



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



A Practical Field Guide to

Weeds of Rice in Asia

B.P. Caton, M. Mortimer, J.E. Hill, and D.E. Johnson



IRRI

Second Edition

A Practical Field Guide to

Weeds of Rice in Asia

Second Edition

B.P. Caton, M. Mortimer,
J.E. Hill, and D.E. Johnson

2010

IRRI

INTERNATIONAL RICE RESEARCH INSTITUTE
Los Baños, Laguna, Philippines

The International Rice Research Institute (IRRI) was established in 1960 by the Ford and Rockefeller Foundations with the help and approval of the Government of the Philippines. Today IRRI is one of 16 nonprofit international research centers supported by the Consultative Group on International Agricultural Research (CGIAR – www.cgiar.org).

IRRI receives support from several CGIAR members, including the World Bank, European Union, Asian Development Bank, International Fund for Agricultural Development, International Development Research Centre, Rockefeller Foundation, and agencies of the following governments: Australia, Belgium, Canada, People's Republic of China, Denmark, France, Germany, India, Islamic Republic of Iran, Japan, Republic of Korea, The Netherlands, Norway, Philippines, Spain, Sweden, Switzerland, Thailand, United Kingdom, United States, and Vietnam.

The responsibility for this publication rests with the International Rice Research Institute.

Copyright International Rice Research Institute 2010

Mailing address: DAPO Box 7777, Metro Manila, Philippines

Phone: +63 (2) 580-5600, 845-0563, 844-3351 to 53

Fax: +63 (2) 580-5699, 891-1292, 845-0606

Email: irri@cgiar.org

Home page: www.irri.org

Riceweb: www.riceweb.org

Rice Knowledge Bank: www.knowledgebank.irri.org

Courier address: Suite 1009, Pacific Bank Building

6776 Ayala Avenue, Makati City, Philippines

Tel. (63-2) 891-1236, 891-1174, 891-1258, 891-1303

Suggested citation:

Caton BP, Mortimer M, Hill JE, Johnson DE. 2010. A practical field guide to weeds of rice in Asia. Second Edition. Los Baños (Philippines): International Rice Research Institute. 118 p.

Editing: Bill Hardy

Cover design: Juan Lazaro IV

Design and print production coordinator: Priscilla Grace Cañas

ISBN 978-971-22-0256-8

Contents

Species by common name in English	5
Foreword	7
Acknowledgments	8
Terms and definitions	9
Key to species listings	10

BROADLEAF

<i>Aeschynomene aspera</i>	12
<i>A. indica</i>	15
<i>Ageratum conyzoides</i>	16
<i>Alternanthera sessilis</i>	19
<i>Alternanthera philoxeroides</i>	19
<i>Amaranthus spinosus</i>	20
<i>Amaranthus viridis</i>	20
<i>Commelina benghalensis</i>	23
<i>C. diffusa</i>	24
<i>Eclipta prostrata</i>	27
<i>Eichhornia crassipes</i>	28
<i>Ipomoea aquatica</i>	31
<i>Ludwigia adscendens</i>	32
<i>L. octovalvis</i>	35
<i>L. hyssopifolia</i>	35
<i>Marsilea minuta</i>	36
<i>Mimosa diplotricha</i>	39
<i>Monochoria vaginalis</i>	40
<i>Pistia stratiotes</i>	43
<i>Polygonum hydropiper</i>	44
<i>Portulaca oleracea</i>	47
<i>Sphenoclea zeylanica</i>	48
<i>Trianthema portulacastrum</i>	51

GRASSES

<i>Cynodon dactylon</i>	52
<i>Dactyloctenium aegyptium</i>	55
<i>Digitaria ciliaris</i>	56
<i>Echinochloa colona</i>	58
<i>E. crus-galli</i>	61
<i>E. glabrescens</i>	62
<i>Eleusine indica</i>	65
<i>Imperata cylindrica</i>	66
<i>Ischaemum rugosum</i>	69
<i>Leersia hexandra</i>	70
<i>Leptochloa chinensis</i>	73
<i>Oryza sativa</i>	75
<i>Panicum repens</i>	76
<i>Paspalum distichum</i>	79
<i>P. scrobiculatum</i>	80
<i>Rottboellia cochinchinensis</i>	83

SEDGES

<i>Bolboschoenus maritimus</i>	84
<i>Cyperus difformis</i>	87
<i>C. iria</i>	88
<i>C. rotundus</i>	91
<i>Fimbristylis dichotoma</i>	92
<i>F. miliacea</i>	95
<i>Scirpus juncooides</i>	96
Appendices	98
Selected references	117

Species

by common name in English

Barnyardgrass	61
Bermuda grass	52
Bulrush	96
Chinese sprangletop, red sprangletop	73
Cogon grass	66
Crab grass	56
Creeping water primrose	32
Crowfoot grass	55
False daisy	27
Forked fringe-rush	92
Giant sensitive plant	39
Globe fringe-rush	95
Goosegrass	65
Gooseweed	48
Horse purslane, giant pigweed	51
Indian joint-vetch	15
Itchgrass	83
Jungle-rice	58
Knotgrass	79
Kodo millet	80
Longfruited primrose-willow	35
Marsh-pepper smartweed, water pepper	44
Monochoria	40
Purple nutsedge	91
Purslane	47
Rice flat sedge	88

Saltmarsh bulrush	84
Sessile joyweed	19
Smallflower umbrella sedge	87
Sola pith plant	12
Southern cutgrass	70
Spiny amaranth	20
Spreading dayflower	24
Torpedo grass	76
Tropic ageratum, goat weed	16
Tropical spiderwort	23
Water clover	36
Waterlettuce	43
Water spinach, swamp morningglory	31
Water hyacinth	28
Weedy rice, red rice	75
Wrinkled grass, saramollagrass	69

Foreword

Weed infestations are a concern for every farmer. Depending on the type of rice production system, farmers across Asia often contend with the same or similar weed species. This group of species is relatively small, but of great importance, and includes many of the “world’s worst weeds.”

In this guide, we have tried to collect practical information about some of the most common weeds of rice in Asia. The guide contains information about the botany, ecology, herbicide resistance, and cultural control of these species in a short text that should be easy to use in the field. In addition, it includes pictures to aid in early and accurate species identification.

Our goal is to give farmers, extension agents, researchers, and others a practical in-field means of assessing weed control problems and, when possible, to provide strategies for improving integrated weed management in rice systems. We especially hope the guide will help farmers better understand the relationships among land preparation, rice establishment methods, and early-season water management practices that often strongly influence the particular weed species that infest their rice fields.

In this second edition, we have revised some of the text, added or changed more than 50 plates, and added reference to five additional species. We welcome comments from practitioners on how this can be improved in the future.

Robert Zeigler
Director General
International Rice Research Institute

Acknowledgments

The authors thank the following people for their contributions to this project: Ross Lubigan, Ted Migo, Joel Janiya, Bill Sta. Clara, and Chris Quintana, photography; Panya Romyen and Dome Harnpichitvitaya for editing Thai common names.

The authors also thank the following persons who provided weed photos that could not be located in the IRRI archives: I.P. de Boer-Dammers (<http://home.hccnet.nl/boer.3>) for *Aeschynomene aspera* (Figs. 1-3); Y. Hada for *Aeschynomene indica* (Figs. 4-6); and D. Tenaglia for *Polygonum hydropiper* (Figs. 46-47).

The publication of this second edition of the field guide was partly funded by the Swiss Agency for Development and Cooperation through the Irrigated Rice Research Consortium.

Terms and definitions

Apical (bud) dominance—growth of lateral buds is inhibited until the terminal bud stops growing

Ascending—curving upward

Creeping—a plant that often spreads horizontally using stolons or rhizomes

Erect—stems or branches growing vertically

Hypocotyl—the part of the stem below the first true leaf or leaves (seed leaf/cotyledons)

Inflorescence—a structure with flowers

Leaf blade—the extended portion of the leaf

Node—a place on the stem that may bear leaves

Propagule—a reproductive structure, for example, a seed or tuber

Rhizome—underground stem

Runner—a long, aboveground stem that roots at nodes to form new plants; longer than stolons

Sheath—basal part of leaf extending around stem

Stolon—a short, aboveground stem that roots at nodes to form new plants

Tuber—underground food-storing organ from which stems and roots may grow

Tufted—growing in clumps

Key to species listings

Scientific name: genus and species, family name.

Common name(s): Bayer code.

Found in: upland or lowland fields: upland = dryland, either occasionally or never flooded; lowland = wetland, often bunded and regularly flooded during rice season.

Establishment method: methods of rice establishment after which species may commonly occur. DS = dry-seeded, WS = wet-seeded, TP = transplanted. ">" indicates more than and ">>" much more than, e.g., DS > TP means that the species is likely to occur more in direct-seeded than in transplanted rice.

Growth habit: general appearance of growing plant.

Moisture: range of soil moisture, from dry to moist to wet (saturated) to flooded. The first listed is preferred.

Emergence time: approximate time of emergence, usually relative to rice germination rather than rice planting.

Competitiveness: potential of a species to reduce rice yields at high weed densities; low = 20% or less yield loss, moderate = 20% to 50% loss, high = greater than 50% loss, very high = up to 100% loss.

Seed contaminant: either reported or the possibility of contamination of rice seeds.

Cultural control: nonchemical methods that may help control a species.

Reported resistance (to herbicides): reported cases worldwide by herbicide type (weedsience.org, 2009). See country codes.

Life cycle: annual, lives for only one season; perennial, may live for two or more seasons.

Seed wt: measured or reported seed mass or weight (wt), in mg.

Method(s) of reproduction: main types of propagules produced by the species.

Flowering/maturity time: days till flowering begins or maturity is reached. All times are approximate.

Dormancy: whether propagules can germinate immediately after shedding or not. If so, seed banks are likely to be transient.

Flower: general description.

Elevation: maximum reported elevation.

Light: preference for radiation intensity.

Notes: other information that may be of interest.

Reported in: countries where the species has been found.

Country codes: AUS = Australia, BAN = Bangladesh, BHU = Bhutan, BRA = Brazil, BOL = Bolivia, BUL = Bulgaria, CAM = Cambodia, CAN = Canada, CHN = China, COL = Colombia, COS = Costa Rica, CZE = Czech Republic, SLV = El Salvador, FRA = France, GRC = Greece, GTM = Guatemala, HND = Honduras, IDO = Indonesia, IND = India, IRN = Iran, ITA = Italy, JAP = Japan, KOR = Korea, LAO = Lao PDR, MAL = Malaysia, MYA = Myanmar, NEP = Nepal, NIC = Nicaragua, PAK = Pakistan, PAN = Panama, PHI = Philippines, POL = Poland, ESP = Spain, SRI = Sri Lanka, THA = Thailand, USA = United States of America, VEN = Venezuela, VIE = Vietnam.

Note: The absence of a listing indicates that no information was found.

***Aeschynomene aspera* L.**

Fabaceae

SOLA PITH PLANT, AESAS, dicot

Found in: lowland rice

Establishment method: DS > WS

Growth habit: ascending or erect, much-branched; up to 2 m

Moisture: aquatic, wet to moist

Competitiveness: unreported

Seed contaminant: unknown

Cultural control: tillage, split applications of fertilizer

Reported resistance: none

Life cycle: perennial **Seed wt:** 36

Method(s) of reproduction: seeds

Dormancy: short

Flower: pale yellow to yellow; small

Elevation: up to 1,500 m

Light: sunny

Notes: C₃ plant; often larger than *A. indica*; prefers fertile soils; pith is used as insulation for several products in India; useful as green manure or cover crop

Reported in: BAN, CAM, IDO, IND, MYA, NEP, PHI, SRI, THA, VIE

(1) Seedling, (2) young plant, (3) mature plant



1



2



3



4



5



6

Aeschynomene indica L.

