

**AN UNWANTED  
WEED IN  
AFRICA IN  
SOUTH AND  
SOUTHEAST ASIA**

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# MAJOR WEEDS OF RICE IN SOUTH AND SOUTHEAST ASIA

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INTERNATIONAL RICE RESEARCH INSTITUTE  
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The responsibility for this publication rests with the International Rice Research Institute.

## Contents

- Foreword 1  
Introduction 2  
Family: Amaranthaceae  
    *Alternanthera sessilis* (L.) R. Br. ex Roth 4  
    *Amaranthus spinosus* L. 7  
Family: Araceae  
    *Pistia stratiotes* L. 8  
Family: Asteraceae (Compositae)  
    *Ageratum conyzoides* L. 11  
    *Eclipta prostrata* (L.) L. [Syn. *E. alba* (L.) Hassk.] 12  
Family: Commelinaceae  
    *Commelina benghalensis* L. 15  
Family: Convolvulaceae  
    *Ipomoea aquatica* Forsk. 16  
Family: Cyperaceae  
    *Cyperus difformis* L. 19  
    *Cyperus iria* L. 20  
    *Cyperus rotundus* L. 23  
    *Fimbristylis littoralis* Gaud. 24  
Family: Euphorbiaceae  
    *Phyllanthus niruri* L. 27  
Family: Marsileaceae  
    *Marsilea minuta* L. 28  
Family: Onagraceae  
    *Ludwigia adscendens* (L.) Hara 31  
    *Ludwigia octovalvis* (Jacq.) Raven 32  
Glossary 34  
Illustrated glossary 41  
Family: Poaceae (Gramineae)  
    *Brachiaria mutica* (Forsk.) Stapf. 47  
    *Cynodon dactylon* (L.) Pers. 49  
    *Dactyloctenium aegyptium* (L.) Beauv. 50  
    *L'gitaria ciliaris* (Retz.) Koel. [Syn. *D. adscendens* (H.B.K  
    Henr.) 53  
    *Echinochloa colona* (L.) Link 54  
    *Echinochloa crus-galli* ssp. *hispidula* (Retz.) Honda 57  
    *Echinochloa glabrescens* Munro ex Hook. f. 58  
    *Eleusine indica* (L.) Gaertn. 61  
    *Ischaemum rugosum* Salisb. 62  
    *Leersia hexandra* Sw. 65  
    *Leptochloa chinensis* (L.) Nees 66  
    *Panicum repens* L. 69  
    *Paspalum conjugatum* Berg. 70  
    *Paspalum paspalodes* (Michx.) Scribn. [Syn. *P. distichum*  
    L.] 73  
    *Paspalum scrobiculatum* L. 74  
Family: Pontederiaceae  
    *Monochoria vaginalis* (Burm. f.) Presl 77  
Family: Sphenocleaceae  
    *Sphenoclea zeylanica* Gaertn. 78



## FOREWORD

Three major pests — insects, diseases, and weeds — limit rice yields in the tropics.

Several books and manuals have been published on the identification of insects and diseases of rice. But until now, rice workers in tropical Asia have had no readily-available reference to help in the identification of the weeds that compete with the rice plant for nutrients, solar radiation, and water.

Thus *Major weeds of rice in South and South east Asia* fills a vital information gap for scientists, educators, extension specialists, and students in the tropical rice-growing regions.

Dr. Keith Moody, IRRI agronomist, drew on his years of experiences in weed science in Asia and Africa to select and compile the species included in this publication. We commend Dr. Moody for this timely and important publication.

M. R. Vega  
Acting Director General  
International Rice Research Institute

## INTRODUCTION

Weeds of rice in South and Southeast Asia can be identified by reference to published floras, but these are not widely available and many are out-dated. No book that describes and illustrates the principal weeds of rice is available.

*Major weeds of South and Southeast Asia* includes colorplates and descriptions of what I consider the most widespread weeds of rice in the region, based on information available in the literature and a survey of weed scientists. Weeds that are important in only one or two countries are not included.

Because of the large number of plants regarded as weeds in rice, I was selective in determining the most important. I fully realize that some species I consider important will be considered unimportant by other scientists, and vice versa.

The weed species are listed alphabetically by family and by scientific name within each family. Because this book is intended for use in an area where many languages are used, common names have been avoided. A minimum of botanical terms is used. A comprehensive glossary is included for those who are unfamiliar with the botanical language.

The main purpose of the book is to help rice workers identify weeds by visual comparison. Control methods vary throughout the region and are not included.

Appreciation is extended to all who had an input in the preparation of this book, particularly those that provided comments on the taxonomy and descriptions of weed species. Special thanks

are extended to Dr. P. W. Michael, Department of Agronomy and Horticultural Science, the University of Sydney, N.S.W. 2006, Australia, Dr. R. J. Dekker, c/o Biotrop, P.O. Box 17, Bogor, Indonesia, and to Mr. R. Lubigan, IRRI, for his collecting of the weed specimens portrayed in this book.

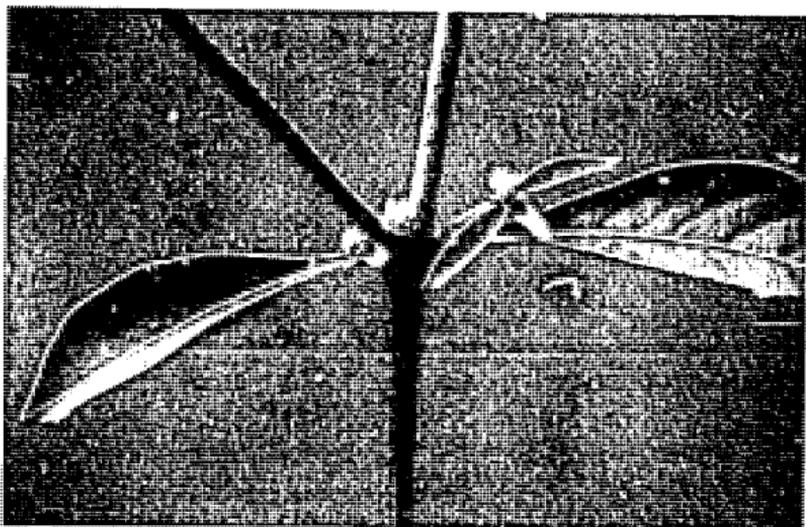
This book was edited by Debra Jefferson and Corazon V. Mendoza of IRRI's Office of Information Services.

Keith Moody  
*Agronomist*  
*International Rice Research Institute*

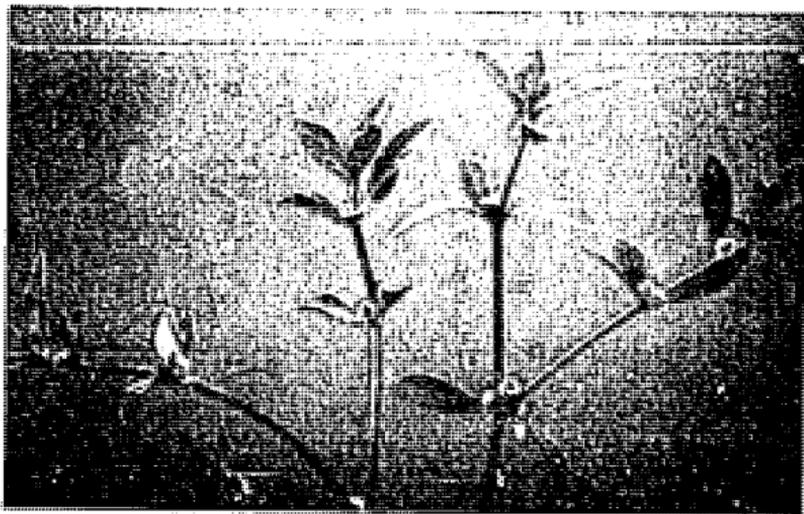
**FAMILY: Amaranthaceae**

*Alternanthera sessilis* (L.) R.Br. ex Roth

A many-branched annual, prostrate, creeping or ascending at the tips; flowers in dense, silvery white clusters in the leaf axils. **Stem:** slightly hairy, rooting at the nodes, up to 60 cm long. **Leaves:** simple, opposite, obovate to oblanceolate, 2-8 cm long, 1-2 cm wide, hairless, with minutely toothed margins and acute tips. **Inflorescence:** dense sessile silvery-white clusters of compressed spikes in the leaf axils; individual flowers small, perianth segments equal, acute, 2-2.5 mm long, not ending in a hard spine. Bracts, ovate with a short point. **Fruit:** a small, flattened, obovate, indehiscent bladder. **Seed:** brown, round. **Propagation:** by seed.



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**FAMILY: Amaranthaceae**  
***Amaranthus spinosus* L.**

An erect, annual 30-120 cm high with pairs of slender sharp-pointed spines, 6-10 mm long at the axils of the leaves and branches. **Stem:** stout, glabrous, round, many branched, fleshy, longitudinally grooved, green or red. **Leaves:** simple, alternate, ovate to lanceolate, 3-10 cm long, 2-5 cm wide, with a hair-like point at the often indented tip; narrowed gradually at the base to a stalk 2-8 cm long. **Inflorescence:** terminal and axillary spikes of close-packed clusters of small greenish flowers about 1 mm long, the upper ones male, the lower ones female. Terminal spike 7-15 cm long, with paired spines at the base of the flower clusters, axillary spikes shorter, without paired spines. Bracts with spiny tips. **Fruit:** a 1-seeded circumscissile, dehiscent capsule. **Seed:** shiny, black, lens-shaped 0.5 mm in diameter. **Propagation:** by seed.

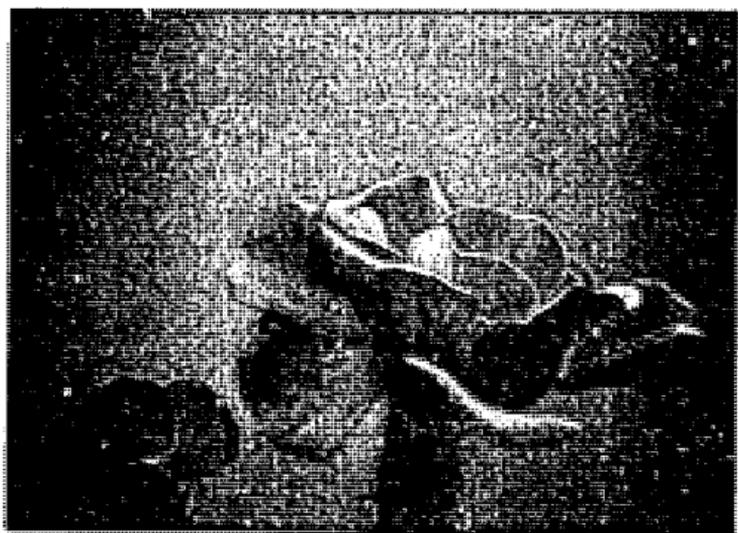
FAMILY: **Araceae**

*Pistia stratiotes* L.

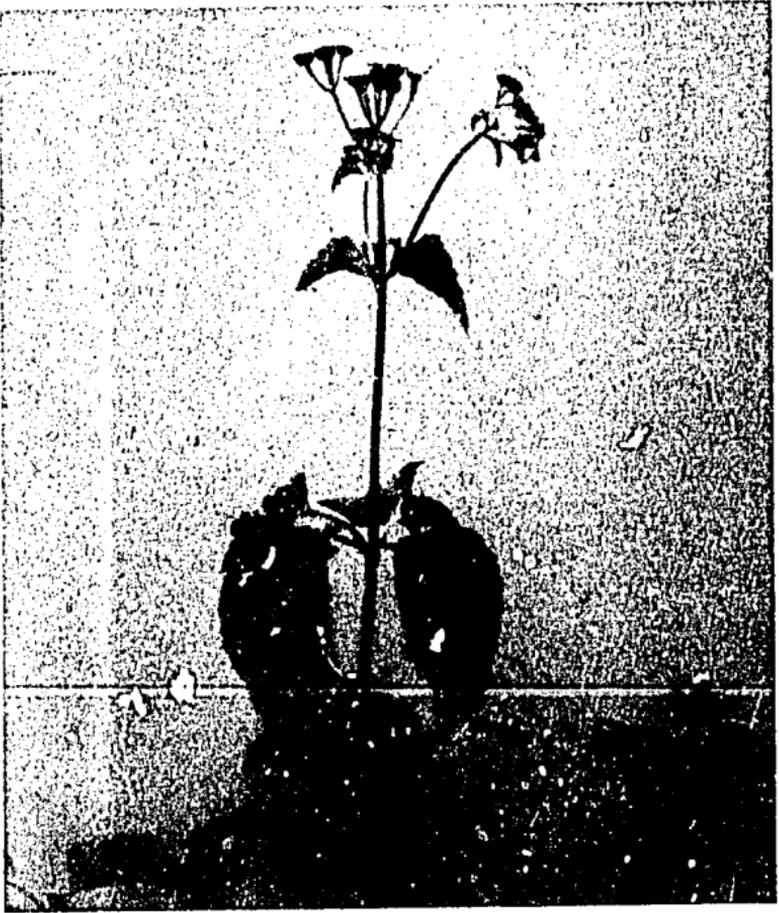
A free-floating stoloniferous monocotyledonous perennial with long feathery roots bearing small plants (off-shoots) at the end of each stolon. **Leaves:** pale green, wedge-shaped, succulent, up to 10 cm long and 5 cm wide, covered on both surfaces with numerous fine hairs forming a rosette on a short stem axis. Older leaves have a conspicuous, ovoid swelling filled with spongy parenchyma on the lower surface. Prominent veins arranged in a fan-like manner. **Inflorescence:** Flowers, inconspicuous surrounded by green tubular spathes arising in the leaf axis in the center of the leaf whorl. **Fruit:** green berry-like, slimy, ruptures irregularly containing 4-12 brown seeds. **Seed:** oblong, tapering toward the apex, 2-2.5 mm long with a thick seed coat. **Propagation:** vegetatively by off-shoots and by seed.



