WEEDS

in Irrigated & Rainfed Lowland Ricefields in the Philippines

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MESSAGE

We are glad to be part of PhilRice’s efforts in improving the lives of the Filipino rice farmers. With the realization of this handbook, we have become closer to the farmers whom we want to benefit from the products of our research. We’ll now be able to guide them on how to efficiently manage the weeds in their rice fields. Further, this handbook will advance the dissemination of agricultural technologies and increase rice production in the Philippines.

To the authors, congratulations for this feat. To researchers and agriculture professionals who will use this handbook, may you acquire additional knowledge that you can impart to our farmers. And to the farmers, this handbook is for you. We hope this can inform you in your farm management decisions so you’ll be more productive.

JEONG TAEK LEE, PhD
Center Director
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MESSAGE

In our continuing pursuit of giving the best for our farmers, we have come up with this practical guide to help them identify their weeds. Proper weed identification is important so our farmers will know how to handle them. With appropriate weed handling, farmers will be able to save on additional cost and maintain an environment-friendly farm with less herbicide use. This can also be a helpful tool for researchers and agriculture extension workers in developing rice farming systems and educating rice stakeholders.

PhilRice sincerely thanks the Korea Program on International Agriculture (KOPIA) for the financial support in the production of this booklet. We would also like to congratulate the authors of this book for being able to provide sufficient information for our farmers and their fellow researchers. Finally, we thank the Filipino farmers for being our inspiration in advancing rice research for development.

SAILILA E. ABDULA, PhD
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FOREWORD

Knowledge in proper weed identification is very critical in the selection and implementation of effective weed management. It is also valuable in the choice and recommendation of economical and environment-friendly methods of control.

This handbook was purposely developed to serve as guide to all farmers, students, professors, researchers, extension workers, and decision-makers for effective management of weeds in the Philippines.

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Weed Management Options

Use clean rice seeds
Practice field sanitation
Practice thorough land preparation
Practice good water management
Do manual and mechanical weeding
Use biological control
Use herbicides

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Terminologies

Acknowledgements
Guide to Weed Species Listed

*Cynodon dactylon* (L.) Pers. - scientific name

**Bakbaka, kawad-kawad** - local names commonly used by Filipino farmers

**Poaceae (Graminae)**- family name

**CYND** - EPPO Code (European and Mediterranean Plant Protection Organization)

**Grows in** - habitat related to rice ecosystem and establishment

**Life cycle** - life span in the field

**Means of propagation** - method of reproduction

**Distinguishing characteristics** - morphological characteristics that immediately describe the weed species.

**Reported impacts on rice** - negative effects of weed species on growth and development of rice plants in the fields as well as on the quality and quantity of harvested grains. Weed species lacking this part means that no information was available.

**Weakness (-es)** - agronomic conditions and control techniques that negatively affect the growth and development of a weed.

**References** - literatures from where information on the weed were taken.
Rationale

Weeds are among the major groups of pests that farmers always consider as limiting factors in rice production. If not controlled, weeds can reduce yield of rice from 44 to 96% by way of competition for the limited resources for growth and development such as nutrients, sunlight, and water. Indirectly, they can also cause increase in the cost of rice production. Weeds can reduce the quality and value of rice grains through the contamination of their seeds during harvest. They also serve as alternate hosts and refuges of disease-causing pathogens, insect pests, rats, and other pests of rice.

Classification of Weeds

Knowledge in weed classification is very important in selecting, designing, planning, and implementing cost-effective and environment-friendly weed management strategies and techniques.

A. Based on morphology

a. Grasses

- Members of the family Graminae (Poaceae)
- Leaves are long and narrow, which usually arise alternately in two rows from the nodes, and have ligules and sometimes auricles
- Leaf veins are in parallel while leaf sheaths are split around the stem
- Stems are called culms with well-defined nodes and internodes
- Stems are round and hollow inside
b. Sedges

- Members of the family Cyperaceae
- Leaves are also long and narrow but do not have ligules and auricles
- Leaf veins are also parallel but the leaf sheaths are continuous around the stem
- Stems are triangular in shape and have no nodes and internodes

c. Broadleaves

- Members belong to many families
- Leaves are fully expanded with netted veins
- Leaves, flowers, stems, and branches are broadly arranged in various shapes, colors, and structures

B. Based on life cycle

a. Annuals
Weeds that complete their life cycle from seed to seed in less than one year or in one growing season.

b. Perennials
Weeds that complete their life cycle in more than a year. They can be simple or creeping. Simple perennials spread through seeds and by vegetative propagations. They may regenerate vegetatively into a new plant if their shoots are injured or cut off from the mother plant. Creeping perennial, on the other hand, are those that reproduce by seeds and vegetative organs such as stolons (creeping above-ground stems), rhizomes (creeping below-ground stems), tubers, aerial bulblets, and bulbs.
C. Based on Habitat

a. Aquatic
   Weeds that emerge and grow in very wet or submerged soils (wet to moist)

b. Semi-aquatic
   Weeds that row in dry lands with some tolerance to submergence conditions (dry to wet)

c. Terrestrial
   Weeds that grow in dry lands (moist to dry)

D. Based on Photosynthetic Activity

a. \( \text{C}_3 \) weeds
   Weeds that employ a photosynthetic pathway where a 3-carbon compound is the first stable product. Weeds belonging to this group prefer environment where temperature and sunlight intensity are moderate, and water supply is plenty. \( \text{C}_3 \) weeds, however, cannot tolerate very high temperature since they are prone to wasteful biochemical process called photorespiration. Thus, most of them are dominant in ricefields that are under submerged condition.

b. \( \text{C}_4 \) weeds
   Weeds that employ a more efficient photosynthetic pathway in which a 4-carbon compound is the first stable product. Weeds under this group have physiological adaptations that allow them to thrive in very hot and drier areas (dry land or rainfed conditions), and where concentrations of carbon dioxide are limited.
Grasses

*Cynodon dactylon*
*Dactyloctenium aegyptium*
*Digitaria ciliaris*
*Echinochloa colona*
*Echinochloa crus-galli* ssp. *hispidula*
*Echinochloa glabrescens*
*Ischaemum rugosum*
*Leptochloa chinensis*
*Paspalum distichum*
*Oryza sativa* (weedy rice)
Cynodon dactylon (L.) Pers.