Fabaceae

INDIAN JOINT-VETCH, AESIN, dicot

Found in: lowland, upland

Establishment method: DS > WS

Growth habit: erect, branched; up to 1.2 m

Moisture: wet to moist

Competitiveness: moderate

Seed contaminant: yes

Cultural control: high fertility; early removal by hand weeding or cultivation

Reported resistance: none

Life cycle: perennial **Seed wt:** 7.3

Method(s) of reproduction: seeds

Dormancy: yes, pronounced

Flower: yellow, often suffused with purple

Elevation: up to 1,000 m

Light: sunny

Notes: seedpod is distinctive of leguminous plants; red light inhibits germination; useful as fodder

Reported in: BAN, CAM, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

TROPIC AGERATUM, GOAT WEED, AGEKO, dicot

Found in: upland

Establishment method: DS

Growth habit: erect, often decumbent herb; up to 1.2 m

Moisture: moist to dry

Competitiveness: moderate

Seed contaminant: unknown

Cultural control: early cutting or hand weeding and shallow cultivation

Reported resistance: none

Life cycle: annual **Seed wt:** 0.1

Method(s) of reproduction: seeds

Maturity time: quick flowering and short-lived, as little as 2 months

Dormancy: 50% of seeds can germinate immediately; light required for germination

Flower: white to pale purple/blue

Elevation: up to 3,000 m

Light: shade-tolerant

Notes: very plastic growth habit; may emerge throughout the entire season; responds to fertilizer; prefers higher elevations; toxic to livestock

Reported in: BAN, BHU, CHN, IDO, IND, LAO, MAL, MYA, NEP, PHI, SRI, THA, VIE

Similar species

Ageratum houstonianum Miller (plate 10)

Leaves squarer at the base; flower heads larger, florets about 6 mm long with blue styles exerted 2-3 mm.

(7) Seedling, (8) inflorescence, (9) mature plant,
(10) *Ageratum houstonianum*



7



8



9



10



11



12



13



14

Alternanthera sessilis
(L.) R. Br. ex DC.

Amaranthaceae

SESSILE JOYWEED, ALRSE, dicot

Found in: lowland, upland

Establishment method: DS > WS

Growth habit: prostrate, creeping or ascending; many suberect branches, up to 1 m

Moisture: wet to moist; more terrestrial than aquatic

Competitiveness: moderate

Seed contaminant: unknown

Cultural control: flooding, hand weeding or tillage

Reported resistance: none

Life cycle: perennial

Seed wt: 0.5

Method(s) of reproduction: seeds, stolons, stem fragment

Dormancy: unknown

Flower: white or pinkish, very small

Elevation: up to 2,650 m

Light: sunny

Notes: C₃ plant; sometimes consumed by humans

Reported in: BAN, BHU, CAM, CHN, IDO, IND, LAO, MAL, MYA, NEP, PHI, SRI, THA, VIE

Similar species

Alternanthera philoxeroides (Mart.) Griseb. (plate 14)

Flower heads axillary and on peduncles

10-45 mm long.

(11) Seedling, (12) inflorescence, (13) mature plant,
(14) *Alternanthera philoxeroides* inflorescence

SPINY AMARANTH, AMASP, dicot

Found in: upland

Establishment method: DS

Growth habit: erect, much-branched; sharp axillary spines; up to 1 m

Moisture: moist

Competitiveness: moderate to high

Seed contaminant: unknown

Cultural control: early hand weeding (before thorns grow) or cultivation; flooding suppresses growth

Reported resistance: none

Life cycle: annual **Seed wt:** 0.2

Method(s) of reproduction: seeds

Dormancy: variable, none to 4 mo; long viability; no light requirement for germination

Flower: pale green-purple tinge

Elevation: up to 1,800 m

Light: sunny; shade-sensitive

Notes: one of the world's worst weeds; C_4 plant; prefers fertile soils and higher temperatures; sometimes consumed by humans; young plants poisonous to livestock

Reported in: BAN, BHU, CHN, IDO, IND, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

Similar species

Amaranthus viridis L. (plate 17)

Erect, 0.8 m tall, without spines.

Leaves used as vegetable.



15



16



17



18



19



20

***Commelina benghalensis* L.**

Commelinaceae

TROPICAL SPIDERWORT, COMBE, monocot

Found in: upland, lowland

Establishment method: DS >> WS

Growth habit: herb; up to 1 m; prostrate or ascending

Moisture: moist to wet; drier than *C. diffusa*

Emergence time: 10 to 12 d

Seed contaminant: unknown

Competitiveness: moderate

Cultural control: flooding; hand and mechanical weeding
may as stem pieces re-root

Reported resistance: none

Life cycle: perennial **Seed wt:** 2.0

Method(s) of reproduction: seeds, stolons

Maturity time: aerial flowers in 35 d; rhizomes with
underground flowers in 42 d

Dormancy: yes, innate

Flower: purple or blue; those from underground stems
are whitish

Elevation: up to 2,000 m

Light: sunny to slightly shaded

Notes: germinates best in full light; somewhat tolerant
of herbicides; annual in temperate zones; prefers high
fertility; single plant can cover a large area; useful forage
and human food

Reported in: BAN, BHU, IDO, IND, JAP, KOR, MYA, NEP,
PAK, PHI, SRI, THA, VIE

(18) Seedling, (19) flower, (20) whole plant

***Commelina diffusa* Burm. f.**

Commelinaceae

SPREADING DAYFLOWER, COMDI, monocot

Found in: upland

Establishment method: DS > WS

Growth habit: creeping or ascending; up to 1 m

Moisture: wet, not flooded

Competitiveness: at least moderate

Seed contaminant: yes

Cultural control: early continuous flooding; hand and mechanical weeding difficult because pieces may re-root

Reported resistance: synthetic auxins (USA)

Life cycle: perennial **Seed wt:** 11.5

Method(s) of reproduction: stolons and by seeds

Flowering time: earlier than rice

Dormancy: innate and induced by high temperatures

Flower: blue

Elevation: up to 2,000 m

Light: shaded

Notes: more common than *C. benghalensis* in rice; somewhat tolerant of herbicides; very persistent in fields

Reported in: BAN, BHU, CHN, IDO, IND, KOR, LAO, MAL, MYA, NEP, PHI, SRI, THA, VIE

(21) Young plant, (22) mature plant



21



22



23



24



25

(19) Young plant, (20) flower, (21) mature plant

Eclipta prostrata (L.) L.

Asteraceae

FALSE DAISY, ECLAL, dicot

Found in: lowland, upland

Establishment method: DS > WS

Growth habit: herb; prostrate to erect, much-branched;
up to 1.0 m

Moisture: wet to moist

Competitiveness: low to moderate

Seed contaminant: yes

Cultural control: cultivation and hand weeding; early
removal or cutting; high fertility

Reported resistance: none

Life cycle: annual

Seed wt: 0.4

Method(s) of reproduction: seeds

Maturity time: 42 d

Dormancy: none; light required for germination

Flower: white or cream

Elevation: up to 2,000 m

Light: sunny

Notes: no emergence from depth; C₃ plant; saline-tolerant;
often in field margins; somewhat tolerant of butachlor

Reported in: BAN, BHU, CAM, CHN, IDO, IND, JPN, KOR,
LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(23) Young plant, (24) inflorescence, (25) mature plant

***Eichhornia crassipes* (Mart.) Solms**

Pontederiaceae

WATER HYACINTH, EICCR, monocot

Found in: lowland

Establishment method: TP > WS

Growth habit: floating, rooted in shallow water; up to 0.3 m

Moisture: aquatic—flooded to wet

Competitiveness: low to moderate; greater early, and greater than many other aquatics

Seed contaminant: unknown

Cultural control: drainage and physical removal possible with small infestations

Reported resistance: none

Life cycle: perennial **Seed wt:** 0.1

Method(s) of reproduction: stolons, plant fragments, plantlets developing from seeds

Dormancy: variable—none to many years

Flower: blue to violet

Elevation: up to 1,600 m

Light: sunny

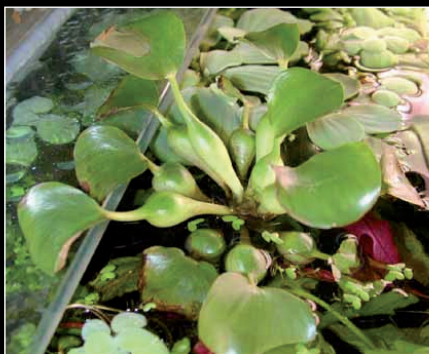
Notes: one of the world's worst weeds; seeds viable for up to 15 years; causes increased water loss through evapotranspiration

Reported in: BAN, BHU, CAM, CHN, IDO, IND, JPN, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(26) Seedling, (27) vegetative growth, (28) flowers



26



27



28



29



30

Ipomoea aquatica Forssk.

Convolvulaceae

WATER SPINACH, SWAMP MORNINGGLORY, IPOAQ, dicot

Found in: lowland

Establishment method: TP > WS

Growth habit: vine, widely spreading and much-branched

Moisture: aquatic—flooded to wet

Competitiveness: low; greater early

Seed contaminant: yes

Cultural control: physical removal though readily re-roots from nodes

Reported resistance: none

Life cycle: perennial **Seed wt:** 36

Method(s) of reproduction: seeds, runners

Flowering time: 45–60 d

Dormancy: yes; may require seed coat to be broken

Flower: white to cream or purple

Elevation: up to 1,200 m

Light: sunny

Notes: consumed by humans; known widely in many Southeast Asian nations as kangkong

Reported in: BAN, CAM, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

Ludwigia adscendens (L.) Hara

Onagraceae

CREeping WATER PRIMROSE, LUDAC, dicot

Found in: lowland

Establishment method: TP > WS

Growth habit: herb; floating or rooted and creeping; up to 0.5 m

Moisture: aquatic—flooded or wet

Competitiveness: low

Seed contaminant: unknown

Cultural control: hand weeding

Reported resistance: none

Life cycle: perennial

Method(s) of reproduction: seeds, plant fragments, stolons

Dormancy: unknown

Flower: white to yellow

Elevation: up to 1,600 m

Light: partial shade to sunny

Notes: restricts waterways; reduces oxygen content in water; dangerous to cattle

Reported in: BAN, CAM, CHN, IDO, IND, JPN, LAO, MAL, MYA, NEP, PHI, SRI, THA, VIE

(31–33) Roots and shoots, (34) flower



31



32



33



34



35



36



37

34

***Ludwigia octovalvis* (Jacq.) Raven**

Onagraceae

LONGFRUITED PRIMROSE-WILLOW, LUDOC, dicot

Found in: lowland

Establishment method: WS, TP

Growth habit: erect, much-branched and robust herb;
up to 1.5 m

Moisture: wet to damp; drier than *L. adscendens*

Competitiveness: high

Seed contaminant: yes

Cultural control: early flooding or hand weeding

Reported resistance: none

Life cycle: perennial

Method(s) of reproduction: seeds and plant fragments

Dormancy: low or none; light requirement for germination

Flower: yellow, 4 petals each about 10 mm long

Elevation: up to 1,500 m

Light: partial shade to sunny

Notes: responsive to fertilizers; red hypocotyl, entire seedling often reddish

Reported in: BAN, CAM, IDO, IND, JPN, LAO, MAL, MYA, NEP, PHI, SRI, THA, VIE

Similar species

Ludwigia hyssopifolia (G. Don) Exell

Flowers with 4 petals each 3–5 mm long; widespread in Asia.

