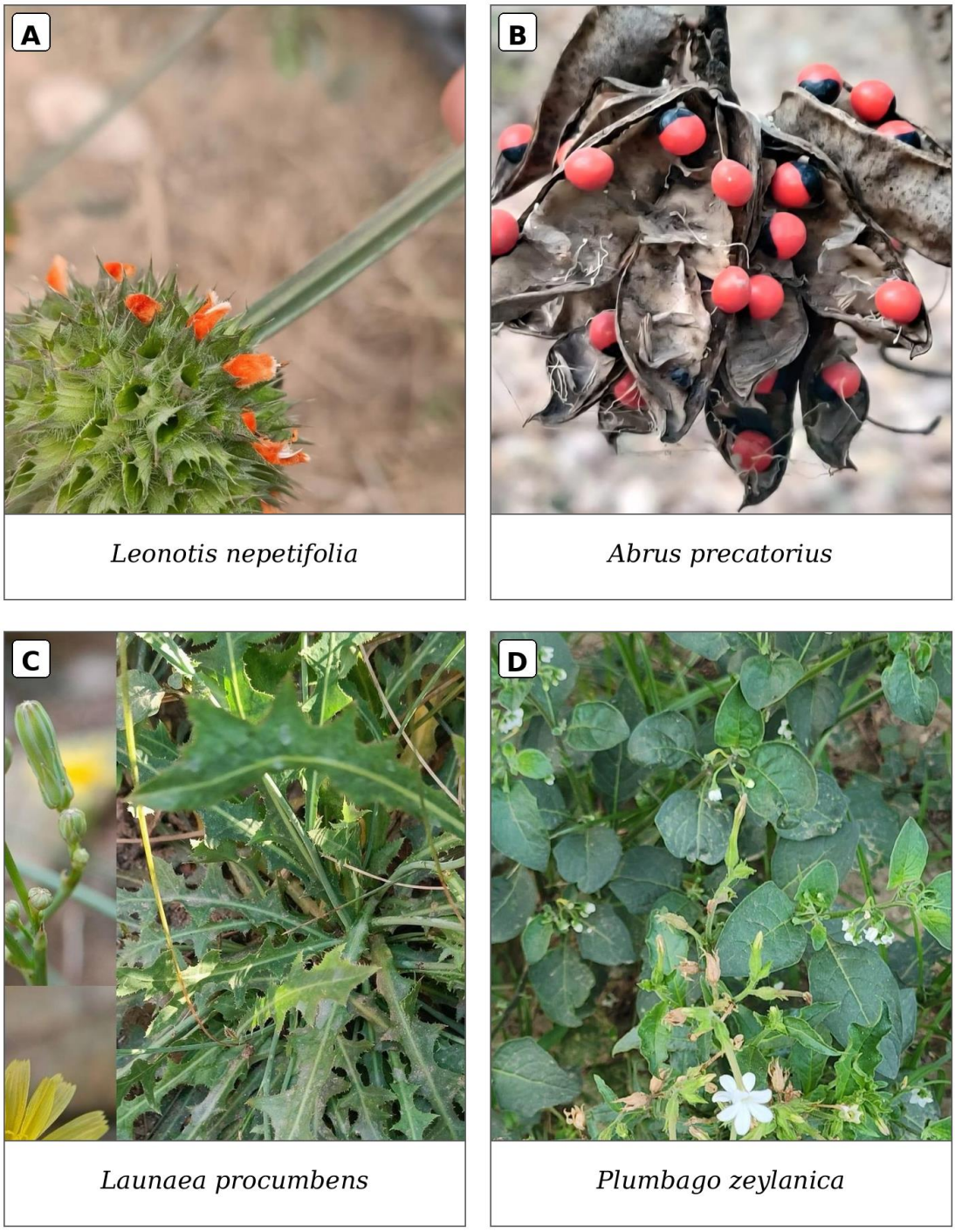

Figure 4. Representative weed taxa recorded on the Meerut College campus: (A) *Leonotis nepetifolia*; (B) *Abrus precatorius*; (C) *Launaea procumbens*; (D) *Plumbago zeylanica*. Original field photographs.