Local names: Bakbaka, buku-buku, galud-galud, kawad-kawad
Family: Poaceae (Graminae)
EPPO Code: CYNDA

Grows in: rainfed lowland ricefields
Life cycle: perennial
Means of propagation: seeds and vegetative parts (stolons and rhizomes)

Distinguishing characteristics: stems are branching, spreading on the ground, and rooting at the nodes; leaves are covered with long white hairs around the ligules; spikes are terminal and finger-like; and seed heads consist of 3 to 7 finger-like spikes measuring 4 cm long. C. dactylon can be easily differentiated from Panicum repens and Paspalum distichum through its 2-3 leaves that grow on each node on extended runners.

Reported impacts on rice: C. dactylon is a C₄ weed. It is an alternate host of disease-causing pathogens such as Bipolaris oryzae and Rhizoctonia solani. It can produce up to 230 seeds per panicle.


(Photos taken at PhilRice Negros, Murcia, Negros Occidental)
Dactyloctenium aegyptium (L.) Beauv.

Local names: Damong-balang, bayakibok, krus-krusan, sabong-sabongan, tugot-manok
Family: Poaceae (Graminae)
EPPO Code: DTTAE

Grows in: rainfed lowland ricefields
Life cycle: annual, sometimes perennial
Means of propagation: primarily by seeds and sometimes by stolons

Distinguishing characteristics: D. aegyptium has basal stems that are creeping, rooting, and dichotomously branching. Its upper stems bearing the flowers are slightly ascending (erect). Its digitate inflorescence appears like starfish or bird’s foot.

Reported impacts on rice: D. aegyptium is a C₄ plant and is well-adapted to drier areas. A single plant can produce up to 66,000 seeds. It can reduce yield of rice by 10 to 75%. The weed is also an alternate host of tungro viruses and rice bugs.

References: Caton et al. (2010), Galinato et al. (1999), Pancho and Obien (1995)

(Photos taken by Gerald E. Bello at San Miguel, Iloilo)
**Digitaria ciliaris** (Retz.) Koel.

Local names: Baludgangan, halos, saka-saka  
**Family:** Poaceae (Graminae)  
**EPPO Code:** DIGAD

Grows in: rainfed lowland ricefields  
**Life cycle:** annual  
**Means of propagation:** seeds

**Distinguishing characteristics:** a creeping grass that has smooth, flattened stems. Basal parts of the stems are more or less lying on the ground while the upper stems are ascending. It has thin and narrow-lanceolate leaves; prominent, and membranous ligules that are clasping the stem. Inflorescence is composed of 3-6 pseudo-spikes digitally arranged as pseudo-whorls at the apical portion.

**Reported impacts on rice:** *D. ciliaris* is a $C_4$ weed. A single plant can produce an average of 1,700 seeds. It reduces yield of rice by as much as 62%.

**Weakness:** *D. ciliaris* is very sensitive to shading.

**References:** Galinato et al. (1999), Moody et al. (1984), Pancho and Obien (1995)

*(Photos taken at Science City of Muñoz, Nueva Ecija; PhilRice Negros, Murcia, Negros Occidental)*
**Echinochloa colona** (L.) Link

Local names: Dukayang, lau-lau, pulang-pwet
Family: Poaceae (Graminae)
EPPO Code: ECHCO

Grows in: irrigated and rainfed lowland ricefields
Life cycle: annual
Means of propagation: seeds

Distinguishing characteristics: stems usually grow flat on top of the soil surface while the uppermost portions grow in upward position (ascending). Most stems are purple or reddish. Spikelets are ovate to broad ovate, closely crowded in four rows along one side of the branch, nearly sessile, sometimes with awn measuring less than 1mm.

Reported impacts on rice: *E. colona* is a C₄ weed. One plant can produce 3,000 to 6,000 seeds. Control of this weed by hand weeding is difficult due to close resemblances of its young seedlings to rice at early stages. Its full competition at ratios of 4:1 and 8:1 (weed: rice) reduces yield of rice by 86% and 93%, respectively. The weed can also act as alternate host of other pests such as *Sarocladium oryzae* causing sheath rot of rice, rice bug, and rice black bug.


*(Photos taken at PhilRice Negros, Murcia, Negros Occidental)*
**Echinochloa crus-galli** (L.) P. Beauv. ssp. *hispidula* (Retz.) Honda

Local names: Telebisyon, antena, bayakibok, biyuro, humay-humay, marapagay, naik, palay-pato  
Family: Poaceae (Graminae)  
EPPO Code: ECHCG

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual  
Means of propagation: seeds

**Distinguishing characteristics:** tall and can grow up to 200cm. It has stout and spongy stems; thick roots; and pinkish to purplish, green, soft, nodding panicle with densely crowded, elliptic, and pointed spikelets. Awns are long (2.5cm) and reddish or purplish in color.

**Reported impacts on rice:** *E. crus-galli* is a $C_4$ weed. It can complete its life cycle within 42 to 64 days after emergence producing an average of 2,000 to 40,000 seeds/plant. Some of its variants growing in direct-seeded rice areas in the Philippines are resistant to chloroacetamide (butachlor) and acetanilide (propanil) groups of herbicides. At its early stage, the weed is difficult to control by handweeding because it resembles rice seedlings. The weed can reduce yield of direct-seeded rice by 18 to 57% when its population is at 10 to 80 plants/m$^2$. It is also an alternate food of rice bug and rice black bug in the absence of rice.


*(Photos taken at Malagos, Davao City; and PhilRice Negros, Murcia, Negros Occidental)*
**Echinochloa glabrescens** Munro ex Hook. f.