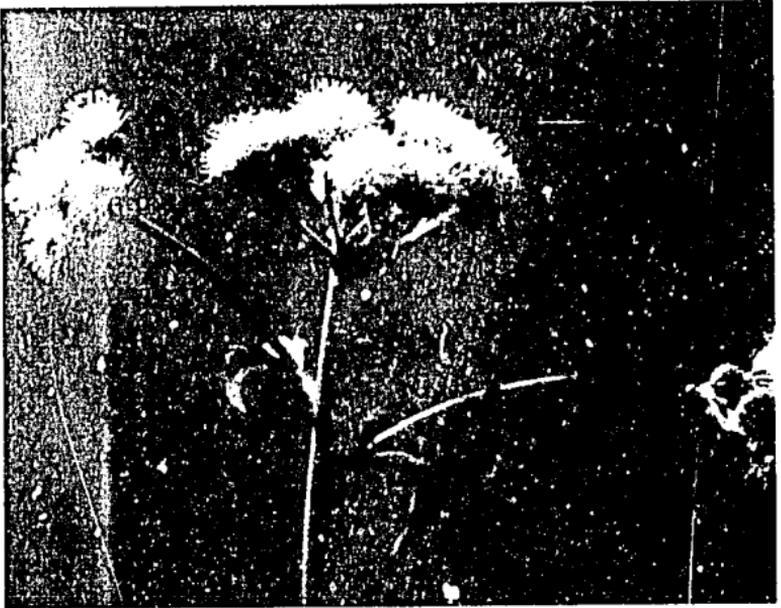
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**FAMILY: Asteraceae (Compositae)**

*Ageratum conyzoides* L.

An ascending to erect, often many branched, hairy annual, 20 cm-1 m high, with pale blue or white flowers and an unpleasant odor. **Leaves:** simple, opposite, ovate, 5-13 cm long, 3-6 cm wide with serrated margin. Tip acute, narrowed abruptly at the base to a hairy stalk up to 5 cm long. **Inflorescence:** a terminal corymb, branches with clusters of 4-18 flower heads, each 5-7 mm across made up of numerous tubular florets, acute or acuminate green bracts with sparse hairs or hairless. **Fruit:** an achene, slender, lanceolate, 5-angled black with a brown to white base, about 1.5 mm long, crowned with a pappus of 5 white, pointed reduced awns. **Propagation:** by seed.

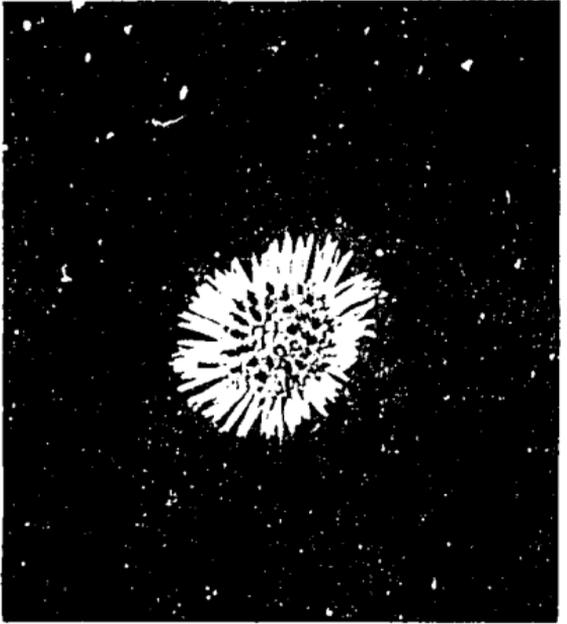
**FAMILY: Asteraceae (Compositae)**

*Eclipta prostrata* (L.) L. [Syn. *E. alba* (L.) Hassk.]

Many-branched annual, usually decumbent but sometimes erect, 30-60 cm high, covered with short, rough, appressed hairs. **Stem:** somewhat fleshy, often red, rooting at the nodes. **Leaves:** simple, opposite, ovate to oblong-lanceolate, acute, 2-10 cm long, 1-3 cm wide, fine- and sparse-toothed, somewhat hairy, the upper sessile, the lower short-stalked. **Inflorescence:** 1-3 terminal or axillary, flower heads up to 1 cm in diameter on stalks, 2-7 cm long. Involucral bracts 6-10, ovate, hairy, prominent; ray florets, inconspicuous; disc florets, white. **Fruit:** an achene, brown, about 3 mm long, wedge-shaped, covered with small warts; pappus, not prominent, either a ring of many minute pointed hairs or absent. **Propagation:** by seed.



9



10



11



12

**FAMILY: Commelinaceae**  
*Commelina benghalensis* L.

A sprawling, prostrate or ascending annual or perennial up to 60 cm high, with a fleshy stem and blue flowers. **Stem:** rooting at nodes, the basal ones often underground with reduced leaves and modified flowers. **Leaves:** simple, alternate, ovate, 6-10 cm long, 4-5 cm wide, narrowed at the base into tubular sheaths enclosing the stem and bearing rust-colored hairs. **Inflorescence:** terminal, 3-4 blue flowers, 3-4 mm long on slender stalks arising from unstalked funnel-shaped spathes, 1.5-2 cm long and wide, with the margins joined at the base. Spathes, 1-3 together. Whitish flowers, which do not open are produced on underground stems. **Fruit:** a 5-seeded capsule. **Seed:** black with a wrinkled surface. **Propagation:** by seed and vegetatively from underground stems.

**FAMILY: Convolvaceae**  
*Ipomoea aquatica* Forsk.

Perennial, glabrous, widely spreading vine. **Stem:** lying or creeping, sometimes twining on mud, rooting at the nodes, becoming hollow and slightly inflated when floating on water. **Leaves:** simple, oblong-ovate to oblong-cordate, entire or sublobed with a prominent pointed tip, 7-15 cm long, about 3.5 cm wide, petioles 2.5-15 cm long. **Inflorescence:** white to cream or purple, solitary, axillary, on stalks 5-15 cm long. **Fruit:** a capsule, ovoid, about 1 cm long, 2-celled, 4-seeded. **Seed:** about 4 mm long, 5-7 mm broad, light brown, densely grayish pubescent or glabrous. **Propagation:** by seed and cuttings.



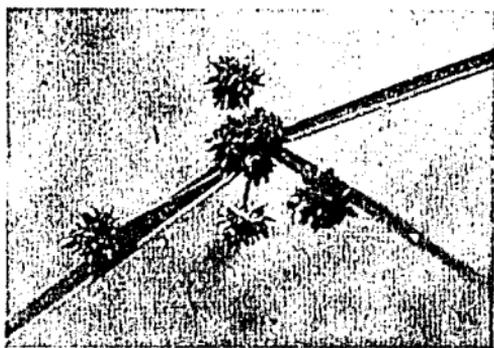
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14



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**FAMILY: Cyperaceae**  
*Cyperus difformis* L.

An erect, smooth, densely tufted annual 20-70 cm high. **Stem:** smooth, sharply triangular at the top, 1-4 mm thick. **Roots:** numerous, fibrous, reddish. **Leaves:** Sheath, tubular, united at the base, the lower ones straw-colored to brown. Blade, 3-4 basal leaves, rather flaccid, linear abruptly acuminate, smooth, usually shorter than the flowering stem, 10-40 cm long, 2-3 mm wide. **Inflorescence:** dense, globose, simple or compound umbel, 5-15 cm in diameter subtended by 2-4 (usually 3) leaf-like bracts, 15-30 cm long, 1 mm wide. Primary rays of the umbels 2-4 cm long and the secondary rays about 1 cm long, some sessile, some long peduncled. Rays end in globose or ovoid masses about 6 mm in diameter composed of numerous, dense spikelets. Spikelets, green, linear to oblong linear, 2-5 mm long 1-1.5 mm wide, 10-30 flowered. **Fruit:** an achene elliptical to slightly obovate, lightly pitted, brown, about 0.6 mm long. **Propagation:** by seed.

**FAMILY: Cyperaceae**

*Cyperus iria* L.

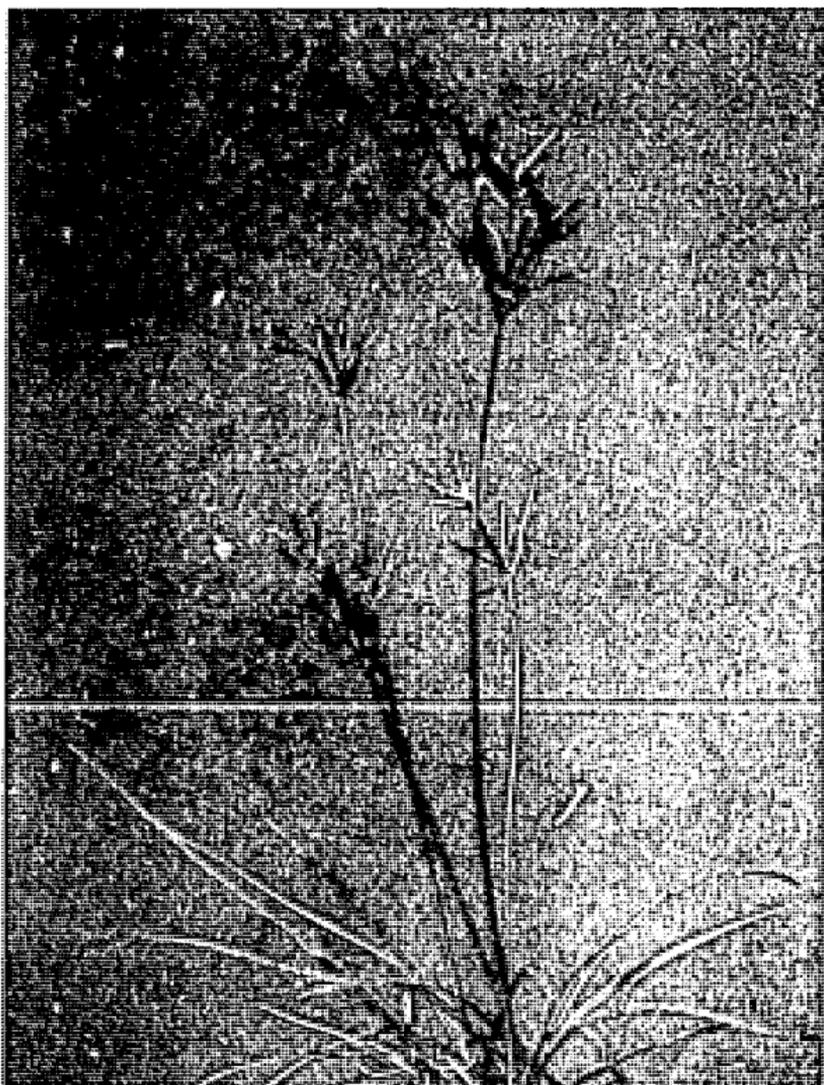
Smooth, tufted annual, 20-60 cm high with sharply triangular stems. **Roots:** yellow-red, fibrous. **Leaves:** Sheath, enveloping the stem at the base, membranous. Blade, linear, lanceolate, shorter than the flowering stem, about 5 mm wide. **Inflorescence:** compound umbel, primary rays about 10 cm long; secondary rays, about 2 cm long, subtended by 3-5 (occasionally 7) bracts, the lowest one longer than the inflorescence. Spike, elongate, loose, 2-4 cm long at the ends of the branches. Spikelets, numerous, erect-spreading, 3-10 mm long, 1.5-2 mm wide, yellow-brown to green. Glume, obovate, 1-2 mm long. **Fruit:** an achene, obovate, triangular in cross-section, 1-1.5 mm long, yellow-brown. **Propagation:** by seed.



17



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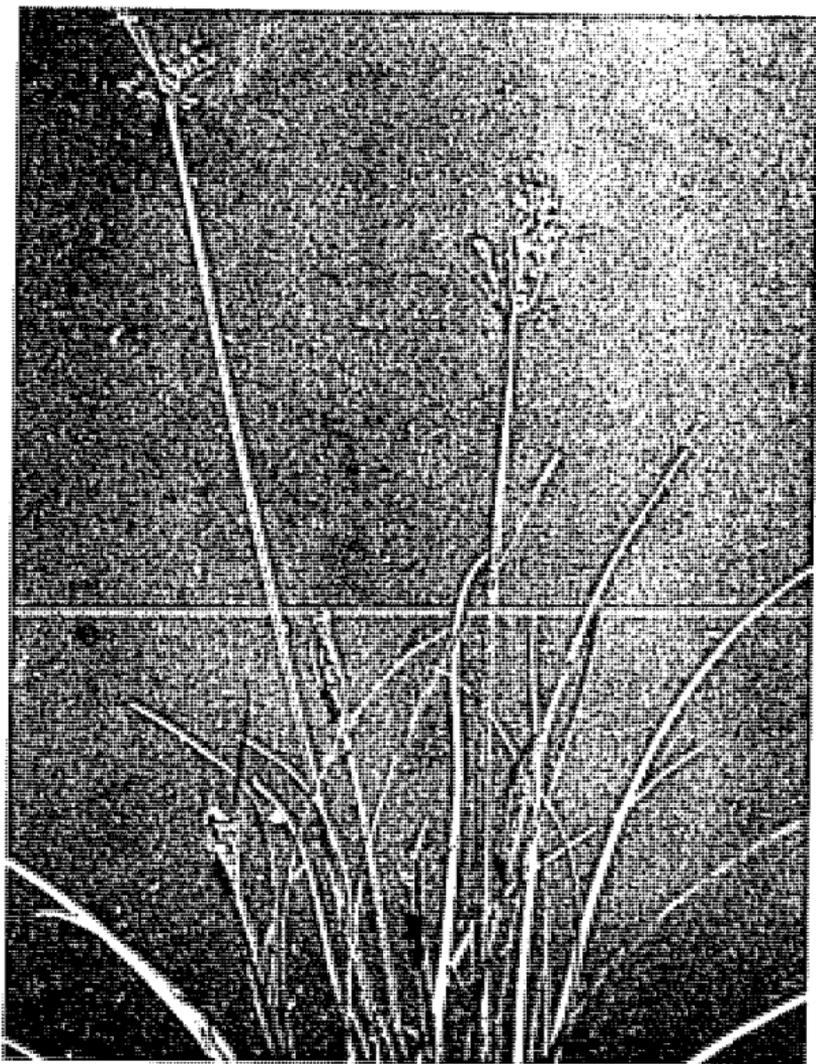
**FAMILY: Cyperaceae**  
*Cyperus rotundus* L.