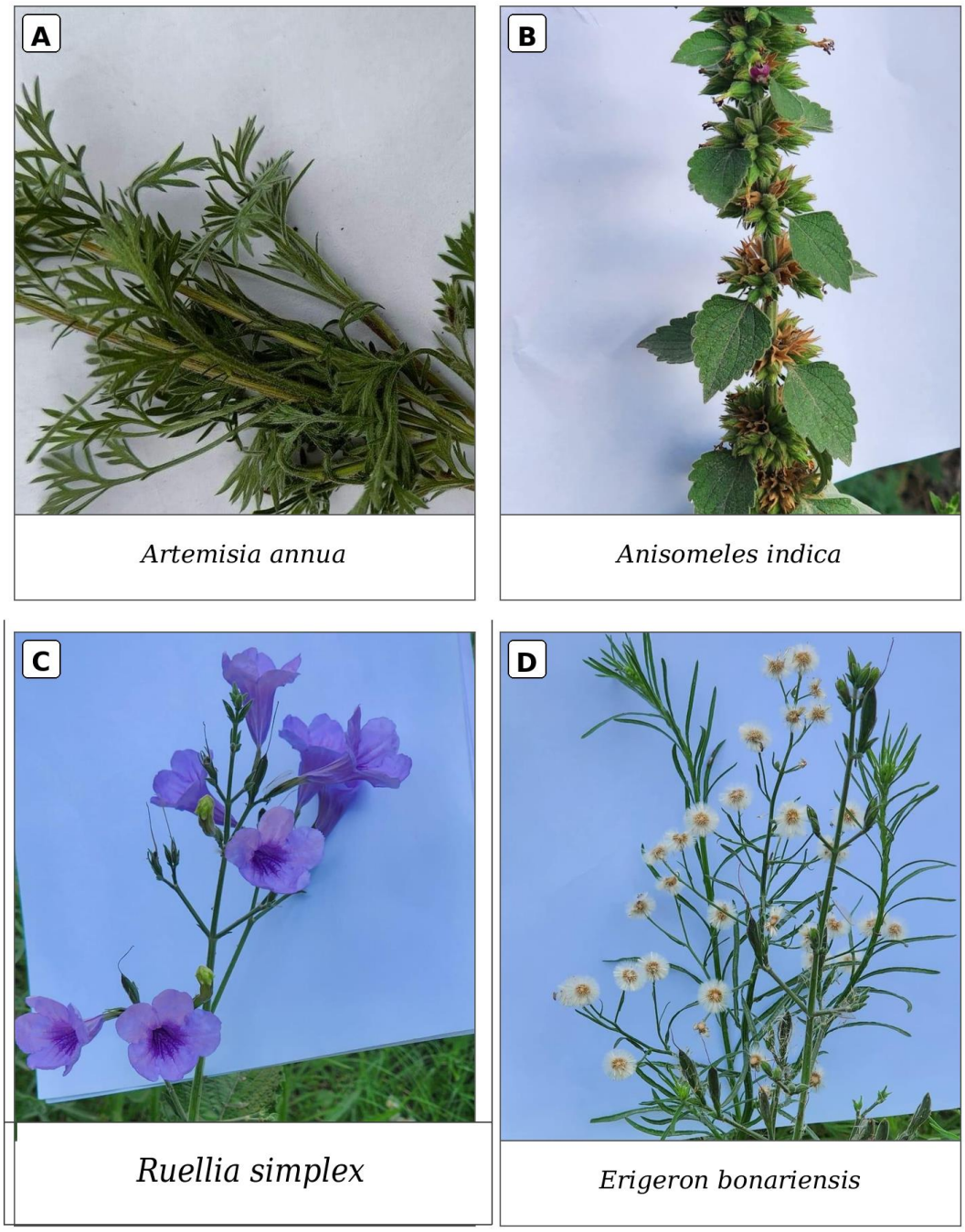

Figure 5. Representative weed taxa recorded on the Meerut College campus: (A) *Artemisia annua*; (B) *Anisomeles indica*; (C) *Ruellia simplex*; (D) *Erigeron bonariensis*. Original field photographs.