Local names: Telebisyon, antena, dawa-dawa, marapagay, paray-paray, humay-humay  
Family: Poaceae (Graminae)  
EPPO Code: ECHGL

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual  
Means of propagation: seeds

Distinguishing characteristics: erect and can grow up to 100 cm tall. It has panicles that are usually narrow, pyramidal has numerous spikes and green to purplish spikelets that shed at maturity. Awns, if present, are about 1 cm long.

Reported impacts on rice: *E. glabrescens* is highly competitive especially when its seedlings grow with rice seedlings during transplanting or after direct seeding. Mean yield reductions in rice could range from 6-73% when its infestation level is at 5 to 40%, respectively. The weed was also reported as alternate food of rice bug and rice black bug in the absence of rice.


*(Photos taken at PhilRice Negros, Murcia, Negros Occidental)*
Ischaemum rugosum Salisb.

Local names: Ipot-doron, bika-bika, bulo-bulo, gulong-lapas, limba-limba, salsaladay, tinitrigo, trigo-trigohan  
Family: Poaceae (Graminae)  
EPPO Code: ISCRU

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual  
Means of reproduction: seeds

Distinguishing characteristics: erect and can grow up to 100 cm. It has distinctive, prominent transverse ribs or ridges on the lower glume of the spikelets. Its stems are purplish with long hairs at the nodes. It also has leaves that are flat and wide. Its inflorescence is single when young but splits at maturity into two spike-like racemes.

Reported impacts on rice: *I. rugosum* is a C₄ weed. One plant can produce an average of 4,000 seeds. Failure to control it could reduce yield of rice by as much as 60%. It can also reduce the quality of rice grains by way of contamination when its seeds are accidentally harvested and mixed with rice.


(Photos taken at Dingle, Iloilo; and Science City of Munoz, Nueva Ecija)
**Leptochloa chinensis** L.

Local names: Kuring-kuring, marapagay, maroy-paroy, salay-maya, palay-maya  
Family: Poaceae (Graminae)  
EPPO Code: LEPCH

**Grows in:** irrigated and rainfed lowland ricefields  
**Life cycle:** annual, sometimes perennial  
**Means of reproduction:** primarily by seeds but can also propagate by culm cuttings

**Distinguishing characteristics:** slender, tufted, and can grow up to 120 cm tall. Its leaves are linear, flat, thin, membranous, and sometimes reddish or purplish. Its inflorescence has narrowly ovate panicles consisting of 2-7 spikelets.

**Reported impacts on rice:** *L. chinensis* is a C₄ weed and can produce 27,000 seeds per plant. It can reduce yield of rice by as much as 48% when allowed to compete at 16 plants/m². It is also an alternate host of other rice pests such as the green and zigzag leaf hoppers.


*(Photos taken at PhilRice CES, Science City of Munoz, Nueva Ecija; and Dingle, Iloilo)*
Weeds in Irrigated and Rainfed Lowland Ricefields in the Philippines
**Paspalum distichum L.**

Local names: Bakbaka, barit, damong-ube, lubid-lubid, malit-kalabaw, ragitnit  
Family: Poaceae (Graminae)  
EPPO Code: PASDS

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: perennial  
Means of propagation: rhizomes and aerial stems (stolons), occasionally by seeds

Distinguishing characteristics: long creeping and branching stolons; erect, reddish-stems that grow up to 50 cm tall; inflorescence has two erect, Y-looking racemes; and ligules below leaf sheaths.

Reported impacts on rice: *P. distichum* is a C₄ weed. It can reduce yield of irrigated rice by 4, 45, and 46% when the crop’s seedlings are planted at distances of 15 x 15cm, 20 x 20cm, and 25 x 25cm, respectively. When growing with rice, *P. distichum* is difficult to control by handweeding because the detached stolon fragments regenerate easily; and by chemical method because its stolons may escape the toxicity effect of the herbicide applied.

Weaknesses: its shoot development is largely reduced when shaded and deeply flooded in the field. Repeated harrowings before final levelling and planting also reduce its growth.


*(Photos taken at PhilRice Negros, Murcia, Negros Occidental)*
**Oryza sativa L. (weedy rice)**

Local names: Halo, lahok, lakay, sabag, weder-weder  
Family: Poaceae (Gramineae)  
EPPO Code: ORYSA

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual  
Means of propagation: seeds

Distinguishing characteristics: generally taller and have fewer tillers than rice; most seeds have short to long awns that are white, yellow, or purple; most grains have red pericarp while some are off-white; and mature earlier than cultivated rice. Mature seeds of other variants shatter or fall when touched.

Reported impacts on rice: it absorbs up more nutrients (Nitrogen) in the soil than cultivated rice. It can reduce yield of cultivated rice by 20 to 90% when it competes at densities of 5 to 40 plants m$^{-2}$. It can also reduce the quality and price of milled rice when its pigmented grains are mixed during harvest. Its control by chemical and manual methods is very challenging particularly in direct-seeded rice because it has the same morphological and physiological characteristics as cultivated rice.


*(Photos taken at Aliaga, Nueva Ecija; and Dingle, Iloilo)*
Sedges

- *Cyperus compactus*
- *Cyperus compressus*
- *Cyperus difformis*
- *Cyperus digitatus*
- *Cyperus distans*
- *Cyperus halpan*
- *Cyperus imbricatus*
- *Cyperus iria*
- *Cyperus rotundus*
- *Fimbristylis dichotoma*
- *Fimbristylis miliacea*
- *Scirpus grossus*
- *Scirpus juncoides*
Cyperus compactus Retz.

Family: Cyperaceae  
EPPO Code: CYPCM

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: perennial, sometimes annual  
Means of reproduction: seeds and rhizomes

Distinguishing characteristics: its erect stems can grow up to 70 cm tall. It has spongy leaves that have the same length as the stem. Its inflorescence is a compound of numerous, big, round, spikes and reddish-brown spikelets.


(Photos taken at Hinigaran, Negros Occidental)
**Cyperus compressus** L.