(35) Seedling, (36) mature plant, (37) *L. hyssopifolia* flowers

***Marsilea minuta* L.**

Marsiliaceae

WATER CLOVER, MARM, monocot

Found in: lowland

Establishment method: WS, TP

Growth habit: fern; creeping hairy rhizomes, erect or leaves floating

Moisture: aquatic—flooded to wet

Emergence time: first 10 days after transplanting

Competitiveness: moderate, but can be severe early; strong competitor for nutrients

Seed contaminant: unlikely

Cultural control: minimize wet tillage; dry tillage after harvest to desiccate rhizomes

Reported resistance: none

Life cycle: perennial

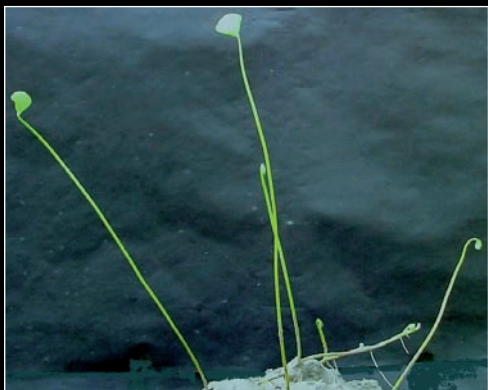
Method(s) of reproduction: spores, rhizomes, and fragments of rhizomes

Light: sunny

Notes: four-leaf clover appearance is distinctive; rhizomes establish best from surface; height responds plastically to water depth

Reported in: BAN, BHU, CAM, CHN, IDO, IND, KOR, LAO, MAL, MYA, PAK, PHI, SRI, THA, VIE

(38) Shoots, (39) mature plant



38



39



40



41

***Mimosa diplotricha* C. Wright ex Sauvalle**

Fabaceae

GIANT SENSITIVE PLANT, MIMIN, dicot

Found in: upland

Establishment method: DS

Growth habit: prostrate to erect, many-branched shrub;
up to 2 m

Moisture: dry to wet

Competitiveness: moderate

Seed contaminant: unknown

Cultural control: cutting or burning or hand weeding of
seedlings; probably early flooding

Reported resistance: none

Life cycle: perennial

Seed wt: 6

Method(s) of reproduction: seeds

Dormancy: yes, long; also long viability because of hard
seeds; broken by heat

Flower: reddish purple to white

Elevation: up to 2,000 m

Light: sunny to partly shaded

Notes: improves soil fertility (legume); high early growth
rate; a single plant can cover a large area; dangerous to
cattle

Reported in: CAM, CHN, IDO, IND, LAO, MAL, MYA, PHI,
SRI, THA, VIE

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

Pontederiaceae

MONOCHORIA, MOOVA, monocot

Found in: lowland

Establishment method: TP > WS

Growth habit: herb; erect, hairless and fleshy; up to 0.5 m

Moisture: aquatic—wet to flooded

Competitiveness: moderate with great densities early

Seed contaminant: yes

Cultural control: stale seedbed with wet tillage, hand weeding

Reported resistance: ALS inhibitors (KOR)

Life cycle: perennial

Seed wt: 0.07

Method(s) of reproduction: seeds, perhaps stolons

Flowering time: within 60 d

Dormancy: may need long anaerobic period to germinate

Flower: pale to dark blue

Elevation: up to 1,550 m

Light: sunny

Notes: germinates best in full light; often an annual in rice; consumed by humans

Reported in: BAN, BHU, CAM, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(42) Seedling, (43) mature plant



42



43



44



45

Pistia stratiotes L.

Araceae

WATERLETTUCE, PIIST, monocot

Found in: lowland

Establishment method: TP > WS

Growth habit: floating stoloniferous herb, sometimes rooting; about 0.1 m

Moisture: aquatic—flooded to moist

Competitiveness: probably low

Seed contaminant: unlikely

Cultural control: drainage; physical removal

Reported resistance: none

Life cycle: perennial

Method(s) of reproduction: plantlets and seeds

Maturity time: stolons by 5- to 6-leaf stage; maturity at 120 d

Dormancy: yes, seems to require long submergence period

Elevation: up to 1,000 m

Light: sunny

Notes: seeds germinate while submerged; survives extended periods in unflooded conditions; cold-sensitive, so not usually found in temperate regions

Reported in: BAN, CAM, CHN, IDO, IND, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

***Polygonum hydropiper* L.**

Polygonaceae

MARSH-PEPPER SMARTWEED, WATER PEPPER, POLHY,
dicot

Found in: lowland

Establishment method: DS, WS, TP

Growth habit: herb; erect or ascending; branched; up
to 0.6 m

Moisture: flooded to damp; may require saturation for
establishment

Competitiveness: probably low

Seed contaminant: unknown

Cultural control: completely uproot by hand or tillage as
cut stems may resprout; control before flowering

Reported resistance: photosystem II inhibitor (FRA)

Life cycle: annual

Method(s) of reproduction: seeds, sometimes rooted
stems

Maturity time: flowering by 90 d

Dormancy: variable, but usually an after-ripening period;
light requirement for germination

Flower: greenish yellow, pinkish

Light: partial shade

Notes: acid-tolerant; leaves have hot taste; cultivated as
spice for sashimi, raw fish

Reported in: BAN, BHU, CHN, IDO, IND, JPN, KOR, MAL,
NEP, THA

(46) Flower, (47) mature plant



46



47



48



49



50

Portulaca oleracea L.

Portulacaceae

PURSLANE, POROL, dicot

Found in: upland

Establishment method: DS >> WS

Growth habit: succulent branched spreading herb; up to 0.5 m

Moisture: dry to moist

Competitiveness: low to moderate

Seed contaminant: unknown

Cultural control: flooding; repeated shallow cultivation though re-roots readily

Reported resistance: multiple to photosystem II inhibitor + ureas/amides (USA)

Life cycle: annual **Seed wt:** 0.07

Method(s) of reproduction: seeds > stem fragments

Maturity time: flowers in 1 mo, maturity in 2 to 4 mo

Dormancy: low or none

Flower: yellow

Elevation: up to 2,700 m

Light: sunny to partly shaded

Notes: one of the world's worst weeds; prefers fertile soils; growth is slow until about 14 d; pig fodder and consumed by humans

Reported in: BAN, BHU, CHN, IDO, IND, JPN, KOR, MAL, MYA, PAK, PHI, THA, VIE

(48) Seedling, (49) flowers, (50) mature plant

***Sphenoclea zeylanica* Gaertn.**

Campanulaceae

GOOSEWEED, SPDZE, dicot

Found in: lowland

Establishment method: DS, WS > TP

Growth habit: erect, branched herb with hollow stems;
up to 1.5 m

Moisture: aquatic—flooded to wet; prefers stagnant water

Competitiveness: moderate

Seed contaminant: unknown

Cultural control: closed crop canopy limits weed growth

Reported resistance: synthetic auxins (PHI, MAL, THA)

Life cycle: annual **Seed wt:** 0.01

Method(s) of reproduction: seeds

Dormancy: yes; light requirement for germination

Flower: small and white

Elevation: up to 300 m

Light: partial shade to sunny

Notes: height is very plastic; usually not a weed of other crops

Reported in: BAN, CAM, IDO, IND, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(51) Seedling, (52) inflorescence, (53) mature plant



51



52



53



54



55



56

***Trianthema portulacastrum* L.**

Aizoaceae

HORSE PURSLANE, GIANT PIGWEED, TRTPO, dicot

Found in: lowland, upland

Establishment method: DS > WS

Growth habit: prostrate to ascending, much branched, with fleshy leaves; up to 0.5 m

Moisture: dry to moist

Emergence time: with rice

Competitiveness: moderate

Seed contaminant: unknown

Cultural control: flooding; tillage often ineffective because of stem regrowth; do not allow to mature; remove fruiting plants from field to stop shedding

Reported resistance: none

Life cycle: annual

Seed wt: 1.3

Method(s) of reproduction: seeds

Maturity time: flowers in 20–30 d; maturity about 20 d after pollination

Dormancy: secondary; long viability because of hard seed

Flower: white to pale pink

Elevation: up to 800 m

Light: partial shade

Notes: green (most competitive) and red (most reproductive) biotypes in India; solar-tracking leaves; may produce 3 to 4 flushes in one season

Reported in: CAM, IDO, IND, LAO, MYA, NEP, PAK, PHI, SRI, THA, VIE

Cynodon dactylon (L.) Pers.

Poaceae

BERMUDA GRASS, CYNDA, monocot

Found in: upland, lowland

Establishment method: DS

Growth habit: prostrate to ascending; up to 0.4 m

Moisture: dry to moist, drained

Emergence time: 14 d

Competitiveness: moderate

Seed contaminant: unknown

Cultural control: stale seedbed; tillage and removal; dry tillage to desiccate rhizomes; soil solarization

Reported resistance: none

Life cycle: perennial

Seed wt: 0.3

Method(s) of reproduction: rhizomes and stolons, seeds

Maturity time: tillers at 25 to 30 d; maturity at 120 d

Dormancy: no; seeds survive 50 d of submergence

Flower: white or pinkish, very small

Elevation: up to 2,300 m

Light: sunny, partial shade

Notes: one of the world's worst weeds; C_4 plant; alkaline- and acid-tolerant; flood- and drought-tolerant; numerous biotypes

Reported in: BAN, BHU, CAM, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(57) Shoots from rhizome, (58) inflorescence,
(59) mature plant



57



58



59



60



61

***Dactyloctenium aegyptium* (L.) Willd.**

Poaceae

CROWFOOT GRASS, DTTAE, monocot

Found in: upland, lowland

Establishment method: DS

Growth habit: creeping with ascending culms; up to 0.6 m

Moisture: moist

Emergence time: shortly after rainfall

Competitiveness: moderate to high

Seed contaminant: yes

Cultural control: stale seedbed; flooding; early removal by hand

Reported resistance: none

Life cycle: annual

Seed wt: 0.3

Method(s) of reproduction: seeds

Maturity time: 28 d; senescence in 4 mo

Dormancy: unknown

Elevation: up to 1,000 m

Light: sunny, partial shade

Notes: C₄ plant; seed viability is long; fodder, but some reports of poor nutrition, and may be toxic to livestock during hot weather

Reported in: BAN, CHN, IDO, IND, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

***Digitaria ciliaris* (Retz.) Koel.**

Poaceae

CRAB GRASS, DIGSP, monocot

Found in: upland

Establishment method: DS

Growth habit: creeping, tufted with prostrate to erect culms; up to 0.6 m

Moisture: dry to moist

Competitiveness: moderate to high

Seed contaminant: yes

Cultural control: flooding, early removal by hand

Reported resistance: ACCase inhibitors (BRA)

Life cycle: annual

Seed wt: 0.6

Method(s) of reproduction: seeds

Dormancy: variable, up to 7 mo

Elevation: up to 2,000 m

Light: sunny; shade-sensitive

Notes: tolerates defoliation; very responsive to nutrients; C₄ plant; useful forage

Reported in: BAN, BHU, CAM, CHN, IDO, IND, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(62) Seedling, (63) inflorescence, (64) mature plant



62



63



64

***Echinochloa colona* (L.) Link**

Poaceae

JUNGLE-RICE, ECHCO, monocot

Found in: lowland, upland

Establishment method: DS > WS

Growth habit: tufted and erect; up to 0.6 m

Moisture: dry to wet

Competitiveness: high

Seed contaminant: yes

Cultural control: early cultivation; early flooding; hand weeding

Reported resistance: ACCase inhibitors (BOL, COS, NIC), ALS inhibitors (BOL, COS), glycines (AUS), photosystem II inhibitors (AUS, IRN), ureas and amides (COL, COS, GTM, HND, PAN, SLV, VEN), multiple resistance (COS)

Life cycle: perennial **Seed wt:** 1.0

Method(s) of reproduction: seeds, stolons

Flowering time: 30 to 45 d

Dormancy: low or none; light requirement for germination

Elevation: up to 2,000 m

Light: sunny, partial shade

Notes: one of the world's worst weeds; soil saturation strongly reduces emergence of buried seeds; responsive to nutrients; profuse root production; good forage; C₄ plant; encouraged by zero tillage

Reported in: BAN, CAM, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(65) Seedling, (66) inflorescence, (67) mature plant



65



66



67



68



69



70

Echinochloa crus-galli (L.) P. Beauv.