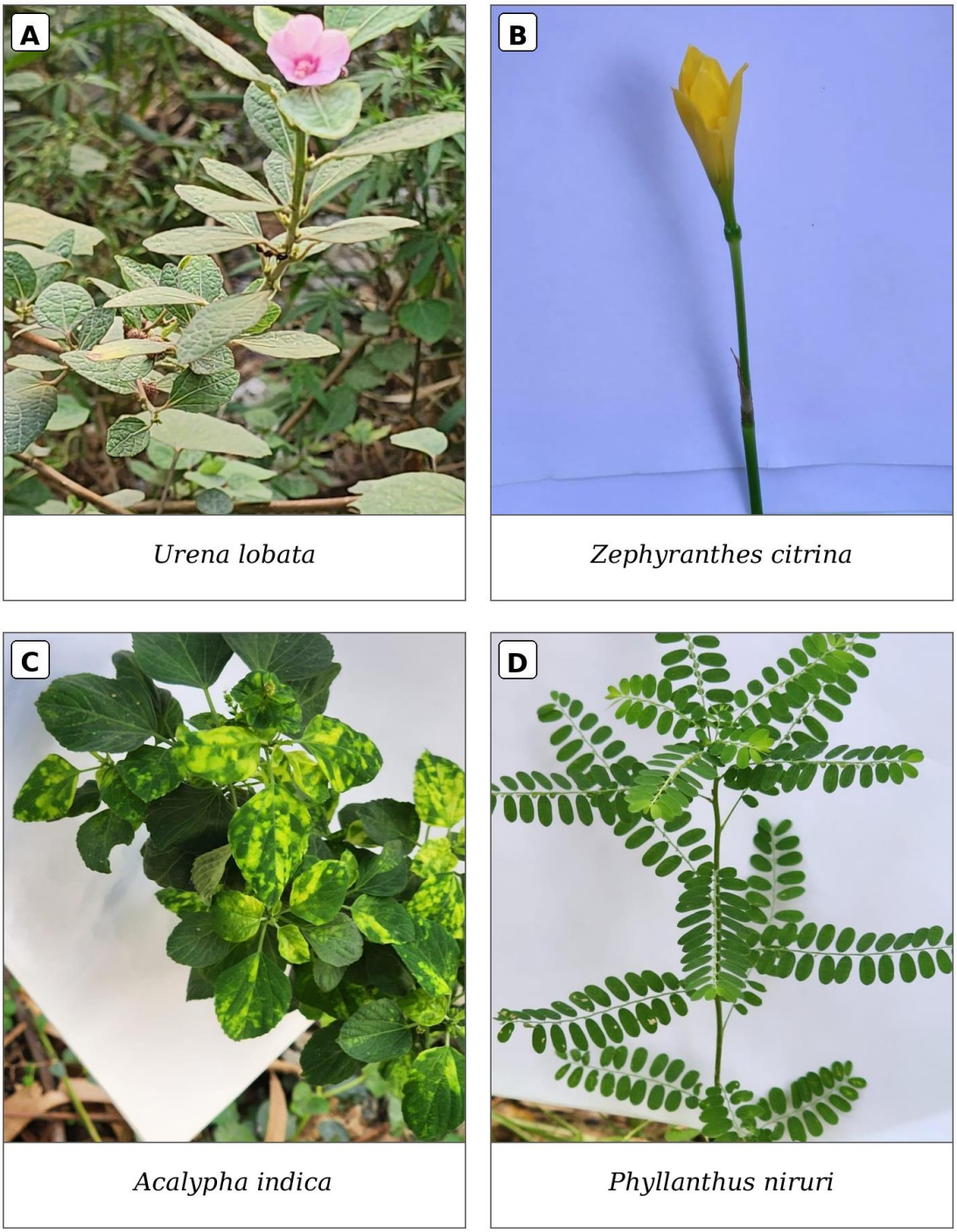

Figure 6. Representative weed taxa recorded on the Meerut College campus: (A) *Urena lobata*; (B) *Zephyranthes citrina*; (C) *Acalypha indica*; (D) *Phyllanthus niruri*. Original field photographs.