Local names: Tuhog-dalag, gisai-kalabaw  
Family: Cyperaceae  
EPPO Code: CYPCP

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual  
Means of reproduction: seeds

Distinguishing characteristics: stems are smooth, green, and densely tufted. Leaves are shorter than stems while its inflorescence is simple and open. Spikes have 3 to 10 crowded spikelets in digitate cluster, while spikelets are greenish and very flattened in appearance.

References: Moody et al. (1984), Pancho and Obien (1995)

*(Photo taken at Science City of Munoz, Nueva Ecija)*
**Cyperus difformis** L.

**Local names:** Baong-baong, bulo-butones, payong-payong, siraw-siraw, treskantos, tuhog-dalag, ubod-ubod

**Family:** Cyperaceae

**EPPO Code:** CYPDI

**Grows in:** irrigated and rainfed lowland ricefields

**Life cycle:** annual

**Mode of reproduction:** seeds

**Distinguishing characteristics:** can grow as tall as 75 cm. It has stems that are pale green and sharply 3-angled at the top; shorter leaves than the stems; umbellate inflorescence that is simple or compound; and numerous spikelets that are globose.

**Reported impacts on rice:** *C. difformis* is a $C_3$ weed. One plant can produce 50,000 seeds with 60% germination. It can complete its life cycle within 30 days and spreads rapidly to become a dominant weed in a ricefield where moisture level is fluctuating. When left uncontrolled, it can reduce yield of rice by as much as 43%.


*(Photos taken at Datu Odin Sinsuat, Maguindanao)*
Cyperus digitatus Roxb.

Family: Cyperaceae  
EPPO Code: CYPDG

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: perennial, sometimes annual  
Means of reproduction: seeds and rhizomes

Distinguishing characteristics: its stems are triangular, flat leaves, compound inflorescence composed of digitately arranged spikes and yellow spikelets.


(Photograph taken at Bago City, Negros Occidental)
Cyperus distans  L. f.

Family: Cyperaceae  
EPPO Code: CYPDT

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: perennial  
Means of reproduction: seeds

Distinguishing characteristics: has erect and smooth stems that are triangular; leaves that are as long as the stems; and umbel-type inflorescence. It also has spreading, slender, red or reddish-brown spikelets.


(Photo taken at PhilRice Negros, Murcia, Negros Occidental)
Weeds in Irrigated and Rainfed Lowland Ricefields in the Philippines
Weeds in Irrigated and Rainfed Lowland Ricefields in the Philippines
**Cyperus halpan L. (‘haspan’)**

Local names: Balabalangutan, manik-manikan, barsanga, bungot-bungot  
Family: Cyperaceae  
EPPO Code: CYPHP  

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual, sometimes perennial  
Means of reproduction: seeds and rootstocks  

Distinguishing characteristics: has slender stems with longitudinal median rib on each side. Inflorescence has numerous, long, slender-shaped primary rays and short secondary rays. Its spikelets are digitately arranged in clusters.

References: Koo et al. (2000), Pancho and Obien (1995)  

*(Photos taken at Babatngon, Leyte)*
Cyperus imbricatus Retz.

Local names: Obod-obod, ballayang, balabalongutan
Family: Cyperaceae
EPPO Code: CYPIM

Grows in: irrigated and rainfed lowland ricefields
Life cycle: perennial, sometimes annual
Means of reproduction: seeds, sometimes by rhizomes

Distinguishing characteristics: coarse, tufted, and erect. Its stems are triangular; leaves are shorter than the stem; compound umbel green inflorescence when young and brown when mature; and with numerous long spikelets.

References: Moody et al. (1984), Pancho and Obien (1995)

(Photos taken at Braulio E. Dujali, Davao del Norte)
Cyperus iría L.

Local names: Payong-payong, siraw-siraw, taga-taga
Family: Cyperaceae
EPPO Code: CYPIR

Grows in: irrigated and rainfed lowland ricefields
Life cycle: annual
Means of reproduction: seeds

Distinguishing characteristics: its stems are smooth and triangular; linear-lanceolate leaves; umbel-shaped inflorescence; and numerous, spreading, erect spikelets that are yellow to yellow-brown.

Reported impacts on rice: C. iría is a C₄ weed. It can establish quickly in the field soon after rice plants are transplanted or direct-seeded. One plant can produce 3,000 seeds. When not controlled, it can reduce yield of rice by as much as 40%. It can also act as alternate host to other rice pests such as green leafhoppers, and plant pathogenic microorganisms such as Pyricularia oryzae, Rhizoctonia solani, and Sarocladium oryzae causing rice blast, sheath blight, and sheath rot diseases, respectively.


(Photos taken at PhilRice Negros, Murcia, Negros Occidental)
**Cyperus rotundus** L.

**Local names:** Barsanga, mutha, sud sud  
**Family:** Cyperaceae  
**EPPO Code:** CYPRO

**Grows in:** irrigated and rainfed lowland ricefields  
**Life cycle:** perennial  
**Means of propagation:** tubers and rhizomes

**Distinguishing characteristics:** erect with smooth unbranched three-sided stem, dark green leaves, and flowers in red-brown spikelets. It has extensive underground parts called the basal bulb, rhizomes, tubers, and roots which permit rapid production of multiple young sprouts in the soil.

**Reported impacts on rice:** *C. rotundus* is a C₄ plant and is considered as the world’s worst weed. It is a problem due to its prolific behavior in the soil, persistence in harsh environments, and infestations in many crops. In earlier years, it used to be dominant only in upland rice areas in the Philippines but has adapted and infested irrigated and rainfed lowlands as well. Its full competition with upland rice plants reduces rice yield by 42%. Its effects on yields of irrigated and rainfed lowland rice plants, however, are still unknown.