An erect, rhizomatous, tuber-forming perennial, 15-50 cm high with flowers in red-brown spikelets arranged in terminal umbels. **Stem:** above ground stems, erect, unbranched, smooth, triangular, with a swollen tuberous base. Rhizomes, spreading, slender, white and fleshy, and covered with scale leaves when young, brown, fibrous or woody when old. Tubers, irregularly shaped, 1-2.5 cm long, white and succulent when young, turning coarse, fibrous, brown or almost black when old, often produced in chains. **Leaves:** linear, dark green, basal and involucreal, 5-15 cm long, up to 5 mm wide. **Inflorescence:** subtended by 2-4 leafy bracts. Primary rays, 2-5 cm long with 3-8 spikelets toward the tips, sometimes on short branches. Spikelets, 1-2.5 cm long, 1.5-2.0 mm wide, flattened, acute at the tip, composed of 10-40 closely overlapping florets, which are red-brown when mature. The outer scales are 3-4 mm long and blunt-tipped. **Seed:** an achene, ovate or oblong-ovate, 1.5 mm long, 3-angled, black when ripe. **Propagation:** by rhizomes, tubers and seeds.

**FAMILY: Cyperaceae**

*Flmbristylis littoralis* Gaud.

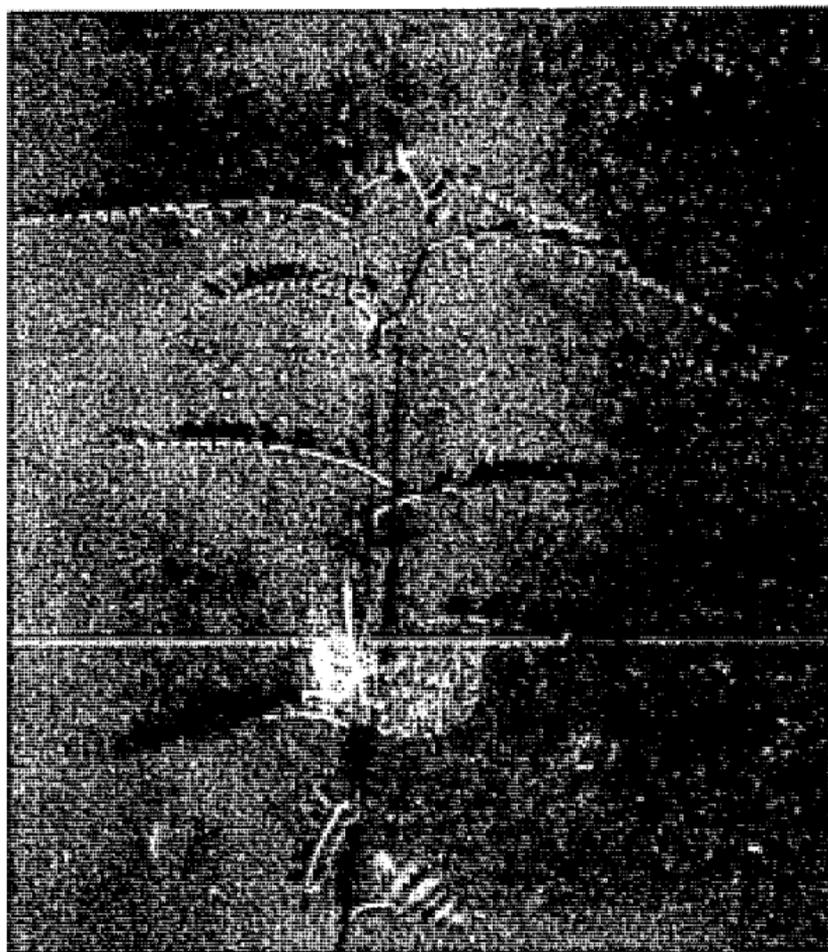
An erect, tufted annual 20-70 cm high. **Stem:** flattened at the base, strongly 4-5 angled at the top. Flowering stem, 0.6-1.5 mm thick bearing 2-4 unequal bracts, shorter than the inflorescence. **Leaves:** basal ones, with overlapping leaf sheaths, up to 35 mm long, 1-2.5 mm wide. Stem leaves with very short blades. **Inflorescence:** a decomposed, lax, and diffuse umbel, 6-10 cm long, 2.5-8 cm wide. Spikelets, numerous, solitary, brown or straw-colored, 2-2.5 mm in diameter. **Fruit:** an achene, 3-angled, 0.5-1 mm long, 0.75 mm wide, with 3 heavy ridges on each side, pale ivory colored to brown. **Propagation:** by seed.



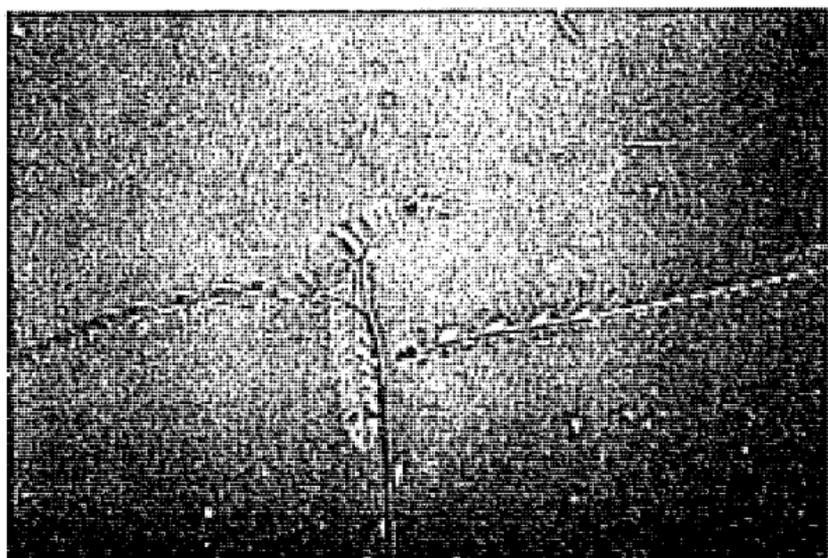
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24

FAMILY: **Euphorbiaceae**

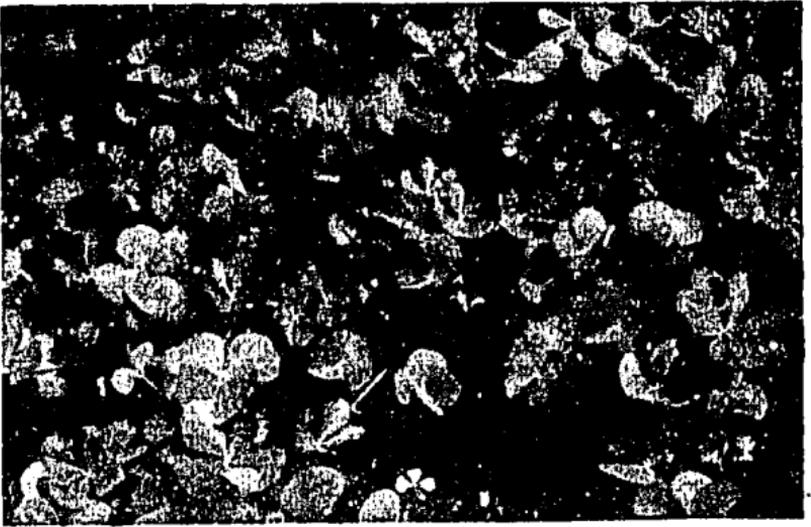
*Phyllanthus niruri* L.

A slender, erect annual with spreading closely-set branches, 20-50 cm high with numerous small leaves that give the appearance of pinnate leaves with many leaflets. **Leaves:** simple, alternate, oblong or elliptical, 5-10 mm long with narrow triangular stipules about 1.5 mm long. **Inflorescence:** very small, white flowers. Male and female flowers separate, occur singly or 2-3 together on 2- to 3-mm long stalks from the leaf axils on the underside of the stem. **Fruit:** a capsule, 3-celled, round, smooth, about 2 mm across, with 2 seeds per cell, dehiscent. **Seed:** light brown, wedge-shaped with two flat sides and a convex one, longitudinally ribbed on the back, about 1.5 mm long. **Propagation:** by seed.

**FAMILY: Marsileaceae**

*Marsilea minuta* L.

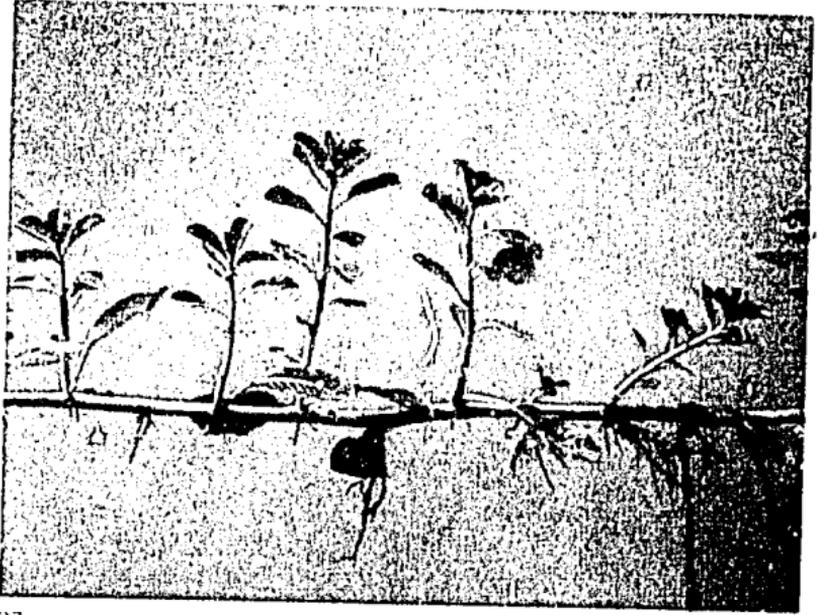
A perennial fern with long, slender, creeping rhizomes. **Leaves:** stalk, 10-30 cm long in water, much shorter (to 2 cm) on dry mud. Leaflets, 4 (rarely 2 or 3), triangular, apically rounded, subentire or cuneate, 10-15 mm long. **Inflorescence:** Sporocarps, 2-3 mm in diameter, commonly in pairs, one often abortive, on stalks 2-3 mm long at the base of the leaf stalk. Sporocarp covered with brown hairs when young, becoming glabrous or nearly so with age. **Propagation:** vegetatively and by spores.



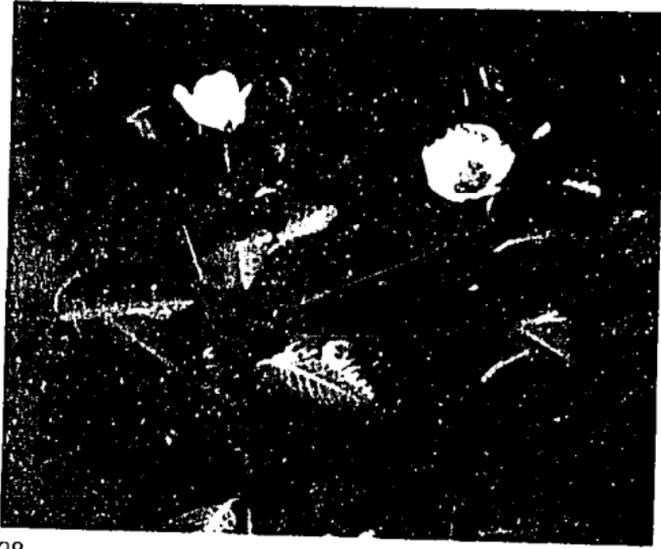
25



26



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28

**FAMILY: Onagraceae**

*Ludwigia adscendens* (L.) Hara

Decumbent annual with dense long, soft, hairs rooted in the mud or floating in the water with thick white spongy pneumatophores arising in clusters at the nodes of the floating stems and from the roots. **Leaves:** simple, alternate, oblong-elliptic, up to 8 cm long, up to 4 cm wide, narrowly tapering at the base to a long stalk; apex, blunt. **Inflorescence:** solitary, white, yellow at the base, 1-1.5 cm long, 0.5-1 cm wide. **Fruit:** a thick-walled, hairy, cylindrical 10-ribbed capsule, 2-3.5 cm long, stalk 2.5-5 cm long. Seeds embedded in lumps of corky tissue. **Seed:** pale brown, 1-1.5 mm long. **Propagation:** by seed.