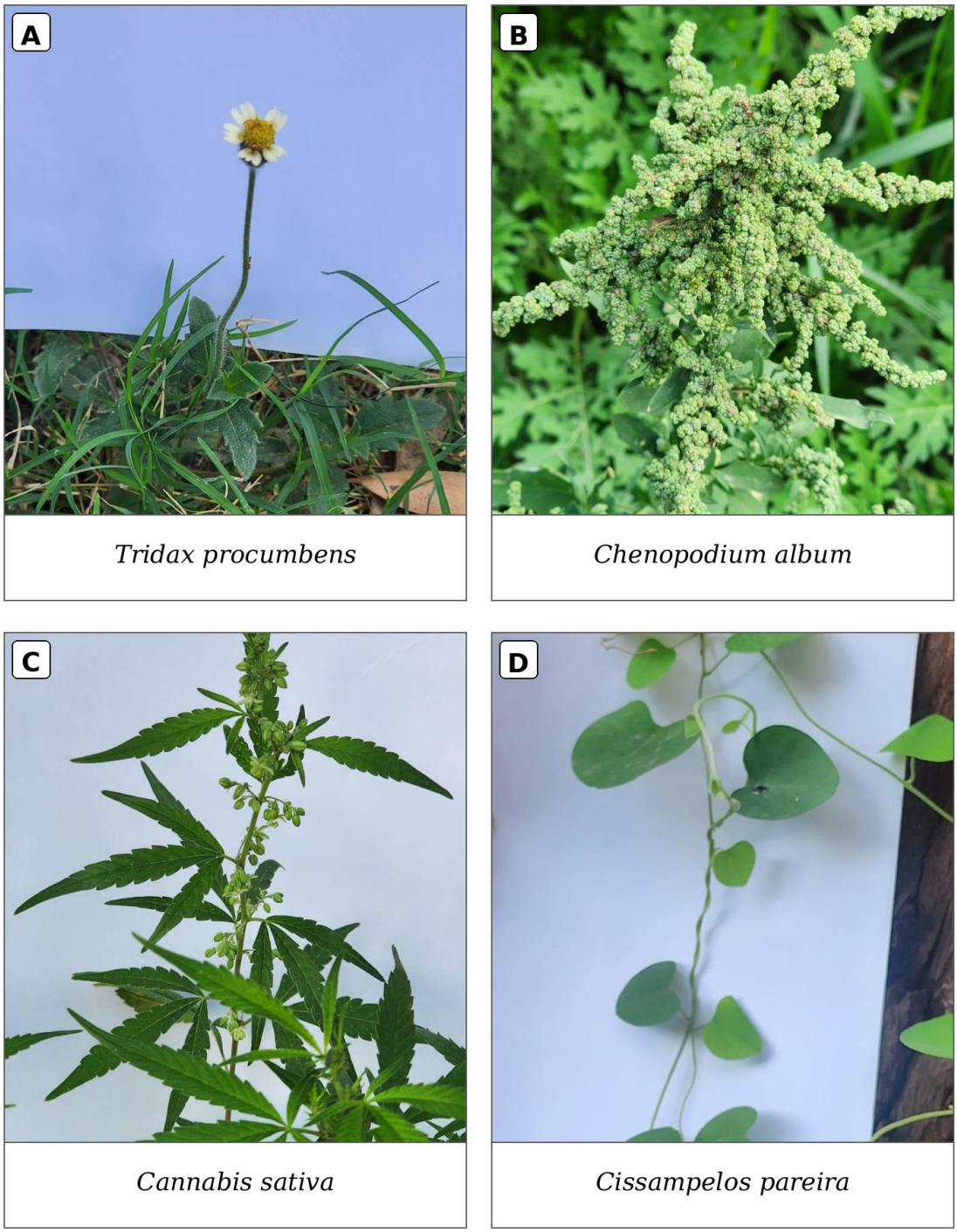

Figure 7. Representative weed taxa recorded on the Meerut College campus: (A) *Tridax procumbens*; (B) *Chenopodium album*; (C) *Cannabis sativa*; (D) *Cissampelos pareira*. Original field photographs.