**Weaknesses:** Its leaves are susceptible to infection by *Puccinia philippinensis* that causes leaf rust. The bulbs of the weed are susceptible to feeding by *Bactra sp.*


*(Photos taken at Aliaga, Nueva Ecija)*
**Fimbristylis dichotoma**

Local names: Bungot-bungot, buntot-pusa, gumi, siraw-siraw, sirisibayas, sumpana-balik  
**Family:** Cyperaceae  
**EPPO Code:** FIMDI

**Grows in:** irrigated and rainfed lowland ricefields  
**Life cycle:** annual, sometimes perennial  
**Means of reproduction:** seeds

**Distinguishing characteristics:** *F. dichotoma* (L.) Vahl has the same characteristics with *F. miliacea* except that its spikelets are less in number, bigger and ovoid. Pancho and Obien (1995) has deeper taxonomic classification between the two weed species.

**Reference:** Pancho and Obien (1995)

*(Photos taken at PhilRice Negros, Murcia, Negros Occidental)*
**Fimbristylis miliacea (L.) Vahl**

Local names: Bungot-bungot, buntot-pusa, gumi, siraw-siraw, sirisibayas, sumpana-balik  
Family: Cyperaceae  
EPPO Code: FIMMI

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual, sometimes perennial  
Means of reproduction: seeds

Distinguishing characteristics: erect with flattened stems that bear 2-4 unequal bracts that are shorter than the inflorescence. Leaves are linear, flat, soft, and overlapping in two rows. Spikelets are numerous, globose to ovoid in shape, and brown to brown-orange.

Reported impacts on rice: *F. miliacea*, a C₄ weed, is a prolific seed producer. A single plant can produce more than 40,000 seeds.


*(Photos taken at PhilRice Negros, Murcia, Negros Occidental)*
**Scirpus grossus** L.

Local name: Tikiw  
Family: Cyperaceae  
EPPO Code: SCPGR  

**Grows in:** irrigated and rainfed lowland ricefields  
**Life cycle:** annual, sometimes perennial  
**Means of reproduction:** seeds and by rootstocks  

**Distinguishing characteristics:** has triangular stem. It has numerous brown spikelets that are ovoid.

**References:** AICAF (1996), Moody et al. (1984), Pancho and Obien (1995)

*(Photos taken at Aklan)*
Scirpus juncoides L.

Local names: Apulid, bitubituinan, balbas-kalabaw
Family: Cyperaceae
EPPO Code: SCPJU

Grows in: irrigated and rainfed lowland ricefields
Life cycle: annual/ perennial
Means of reproduction: seeds

Distinguishing characteristics: stems are erect and slender. Leaves degenerate to become sheath-like and cover the base of the stems. Fruits are brown to black when mature and broadly elliptical.


(Photo taken at Dingle, Iloilo)
Broadleaves

Aeschynomene indica
Alysicarpus vaginalis
Alternanthera sessilis
Ammannia baccifera
Ammannia coccinea
Basilicum polystachyon
Cardiospermum halicacabum
Commelina benghalensis
Commelina diffusa
Eclipta prostrata
Eclipta zippeliana
Eichhornia crassipes
Hedyotis biflora
Hedyotis corymbosa
Hydrolea zeylanica
Ipomoea aquatica
Limnocharis flava
Lindernia antipoda
Lindernia procumbens
Ludwigia adscendens
Ludwigia hyssopifolia
Ludwigia octovalvis
Ludwigia perennis
Marsilea minuta
Macroptilium lathyroides
Melochia concatenata
Merremia emarginata
Monochoria vaginalis
Murdannia nudiflora
Pistia stratiotes
Physalis angulata
Portulaca oleracea
Salvinia molesta
Sphenoclea zeylanica
Sphaeranthus africanus
**Aeschynomone indica L.**

Local name: Makahiyang-lalaki  
Family: Fabaceae  
EPPO Code: AESIN

Grows in: rainfed lowland ricefields  
Life cycle: annual  
Means of reproduction: seeds

Distinguishing characteristics: erect and robust, and can grow up to 1 m tall. Stems are branching and woody at the base. Leaves are even-pinnately arranged with numerous leaflets that are linear or oblong. Flowers are light yellow. Pods are linear-oblong, straight or curved, and composed of 4-8 joints with ridge-like appearance.

References: Moody et al. (1984), Pancho and Obien (1995)

*(Photos taken at Sta. Barbara, Iloilo)*
Alysicarpus vaginalis (L.) DC.

Local names: Banig-usa, mani-manian, maramani
Family: Papilionaceae
EPPO Code: ALZVA

Grows in: rainfed lowland ricefields
Life cycle: annual
Means of reproduction: seeds

Distinguishing characteristics: has ascending-erect growth. Stems are branched, stout, and hairless; leaves are ovoid, usually cordate at the base, round at the tip with spines, hairy at the lower surface; flowers usually red with two basal yellow stripes; and pods are yellowish.

References: Koo et al. (2005), Pancho and Obien (1995)

(Photos taken at Miag-ao, Iloilo; and Cuyapo, Nueva Ecija)
**Alternanthera sessilis (L.) DC.**

Local names: Lupo, bonga-bonga, bilanamanut  
Family: Amaranthaceae  
EPPO Code: ALRSE

**Grows in:** rainfed lowland ricefields  
**Life cycle:** annual  
**Means of reproduction:** seeds

**Distinguishing characteristics:** has a spreading or prostrate growth in the field. It has leaves that are elliptic-lanceolate to linear-lanceolate in shape. Its flowers are white and are globose to oblong.

**References:** AICAF (1996), Moody et al. (1984), Pancho and Obien (1995)

*(Photos taken at PhilRice Negros, Murcia, Negros Occidental; and Dingle, Iloilo)*
Ammannia baccífera L.

Local name: Apoy-apuyan
Family: Lythraceae
EPPO Code: AMMBA

Grows in: irrigated and rainfed lowland ricefields
Life cycle: annual, perennial
Means of propagation: seeds and stem fragments

Descriptions: stems are erect, branched and brownish; branches are longer near the base of the stem and shorter when near the apex; leaves are elliptical to lanceolate, acute at the tip, and narrow toward the basal part. Flowers in clusters are purplish.