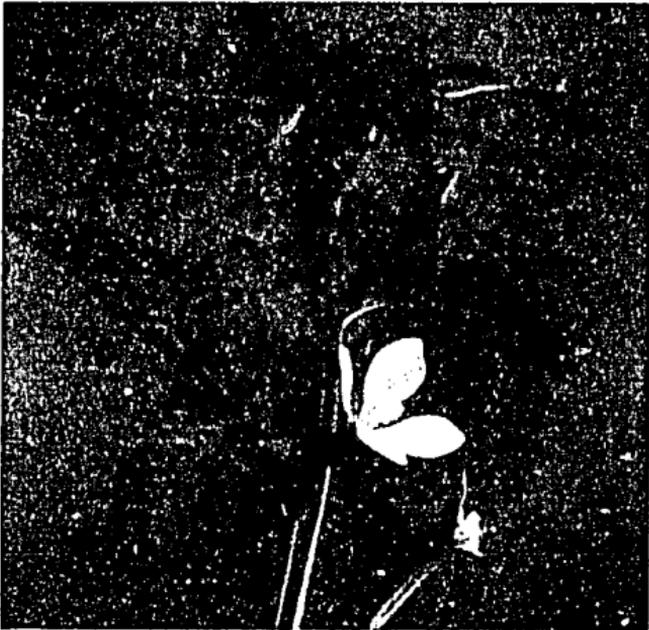
FAMILY: **Onagraceae**

*Ludwigia octovalvis* (Jacq.) Raven

A stout, coarse, many-branched, sometimes woody or shrubby annual, glabrous to densely hairy up to 1.5 m tall. **Leaves:** simple, alternate, lanceolate or linear to narrowly ovate up to 15 cm long, 4 cm wide. **Inflorescence:** solitary, axillary, sessile or nearly so. Petals, yellow, broadly ovate or cuneate, 1-1.5 cm long, 2-7 mm wide. **Fruit:** a 4-celled thin-walled terete capsule, 1.5-4.5 cm long, 2-8 mm wide with 8 ribs. Seeds, several rowed in each cell. **Seed:** free, rounded, brown, about 0.7 mm in diameter, raphe inflated. **Propagation:** by seed.



29



30

## GLOSSARY

### A

**ABRUPT:** ending suddenly.

**ACHENE:** a dry, indehiscent, one-seeded fruit (the pericarp is free from the seed).

**ACUMINATE:** gradually tapering to a sharp, prolonged point.

**ACUTE:** sharply pointed.

**ADNATE:** united to a different part.

**ALTERNATE:** arranged at different levels along an axis.

**ANATROPOUS:** descriptive of an ovule in which the body is bent backward along the funiculus and adnate to it.

**ANGIOSPERM:** flowering plant.

**ANNUAL:** a plant which completes its life cycle in 1 year or less.

**ANTHER:** part of the stamen where pollen is produced.

**APEX:** tip.

**APPENDAGE:** any external outgrowth of a plant that does not have any apparent essential function.

**APPRESSED:** pressed flat against.

**ASCENDING:** curving upwards.

**ASYMMETRICAL:** parts not equal or symmetrically arranged.

**AWN:** a bristle-like appendage.

**AXIL:** the upper angle between a leaf or a branch and the stem from which it arises.

**AXILLARY:** arising in an axil.

**AXIS:** the main stem of any organ.

### B

**BAZIL:** located at the base.

**BERRY:** a fleshy, indehiscent, usually many-seeded fruit.

**BICONVEX:** convex on both sides.

**BLADDER:** inflated pericarp.

**BLADE:** the expanded portion of a leaf or petal.

**BRACT:** a reduced or modified leaf at the base of a flower or flower head.

**BRANCH:** a division of the stem or axis of growth.

**BRISTLE:** a stiff hair.

**BUD:** a short embryonic stem tip bearing leaves or flowers or both.

**BUSH:** a low woody plant with a number of branches at, or near, ground level.

### C

**CALYX:** the outer ring of a flower made up of separate or joined sepals usually green and leaflike.

**CAPSULE:** a dry dehiscent fruit formed from several carpels.

**CARPEL:** a simple pistil or one of the structures of a compound pistil.

**CARYOPSIS:** a fruit in which the pericarp is fused to the seed. A grain.  
**CELL:** the cavity of an ovary or fruit containing the ovules or seeds.  
**CILIATE:** fringed with hairs.  
**CIRCUMSCISSILE:** dehiscent horizontally at or above the middle, the top part falling away as a lid.  
**CLASPING** partly or wholly surrounding.  
**CLUSTER** closely crowded inflorescence.  
**CLUSTERED** crowded closely together.  
**COMPOUND** composed of several similar parts.  
**COMPRESSED** flattened laterally.  
**CORDATE** heart-shaped.  
**COROLLA** the ring of usually showy flower structures inside the calyx made up of separate or joined petals.  
**CORYMB** a flat-topped inflorescence with the lower branches longer than the upper so that all flowers are at the same level.  
**COTYLEDON** seed leaf; the leaf formed directly from the embryo.  
**CREeping** spreading over or below the ground.  
**CUNEATE** wedge-shaped, tapering toward point of attachment.

## **D**

**DECUMBENT:** lying flat with the apex ascending.  
**DEHISCENT** splitting spontaneously when ripe.  
**DENTATE:** having sharp teeth pointing outward.  
**DICHOTOMOUS** forking regularly into two.  
**DIFFUSE:** widely spread.  
**DIGITATE** a compound structure whose members arise and diverge from the same point, like the fingers of the hand.  
**DISC FLORET** one of the central tubular flowers of a composite flower head.  
**DISSECTED** divided into many segments.  
**DISTINCT** separate, not united.  
**DIVIDED** cut into distinct sections.

## **E**

**ELLIPSOID** an elliptical solid.  
**ELLIPTICAL** oval-shaped.  
**EMBRYO** young plant forming in a seed developed from an egg cell.  
**EMBRYONIC:** rudimentary, in an early stage.  
**ENTIRE** with an even margin.  
**EPIDERMIS** the outer layer of cells.  
**ERECT** upright.

## **F**

**FEMALE FLOWER:** a flower with functional ovary but no stamens.

**FERTILE:** capable of producing viable seed.

**FIBROUS:** thread-like.

**FILAMENT:** the stalk of the stamen.

**FLACCID:** limp and flabby.

**FLESHY:** thick and soft.

**FLORET:** a small flower, generally one of a dense cluster but an individual flower in grasses and composites.

**FLOWER:** reproductive part of the angiosperms.

**FREE:** not fused to another part.

**FRUIT:** the ripened (mature) ovary containing one or more seeds.

## **G**

**GLABROUS:** smooth, without hairs.

**GLOBOSE:** spherical or rounded.

**GLOBULAR:** nearly spherical.

**GLUME:** one of a pair of dry bracts at the base of and enclosing a spikelet.

**GRAIN:** a fruit in which the pericarp is fused with the seed.

## **H**

**HABIT:** the general appearance of a plant.

**HAIR:** a uni- or multi-cellular epidermal outgrowth.

**HASTATE:** arrowhead-shaped.

**HEAD:** a dense cluster of sessile or nearly sessile flowers.

**HERB:** any plant that is not woody.

**HERBACEOUS:** not woody.

## **I**

**INDEHISCENT:** not splitting open when ripe.

**INFLORESCENCE:** the arrangement of the flowers on a plant.

**INTERNODE:** the portion of a stem between two nodes.

**INVOLUCRE:** a ring of bracts subtending a flower head.

## **J**

**JOINTED:** constricted at intervals.

## **K**

**KEEL:** the two lower united petals of a legume flower.

**KEELED:** ridged along the middle.

## **L**

**LAMINA:** blade.

**LANCEOLATE:** lance-shaped, several times longer than wide; widest towards the base and tapering at both ends.

**LATERAL:** on the side.

**LEAF:** an outgrowth from the stem of a vascular plant, usually green. It consists of a leaf-base, petiole and flattened lamina, which is usually conspicuously veined.

**LEAFLET:** a segment of a compound leaf.

**LEGUME:** a one-locular fruit dehiscent on two sutures.

**LEMMA:** the outer of two bracts enclosing the floret in grasses.

**LIGULE:** a thin membranous appendage at the top of the leaf sheath in grasses.

**LINEAR:** long and narrow with nearly parallel edges.

**LOBED:** partially divided into usually rounded or obtuse segments but not deeply enough to form separate entities.

## **M**

**MALE FLOWER:** a flower with functional stamens but no ovary.

**MARGIN:** edge.

**MARGINATE:** with a distinct margin.

**MEMBRANOUS:** thin, soft and pliable, often partly transparent.

**MIDRIB:** central vein.

**MONOCOTYLEDONOUS:** an embryo having a single cotyledon.

## **N**

**NODE:** the joint of a stem from which leaves or branches arise.

**NUT:** a fruit having a hard woody coat developed from a pistil with more than one carpel.

## **O**

**OBLANCEOLATE:** lanceolate, but with the widest part toward the apex.

**OBLIQUE:** sloping, having unequal sides (leaves).

**OBLONG:** longer than broad with almost-parallel sides.

**OBOVATE:** ovate, but the widest part toward the apex.

**OBTUSE:** blunt or rounded at the end.

**OPPOSITE:** arising at the same node, one on either side of the stem.

**ORBICULAR:** almost circular.

**ORGANS:** the major components of a plant: a) vegetative — roots, stems, leaves; b) reproductive — flowers, fruit seeds.

**OVAL:** broadly elliptical.

**OVARY:** the part of the pistil that contains the ovules.

**OVATE:** egg-shaped, widest towards the base.

**OVOID:** ovate or oval solid.

**OVULE:** the immature seeds before fertilization.

## **P**

**PALEA:** the inner of the two bracts enclosing the floret in grasses.

**PANICLE:** an inflorescence with a main axis and at least primary and secondary branching.

**PAPPUS:** a ring of hairs or scales around the top of the fruit of the composites.

**PARALLEL:** occurring side by side without intersecting.

**PARENCHYMA:** a soft tissue of thin-walled undifferentiated cells that are more-or-less spherical.

**PEDICEL:** the stalk of each individual flower.

**PEDUNCLE:** the stalk bearing the entire inflorescence or a solitary flower.

**PERENNIAL:** living from year to year.

**PERIANTH:** a single term for calyx and corolla, usually used when these are not clearly differentiated.

**PERICARP:** the wall of the ripened ovary.

**PETAL:** one of the divisions of the corolla, usually colored.

**PETIOLE:** the leaf stalk.

**PINNATE:** a compound leaf having the leaflets or segments arranged on either side of a common axis.

**PISTIL:** the female part of the flower consisting of ovary, style, and stigma.

**PITH:** the spongy tissue in the center of the stem.

**PNEUMATOPHORE:** a specialized root that grows vertically into the air from roots embedded in the mud.

**POD:** a dry, usually elongated fruit.

**PRIMARY:** a) first formed. b) most important.

**PROCUMBENT:** trailing or lying flat but not rooting.

**PROSTRATE:** lying flat on the ground.

**PUBERULENT:** slightly pubescent.

**PUBESCENT:** covered with short, soft hairs.

## **R**

**RACEME:** a more-or-less conical inflorescence with flowers arising laterally from a common axis, the youngest towards the tip.

**RACHIS:** the axis of a spike or raceme, or of a compound leaf.

**RADIATING:** spreading from the center.

**RADICLE:** the embryonic root of seed plants.

**RAPHE:** the ridge connecting the two ends of an anatropous ovule.

**RAY FLORET:** one of the outer tubular flowers of a composite flower head when different from those of the center.

**RECURVED:** bent backward.

**RHIZOME:** an underground stem. Distinguished from a root by the presence of buds and scales.

**RIB:** the ridge of a fruit.

**RIBBED:** having prominent ribs.

**ROOT:** a) primary — the root developing from the radicle that first appears from the seed; b) secondary — developing from the primary root; branch roots; c) tap — a primary root that enlarges and grows downward.