Poaceae

BARNYARDGRASS, ECHCG, monocot

Found in: lowland, upland

Establishment method: DS > WS > TP

Growth habit: erect, tufting up to 2 m

Moisture: wet to moist

Competitiveness: very high

Seed contaminant: yes

Cultural control: thorough land preparation; early, deep flooding; rotation

Reported resistance: ACCase inhibitors (CHN, THA, USA), chloroacetamides (CHN, PHI, THA), dinitroanilines (BUL), photosystem II inhibitors (CAN, CZE, FRA, POL, ESP, USA), synthetic auxins (BRA, USA), thiocarbamates (CHN, USA), ureas and amides (GRC, PHI, THA, USA), multiple resistance (BRA, PHI, THA, USA)

Life cycle: annual **Seed wt:** 3

Method(s) of reproduction: seeds

Flowering time: 42 to 63 d

Dormancy: variable, up to 4 mo

Elevation: up to 2,500 m

Light: sunny; shade-sensitive

Notes: one of the world's worst weeds; C₄ plant; phenotypically variable; responds to nitrogen, potassium, and phosphorus

Reported in: BAN, BHU, CAM, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(68) Seedling, (69) inflorescence, (70) mature plant

***Echinochloa glabrescens* Munro ex Hook. f.** Poaceae

ECHGL, monocot

Found in: lowland

Establishment method: DS, WS, TP

Growth habit: tufted, erect; up to 1 m

Moisture: wet

Competitiveness: high

Emergence time: within 7 d

Seed contaminant: yes

Cultural control: thorough land preparation; early flooding to 30 mm depth

Reported resistance: none

Life cycle: annual

Seed wt: 2

Method(s) of reproduction: seeds

Flowering time: 30 to 35 d

Dormancy: unknown

Elevation: unknown

Light: sunny

Reported in: BAN, BHU, CAM, IDO, IND, KOR, LAO, MAL, NEP, PAK, PHI, SRI, THA, VIE



71



72



73

Eleusine indica (L.) Gaertn.

Poaceae

GOOSEGRASS, ELEIN, monocot

Found in: upland

Establishment method: DS

Growth habit: stems erect or ascending, branched; up to 0.6 m

Moisture: moist to wet

Competitiveness: high

Seed contaminant: unknown

Cultural control: early continuous flooding; hand weeding

Reported resistance: ACCase inhibitor (BOL, BRA, MAL), ALS inhibitor (COS), bipyridiliums (MAL, USA), dinitroanilines (USA), multiple: ACCase inhibitor + glycines (MAL)

Life cycle: annual

Seed wt: 0.4

Method(s) of reproduction: seeds

Maturity time: flowering in 30 d; maturity in 4 to 6 mo

Dormancy: some, but usually short

Elevation: up to 2,000 m

Light: sunny; shade-sensitive

Notes: one of the world's worst weeds; C_4 plant; multiple generations in one season; can emerge from soil depths of up to 0.08 m

Reported in: BAN, BHU, CAM, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

Imperata cylindrica (L.) Raeuschel

Poaceae

COGON GRASS, IMPCY, monocot

Found in: upland

Establishment method: DS

Growth habit: erect, tufted, and unbranched; scaly rhizomes; up to 2 m

Moisture: moist to dry; well-drained

Competitiveness: high

Seed contaminant: unknown

Cultural control: legume cover crops; repeated tillage to desiccate rhizomes; flooding; rotation

Reported resistance: none

Life cycle: perennial **Seed wt:** 1

Method(s) of reproduction: seeds, rhizomes

Dormancy: none in seeds, but lateral buds are dormant; seeds viable for up to 1 year

Elevation: up to 3,000 m

Light: sunny; shade-sensitive

Notes: one of the world's worst weeds; C_4 plant; acid- and alkaline-tolerant; prefers light-textured soils; many infested fields are abandoned; burning does not injure rhizomes

Reported in: BAN, BHU, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(74) Shoots, (75) inflorescence, (76) mature plant with rhizomes



74



75



76



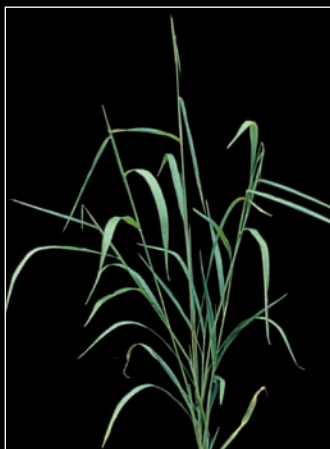
77



78



79



80

Ischaemum rugosum Salisb.

Poaceae

WRINKLED GRASS, SARAMOLLAGRASS, ISCRU, monocot

Found in: lowland, upland

Establishment method: DS >> WS, TP

Growth habit: tufted, ascending to erect, and much-branched; up to 1.0 m

Emergence time: within 7 d

Moisture: aquatic—flooded to wet

Competitiveness: high

Seed contaminant: unknown

Cultural control: early continuous flooding; early removal

Reported resistance: ACCase inhibitor (COL), bipyridiliums (MAL)

Life cycle: perennial **Seed wt:** 4

Method(s) of reproduction: seeds, rhizomes

Maturity time: 130 d

Dormancy: yes; light required for germination

Elevation: up to 2,400 m

Light: sunny; shade-tolerant

Notes: red leaf sheaths at the base; new seedling cohorts emerge after drainage from up to 0.05 m soil depth; responsive to fertilizer; acid-tolerant; good forage if young; germinates on surface of saturated soil; C₄ plant

Reported in: BAN, CAM, IDO, IND, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(77) Young plant, (78) inflorescence showing paired racemes, (79) inflorescence, (80) mature plant

Leersia hexandra Sw.

Poaceae

SOUTHERN CUTGRASS, LERHE, monocot

Found in: lowland

Establishment method: WS, TP > DS

Growth habit: creeping to ascending, tufted, and erect;
up to 1.2 m

Moisture: aquatic—flooded to wet

Competitiveness: moderate to high

Seed contaminant: yes

Cultural control: stale seedbed; rotavating/puddling in
wet or dry conditions

Reported resistance: none

Life cycle: perennial **Seed wt:** 0.8

Method(s) of reproduction: rhizomes, seeds

Dormancy: unknown

Elevation: up to 2,200 m

Light: partial shade to sunny

Notes: stem fragments will root at nodes

Reported in: BAN, CAM, CHN, IDO, IND, KOR, LAO, MAL,
MYA, NEP, PAK, PHI, SRI, THA, VIE

(81) Inflorescence and node, (82) mature plants



81



82



83



84

Leptochloa chinensis (L.) Nees

Poaceae

CHINESE SPRANGLETOP, RED SPRANGLETOP, LEFCH, monocot

Found in: lowland

Establishment method: DS > WS > TP

Growth habit: tufted, erect, and slender; sometimes with reclining stems; up to 1.2 m

Moisture: aquatic—wet to flooded

Competitiveness: high

Seed contaminant: yes

Cultural control: thorough land preparation and hand weeding; permanent flood within 1 week

Reported resistance: ACCase inhibitor (THA)

Life cycle: perennial **Seed wt:** 0.1

Method(s) of reproduction: seeds, plant fragments

Dormancy: low or none

Elevation: up to 1,400 m

Light: sunny

Notes: C₄ plant; good fodder

Reported in: BAN, CAM, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, PAK, PHI, SRI, THA, VIE



85



86

Oryza sativa L.

Poaceae

WEEDY RICE, RED RICE, ORYSA, monocot

Found in: lowland

Establishment method: WS, DS

Moisture: moist to flooded

Emergence time: with sown crop or soon after

Competitiveness: high

Seed contaminant: yes

Cultural control: stale seedbed, early flooding, hand weeding, water seeding, transplanting rice

Reported resistance: none

Life cycle: annual

Seed wt: 20-30

Method(s) of reproduction: seeds

Elevation: as for rice crop

Light: as for rice crop

Notes: introduced to fields as seeds in irrigation water, contaminated tillage and harvesting equipment, and contaminated seed supplies. Originates as result of hybridization between *O. rufipogon* or *O. nivara* and *O. sativa* cultivars, or between cultivars, through selection of weedy traits or through segregation from landraces. Key weedy traits are early grain shattering and variable dormancy.

Reported in: BAN, BOL, BRA, CAM, CHN, COL, COS, IDO, IND, MAL, KOR, NEP, PAK, PHI, SRI, THA, USA, VEN, VIE

(85) Mature plants, (86) seeds/caryopsis with hull removed

***Panicum repens* L.**

Poaceae

TORPEDO GRASS, PANRE, monocot

Found in: lowland

Establishment method: DS

Growth habit: creeping; erect and branching stems; up to 1.0 m

Moisture: dry to moist; drought-tolerant

Competitiveness: perhaps moderate

Seed contaminant: yes

Cultural control: flooding; tillage or cutting

Reported resistance: none

Life cycle: perennial **Seed wt:** 0.67

Method(s) of reproduction: rhizomes, seeds

Maturity time: rhizomes in 30 d; flowers in 50 to 60 d

Dormancy: unknown

Elevation: up to 2,000 m

Light: sunny; shade-tolerant

Notes: prefers sandy soils; acid- and salt-tolerant; deep plowing increases rate of spread; after establishment can survive moderate drought; fodder

Reported in: BAN, CAM, CHN, IDO, IND, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(87) Shoots from rhizomes, (88) inflorescence,
(89) mature plants



87



88



89



90

***Paspalum distichum* L.**

Poaceae

KNOTGRASS, PASDS, monocot

Found in: lowland, upland

Establishment method: DS > WS, TP

Growth habit: creeping branched stolons, erect stems;
up to 0.6 m

Moisture: moist to wet

Competitiveness: high

Seed contaminant: yes

Cultural control: thorough land preparation; early continuous flooding; tillage during dry season to desiccate rhizomes

Reported resistance: none

Life cycle: perennial

Method(s) of reproduction: stolons > seeds and rhizomes

Maturity time: 82 d

Dormancy: yes, perhaps requires cold to germinate; apical and bud dominance in new stems

Elevation: up to 1,500 m

Light: sunny; shade-sensitive

Notes: detached stolons easily regenerate; increases under zero tillage; similar to *Panicum repens* but more slender

Reported in: BAN, BHU, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

***Paspalum scrobiculatum* L.**

Poaceae

KODO MILLET, PASSC, monocot

Found in: lowland, upland

Establishment method: DS > WS

Growth habit: erect, tufted, and rooting at lower nodes;
up to 1 m

Moisture: flooded to moist

Competitiveness: low

Seed contaminant: yes

Cultural control: tillage; deep flooding; hand weeding

Reported resistance: none

Life cycle: perennial

Method(s) of reproduction: seeds, rooted stem fragments

Maturity time: 90 d

Dormancy: undetected

Elevation: up to 3,000 m

Light: sunny; shade-sensitive

Notes: responsive to nutrients; very heterogeneous; good forage; grown as cereal grain in some places, but also reported toxic in some cases

Reported in: BAN, CAM, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(91) Young shoot, (92) inflorescence, (93) mature plants



91



92



93



94



95



96

Rottboellia cochinchinensis
(Lour.) W.D. Clayton

Poaceae

ITCHGRASS, ROOEX, monocot

Found in: upland

Establishment method: DS

Growth habit: tufted, erect, and branching; rooting at nodes; up to 3 m

Moisture: dry to moist; well-drained

Competitiveness: very high

Seed contaminant: yes

Cultural control: clean seed and implements; flooding; rotate to broadleaf crops; control in nearby areas

Reported resistance: ACCase inhibitors (USA)

Life cycle: annual

Seed wt: 15

Method(s) of reproduction: seeds

Dormancy: 1 to 4 mo; after-ripening requirement

Elevation: up to 1,500 m

Light: sunny; shade-sensitive

Notes: one of the world's worst weeds; emerges from up to 0.15-m depth, but relatively low seed viability

Reported in: CHN, IDO, IND, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

Bolboschoenus maritimus
(L.) L. Palla

Cyperaceae

SALTMARSH BULRUSH, SCPMA, monocot

Found in: lowland

Establishment method: WS, TP > DS

Growth habit: erect and slender stem arising from tuberous base; up to 1.5 m

Moisture: wet to flooded

Emergence time: within 7 d of last tillage

Competitiveness: high

Seed contaminant: yes

Cultural control: rotation; deep tillage may bury tubers; alternately, long drainage periods and zero tillage

Reported resistance: ALS inhibitor (KOR)

Life cycle: perennial **Seed wt:** 5.6

Method(s) of reproduction: tubers > stolons > seeds

Dormancy: yes, in tubers

Elevation: up to 3,000 m

Light: sunny; shade-sensitive

Notes: saline-tolerant; seed production may increase with water depth, helping its persistence through wet/dry cycles

Reported in: BAN, CAM, CHN, IDO, IND, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(97) Shoots, (98) inflorescence



97



98



99



100



101

Cyperus difformis L.