Weakness: sensitive to herbicide application particularly 2,4-D and butachlor.


(Photo taken at Sta. Barbara, Iloilo)
**Ammannia coccinea Rottb.**

**Family:** Lythraceae  
**EPPO Code:** AMMCO

**Grows in:** irrigated and rainfed lowland ricefields  
**Life cycle:** annual  
**Means of propagation:** seeds

**Distinguishing characteristics:** stems are erect, branched, and glabrous, and can grow up to 50 cm. It has leaves that are opposite and auriculate at base. Flowers form petals that are pinkish.

**Reported impacts on rice:** at a population of more than 100 plants m\(^{-2}\), it can reduce yield of rice up to 21%.

**References:** Morita (1997), Shen et al. (2008)

*(Photos taken at San Miguel, Iloilo)*
**Basilicum polystachyon (L.) Moench**

Local name: Pansi-pansi  
Family: Lamiaceae  
EPPO Code: OCIPO

**Grows in:** rainfed lowland ricefields  
**Life cycle:** annual  
**Means of reproduction:** seeds

**Distinguishing characteristics:** erect and branched weed that grows up to 1 m tall. Its stems are 4-angled while leaves are ovate to oblong-ovate, with toothed margins. Racemes bear dense flowers and can grow 10 cm long. Flowers are lilac or pink.

**Reference:** Pancho and Obien (1995)

*(Photo taken at Sta. Barbara, Iloilo)*
Weeds in Irrigated and Rainfed Lowland Ricefields in the Philippines
**Cardiospermum halicacabum** L.

Local names: Lubo-lobohan, alalayon, bangkolon, parol-parolan, paltupaltukan, parya-aso, paspalya

Family: Sapindaceae

EPPO Code: CRIHA

**Grows in:** rainfed lowland ricefields

**Life cycle:** annual

**Means of reproduction:** seeds

**Distinguishing characteristics:** a climbing herb; has long stems that are slightly hairy; alternating leaves with slender petioles; leaflets that are biternate, ovate to lanceolate, and serrate at the margins and sometimes lobes. Flowers are white and very small while fruits are lantern-shaped.

**Reference:** AICAF (1996), Koo et al. (2005)

*(Photos taken at San Jose, Occidental Mindoro)*
**Commelina benghalensis** L.

Local names: Alikbangon, gatilang, kulasi  
Family: Commelinaceae  
EPPO Code: COMBE

Grows in: rainfed lowland ricefields  
Life cycle: annual, sometimes perennial  
Means of reproduction: seeds and by vegetative fragments

Distinguishing characteristics: fleshy stems are creeping to ascending. Leaves are wide in the center, elliptic-ovate and alternately arranged. Petals of the flowers are three to four, and are blue. Petals have different sizes (two to three are large, while one is small) and are blue.


*(Photos taken at Hinigaran, Negros Occidental)*
Commelina diffusa Burm. f.

Local names: Alikbangon, gatilang, kulasi
Family: Commelinaceae
EPPO Code: COMDI

Grows in: rainfed lowland ricefields
Life cycle: annual, sometimes perennial
Means of reproduction: seeds and vegetative fragments

Distinguishing characteristics: fleshy stems are creeping to ascending, and heavily branched. Leaves are narrow, alternately arranged, lanceolate to broadly lanceolate-shaped, and with stem-clasping sheath. Petals of the flowers are three (two large and 1 small), and are blue.


(Photos taken at Hinigaran, Negros Occidental)
**Eclipta prostrata** (L.) L.

Local names: Higis-manok, tultulisan, tinta-tinta  
Family: Asteraceae (Compositae)  
EPPO Code: ECLAL

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual  
Means of reproduction: seeds

Distinguishing characteristics: a $C_3$ weed; its stems are fleshy, reddish, hairy, and rooting at the nodes. Leaves are dark green and oppositely arranged, and are linear-oblong to lanceolate, with distinct toothed margins. Flower heads measuring 1-cm diameter bear small white flowers (florets).


*(Photos taken at PhilRice Negros, Murcia; Guihulngan City, Negros Oriental)*
**Eclipta zippeliana** Bl.

Local names: Higis-manok, tultulisan, tinta-tinta  
Family: Asteraceae (Compositae)  
EPPO Code: ECLPZ  

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual  
Means of reproduction: seeds  

**Distinguishing characteristics:** a C₃ weed; has the same morphological characteristics as *E. prostrata* except that its leaves are light green, oblong-ovate to lanceolate, has margins that are coarsely spinulose-toothed. In addition, stems and leaves are much covered with many hairs.

**References:** Pancho and Obien (1995)

*(Photos taken at PhilRice Negros, Murcia)*
**Eichhornia crassipes** (Mart.) Solms

Local name: Water lily  
Family: Pontederiaceae  
EPPO Code: EICCR

**Grows in:** irrigated lowland ricefields  
**Life cycle:** perennial  
**Means of reproduction:** stolons, plant fragments, seeds

**Distinguishing characteristics:** a floating aquatic weed that has short and rosette-like stems. Leaves are ovate to orbicular, with petioles that are swollen and spongy. Flowers are numerous and are purple.

**Reported impacts on rice:** this weed restricts irrigation and crop growth causing heavy economical losses in rice paddy fields. It can also transmit pathogens that infect several other crops.


*(Photos taken at PhilRice Negros, Murcia, Negros Occidental)*
Weeds in Irrigated and Rainfed Lowland Ricefields in the Philippines
**Hedyotis biflora** (L.) Lam.

- **Local names:** Dalumbang, kaddok-na-kalinga, palarapdap, pisak, pisek
- **Family:** Rubiaceae
- **EPPO Code:** HYOBI

**Grows in:** irrigated and rainfed-lowland ricefields

**Life cycle:** annual

**Means of reproduction:** seeds

**Distinguishing characteristics:** has erect or spreading growth; leaves that are short-petioled, elliptic-ovate to oblong; branched and slender stems; and inflorescence with 2-8 small flowered umbels.