**RÓOTSTOCK:** rhizome.

**ROSETTE:** a cluster of radiating leaves, usually arising at or close to the ground.

**RUNNER:** a slender, trailing stem rooting at the nodes.

**RUPTURE:** to burst open along irregular lines.

## **S**

**SCALE:** a highly modified leaf, usually sessile and dry.

**SEED:** the ripened ovule.

**SEMI-ERECT:** somewhat erect.

**SEPAL:** a segment of the calyx, usually green.

**SEPTATE:** divided into cells or segments by partitions.

**SERRATE:** saw-toothed.

**SESSILE:** without a stalk.

**SHEATH:** the lower part of a leaf enclosing the stem.

**SHRUB:** a woody plant with spreading branches arising from the base.

**SIMPLE:** not divided, single.

**SPARSE:** few and scattered.

**SPATHE:** a large bract partially or wholly enclosing a group of flowers.

**SPIKE:** an unbranched elongated inflorescence with sessile or almost-sessile flowers.

**SPIKELET:** a small spike of one or more flowers surrounded by bracts.

**SPINE:** a sharp-pointed, stiff, woody structure.

**SPOROCARP:** the spore-containing structure.

**SPREADING:** diverging gradually outwards.

**STAMEN:** the male part of a flower which produces pollen.

**STEM:** main axis of the plant.

**STIGMA:** the terminal part of the pistil to which pollen grains adhere.

**STIPULE:** leaf-like appendage at the base of the leaf stalk.

**STOLON:** a modified stem creeping and rooting at the nodes.

**STRAGGLING:** spreading out irregularly.

**STYLE:** the elongated stalk connecting the stigma and the ovary.

**SUB-ENTIRE:** slightly indented.

**SUB-ERECT:** erect at the base, bending downward at the top.

**SUB-LOBED:** somewhat lobed.

**SUBTEND:** situated at the base of.

**SUCCULENT:** soft, juicy, and fleshy.

## **T**

**TERETE:** cylindrical or tapering, circular in cross-section.

**TERMINAL:** at the end of branch or a stem.

**TOOTH:** small irregularity on the leaf margin.

**TRANSPARENT:** easily seen through.

**TRANSVERSE** across the long axis.

**TRUNCATE** cut-off somewhat squarely at the end.

**TUBE** the narrow basal portion of a fused calyx or corolla.

**TUBER** a short, thickened, underground stem.

**TUBEROUS** bearing a tuber.

**TUFTED** having many short, crowded branches all arising from about the same point.

## **U**

**UMBEL** an inflorescence in which a number of divergent flowers arise from the same point.

## **V**

**VALVE** one of the sections into which a dehiscent capsule splits.

**VASCULAR** pertaining to, or having vessels that convey, fluids.

## **W**

**WART** a small, blunt-tipped, rounded outgrowth.

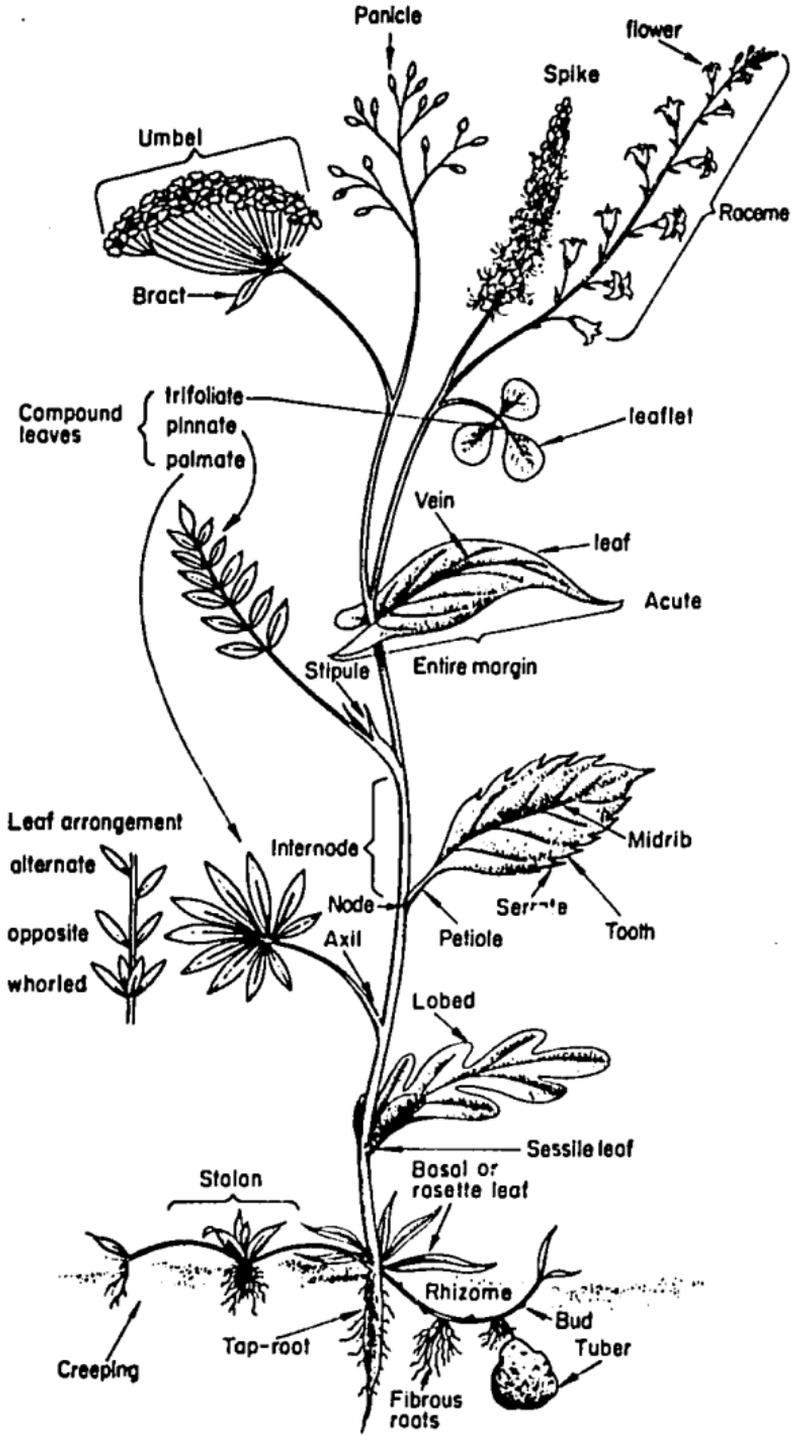
**WHORL** a ring of similar organs arising from a node.

**WING** a thin, usually dry, extension.

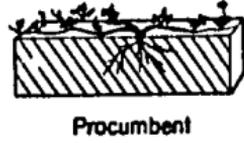
**WOODY** hard in texture.

# ILLUSTRATED GLOSSARY

## PARTS OF A BROADLEAF WEED (generalized)



# GROWTH HABITS



# LEAF SHAPES

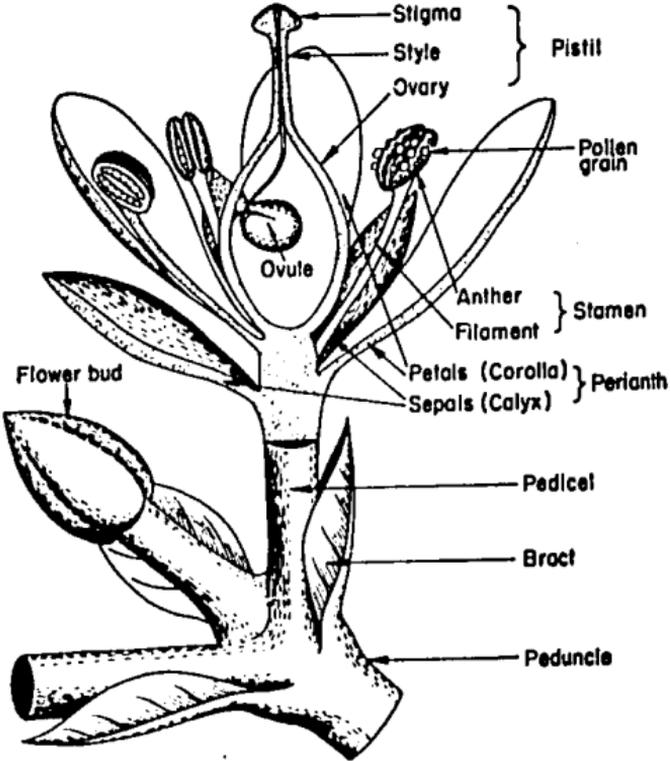


LEAF APEX	
	Truncate
	Obtuse
	Acute
	Acuminate
LEAF BASE	
	Cordate
	Truncate
	Hastate
	Oblique

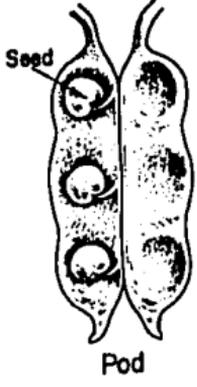
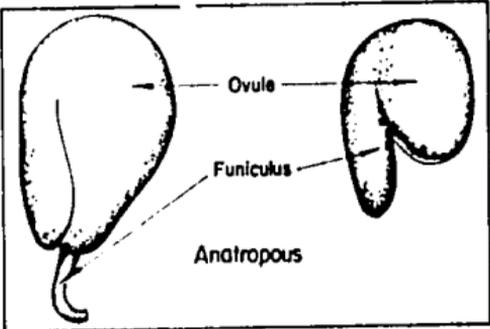
# ROOT TYPES