Cyperaceae

SMALLFLOWER UMBRELLA SEDGE, CYPDI, monocot

Found in: lowland

Establishment method: WS > TP > DS

Growth habit: tufted and erect; up to 1.0 m

Moisture: wet to moist

Emergence time: within 7 d; continual throughout season

Competitiveness: moderate

Seed contaminant: yes

Cultural control: early continuous flooding, hand weeding, tillage

Reported resistance: ALS inhibitors (AUS, BRA, ITA, KOR, ESP, USA)

Life cycle: annual

Seed wt: 0.01

Method(s) of reproduction: seeds

Maturity time: as little as 30 d

Dormancy: none

Elevation: up to 1,400 m

Light: sunny

Notes: germinates best in full light

Reported in: BAN, BHU, CAM, CHN, IDO, IND, LAO, JPN, KOR, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

RICE FLAT SEDGE, CYPİR, monocot

Found in: lowland, upland

Establishment method: DS, WS >> TP

Growth habit: erect; tufted up to 0.8 m

Emergence time: within 7 d

Moisture: moist to wet

Competitiveness: moderate

Seed contaminant: yes

Cultural control: early flooding; hand weeding

Reported resistance: none

Life cycle: annual **Seed wt:** 0.1

Method(s) of reproduction: seeds

Maturity time: as little as 30 d

Dormancy: yes; can germinate about 75 d after shedding

Elevation: up to 1,200 m

Light: sunny

Notes: germinates best in full light; C₄ plant; may have multiple generations in one season; prefers lower elevations; used as forage and in mat-making

Reported in: BAN, BHU, CAM, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(102) Seedling, (103) inflorescence, (104) mature plant



102



103



104



105



106



107

Cyperus rotundus L.

Cyperaceae

PURPLE NUTSEDGE, CYPRO, monocot

Found in: upland

Establishment method: DS

Growth habit: erect; tubers in chains on rhizomes; up to 0.7 m

Emergence time: simultaneous with rice

Moisture: dry to moist

Competitiveness: moderate to low, but competitive early

Seed contaminant: yes

Cultural control: stale seedbed; suppressive crop with narrow rows; high plant density; flooding suppresses growth but does not kill tubers; interrow cultivation

Reported resistance: none

Life cycle: perennial **Seed wt:** 0.1

Method(s) of reproduction: tubers, rhizomes

Maturity time: from 21 to 56 d

Dormancy: yes, apical dominance in tubers

Elevation: up to 1,800 m

Light: sunny; shade-sensitive

Notes: the world's worst weed; C_4 plant; saline-sensitive; tubers may be viable for several years; tubers consumed by humans; forage

Reported in: BAN, BHU, CHN, IDO, IND, JPN, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(105) Shoots from tubers, (106) inflorescence,
(107) mature plant

Fimbristylis dichotoma (L.) Vahl

Cyperaceae

FORKED FRINGE-RUSH, FIMDI, monocot

Found in: upland, lowland

Establishment method: DS, WS

Growth habit: erect; variable in habit and inflorescence size, up to 0.7 m

Moisture: dry to wet

Competitiveness: moderate

Seed contaminant: yes

Cultural control: early flooding; hand weeding, tillage

Reported resistance: none

Life cycle: perennial **Seed wt:** 0.1

Method(s) of reproduction: seeds, rhizomes

Dormancy: unknown

Elevation: up to 2,500 m

Light: sunny

Notes: very heterogeneous species; saline-tolerant; C₄ plant; better adapted to drier soils; useful for mat-making

Reported in: BAN, CHN, IDO, IND, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(108) Seedling, (109) mature plant



108



109



110



111



112



113

Fimbristylis miliacea (L.) Vahl

Cyperaceae

GLOBE FRINGE-RUSH, FIMMI, monocot

Found in: lowland, upland

Establishment method: DS > WS > TP

Growth habit: erect and strongly tillering; up to 0.6 m

Moisture: moist to wet

Emergence time: within 7 d

Competitiveness: moderate; strong root competition

Seed contaminant: yes

Cultural control: early flooding; hand weeding

Reported resistance: ALS inhibitors (BRA); synthetic auxins (MAL)

Life cycle: perennial **Seed wt:** 0.02

Method(s) of reproduction: seeds

Flowering time: 30 d

Dormancy: none; light requirement for germination

Elevation: up to 1,000 m

Light: sunny

Notes: saline-tolerant; may emerge throughout season; may produce multiple generations in one season; C₄ plant; useful in mat-making

Reported in: BAN, BHU, CAM, CHN, IDO, IND, KOR, LAO, MAL, MYA, NEP, PAK, PHI, SRI, THA, VIE

(110) Seedling, (111) inflorescence, (112-113) mature plants

Scirpus juncooides Roxb.

Cyperaceae

BULRUSH, SCPJO, monocot

Found in: lowland

Establishment method: TP

Growth habit: erect and strongly tillering; up to 0.75 m

Moisture: wet

Competitiveness: low to moderate

Seed contaminant: yes

Cultural control: wet or dry cultivation; early flooding; dry field to stop regrowth after rice harvest

Reported resistance: ALS inhibitors (JAP, KOR)

Life cycle: annual

Seed wt: 0.2

Method(s) of reproduction: seeds

Dormancy: 2 to 3 mo

Elevation: up to 2,000 m

Light: sunny

Notes: burial or submergence favors germination; germinates best at less than full light; fodder for cattle

(114) Shoot, (115-116) inflorescence



114



115



116

Appendix A. Weed species synonyms

Weed	Synonym(s)
<i>Aeschynomene aspera</i>	<i>Hedysarum lagenarium</i>
<i>A. indica</i>	<i>A. virginica</i>
<i>Ageratum conyzoides</i>	<i>A. hirsutum</i>
<i>Alternanthera sessilis</i>	<i>A. repens</i>
	<i>A. triandra</i>
	<i>Gomphrena sessilis</i>
<i>Bolboschoenus maritimus</i>	<i>Scirpus maritimus</i>
<i>Commelina benghalensis</i>	<i>C. prostrata</i>
<i>C. diffusa</i>	<i>C. agraria</i>
	<i>C. aquatica</i>
	<i>C. communis</i>
	<i>C. nodiflora</i>
<i>Cynodon dactylon</i>	<i>C. arcuatus</i>
	<i>C. parviglumis</i>
<i>Cyperus rotundus</i>	<i>C. odoratus</i>
	<i>C. tetrastachyos</i>
	<i>C. tuberosus</i>
	<i>Schoenus tuberosus</i>
<i>Dactyloctenium aegyptium</i>	<i>D. meridionale</i>
	<i>Cynosurus aegyptius</i>
	<i>Eleusine aegyptiaca</i>
	<i>E. mucronata</i>
<i>Digitaria ciliaris</i>	<i>D. adscendens</i>
	<i>D. biformis</i>
	<i>D. marginata</i>
	<i>Panicum adscendens</i>
	<i>P. ciliare</i>
	<i>Syntherisma ciliaris</i>
<i>Echinochloa colona</i>	<i>E. colonum</i>
	<i>Panicum colonum</i>
<i>E. crus-galli</i>	<i>E. spiralis</i>
	<i>Panicum crus-galli</i>
<i>Eclipta prostrata</i>	<i>E. alba</i>
	<i>E. erecta</i>
<i>Eichhornia crassipes</i>	<i>E. cordifolia</i>
	<i>E. crassicaulis</i>
	<i>E. speciosa</i>
	<i>Eichhorniae azureae</i>
	<i>Pontederia crassipes</i>
<i>Eleusine indica</i>	<i>Cynodon indicus</i>
	<i>Cynosurus indicus</i>
	<i>Eleusine japonica</i>
<i>Fimbristylis dichotoma</i>	<i>F. annua</i>
	<i>F. communis</i>
	<i>F. diphylla</i>
	<i>F. lara</i>

continued on next page

Appendix A continued.

Weed	Synonym(s)
<i>F. miliacea</i>	<i>F. littoralis</i>
<i>Imperata cylindrica</i>	<i>I. allang</i>
	<i>I. arundinacea</i>
	<i>I. koenigii</i>
	<i>Lagurus cylindricus</i>
	<i>Saccharum cylindricum</i>
	<i>S. koenigii</i>
<i>Ipomoea aquatica</i>	<i>I. repens</i>
	<i>I. reptans</i>
	<i>I. subdentata</i>
	<i>Convolvulus reptans</i>
<i>Leersia hexandra</i>	<i>L. abyssinica</i>
	<i>L. capensis</i>
	<i>Homalocenchrus hexandrus</i>
<i>Leptochloa chinensis</i>	<i>Poa chinensis</i>
<i>Ludwigia adscendens</i>	<i>Jussiaea repens</i>
	<i>J. adscendens</i>
	<i>J. diffusa</i>
	<i>J. stolonifera</i>
	<i>Ludwigia natans</i>
<i>L. octovalvis</i>	<i>Jussiaea augustifolia</i>
	<i>J. octovalvis</i>
<i>Marsilea minuta</i>	<i>M. crenata</i>
	<i>M. diffusa</i>
	<i>M. crenulata</i>
	<i>M. invisa</i>
<i>Mimosa diplotricha</i>	
<i>Oryza sativa</i>	<i>O. sativa f. spontanea</i>
<i>Panicum repens</i>	<i>P. gouinii</i>
<i>Paspalum distichum</i>	<i>P. paspaloides</i>
	<i>Digitaria paspaloides</i>
<i>P. scrobiculatum</i>	<i>P. commersonii</i>
	<i>P. orbiculare</i>
	<i>P. polystachyum</i>
<i>Pistia stratiotes</i>	<i>P. stratemoides</i>
<i>Polygonum hydropiper</i>	<i>Persicaria hydropiper</i>
<i>Portulaca oleracea</i>	<i>P. sativa</i>
<i>Rottboellia cochinchinensis</i>	<i>R. exaltata</i>
<i>Scirpus</i> spp.	<i>Schoenoplectus</i> spp.
<i>S. juncoides</i>	<i>S. erectus</i>
	<i>S. junctiformus</i>
	<i>S. luzonensis</i>
	<i>S. scirpus</i> var. <i>elatoir</i>
	<i>Eleocharis juncoides</i>
<i>Trianthema portulacastrum</i>	<i>T. monogyna</i>

*Largely based on International Seed Testing Association's "List of Stabilized Plant Names," 2001, at www.ars-grin.gov/~sbmljw/istaintrod.htm.