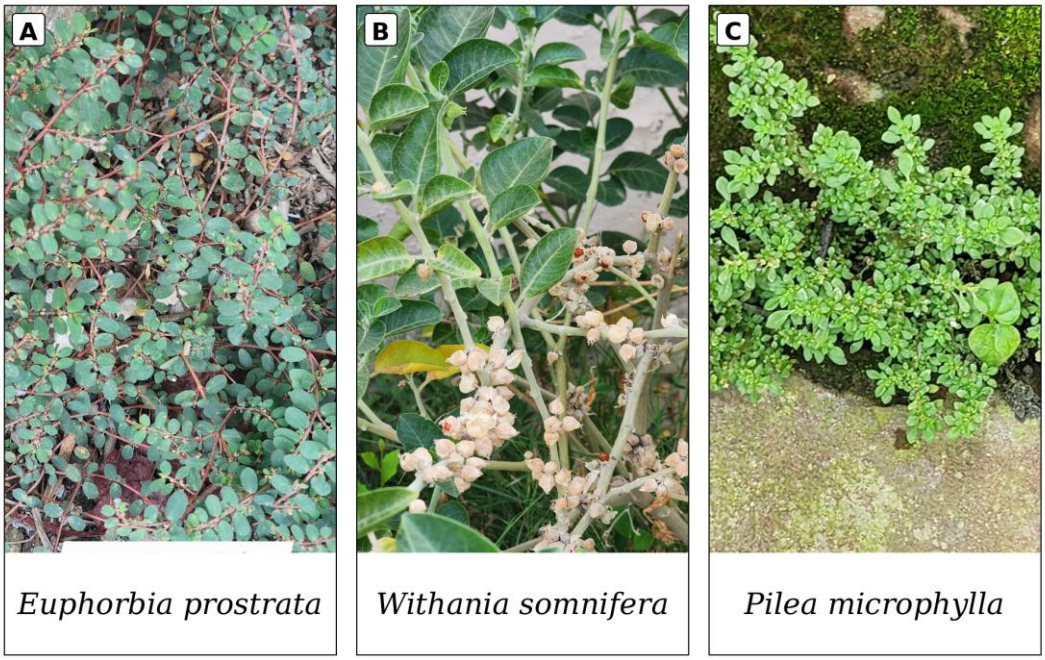

Figure 8. Additional weed taxa recorded on the Meerut College campus: (A) *Euphorbia prostrata*; (B) *Withania somnifera*; (C) *Pilea microphylla*. Original field photographs.

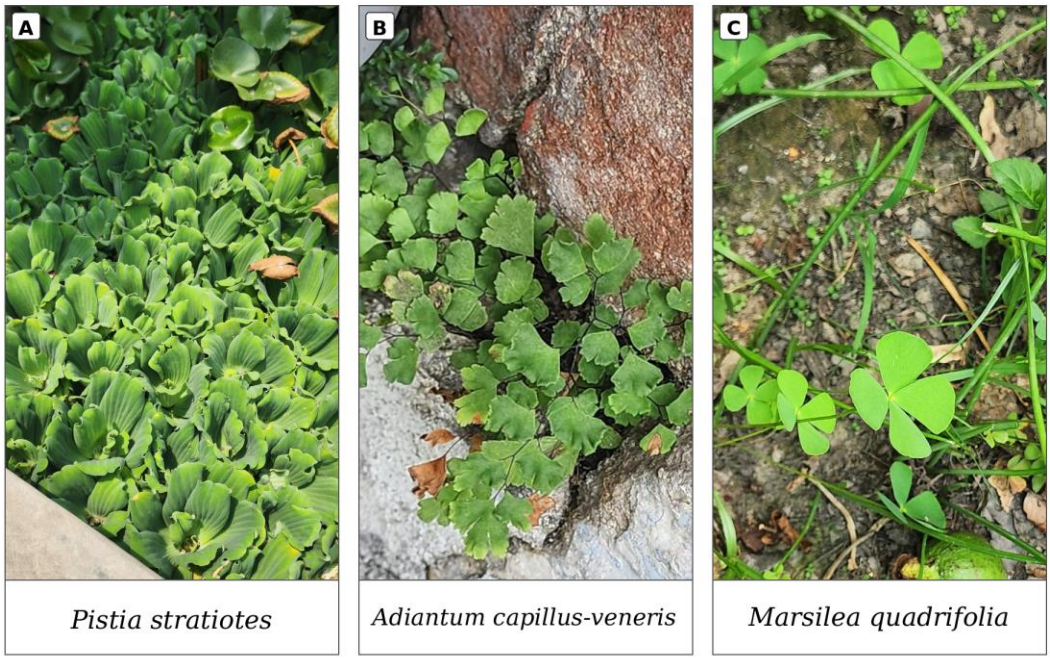

Figure 9. Aquatic and pteridophytic taxa recorded on the Meerut College campus: (A) *Pistia stratiotes*; (B) *Adiantum capillus-veneris*; (C) *Marsilea quadrifolia*. Original field photographs.