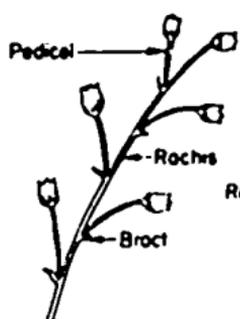
**PARTS OF A FLOWER (generalized)**



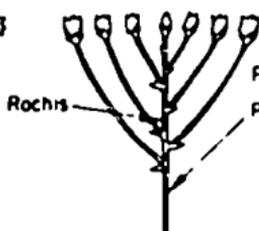
**ANATROPOUS OVULE AND DRY FRUITS**



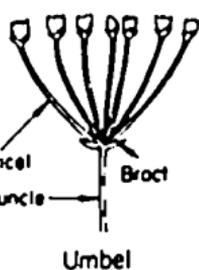
# TYPES OF INFLORESCENCE



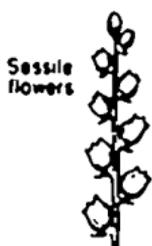
Raceme



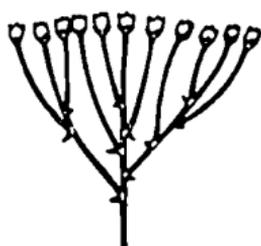
Corymb



Umbel



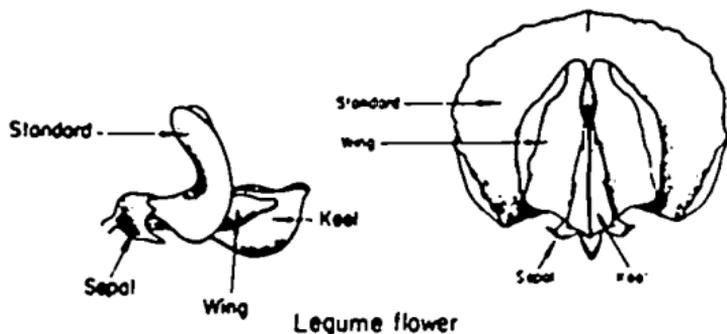
Spike



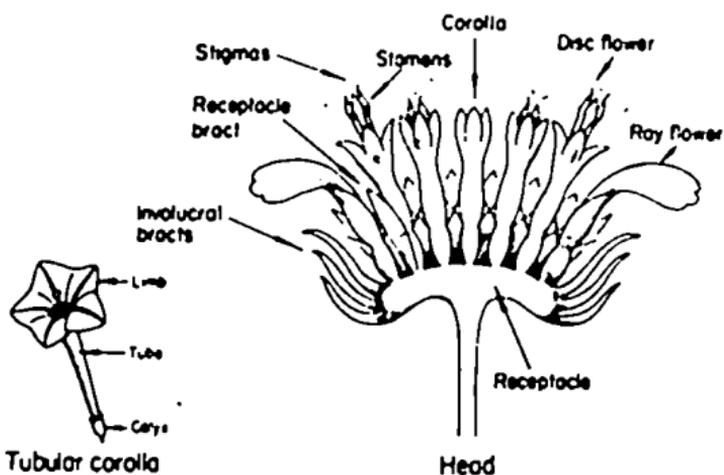
Compound corymb



Head



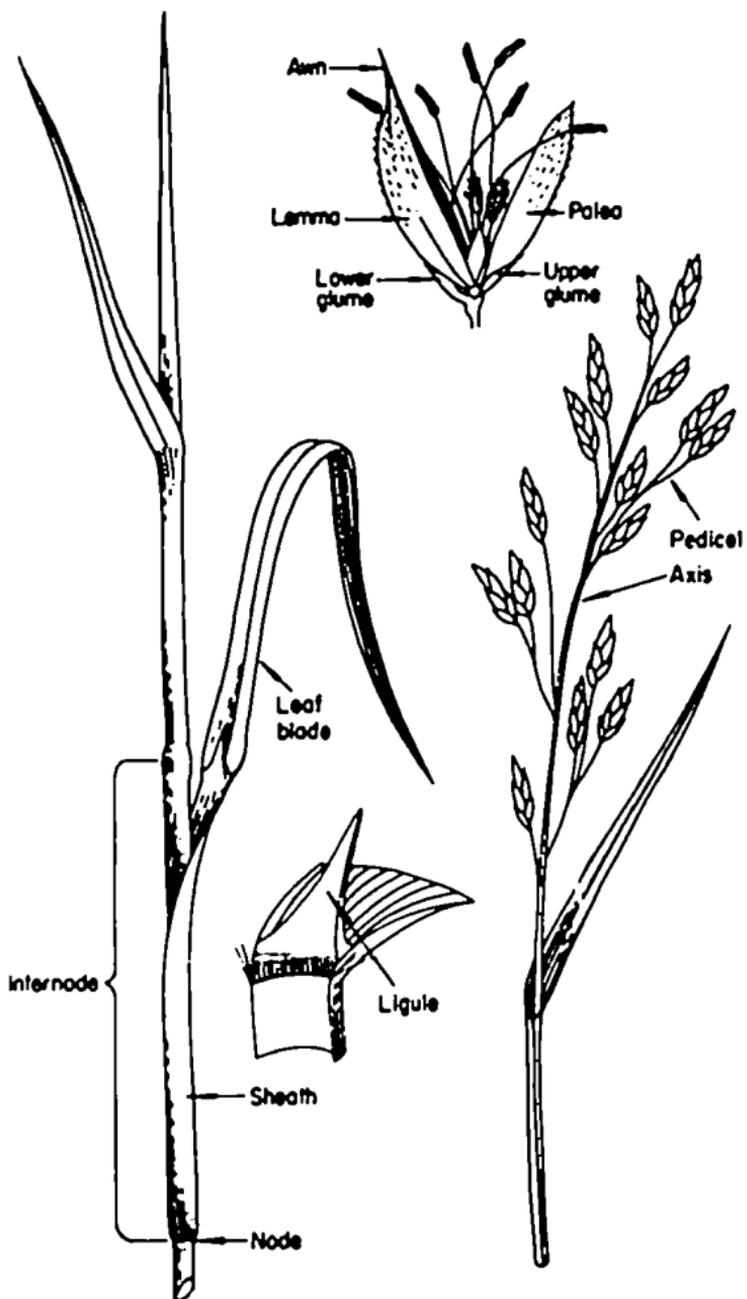
Legume flower



Tubular corolla

Head

# PARTS OF A GRASSY WEED





31

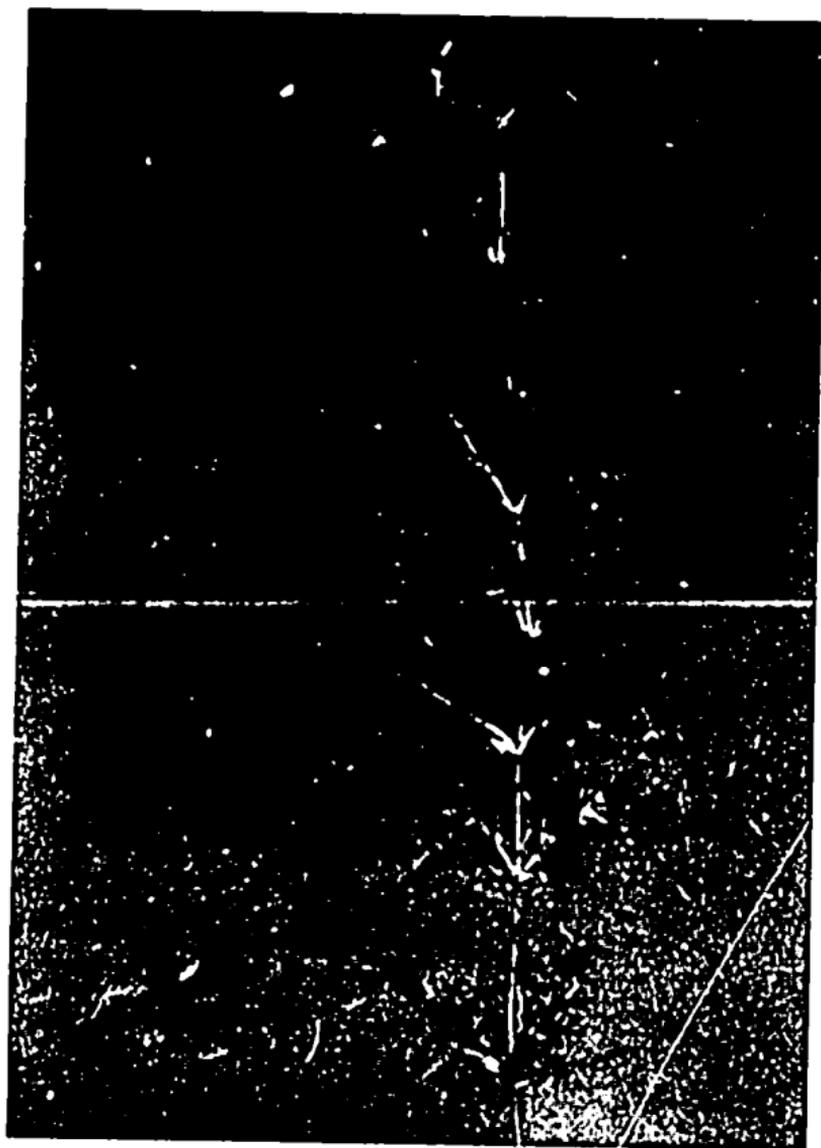


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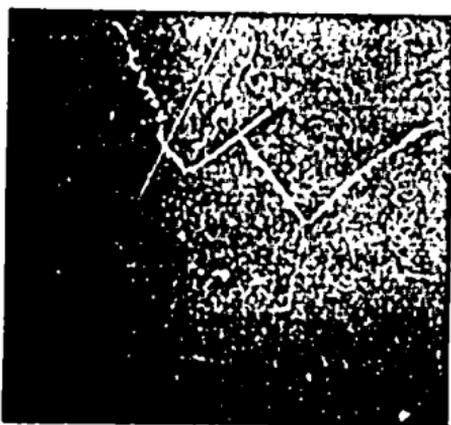
**FAMILY: Poaceae (Gramineae)**

*Brachiaria mutica* (Forsk.) Stapf.

A spreading, stout perennial rooting at the lower nodes. **Stem:** stout horizontal runners with the lower portions trailing on the ground and forming dense masses, then ascending, 2-5 m long to 1.5 m high, the nodes and sheaths hairy. **Leaves:** lanceolate, 6-30 cm long, 0.5-1.5 cm wide, somewhat hairy. Ligule, a ring of dense hairs, collar with dense hairs. **Inflorescence:** terminal, usually purplish, 10-20 cm long, with 8-20 spreading to ascending ribbon-like branches 2-8 cm long bearing many (usually paired) spikelets 2.5-3.5 mm long along one side, one of each pair of spikelets with a distinct stalk. Spikelets, in 2-4 rows. **Seed:** a caryopsis. **Propagatlon:** vegetatively by runners and by seeds.



33



34

FAMILY: **Poaceae (Gramineae)**

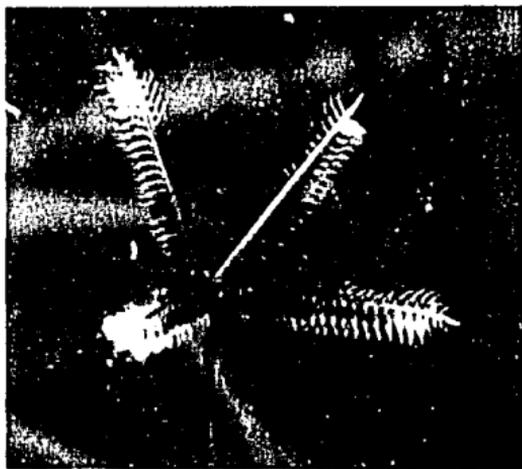
*Cynodon dactylon* (L.) Pers.

An extensive creeping, many-branched perennial with underground rhizomes. **Stem:** flattened, usually prostrate but sometimes somewhat upright, flowering stalks 10-40 cm high. An extensive system of rhizomes produced below ground, long runners above ground with roots and tufted shoots arising from the nodes. **Leaves:** small, linear, 2-10 cm long, up to 4 mm wide, blue-green, smooth on the lower surface, hairy on the upper surface, margins rough. Sheaths on aerial stems overlapping with a few long hairs at the junction of the sheath and blade. Ligule, a ring of short, fine hairs. **Inflorescence:** terminal, 4-5 slender digitate spikes, 1-6 cm long, 1-2 mm wide each bearing many spikelets. Spikelets, sessile, flattened, closely overlapping in 2 rows along one side of the spike. **Fruit:** a caryopsis, flattened, elliptical, red-brown. **Propagation:** by runners, rhizomes, and seed.

**FAMILY: Poaceae (Gramineae)**

*Dactyloctenium aegyptium* (L.) Beauv.

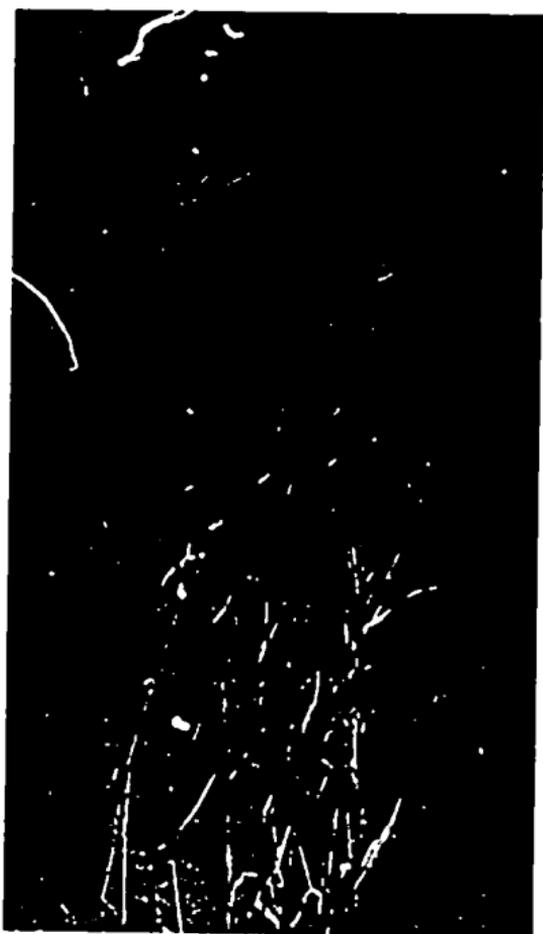
Spreading to slightly ascending annual, rooting at lower nodes, with an erect or ascending stem 15-60 cm high. **Stem:** Smooth, compressed, branching often dichotomously and commonly forming radiate mats. **Leaves:** Sheath, smooth, compressed, loosely overlapping. Blade, flat, linear, 5-35 cm long, 2-8 mm wide, tapering to a fine point, hairy, especially on the margins. Ligule, white, membranous with a jagged hairy edge, 1-2 mm long. **Inflorescence:** floral stem erect or ascending 15-60 cm high; 2-5 digitate terminal spikes, 2-5 cm long, 5-8 mm wide terminating in a short sharp point. **Spikelets,** 2.5-4 mm long, 4 mm wide, set at right angles to the axis and crowded in two overlapping rows along its lower side. **Palea,** 1.5 mm long. **Lemma,** 2.5-3.0 mm long with a short, often recurved, awn 2.0 mm long. **Fruit:** a caryopsis about 0.8 mm long, obovate, transversely ridged, light brown. **Propagation:** by seed.



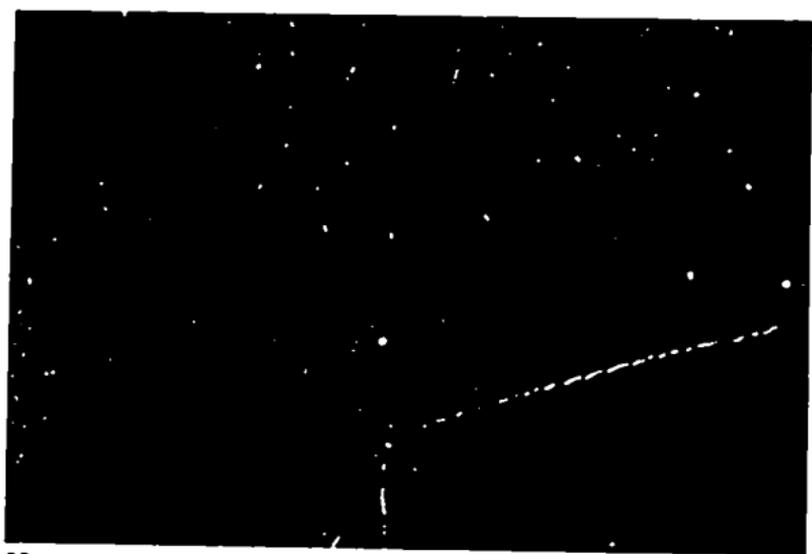
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**FAMILY: Poaceae (Gramineae)**

*Digitaria ciliaris* (Retz.) Koel. [Syn. *D. adscendens* (H.B.K.) Henr.]

A creeping or straggling annual ascending to 60 cm high, rooting at the nodes. **Leaves:** thin, often with a white wrinkled margin 5-10 cm long, 3-8 mm wide, blue-green with a white midrib, occasionally with sparse long hairs on the upper surface. Ligule, very prominent, membranous and clasping the stem. Collar with long, white hairs. **Inflorescence:** Spikes, 5-10 cm long, often in a whorl of 4-9 at the top of the central stalk but sometimes arranged along a short common axis bearing pointed, dense spikelets usually overlapping by half their length in 2 rows on one side, often at maturity developing a fringe of brownish-red hairs along the margins. **Fruit:** a caryopsis, narrow, elliptical. **Propagation:** by seed.

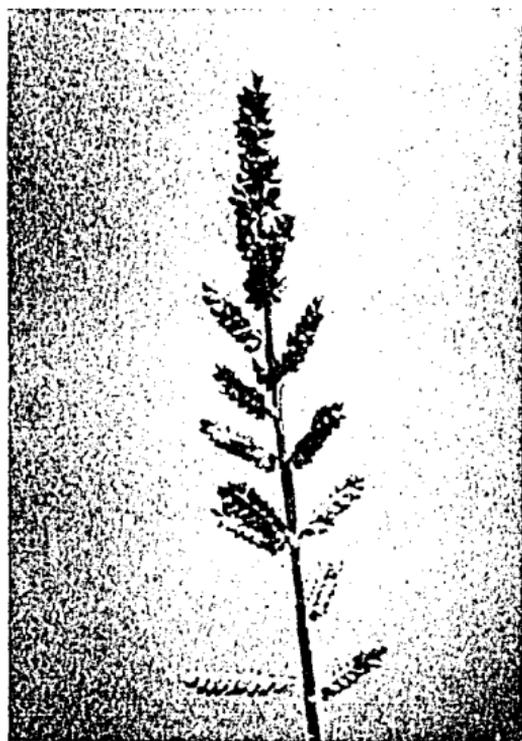
FAMILY: **Poaceae (Gramineae)**

*Echinochloa colona* (L.) Link

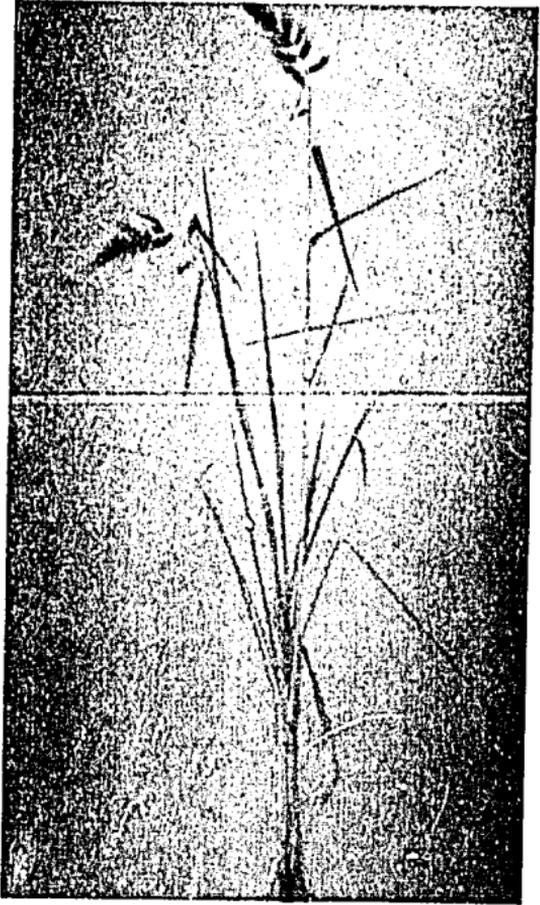
Smooth, tufted annual 30-75 cm high, usually decumbent and rooting at the lower nodes, green to purple with an inflorescence of short spikes in an alternate arrangement on the main axis. **Stem:** flattened, often red-purple at the base, usually swollen at the nodes. **Leaves:** Sheath, smooth, margins free in upper part, basal portion often tinged with red. Blade, smooth, flat, linear-lanceolate, flaccid, up to 25 cm long, 3-7 mm wide, sometimes with transverse purple bands. **Inflorescence:** green to purple, ascending panicle, 6-12 cm long with 4-8 simple, short, compact branches 1-3 cm long, 3-4 mm wide, ascending or appressed about half their own length apart. **Spikelets,** ovate to broad ovate, acute, 2-3 mm long and crowded into 4 rows along one side of the branch, nearly sessile, sometimes with an awn point about 1 mm long. **Fruit:** a caryopsis, 1.3-2 mm long. **Propagation:** by seed.