Appendix B. Common names of weeds in Bangladesh

Weed	Common name(s)
<i>Ageratum conyzoides</i>	Fulkuri, ochunti, shialmuti
<i>Alternanthera sessilis</i>	Phul haicha, chanchi, malcha, sachi shak
<i>Amaranthus spinosus</i>	Katanata, kata notey
<i>Commelina benghalensis</i>	Dholpata, kanaibashi, kanchira
<i>C. diffusa</i>	Kanainala, manaina
<i>Cynodon dactylon</i>	Doorba (durba), dubla, durbaghas
<i>Cyperus difformis</i>	Behua, alighasha, matichaise, chotochaise, moishnoom
<i>C. iria</i>	Barachucha
<i>C. rotundus</i>	Badhail, bedalle, dila, motha, nagarmuta, sadakufi
<i>Dactyloctenium aegyptium</i>	Kachita ghas
<i>Echinochloa colona</i>	Alighasha, khudhey shayma, shymaghas
<i>E. crus-galli</i>	Barashymaghas, dalghas, gobra, jatghasha, shama
<i>E. glabrescens</i>	Shyma
<i>Eclipta prostrata</i>	Keshuti
<i>Eichhornia crassipes</i>	Kachuripana
<i>Eleusine indica</i>	Binna challa, chapra, gaicha, malangakuri, malankuri
<i>Fimbristylis dichotoma</i>	Joina chaise
<i>F. miliacea</i>	Bara javani, bara pukkeri, chatki ghash, joina, murighash
<i>Imperata cylindrica</i>	Ulu
<i>Ischaemum rugosum</i>	Mona, moraro
<i>Leersia hexandra</i>	Arali
<i>Leptochloa chinensis</i>	Fulka
<i>Ludwigia adscendens</i>	Hulmuri?
<i>L. octovalvis</i>	Maricha
<i>Marsilea minuta</i>	Sushni sak, angta ghash, hamai lotti
<i>Monochoria vaginalis</i>	Kosturi, kochoripana, panee kachu
<i>Panicum repens</i>	Baranda, chera
<i>Paspalum scrobiculatum</i>	Angta
<i>Pistia stratiotes</i>	Topapana, takapana, barapana, phena tokapana
<i>Polygonum hydropiper</i>	Bishkatali, pakurmal, panimarich
<i>Portulaca oleracea</i>	Bara laniya, bara nunia, ghee kalam, nunia
<i>Scirpus juncoides</i>	Chisra

Appendix C. Common names of weeds in Cambodia

Weed	Common name(s)
<i>Alternanthera sessilis</i>	Chaeung bang kang
<i>Amaranthus spinosus</i>	Phti banla
<i>Cynodon dactylon</i>	Smao anchien
<i>Cyperus iria</i>	Kak kangkep
<i>C. rotundus</i>	Smao kravanh chrouk
<i>Eichhornia crassipes</i>	Kam-plauk
<i>Eleusine indica</i>	Smao choeung tukke
<i>Imperata cylindrica</i>	Sbauv
<i>Ipomoea aquatica</i>	Trakuon
<i>Ischaemum rugosum</i>	Smao srau
<i>Mimosa invisa</i>	Banla saet (sael)
<i>Mimosa diplotricha</i>	Banla saet
<i>Monochoria vaginalis</i>	Chrach
<i>Panicum repens</i>	Chhlong
<i>Pistia stratiotes</i>	Chak thom
<i>Portulaca oleracea</i>	Kbet choun

Appendix D. Common names of weeds in China

Weed	Common name(s)
<i>Aeschynomene indica</i>	田皂角, 合萌
<i>Ageratum conyzoides</i>	胜红蓟, 鱼香蓟
<i>Alternanthera sessilis</i>	莲子草, 虾钳草
<i>Amaranthus spinosus</i>	刺草
<i>Commelina diffusa</i>	竹节菜
<i>Cynodon dactylon</i>	狗芽根, 绊根草
<i>Cyperus difformis</i>	异型莎草
<i>C. iria</i>	碎米莎草
<i>C. rotundus</i>	香附子, 莎草
<i>Digitaria ciliaris</i>	毛马唐
<i>Echinochloa colona</i>	芒稷
<i>E. crus-galli</i>	长芒野稗
<i>Eclipta prostrata</i>	鳢肠, 旱莲草, 墨草
<i>Eichhornia crassipes</i>	凤眼莲
<i>Eleusine indica</i>	牛筋草
<i>Fimbristylis dichotoma</i>	两歧飘拂草
<i>F. miliacea</i>	水虱草, 日照飘拂草
<i>Imperata cylindrica</i>	白茅, 茅草
<i>Leersia hexandra</i>	李氏禾, 游草
<i>Leptochloa chinensis</i>	千金子
<i>Ludwigia adscendens</i>	水龙, 过江藤
<i>Marsilea minuta</i>	蘋, 四叶蘋, 田字草
<i>Monochoria vaginalis</i>	鸭舌草
<i>Paspalum distichum</i>	双穗雀草
<i>P. scrobiculatum</i>	皱稃雀稗, 鸭也母 草
<i>Pistia stratiotes</i>	大藻, 水浮莲
<i>Polygonum hydropiper</i>	水蓼, 辣蓼
<i>Portulaca oleracea</i>	马齿苋, 马齿菜
<i>Scirpus juncoides</i>	萤蔺

Appendix E. Common names of weeds in India

Weed	Common name(s)
<i>Aeschynomene aspera</i>	Sola
<i>Ageratum conyzoides</i>	Bhurbhurwa, gundhaubon, mahakua
<i>Amaranthus spinosus</i>	Bajra, chauli, katemath, kantili chaulai
<i>Commelina benghalensis</i>	Kanchura, kanasiri, kanchara, kankaua, kena
<i>Cynodon dactylon</i>	Dub, hariyali
<i>Cyperus</i> spp.	Motha
<i>C. iria</i>	Morphula
<i>Dactyloctenium aegyptium</i>	Madana, makra, makara, makari
<i>Digitaria ciliaris</i>	Nargorwa, suruwari, takri
<i>Echinochloa colona</i>	Sanwa
<i>E. crus-galli</i>	Kayada, sanwak
<i>Eclipta prostrata</i>	Bhangra, bhringraj, ghuzi
<i>Eichhornia crassipes</i>	Falkhumbi, jalkhumbi, kulavali
<i>Eleusine indica</i>	Jangali marua, jhingari, kodai
<i>Imperata cylindrica</i>	Dab, siru, chero, dharba, modewa gaddi
<i>Ipomoea aquatica</i>	Kalmua, Kalmi, Kalmi sag, Patuasag
<i>Ludwigia adscendens</i>	keshandam, keshara
<i>Mimosa diplotricha</i>	Anathottavadi
<i>Panicum repens</i>	Injipilla, karigaddi
<i>Paspalum scrobiculatum</i>	Kodo, kodra
<i>Pistia stratiotes</i>	Jalakumbi, kumbi, takapana
<i>Polygonum hydropiper</i>	Bishkatal, packurmul
<i>Portulaca oleracea</i>	Ghol, jangali palak, jowar, kufa, kulfa
<i>Rottboellia cochinchinensis</i>	Barsali, bura, swooate, dholu, konda panookoo
<i>Trianthema portulacastrum</i>	Patharchatta

Appendix F. Common names of weeds in Indonesia*

Weed	Common name(s)
<i>Aeschynomene indica</i>	Dinding, Gědèyân, Kâtisân, Lorotis (Jav.)
<i>Ageratum conyzoides</i>	Bândotân, berokan
<i>Alternanthera sessilis</i>	Krêmâh, tolod
<i>Amaranthus spinosus</i>	Bâyâm duri, bayam eri, bayam cikron, senggang cucuk
<i>Commelina</i> spp.	Brâmbângân, gêwor
<i>Cynodon dactylon</i>	Grintingân
<i>Cyperus difformis</i>	Jěungân, Jukut pendul, Râmon brëndêlân (Jav.)
<i>C. iria</i>	Rumput mëndêrong, Dekeng wangin, Djekeng, Nyur-nyuran, Rumput jekeng kunyit, Umbung
<i>C. rotundus</i>	Těki, Těki berumbi
<i>Dactyloctenium aegyptium</i>	Sukět dringoân, Sukět kâtêlân, Sukět kârtut (Jav.), Sapabang babi
<i>Digitaria ciliaris</i>	Jâlâmpârân, Sukět câkârâyâm
<i>Echinochloa colona</i>	Rumput kusâ-kusâ
<i>E. crus-galli</i>	Pâdi burung
<i>Eclipta prostrata</i>	Orâng-âring, Urâng-âring
<i>Eichhornia crassipes</i>	Ėcèng
<i>Eleusine indica</i>	Rumput belulâng
<i>Fimbristylis dichotoma</i>	Bulu (jukut) mâtâ munding (Sund.)
<i>F. miliacea</i>	Âdâs-âdâsân, Riwit, Sunduk welut, Tumbârân (Jav.)
<i>Imperata cylindrica</i>	Âlâng-âlâng
<i>Ischaemum rugosum</i>	Blěmběm (Jav.)
<i>Leersia hexandra</i>	Běntâ
<i>Leptochloa chinensis</i>	Timunân (Jav.)
<i>Ludwigia adscendens</i>	Pângėor
<i>L. octovalvis</i>	Lâkum âir
<i>Mimosa diplotricha</i>	Pis koetjing, Rěmbětě (Jav.)
<i>Monochoria vaginalis</i>	Ėcèng pâdi
<i>Oryza sativa</i> (weedy rice)	Pâdi hântu
<i>Panicum repens</i>	Kěrunong pâdi, Lâmpuyângân, Rumput jâê-jâê
<i>Paspalum distichum</i>	Âsinân
<i>P. scrobiculatum</i>	Jâringân, Rumput kětih bělâlâng
<i>Pistia stratiotes</i>	Kiâmbâng, Âpu-âpu
<i>Portulaca oleracea</i>	Gelâng, Krokot
<i>Rottboellia cochinchinensis</i>	Brânjângân, Bludru bâyun (Jav.)
<i>Scirpus juncoideus</i>	Kâmbo mândik
<i>Sphenoclea zeylanica</i>	Gundâ
<i>Trianthema portulacastrum</i>	Subang-subang

*Most weeds present were listed in Soerjani et al (1986). Pronunciation as in that text. Except where noted, only common names for the Indonesian language are given. Jav. = Javanese; Sund. = Sundanese. Some names were from Galinato et al (1999).

Appendix G. Common names of weeds in Korea

Weed	Common name(s)
<i>Cyperus difformis</i>	Albang dong sani
<i>C. iria</i>	Chambang-donsani
<i>F. miliacea</i>	Barambaneulgiji
<i>Monochoria vaginalis</i>	Mooldalgebi

Appendix H. Common names of weeds in Laos

Weed	Common name(s)
<i>Ageratum conyzoides</i>	Nya khiu
<i>Alternanthera sessilis</i>	Nea kon ta sarng
<i>Amaranthus spinosus</i>	Pak hom nahm
<i>Commelina benghalensis</i>	Nya kabpi hyai
<i>C. diffusa</i>	Nya kabpi noy
<i>Cynodon dactylon</i>	Nya pong
<i>C. iria</i>	Nya khompao
<i>C. rotundus</i>	Nya heomu
<i>Dactyloctenium aegyptium</i>	Nya pak kuei
<i>Digitaria ciliaris</i>	Nya tinnok
<i>Echinochloa</i> spp.	Nya khao nôk
<i>Eclipta prostrata</i>	Nya hom keo
<i>Eleusine indica</i>	Nya phak koie
<i>Fimbristylis dichotoma</i>	Nya nuet meo
<i>F. miliacea</i>	Nya khai khiad
<i>Imperata cylindrica</i>	Nya kha
<i>Ipomoea aquatica</i>	Phak bung
<i>Ischaemum rugosum</i>	Nya kabthoon
<i>Portulaca oleracea</i>	Nya en eyan, nya tha kong

Appendix I. Common names of weeds in Malaysia

Weed	Common name(s)
<i>Aeschynomene indica</i>	Rumput tahi-ayum, tombok jantan, sianggit
<i>Ageratum conyzoides</i>	Keremak, akar rumput, bayam pasir,
<i>Alternanthera sessilis</i>	bayam tana, kelama hijau, kerak-kerak paya, kerumak bukit paya
<i>Amaranthus spinosus</i>	Bayam duri
<i>Commelina diffusa</i>	Rumput aur, Pulau aur, Rumput kukupu, tapak eti
<i>Cynodon dactylon</i>	Rumput minyak, crintingan
<i>Cyperus iria</i>	Rumput menderong
<i>C. rotundus</i>	Rumput haliya hitan, Rumput china lari
<i>Digitaria ciliaris</i>	Rumput jejari berbulu, cakar ayam
<i>Echinochloa colona</i>	Padi burung, Rumput kusa-kusa
<i>E. crus-galli</i>	Rumput sambau
<i>Eclipta prostrata</i>	Aring-aring
<i>Eichhornia crassipes</i>	Keladi bunting, bunga jamban
<i>Eleusine indica</i>	Rumput kekuasa, godong ula, rumput sambari
<i>F. miliacea</i>	Rumput kuran, rumput tahi kerabau, rumput keladi
<i>Imperata cylindrica</i>	Lalang
<i>Ipomoea aquatica</i>	Kangkong
<i>Ischaemum rugosum</i>	Rumput ekor cawi, Rumput colok chine, Rumput kemarau
<i>Leersia hexandra</i>	Rumput lidah rimau, Rumput benta
<i>Leptochloa chinensis</i>	Rumput ekor tebu
<i>Ludwigia adscendens</i>	Tinggir bangan, tinggir bangau, inai pasir, katang-katang, telinga bangan
<i>Marsilea minuta</i>	Tapak itek, semanggi
<i>Monochoria vaginalis</i>	Rumput air, kelayar, chacha layar, keladi agas, encheng padi
<i>Oryza sativa</i>	Padi angin
<i>Panicum repens</i>	Kerunung padi, telur ikan, Rumput kerbau
<i>Paspalum scrobiculatum</i>	Rumput tulang sentadok, Rumput hijau, Rumput patah siku
<i>Pistia stratiotes</i>	Kiambang besar
<i>Portulaca oleracea</i>	Gelang pasir, segan
<i>Scirpus juncoides</i>	Kambantjik, rumput bulat, rumput purun tikus
<i>Sphenoclea zeylanica</i>	Cempedak air