DISCUSSION

4.1 Taxonomic patterns and family richness

Asteraceae was the most species-rich family in the inventory, a pattern commonly reported from disturbed floras. The family combines a highly specialized capitulum, abundant small fruits, frequent pappus-assisted dispersal, flexible reproductive strategies and numerous annual or short-lived species. In the present checklist, Asteraceae included erect annuals, prostrate herbs, prickly perennials, aromatic herbs and wind-dispersed ruderal species. Its 16 species belonged to 14 genera, showing that its high richness resulted from representation across many genera rather than proliferation within a single genus. These taxa are especially useful for teaching inflorescence architecture, floral reduction, inferior ovaries, cypsela morphology and tribal diversity (Judd *et al.,* 2016; Simpson, 2019).

Amaranthaceae was the second-richest family and included *Amaranthus*, *Chenopodium*, *Achyranthes*, *Alternanthera*, *Digera* and *Gomphrena*. The group displayed substantial variation in habit, armature, inflorescence organization, perianth persistence, utricles and seed morphology. Several members are well adapted to open, dry, nutrient-enriched or frequently disturbed ground. The presence of eight species makes the family valuable for local training in comparative morphology and for distinguishing genera that may appear superficially similar in the vegetative state.

Solanaceae contributed six species and Fabaceae five, representing contrasting taxonomic patterns. Solanaceae included annual herbs, prickly taxa and the shrub or subshrub *Withania somnifera*, characterized by sympetalous flowers, epipetalous stamens, berry or capsule fruits, and diagnostic trichomes or spines. Fabaceae included creeping herbs, annual clovers, a twining climber, and herbs or subshrubs, allowing comparison of papilionoid floral structure, legumes, compound leaves, stipules and nodulation. Euphorbiaceae also contributed five species, including three species of *Euphorbia*, and is useful for studying latex, cyathia, and variation in prostrate and shrubby habits. Acanthaceae, Lamiaceae and Malvaceae contributed four species each and collectively provided a wide range of characters used in routine family identification, including cystoliths, retinacula, opposite leaves, bilabiate corollas, stellate hairs and monadelphous stamens (Judd *et al.,* 2016; Simpson, 2019).

4.2 Significance of growth-form diversity

The prevalence of terrestrial herbs is expected in habitats subject to repeated cutting, trampling, soil turnover and seasonal drying. Annual herbs can complete their life cycles rapidly and persist through seed banks, whereas creeping and prostrate species may avoid some mowing damage by retaining regenerative tissues close to the soil surface. Perennial grasses, sedges and rhizomatous herbs persist through below-ground organs. Shrubs and climbers occur less frequently because their establishment generally requires longer periods without complete removal. Aquatic species broaden the checklist by adding floating and amphibious growth forms that would be absent from a strictly terrestrial survey.

Habit data also have practical taxonomic value. Growth form can narrow identification possibilities before flowers or fruits are examined. A floating rosette, twining stem, prickly annual, latex-bearing shrub, bulbous herb or sedge with three-ranked leaves immediately directs the investigator towards a smaller set of families and genera.

4.3 Campus flora as a taxonomic teaching resource

A campus checklist converts ordinary vegetation into a living laboratory for plant systematics. The 40 families documented here include monocots, eudicots, aquatic angiosperms, climbers, shrubs, herbs, grasses, sedges and ferns. Students can compare classical morphology with APG IV placement, learn botanical author citation, recognize synonyms, prepare diagnostic descriptions, construct dichotomous keys and associate specimens with herbarium records. Because many species are common and accessible, repeated observations can cover germination, vegetative development, flowering, fruiting, dispersal and seasonal disappearance without requiring distant field travel.