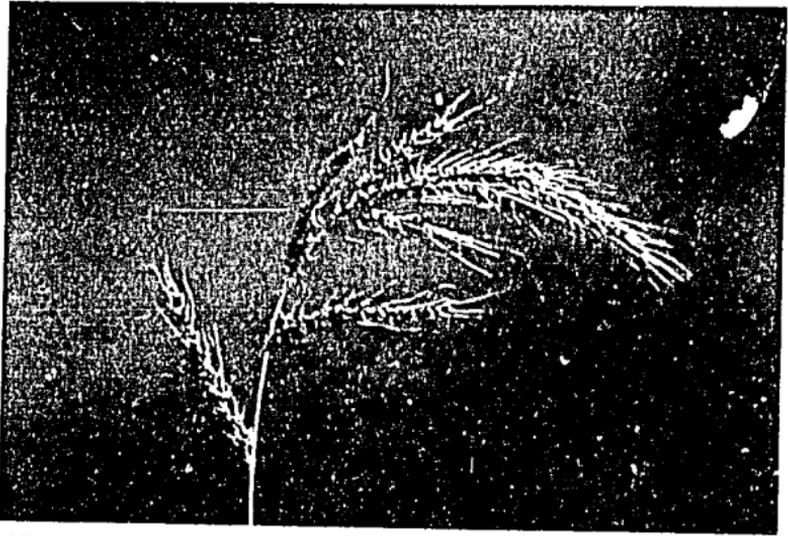
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**FAMILY: Poaceae (Gramineae)**

*Echinochloa crus-galli* ssp. *hispidula* (Retz.)

Honda

An erect annual up to 2 m high, with thick roots and stout spongy stems. **Leaves:** up to 40 cm long and 5-15 mm wide. **Inflorescence:** pink to purple, occasionally green, soft, nodding panicle, 6-20 cm long with dense spikelets. Lowest branches the longest, occasionally 10 cm long, often rebranched and spread at maturity. Spikelets, elliptical, pointed, 3-3.5 mm long, usually slightly hairy. Awns, if present, usually red or purple, 2-5 cm long. The lemma of the first floret is flat or slightly convex and dull. **Fruit:** a caryopsis, 1.3-2 mm long. **Propagation:** by seed.

**FAMILY: Poaceae (Gramineae)**

*Echinochloa glabrescens* Munro ex Hook. f.

An erect annual, 0.5-1.0 m high, usually close-tufted in wetland but spreading in dryland, where it is much less frequent. **Leaves:** acuminate, 10-20 cm long, 5-8 mm wide. **Inflorescence:** Panicle, usually narrow, pyramidal, 10-20 cm long, with numerous green or purple ascending or spreading spikes 2.5-8 cm long and 7 mm in diameter. Spikelets, ovate, 3 mm long. Awns, may or may not be present; if present, 1-3 cm long. The lemma of the first floret is convex and shiny. **Fruit:** a caryopsis. **Propagation:** by seed.



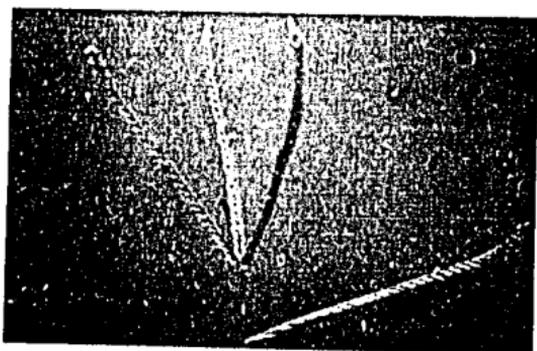
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**FAMILY: Poaceae (Gramineae)**

***Eleusine indica* (L.) Gaertn.**

Smooth or slightly hairy, tufted, prostrate to ascending, annual, up to 60 cm high with a digitate inflorescence profusely branching at the base and occasionally rooting at the lower nodes.

**Stem:** laterally flattened, white or pale green, smooth or with a few long hairs along the edges.

**Leaves:** Sheath, 6-9 cm long, flattened laterally, with a few long hairs at the collar. Blade, flat or folded, linear-lanceolate, 10-30 cm long, 3-6 mm wide, with almost parallel margins and a rather blunt tip. A few scattered hairs on the upper surface. Ligule, membranous with a jagged edge, long hairs on the margins at the junction of the blade and sheath.

**Inflorescence:** a terminal whorl of 3-6 spikes, 4-8 cm long, 3-6 mm wide, often with 1 or 2 additional spikes slightly below the others. Spikelets, numerous, sessile, awnless, 4-5 mm long, crowded into 2 rows along the underside of the flattened rachis, laterally compressed.

**Fruit:** a caryopsis about 1.5 mm long, red-brown, oblong-ovate with conspicuous ridges. **Propagation:** by seed.

**FAMILY: Poaceae (Gramineae)**

*Ischaemum rugosum* Salisb.

An aggressive, erect or straggling, tufted, annual 0.6-1.2 m high with 2 long-awned spike-like racemes and conspicuously ridged spikelets.

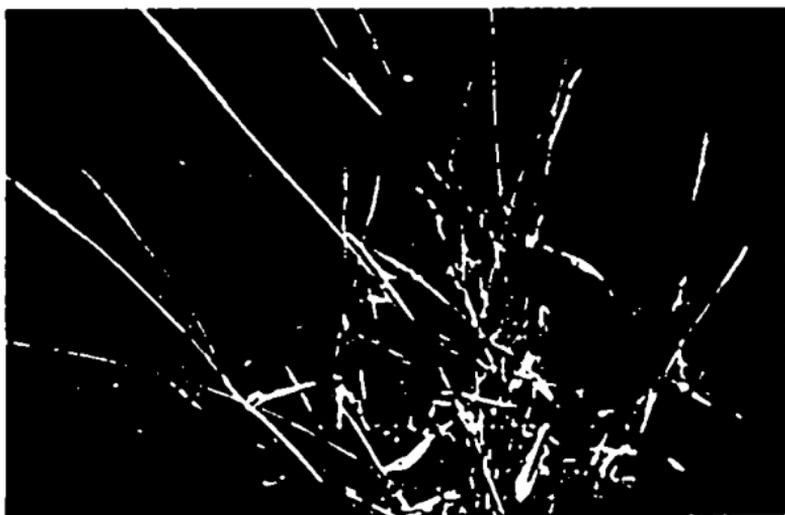
**Stem:** purple, nodes bearded. Flowering stems purple, usually with long hairs at the nodes.

**Leaves:** Blades, linear-lanceolate, 10-30 cm long, 5-13 mm wide, scattered hairs on both surfaces. Sheath, rather loose, green or purple, hairy on the margins.

**Inflorescence:** apparently single when young but separates at maturity into two racemes, 5-10 cm long. Spikelets, yellow-green, up to 6 mm long, in pairs, one sessile, the other stalked up to 6 mm long with awns 1.5-2.5 cm long, slender, spirally twisted at the base. Lower glumes with 3-6 prominent, transverse, ridges.

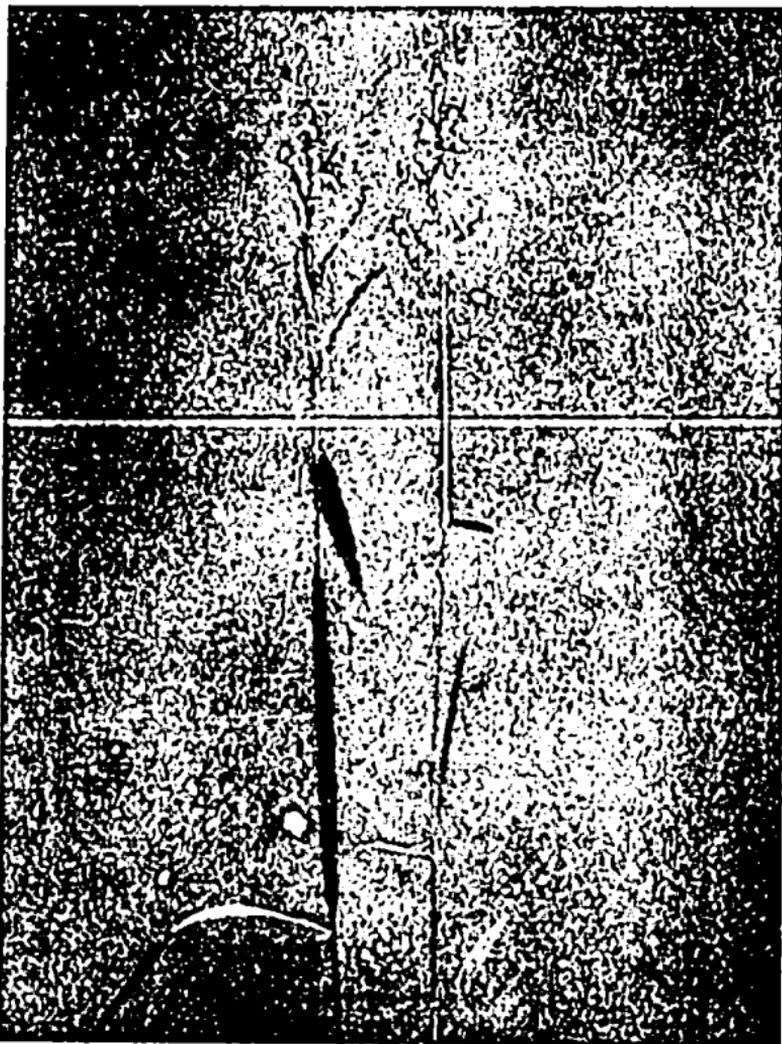
**Fruit:** a caryopsis, red-brown, oblong-lanceolate, pointed at the tip, 1.5-2 mm long.

**Propagation:** by seed.

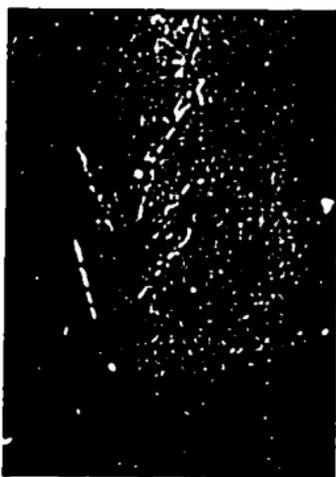


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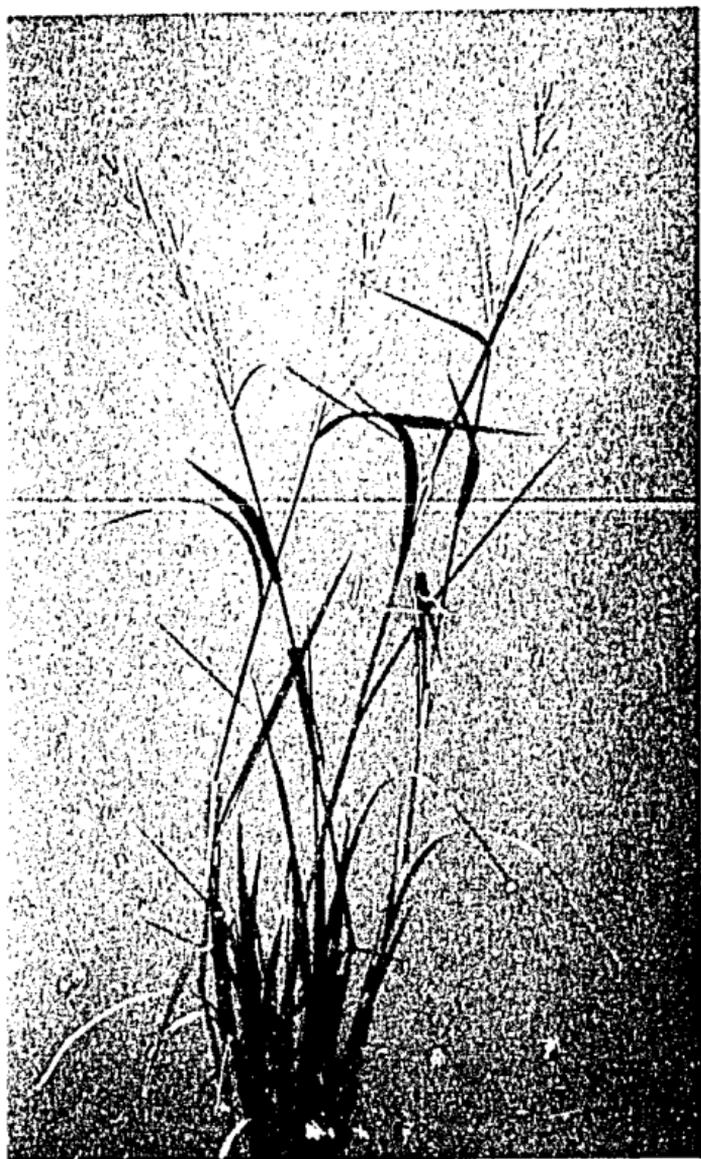
**FAMILY: Poaceae (Gramineae)**

*Leersia hexandra* Sw.