Appendix J. Common names of weeds in Myanmar*

Weed	Common name(s)
<i>Ageratum conyzoides</i>	ခွေးသားပန်း၊ ကရင်မပန်း
<i>Alternanthera sessilis</i>	ပုစွန်စာ
<i>Amaranthus spinosus</i>	ဟင်းနုနွယ်ခူးပေါက်
<i>Commelina benghalensis</i>	ဝက်ကျွတ်
<i>C. diffusa</i>	မျက်ချို
<i>Cynodon dactylon</i>	မြေဧပြက်၊ မြင်းစာမြက်
<i>Cyperus difformis</i>	မြက်ခုံညှင်းအစိမ်း
<i>C. iria</i>	မြက်ခုံညှင်းအဝါ
<i>C. rotundus</i>	မြက်ခုံညှင်းညှော်
<i>Dactyloctenium aegyptium</i>	လေးခွံမြက်၊ ပန်းတော်နီ၊ ပန်းတော်ညို
<i>Digitaria ciliaris</i>	အင်တိုင်မြက်ခါး၊ လက်သံမြက်
<i>Echinochloa colona</i>	ဝမ်းဆဲစွဲမြက်
<i>E. crus-galli</i>	ဘဲစာမြက်၊ မြက်ဘီ၊ မြက်ပျို
<i>Eclipta prostrata</i>	ကြိတ်မှန်
<i>Eichhornia crassipes</i>	ဗေဒါ
<i>Eleusine indica</i>	ဆင်ငိုမြက်
<i>Fimbristylis dichotoma</i>	မြက်ကွမ်းဘီးကြီး
<i>F. miliacea</i>	မြက်ကွမ်းဘီးလေး
<i>Imperata cylindrica</i>	ဘက်ကယ်
<i>Ipomoea aquatica</i>	ရေကန်နွန်း
<i>Leersia hexandra</i>	ဘမန်းမြက်
<i>Leptochloa chinensis</i>	ဒေါင်းမြွေပျံ
<i>Ludwigia adscendens</i>	ရေကညွတ်
<i>Marsilea minuta</i>	မှိုနီတို
<i>Mimosa diplotricha</i>	ထိကရုံကြီး
<i>Monochoria vaginalis</i>	ဆတ်
<i>Panicum repens</i>	မြက်ကြိမ်
<i>Pistia stratiotes</i>	ရေခင်လုပ်
<i>Portulaca oleracea</i>	ဘဲပုရစ်၊ မြေပုရစ်၊ မြေ
<i>R. cochinchinensis</i>	မြက်ယားငယ်
<i>Scirpus juncoides</i>	မြက်ကလုံး၊ တလှိုင်ခေါင်း
<i>Sphenoclea zeylanica</i>	လယ်ပုခူ
<i>T. portulacastrum</i>	လိပ်ရင်ဘတ်

*Weeds present were listed in Morris and Waterhouse (2001) or Myanma Agriculture Service (1996).

Appendix K. Common names of weeds in Nepal

Weed	Common name(s)
<i>Aeschynomene indica</i>	armale, Sola, shola, शोला
<i>Ageratum conyzoides</i>	ganne, elamey
<i>Alternanthera sessilis</i>	Bhirungi, भिरुङ्गी
<i>Amaranthus spinosus</i>	ludey jhar kadey
<i>Commelina</i> spp.	Kane, kane jhar, कने
<i>Cynodon dactylon</i>	dubo
<i>Cyperus</i> spp.	chhatre, Motha मोठा, Chow, Guchen, Ochumani chittrey banso
<i>Digitaria ciliaris</i>	
<i>Echinochloa colona</i>	Saamaa ghans, सामा घन्स
<i>E. crus-galli</i>	Tunde saamaa, टुन्दे सामा
<i>Eclipta prostrata</i>	Bhangraiyo
<i>Eichhornia crassipes</i>	Jal kumbhi, जल कुम्भी
<i>Eleusine indica</i>	Kode banso, कोदे बन्सो
<i>Fimbristylis miliacea</i>	Zhiruwa, चीरुव
<i>Imperata cylindrica</i>	khar, sirru
<i>Ipomoea aquatica</i>	Karaiya, करैय
<i>Ischaemum rugosum</i>	mandilo
<i>Monochoria vaginalis</i>	milo jaluke, pirulay, मिलो जलुके
<i>Paspalum dilitatum</i>	Banso, बन्सो
<i>P. distichum</i>	Ghunde banso, घुन्दे बन्सो
<i>P. scrobiculatum</i>	kodu, kondo, कोदु
<i>Pistia stratiotes</i>	Khumbhika, खुम्भीक
<i>Polygonum hydropiper</i>	Pire, पिरे
<i>Portulaca oleracea</i>	phagpa jakpo
<i>Scirpus juncoides</i>	swirey

Appendix L. Common names of weeds in Pakistan

Weed	Common name(s)
<i>Cynodon dactylon</i>	Khabbal, talla
<i>Cyperus iria</i>	Khana
<i>C. rotundus</i>	Notha
<i>Eichhornia crassipes</i>	gulbakauli, kalali
<i>Panicum repens</i>	Chimacara, surpurrcharela
<i>Portulaca oleracea</i>	kulfa, lunak

Appendix M. Common names of weeds in the Philippines*

Weed	Common name(s)
<i>Aeschynomene indica</i>	Makahiyang lalaki
<i>Ageratum conyzoides</i>	Bulak-manok, damong mabaho, damong-pallas
<i>Alternanthera sessilis</i>	Bonga-bonga, tagtagu
<i>Amaranthus spinosus</i>	Bayambang, kulitis, oray, uray
<i>Commelina benghalensis</i>	Alikbangon, likbangon, ulikbangon
<i>C. diffusa</i>	Tari-tari
<i>Cynodon dactylon</i>	Kawad-kawad, kawad-kawaran, kotati, malit
<i>Cyperus difformis</i>	Ballayang, ubod-ubod
<i>C. iria</i>	Payung-payung, taga-tagat
<i>C. rotundus</i>	Mutha
<i>Dactyloctenium aegyptium</i>	Damong balang, krus-krusan
<i>Digitaria ciliaris</i>	Baludgangan, halos
<i>Echinochloa colona</i>	Bulang, gutad, pulang-pwet, tiribuhan
<i>E. crus-galli</i>	Bayakibok
<i>E. glabrescens</i>	Daua, daua-dauahan
<i>Eclipta prostrata</i>	Higis-manok
<i>Eleusine indica</i>	Bakis-bakisan, kabit-kabit, parag-is, sambali
<i>Fimbristylis dichotoma</i>	Tikog-tikog (Vis)
<i>F. miliacea</i>	Gumi, taulat
<i>Imperata cylindrica</i>	Kogon
<i>Ipomoea aquatica</i>	Kangkong
<i>Ischaemum rugosum</i>	Tiritrigo, trigo-trigohan
<i>Leersia hexandra</i>	Barit
<i>Leptochloa chinensis</i>	Palay-maya
<i>Ludwigia adscendens</i>	Kangkong dapa
<i>L. octovalvis</i>	Balakbak, malapako
<i>Marsilea minuta</i>	Kaya-kayapuan
<i>Mimosa diplotricha</i>	Aroma, kamit-kabag, makahiya
<i>Monochoria vaginalis</i>	Biga-bigaan, gabing-uwak, kalabuwa
<i>Oryza sativa</i> (weedy rice)	Damong palay
<i>Panicum repens</i>	Luya-luyahan
<i>Paspalum distichum</i>	Luya-luyang dagat, malit-kalabaw, pagetpet
<i>P. scrobiculatum</i>	Sabung-sabungan
<i>Pistia stratiotes</i>	Kiapo
<i>Portulaca oleracea</i>	Olasiman
<i>Rottboellia cochinchinensis</i>	Agiñgay
<i>Scirpus juncoideus</i>	Bitubituinan
<i>S. maritimus</i>	Apulid
<i>Sphenoclea zeylanica</i>	Dilang-butiki, silisilihan
<i>Trianthema portulacastrum</i>	Toston

*Weeds present were listed in Moody et al (1984). Only Filipino (Tagalog) names were given, except as noted. Vis = Visayas.

Appendix N. Common names of weeds in Sri Lanka

Weed	Common name(s)
<i>Commelina benghalensis</i>	diya-meneriya
<i>Cynodon dactylon</i>	Aruham-pul, buha
<i>Dactyloctenium aegyptium</i>	Putu tana
<i>Digitaria ciliaris</i>	Arisi pul, guru tana
<i>Echinochloa colona</i>	Adipul, gira-tana
<i>E. crus-galli</i>	Kutirai-val-pul, martu
<i>Eichhornia crassipes</i>	Diya manel, diya kehel, habara, habarala, sabara, yapura
<i>F. miliacea</i>	muduhalkan
<i>Imperata cylindrica</i>	Iluk, inanka-pilu
<i>Ipomoea aquatica</i>	Kankun
<i>Ischaemum rugosum</i>	Kudukedu
<i>Panicum repens</i>	Etoru

Appendix O. Common names of weeds in Thailand*

Weed	Common name(s)
<i>Aeschynomene aspera</i>	โสนคางคก
<i>A. indica</i>	โสนหางไก่
<i>Ageratum conyzoides</i>	สาบแ้งสามกา
<i>Alternanthera sessilis</i>	ผักโปดน้ำ
<i>Amaranthus spinosus</i>	ผักโขมหนาม
<i>Commelina benghalensis</i>	ผักปราง
<i>C. diffusa</i>	ผักปรางใบเขียว
<i>Cynodon dactylon</i>	หญ้าแพรง
<i>Cyperus difformis</i>	กกขนาก
<i>C. iria</i>	กกทราย
<i>C. rotundus</i>	แห้วหมู
<i>Dactyloctenium aegyptium</i>	หญ้าปากควาย
<i>Digitaria ciliaris</i>	หญ้าตีนนก
<i>Echinochloa colona</i>	หญ้าหน้างู
<i>E. crus-galli</i>	หญ้าข้าวนก
<i>Echinochloa glabrescens</i>	หญ้าปล้องละมาน
<i>Eclipta prostrata</i>	กะเม็ง
<i>Eichhornia crassipes</i>	ผักตบชวา
<i>Eleusine indica</i>	หญ้าตีนกา
<i>Fimbristylis dichotoma</i>	หญ้านิ้วหนู
<i>F. miliacea</i>	หญ้าหนวดปลาชุก
<i>Imperata cylindrica</i>	หญ้าคา
<i>Ipomoea aquatica</i>	ผักบุ้ง
<i>Ischaemum rugosum</i>	หญ้าแดง
<i>Leersia hexandra</i>	หญ้าไซ
<i>Leptochloa chinensis</i>	หญ้าดอกขาว
<i>Ludwigia adscendens</i>	เทียนนา
<i>L. octovalvis</i>	เทียนน้ำ
<i>Marsilea spp.</i>	ผักแว่น
<i>Mimosa diplotricha</i>	ไมยราบเลื้อย
<i>Monochoria vaginalis</i>	ขาเขียด
<i>Panicum repens</i>	หญ้าชันกาด
<i>Paspalum distichum</i>	หญ้าชะกาดน้ำเค็ม
<i>P. scrobiculatum</i>	หญ้าปล้องหิน
<i>Pistia stratiotes</i>	จอก
<i>Polygonum hydropiper</i>	ผักไฟน้ำ
<i>Portulaca oleracea</i>	ผักเบี้ยใหญ่
<i>Rottboellia cochinchinensis</i>	หญ้าถอดปล้อง, หญ้าไยยัง
<i>Scirpus juncoides</i>	แห้วทรงกระเทียมเล็ก
<i>Sphenoclea zeylanica</i>	ผักปอดนา
<i>Trianthema portulacastrum</i>	ผักเบี้ยหิน

*Weeds present were listed in Radanachaless and Maxwell (1992).