*(Photo taken at San Miguel, Iloilo)*
**Hedyotis corymbosa** (L.) Lam.

Local names: Dalumbang, kaddok-na-kalinga, palarapdap, pisak, pisek  
Family: Rubiaceae  
EPPO Code: HYOFR

Grows in: irrigated and rainfed-lowland ricefields  
Life cycle: annual  
Means of reproduction: seeds

Distinguishing characteristics: has erect or spreading growth; its leaves are linear-oblong to linear-oblong and are gradually narrow to the apex. Stems are branched and slender; inflorescence has 2-8 small flowered umbels.


*(Photo taken at Science City of Muñoz, Nueva Ecija)*
Weeds in Irrigated and Rainfed Lowland Ricefields in the Philippines
Hydrolea zeylanica (L.) Vahl

Local names: Kangkong-kangkungan, garampingat, lupo-lupo
Family: Hydrophyllaceae
EPPO Code: HYMZE

Grows in: irrigated and rainfed lowland ricefields
Life cycle: perennial, occasionally annual
Means of reproduction: runners and seeds

Distinguishing characteristics: stems are hollow, and usually grow flat on top of the soil surfaces while the uppermost portions grow in upward position (ascending). Leaf blades are lanceolate to ovate, glabrous or pubescent, base acute, margin entire, and apex acute. Petals of the flowers are purple-blue.

Reported impacts on rice: stems of H. zeylanica when cut can germinate into new seedlings. Thus, it establishes rapidly in the field particularly under flooded conditions. It is a very competitive weed. Yields of rice infested with the weed at ratios of 1:1, 1:5, and 1:10 (rice:weed) are significantly reduced by 19, 24, and 52%, respectively.


(Photos taken at PhilRice Negros, Murcia, Negros Occidental)
Ipomoea aquatica Forsk.

Local name: Kangkong
Family: Convolvulaceae
EPPO Code: IPOAQ

Grows in: irrigated lowland ricefields
Life cycle: perennial
Means of reproduction: seeds and cuttings

Distinguishing characteristics: an aquatic weed that has slender, smooth, and creeping stems; it spreads on the ground or floats on water. Stems are hollow and rooting at the nodes. Leaves are alternately arranged with morphological variations in shapes. Flowers are funnel-shaped and are white to purple.

Reported impacts on rice: how the weed reduces the yield of rice has yet to be reported; it is an alternate host of golden apple snails in the absence of rice plants.


(Photos taken at Butuan City, Agusan del Norte)
**Limnocharis flava** (L.) Buchenau

Local name: Pala-pala  
Family: Butomaceae  
EPPO Code: LMNFL

**Grows in:** irrigated lowland ricefields  
**Life cycle:** perennial  
**Means of reproduction:** seeds and vegetative propagules called ramet

**Distinguishing characteristics:** has triangular-shaped leaves and stalks. Its leaves are erect, papery, light green, ovate to broad elliptic that measure 6-20 cm long. Its stems are hollow and smooth in surface while its flowers are yellow and three-lobed. Its fruits are spherical.

**Reported impacts on rice:** *L. flava* is a very competitive weed especially under flooded conditions. In a field study, it significantly reduced the yield of irrigated-transplanted rice (NSIC Rc 144) by 18, 23, 30, and 48%, respectively when allowed to compete at 10, 20, 25, and 30 plants m$^{-2}$ all throughout the growing season. Competition at 50 to 60 plants/m$^{2}$ resulted in yield reduction in rice by 63%.

**Weaknesses:** the weed is sensitive to drier conditions, hence thorough land preparation and proper water management are crucial practices to effectively manage it.

**References:** AICAF (1996), De Grano (2008)

*(Photos taken at Nasugbu, Batangas)*
**Lindernia antípoda (L.) Alston**

Local name: Lalagang  
Family: Scrophulariaceae  
EPPO Code: LIDAP

Grows in: rainfed lowland ricefields  
Life cycle: annual  
Means of reproduction: seeds

Distinguishing characteristics: has spreading or erect growth. Its stems are slender; and leaves are oblong to oblong-lanceolate, shortly petioled, with tooth-like margins. Its flowers lilac.


*(Photo taken at Science City of Muñoz, Nueva Ecija)*
Weeds in Irrigated and Rainfed Lowland Ricefields in the Philippines
*Lindernia procumbens* (Krock.) Philcox

Local name: Lalagang  
Family: Scrophulariaceae  
EPPO Code: LIDPY

**Grows in:** rainfed lowland ricefields  
**Life cycle:** annual  
**Means of reproduction:** seeds

**Distinguishing characteristics:** It has spreading or erect growth; slender and four-sided stems; and leaves that are elliptic, shortly petioled but without tooth-like margins. Flowers are white to lilac.

**References:** Koo et al. (2005)

*(Photo taken at Science City of Muñoz, Nueva Ecija)*
**Ludwigia adscendens** (L.) Hara

Local name: Kangkong-dapa
Family: Onagraceae
EPPO Code: LUDAC

Grows in: irrigated lowland ricefields
Life cycle: perennial
Means of reproduction: seeds and cuttings

Distinguishing characteristics: has stems that creep on the ground or float. Its stems are also rooting at the nodes with their white spongy pneumatophores arising in clusters. Leaves are oblong, elliptic and can grow up to 8 cm long. Flowers have five petals that are white with yellow at the center.


*Photos taken at Butuan City, Agusan del Norte*
**Ludwigia hyssopifolia** (G.Don) Exell

Local names: Kahoy-kahoy, malapako, tina-tina  
Family: Onagraceae  
EPPO Code: LUDLI

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual, perennial  
Means of reproduction: seeds and propagules

**Distinguishing characteristics:** erect and branched and can grow up to 60 cm tall. Stems are angled, green to reddish, and woody at the base. Leaves are narrow and lanceolate. Flowers are yellow with four “diamond-shaped” petals (elliptic) 2-3 cm long. Stems are eight, or more than the number of calyx lobes. Capsules are slender, 4-angled, and reddish.