A slender, straggling, leafy, ascending or sub-erect perennial 50-120 cm high. **Leaves:** stiff, linear-lanceolate, acuminate, 5-15 cm long, 0.3-1 cm broad with tiny backward pointing spines on the back of the midrib. Ligule, long, round, thin, rather stiff and hairy. **Inflorescence:** a narrow, terminal panicle 5-15 cm long, with zigzag slender suberect or spreading branches 2-5 cm long. Spikelets, oblong, 3-4 mm long, overlapping, flattened, asymmetrical on short stalks with short spiny bristles along the margins. **Fruit:** a caryopsis. **Propagation:** by division of rootstocks and by seed.

**FAMILY: Poaceae (Gramineae)**  
***Leptochloa chinensis* (L.) Nees**

An annual with slender or somewhat stout stems ascending from a branching base, 30 cm-1 m high. Foliage and panicles sometimes red or purple. **Leaves:** flat, thin, membranous, 10-30 cm long, 0.3-1.0 cm wide. **Inflorescence:** a panicle, narrowly ovate, branches simple, numerous, spreading, 5-15 cm long. Spikelets, 2-7 flowered, short stalked, appressed or erect, pale green or reddish. **Fruit:** a caryopsis, ellipsoid, 0.8 mm long. **Propagation:** by seed.



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**FAMILY: Poaceae (Gramineae)**

*Panicum repens* L.

An erect, rather wiry creeping perennial 30-100 cm high with long stout underground stems; base covered with smooth scales. **Stem:** somewhat prostrate or creeping below rooting at the hairless nodes. **Leaves:** linear-lanceolate, 7-15 cm long, 5-8 mm wide, flat or folded, blue-green, slightly hairy on the upper surface, smooth on the lower. Ligule, very short, leathery, densely hairy; leaf sheath with ciliate margins. **Inflorescence:** an open terminal panicle up to 20 cm long, the branches slender, erect, or ascending, scattered, 1-3 at each node. Spikelets, oval to elliptical, acute or slightly acuminate, 2-3 mm long, on slender stalks. **Propagation:** vegetatively by stout, creeping underground stems.

**FAMILY: Poaceae (Gramineae)**

***Paspalum conjugatum* Berg.**

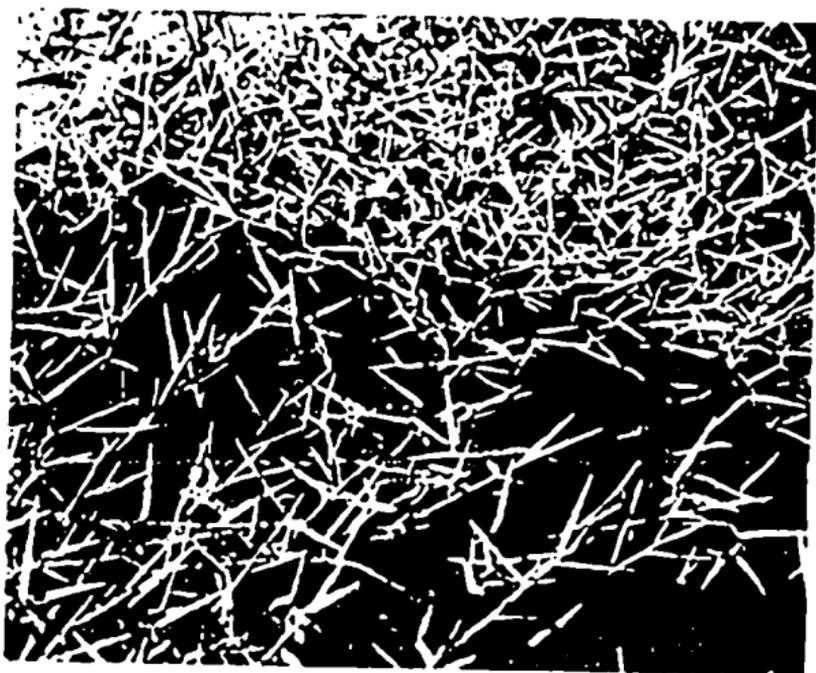
A creeping, prostrate perennial, rooting at the nodes with slender leafy, erect-flowering stems up to 60 cm high. **Stem:** flattened runners, hairy at the nodes, often red-purple. **Leaves:** Blade, thin, flat or folded, linear-lanceolate, 5-15 cm long, 5-15 mm wide. Blade and sheath hairy along the margins. Sheath, flattened, 6-10 cm long, membranous, with a collar of fine hairs just below the junction with the blade. Ligule, 1 mm long. **Inflorescence:** a panicle with 2 (rarely 3) terminal spike-like very slender branches 10-15 cm long, 1 mm wide, with 2 rows of yellow, circular, flattened, overlapping spikelets, 1.5-2 mm long along the underside of the flattened axis. Spikelets, short stalked, with a fringe of long, white hairs on the margin. **Fruit:** a caryopsis, light brown with a finely hairy margin. **Propagation:** by runners and by seed.



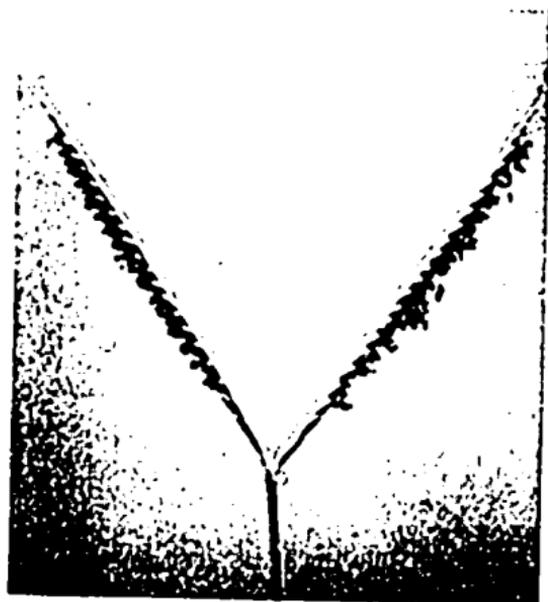
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**FAMILY: Poaceae (Gramineae)**

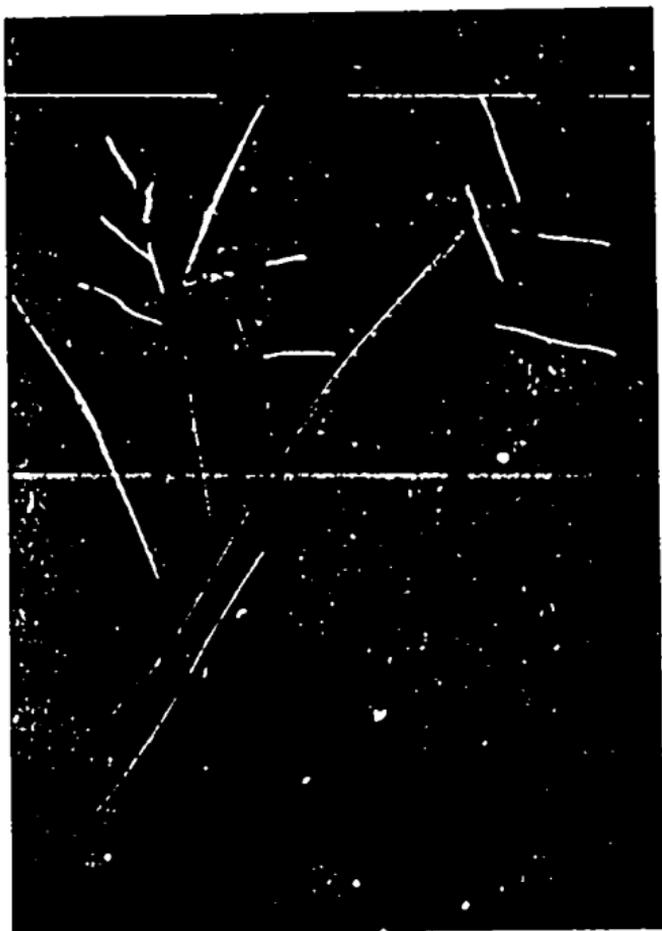
*Paspalum paspalodes* (Michx.) Scribn. [Syn. *P. distichum* L.]

A perennial with slender rhizomes and extensive stolons forming thick mats. Secondary roots arising from many-branched horizontal stems. Flowering stems, ascending, up to 60 cm high with hairy nodes. **Leaves:** flat or folded, 3-12 cm long, 2-6 mm wide, usually hairy on the basal margins. Sheaths, loose, keeled, fine hairs toward the top. Ligule, 0.75-1.25 mm long. **Inflorescence:** a panicle with 2 (rarely 1 or 3) terminal, erect to spreading spikelets racemes up to 7.5 cm long, each bearing usually solitary green to yellow spikelets in 2 rows along one side. Spikelet, appressed, elliptical, upper glume hairy. **Fruit:** a caryopsis, brown. **Propagation:** vegetatively from rhizomes and stolons and by seed.

**FAMILY: Poaceae (Gramineae)**

*Paspalum scrobiculatum* L.

A tufted, erect, rather slender perennial, 0.4-1.0 m high. **Stem:** decumbent and branched below. **Leaves:** flat, glabrous, 5-20 cm long, 5-10 mm wide. Sheath, glabrous, longer than the internode, compressed, keeled. Ligule, 0.5-1 mm long with tawny hairs on the back. **Inflorescence:** a panicle consisting of 3-4 usually spreading racemes 4-8 cm long. Rachis, flat, 1.5-3 mm wide. Spikelets, solitary, orbicular to ovate, about 2 mm long. **Seed:** light brown. **Propagation:** vegetatively and by seed.



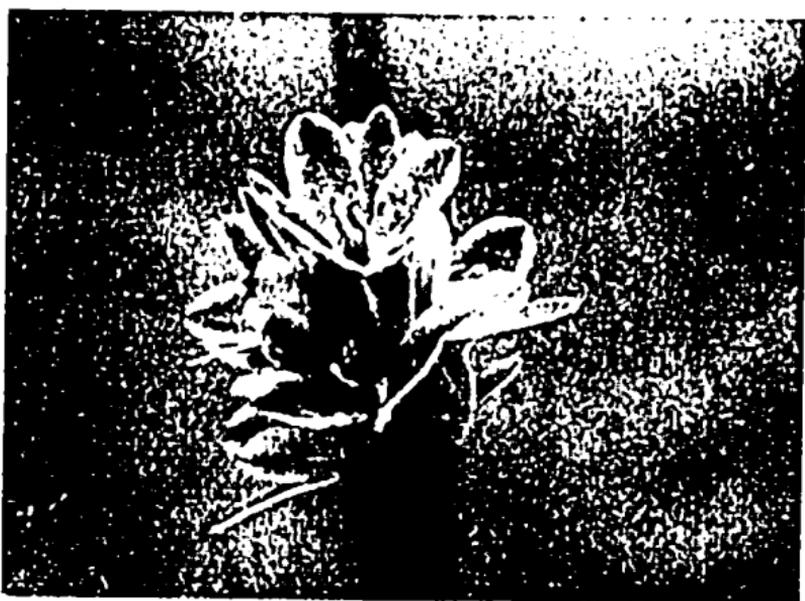
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**FAMILY: Pontederiaceae**

***Monochoria vaginalis* (Burm.f.) Presl**

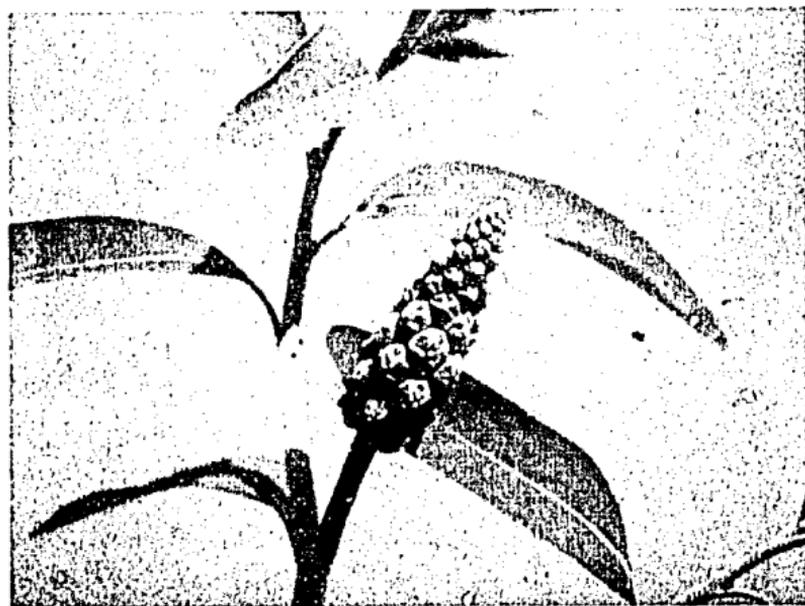
An annual, scum aquatic broadleaf, monocotyledonous weed with fleshy stems and very short roots, 40-50 cm high. **Leaves:** oblong-ovate, sharply acuminate, base cordate 10-15 cm long, 3-5 cm wide with long stalks, 10-20 cm long. **Inflorescence:** a spike, 3-6 cm long with a few blue flowers about 1 cm long arising from a leaf-like sheath. Flower stalks all less than 1 cm long. **Fruit:** a capsule, about 1 cm long. **Seed:** oblong, about 1 mm long. **Propagation:** by seed.

**FAMILY: Sphenocleaceae**  
*Sphenoclea zeylanica* Gaertn.

An erect annual, aquatic with a smooth, stout, fleshy, hollow, branched stem, 0.3-1.5 m high. **Leaves:** simple, spirally arranged, lanceolate up to 10 cm long, 3 cm wide, narrowed to a point at the tip with a short stalk and entire margins. **Inflorescence:** green, cylindrical, dense, terminal spikes up to 7.5 cm long, 12 mm wide on stalks up to 8 cm in length. Flowers, crowded, white to green, about 2.5 mm long and wide. **Fruit:** a globular capsule, 4-5 mm across, splitting transversely. **Seed:** numerous, yellow-brown, 0.5 mm long. **Propagation:** by seed.



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