Appendix P. Common names of weeds in Vietnam*

Weed	Common name(s)
<i>Aeschynomene aspera</i>	Điền ma nhám
<i>A. indica</i>	Điền ma án, Rút nước
<i>Ageratum conyzoides</i>	Cỏ cứt heo
<i>Alternanthera sessilis</i>	Diếp không cuống
<i>Amaranthus spinosus</i>	Dền gai
<i>Commelina benghalensis</i>	Đầu riều, Trai an
<i>C. diffusa</i>	Rau trai, Thài lài trắng
<i>Cynodon dactylon</i>	Cỏ chỉ, Cỏ ông, Cỏ ga
<i>Cyperus difformis</i>	Cỏ cháo, Cỏ tò ty
<i>C. iria</i>	Lác rận, Cú rận
<i>C. rotundus</i>	Cỏ cu, Hương phụ, Cỏ gau
<i>Dactyloctenium aegyptium</i>	Cỏ chân gà, Cỏ chân vịt
<i>Digitaria ciliaris</i>	Túc hình rìa, Túc hình nho, Túc hình leo
<i>Echinochloa colona</i>	Cỏ lồng vực cạn, Cỏ nước mặn
<i>E. crus-galli</i>	Cỏ lồng vực, Cỏ gạo, Cỏ mỳ, gai-hao-muong, lồng-vực Cỏ mực
<i>Eclipta prostrata</i>	Lục bình, Bèo tây
<i>Eichhornia crassipes</i>	Mần trâu, Ngưu cần
<i>Eleusine indica</i>	Mao thuởi lương phân,
<i>Fimbristylis dichotoma</i>	Cỏ quăng lông
<i>F. miliacea</i>	Cỏ chác, Cỏ tờ te, Cỏ chat
<i>Imperata cylindrica</i>	Cỏ tranh, Bạch mao
<i>Ipomoea aquatica</i>	Rau muống
<i>Ischaemum rugosum</i>	Cỏ mom, Cỏ mo van
<i>Leersia hexandra</i>	Cỏ noi, Cỏ bac
<i>Leptochloa chinensis</i>	Đuôi phụng, Mảnh hòa Trung quốc
<i>Ludwigia adscendens</i>	Rau dừa nước
<i>L. octovalvis</i>	Rau mướt đứng
<i>Marsilea minuta</i>	Rau bọ nhỏ
<i>Mimosa diplotricha</i>	Trinh nữ mốc
<i>Monochoria vaginalis</i>	Rau mắc bao, Cui dĩa, Rac mắc lá thon
<i>Panicum repens</i>	Cỏ cua-ga, Cỏ ong
<i>Paspalum distichum</i>	San nước
<i>P. scrobiculatum</i>	Cỏ dăng, san tron, trung ech
<i>Pistia stratiotes</i>	Bèo cái, Bèo tai tướng
<i>Polygonum hydropiper</i>	Nghể rằm
<i>Portulaca oleracea</i>	Rau sam, Sam
<i>Rottboellia cochinchinensis</i>	Cỏ day xanh, Cỏ mia, myet-yar
<i>Scirpus juncoideus</i>	Hoan-thao hen
<i>Sphenoclea zeylanica</i>	Cỏ xà bông
<i>Trianthema portulacastrum</i>	Cỏ tam khôi

*Most weeds present were listed in Koo et al (2000).

Appendix Q. Weed species (by Bayer code) reported in Asian nations.

Bayer code	BAN	BHU	CAM	CHN	IDO	IND	KOR	JAP	LAO	MAL	MYA	NEP	PAK	PHI	SRI	THA	VIE	Sum
AESAS	•		•		•	•					•	•		•	•	•	•	10
AESIN	•		•	•	•	•	•	•		•	•	•	•	•	•	•	•	16
AGECO	•		•	•	•	•			•	•	•	•		•	•	•	•	14
ALRSE	•	•	•	•	•	•			•	•	•	•		•	•	•	•	14
AMASP	•	•	•	•	•	•			•	•	•	•	•	•	•	•	•	15
COMBE	•	•			•	•		•		•	•	•	•	•	•	•	•	14
COMDI	•	•		•	•	•	•		•	•	•	•		•	•	•	•	14
CYNDA	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	16
CYPDI	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	17
CYPIR	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	17
CYPRO	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	16
DTAE	•				•	•			•	•	•	•	•	•	•	•	•	12
DIGSP	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	16
ECHCO	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	16
ECHCG	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	17
ECHGL	•	•	•		•	•			•	•	•	•	•	•	•	•	•	13
ECLAL	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	17
EICCR	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	16
ELEIN	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	17
FIMDI	•			•	•	•	•		•	•	•	•	•	•	•	•	•	14
FIMMI	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	16

continued on next page

Appendix Q continued.

Bayer code	BAN	BHU	CAM	CHN	IDO	IND	JAP	KOR	LAO	MAL	MYA	NEP	PAK	PHI	SRI	THA	VIE	Sum
IMPCY	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	17
IPOAQ	•		•	•	•	•	•		•	•	•	•	•	•	•	•	•	15
ISCRU	•		•	•	•	•			•	•	•	•	•	•	•	•	•	14
LERHE	•		•	•	•	•	•		•	•	•	•	•	•	•	•	•	14
LEFCH	•		•	•	•	•		•	•	•	•	•	•	•	•	•	•	15
LUDAD	•		•	•	•	•	•		•	•	•	•		•	•	•	•	14
LUDOC	•		•		•	•	•		•	•	•	•		•	•	•	•	13
MARMI	•	•	•		•	•			•	•	•		•	•	•	•	•	13
MIMIN					•	•			•	•	•			•		•	•	7
MOOVA	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	17
ORYSA	•		•	•	•	•		•		•		•	•	•	•	•	•	13
PANRE	•		•	•	•	•			•	•	•	•	•	•	•	•	•	14
PASDS		•		•	•	•	•			•	•	•	•	•	•	•	•	13
PASSC	•		•	•	•	•	•			•	•	•	•	•	•	•	•	15
PIIST	•		•	•	•	•			•	•	•	•	•	•	•	•	•	14
POLHY	•	•		•	•	•	•	•		•		•				•		10
POROL	•	•	•	•	•	•	•	•	•	•	•		•	•		•	•	15
ROOEX					•	•			•	•	•	•	•	•		•	•	10
SCPJO	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	17
SCPMA	•		•		•	•		•	•	•	•	•	•	•	•	•	•	14
SPDZE	•		•		•	•			•		•	•	•	•	•	•	•	13
TRTPO			•		•	•			•	•	•	•	•	•	•	•	•	10

Selected references

- Ampong-Nyarko K, De Datta SK. 1991. A handbook for weed control in rice. Manila (Philippines): International Rice Research Institute. 113 p.
- Chauhan BS, Johnson DE. 2010. The role of seed ecology in improving weed management strategies in the tropics. *Adv. Agron.* 105:221-262.
- Chauhan BS, Johnson DE. 2009. Influence of tillage systems on weed seedling emergence pattern in rainfed rice. *Soil Tillage Res.* 106:15-21.
- Crop protection compendium—global module. 3rd edition. 2001. Wallingford (UK): CAB International.
- Ecoport, Global Pest Plant Information Service, an FAO database: www.ecoport.org/default.htm.
- Fujisaka S, Guino RA, Lubigan RT, Moody K. 1993. Farmers' rice seed management practices and resulting weed seed contamination in the Philippines. *Seed Sci. Technol.* 21:149-157.
- Galinato MI, Moody K, Piggim CM. 1999. Upland rice weeds of South and Southeast Asia. Los Baños (Philippines): International Rice Research Institute. 156 p.
- Holm L, Doll J, Holm E, Pancho JV, Herberger JP, editors. 1997. *World weeds: natural histories and distribution*. New York (USA): Wiley. 1,129 p.
- Ismail AA, Man A. 1988. *Rumpai Sawah Padi*. Hakcipta Institut Penyelidikan dan Kemajuan Pertanian Malaysia. Kuala Lumpur (Malaysia): MARDI. 168 p.
- Koo SJ, Kwon YW, Chin DV, Cung HA. 2000. *Co Dai Pho Bien Tai Vietnam (Common weeds in Vietnam)*. Ho Chi Minh City (Vietnam): Agriculture Publishing House. 291 p.
- Lazarides M. 1980. *The tropical grasses of Southeast Asia (excluding bamboos)*. Vaduz (Germany): J. Cramer. 225 p.
- Mai V, Chien HV, A VV, Thi V, Suong T, Thiet LV. 2000. Rice seed contamination in Vietnam. In: Baki BB, Chin DV, Mortimer M, (Editors), *Wild and weedy rice in rice ecosystems in Asia: a review*. Limited Proceedings No. 2. Los Baños (Philippines): International Rice Research Institute. p. 17-19.
- Martinez ML, Valverde T, Moreno-Casasola P. 1992. Germination response to temperature, salinity, light and depth of sowing of ten tropical dune species. *Oecologia* 92(3):343-353.

- Moody K. 1989. Weeds reported in rice in South and Southeast Asia. Los Baños (Philippines): International Rice Research Institute. 442 p.
- Moody K, Munroe CE, Lubigan RT, Paller EC Jr. 1984. Major weeds of the Philippines. Los Baños (Philippines): Weed Science Society of the Philippines. 328 p.
- Morris H, Waterhouse DF. 2001. The distribution and importance of arthropod pests and weeds of agriculture in Myanmar. ACIAR Monograph No. 67. Canberra (Australia): Australian Centre for International Agricultural Research. 73 p.
- Myanma Agriculture Service. 1996. Some major weeds of Myanmar. Myanma Agriculture Service, Ministry of Agriculture, Yangon, Myanmar.
- Radanachalee T, Maxwell JF. 1992. List of weeds reported in Thailand. Chiang Mai (Thailand): Multiple Cropping Center, Chiang Mai University. 138 p.
- Ranjit JD, Bhattarai AN. 1988. Crop weeds and their control in Nepal. Agricultural Research and Production Project, Winrock International/USAID, Kathmandu, Nepal. 40 p.
- Rao AN, Johnson DE, Sivaprasad B, Ladha JK, Mortimer AM. 2007. Weed management in direct-seeded rice. *Adv. Agron.* 93:153-255.
- Rao AN, Moody K. 1990. Weed seed contamination in rice seed. *Seed Sci. Technol.* 18:139-146.
- Soerjani M, Kostermans AJHG, Tjitrosoepomo G. 1986. Weeds of rice in Indonesia. Jakarta (Indonesia): Balai Pustaka. 716 p.
- Wang Z, editor. 1990. Farmland weeds in China: a collection of coloured illustrative plates. Beijing (China): Agricultural Publishing House. 506 p.
- Waterhouse DF. 1993. The major arthropod pests and weeds of agriculture in Southeast Asia: distribution, importance and origin. Canberra (Australia): Australian Centre for International Agricultural Research (ACIAR). 141 p.
- weedsience.org. 2009. The international survey of herbicide resistant weeds. www.weedsience.org.
- Zimdahl RL, Lubigan RT, Moody K, Mabbayad MO. 1989. Seeds and seedlings of weeds in rice in South and Southeast Asia. Los Baños (Philippines): International Rice Research Institute. 63 p.