The coexistence of older and newer names is itself pedagogically useful. Historical floras such as Duthie (1903-1929) and Maheshwari (1963) remain indispensable for regional identification, but their family boundaries and generic concepts may differ from modern sources. Students should learn to distinguish nomenclature from taxonomy: the International Plant Names Index records the publication and authorship of plant names, whereas Plants of the World Online provides a current taxonomic opinion on accepted names and synonyms (International Plant Names Index, 2026; Royal Botanic Gardens, Kew, 2026). This distinction is essential when updating herbarium labels, databases, research papers and biodiversity reports.

4.4 Urban ecological filtering and floristic significance

Urbanization does not simply reduce plant diversity; it reorganizes species pools through habitat transformation, fragmentation, introduction, management and environmental filtering (McKinney, 2002; Williams *et al.,* 2009). The Meerut College checklist contains species associated with lawns, compacted soil, waste places, garden margins, walls, moist ground and standing water. Its mixture of native, naturalized, cultivated-escape and widely distributed ruderal taxa is typical of human-modified landscapes. The checklist also has comparative value for the upper Gangetic Plain. Repeated surveys can reveal local colonization, disappearance, range expansion and nomenclatural change. Comparisons with classical records may identify taxa that have become more frequent under urban disturbance or irrigation, whereas comparisons with other campuses can show the extent of floristic homogenization. Such analyses require harmonized names, consistent inclusion criteria, voucher verification and explicit treatment of cultivated plants and escapes.

The composition and distribution of weed flora may also provide preliminary information about local soil conditions. The occurrence of moisture-loving, drought-tolerant, nutrient-responsive, salt-tolerant or compaction-resistant species may reflect variation in soil moisture, fertility, pH, salinity, drainage and disturbance among campus habitats. Such interpretations, however, should be tested through physicochemical soil analysis because weed distribution is also influenced by season, management, shade, trampling and propagule availability.

5. Study Scope, Limitations and Future Research

All 98 recorded taxa were represented by herbarium specimens, and selected taxa were additionally documented photographically (Figures 3-9). Scientific names were checked against current taxonomic databases and relevant floristic literature. Nevertheless, the study was designed as a qualitative taxonomic inventory and did not use standardized phytosociological sampling, such as quadrats or transects. Consequently, frequency, density, abundance, percentage cover, relative frequency, relative density and importance value index were not estimated. The family rankings reported here therefore describe species richness, not ecological dominance. The checklist should be interpreted as a documented account of the campus weed flora rather than a quantitative assessment of vegetation structure. Common names are included only as field aids and may vary among regions and communities.

Future work should extend this taxonomic baseline through seasonally replicated phytosociological surveys using appropriately sized quadrats placed randomly or systematically across different campus habitats. Such surveys would quantify frequency, density, abundance, cover and importance value index and enable comparisons among lawns, garden beds, roadside margins, building surroundings, shaded sites, disturbed areas and relatively unmanaged zones. Long-term monitoring could document seasonal variation, flowering and fruiting periods, population trends, the establishment of newly introduced taxa and the spread of invasive species. The campus flora database could also be strengthened by integrating herbarium records with georeferenced observations, habitat information, digital photographs and selective DNA barcoding of taxonomically difficult specimens.

CONCLUSION

The survey of the Meerut College campus during the 2024-2025 academic session documented a taxonomically diverse weed flora comprising 98 species, 83 genera and 40 families. Asteraceae was the most species-rich family, followed by Amaranthaceae, whereas terrestrial herbs formed the largest broad growth-form category. The high proportion of genera represented by a single species indicates considerable taxonomic breadth and morphological heterogeneity. By integrating accepted nomenclature, family circumscription, growth habits, voucher specimens and synonymy, the study establishes a useful baseline for plant-systematics teaching, voucher-based taxonomic research, invasive-species surveillance and urban biodiversity assessment.

Several documented taxa are widely reported as alien or invasive in India, including *Parthenium hysterophorus*, *Lantana camara*, *Pontederia crassipes*, *Ageratum conyzoides*, *Bidens pilosa* and *Xanthium strumarium* (Khuroo *et al.,* 2012; Mallick *et al.,* 2019). Their occurrence highlights the value of periodic monitoring; however, the present inventory did not quantify their abundance, spread or ecological impacts.

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