**Reported impacts on rice:** a C₃ weed of rice across a wide range of cultural types, in both clay-loam and clay-soils. Full competition at ratios of 4:1 and 8:1 (weed: rice) can significantly reduce rice yield by 64 and 81%, respectively.

**Weakness:** *L. hyssopifolia* is susceptible to the chrysomelid beetle, *Altica sp.* with its larvae and adults feeding voraciously on leaves of the weed.


*(Photos by Cherry Endino-Tayson at PhilRice Negros, Murcia, Negros Occidental)*
**Ludwigia octovalvis (Jacq.) Raven**

Local names: Kahoy-kahoy, malapako, tina-tina  
Family: Onagraceae  
EPPO Code: LUDOC

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual, perennial  
Means of reproduction: seeds and propagules

Distinguishing characteristics: a robust, erect, and branched weed than can grow up to 3 m tall. Stems are ridged and sometimes reddish. Leaves are lanceolate. Flowers are yellow, with four big ovate-shaped petals. Stamens are eight, or more than the number of calyx lobes. Capsules bearing the seeds are bigger in size, 4-angled and reddish.

Reported impacts on rice: *L. octovalvis* is differentiated from *L. hyssopifolia* and *L. perennis* by its big, yellow flowers. Out of 350 weed species in rice worldwide, *L. octovalvis* is fourth in global-scale importance among broadleaves. It invades a wide range of rice culture systems especially dry-seeded rice.

Weakness: susceptible to the chrysomelid beetle, *Altica* sp., with its larvae and adults feeding voraciously on leaves of the weed.


*(Photos taken at PhilRice Negros, Murcia, Negros Occidental)*
Ludwigia perennis (L.) Raven

Local names: Kahoy-kahoy, malapako, tina-tina, sigang-dagat
Family: Onagraceae
EPPO Code: LUDPN

Grows in: irrigated and rainfed lowland ricefields
Life cycle: annual
Means of reproduction: seeds and plant fragments

Distinguishing characteristics: erect and branched weed that grows up to 30 cm tall. Stems are irregularly ridged and sometimes reddish. Leaves are narrow and lanceolate. Flowers are yellow with four to five egg-shaped (oblone-elliptic) petals. Stamens have the same number as calyx lobes. Capsules bearing the seeds are 4-angled and are reddish.

Weakness: L. perennis is susceptible to the chrysomelid beetle, Altica sp. The insects’ larvae and adults feed voraciously on leaves of the weed.

References: Moody et al. (1984), Pancho and Obien (1995)

(Photos taken at PhilRice Negros, Murcia, Negros Occidental)
**Marsilea minuta L.**

Local names: Paang itik, kaya-kayapuan  
Family: Marsileaceae  
EPPO Code: MASMI

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: perennial  
Means of reproduction: vegetative parts and spores

Distinguishing characteristics: an aquatic fern with long, slender, and branched rhizomes. Leaves have slender and long stalks bearing four triangular-shaped, quadrifoliate leaflets. Sporocarps and short hairs can be found at the base of the petiole.

Reported impacts on rice: persistent and very competitive to rice. When not controlled, it can reduce yield of rice by 70%.


*(Photos taken at PhilRice CES, Science City of Munoz, Nueva Ecija)*
Melochia concatenata L.

Local names: Bankalanan, kaliñgan, marasaluyot  
Family: Sterculiaceae  
EPPO Code: MEOCO

Grows in: rainfed lowland ricefields  
Life cycle: perennial  
Means of reproduction: seeds

Distinguishing characteristics: stems are erect or spreading, and branched with scattered stellate hairs. It has leaves that are oblong to ovate, long, acute, broad base, and rounded or cordate. Inflorescence are terminal or axillary heads with the flowers somewhat crowded, intermixed with linear bracteoles; petals are obovate, white, sometimes pink or pale purple. Fruits are depressed-globose capsules.

References: Moody et al. (1984), Pancho and Obien (1995)

(Photos taken at PhilRice Negros, Murcia, Negros Occidental; and Lambunao, Iloilo)
**Merremia emarginata** (Burm. F) Hallier f.

Local name: Kupit-kupit  
Family: Convolvulaceae  
EPPO Code: MRREM

**Grows in:** rainfed lowland ricefields  
**Life cycle:** annual  
**Means of reproduction:** vegetative parts

**Distinguishing characteristics:** a slender, twining, sparsely hairy to glabrescent weed. Stems are reddish and rooting at the nodes; leaves are kidney to heart-shape, often wider than long, and irregularly toothed. Flowers have yellow corolla, and rounded sepals with few to many white weak hairs.

**References:** Pancho and Gruezo (2009)

*(Photos taken at Cuyapo, Nueva Ecija; and Miag-ao, Iloilo)*
Macroptilium lathyroides (L.) Urb.

Local name: Balabalatong
Family: Papilionaceae (Leguminosae)
EPPO Code: PHSLY

Grows in: rainfed lowland ricefields
Life cycle: annual
Means of reproduction: seeds

Distinguishing characteristics: an erect legume that has branchy and woody stems. Leaves are three (trifoliate) and are ovate to lanceolate. Flowers are red-purple. The weed also has green (young) to brown (mature), long and slender pods that bear seeds.


(Photos taken at PhilRice Negros, Murcia, Negros Occidental)
**Monochoria vaginalis** (Burm. f.) C. Presl

Local names: Gabi-gabi, gabi-gabihan  
Family: Pontederiaceae  
EPPO Code: MOOVA

Grows in: irrigated and rainfed lowland ricefields  
Life cycle: annual, sometimes perennial  
Means of propagation: seeds and tubers

Distinguishing characteristics: a fleshy, semi-aquatic, monocotyledon weed that has shiny appearance in the field. Its stems are soft, erect, and rooting at the nodes. Flower stalks are long bearing lilac-blue or violet petals that are arranged in 2-6 groups. Its leaves are heart-shaped and petioles that are soft and hollow.

Reported impacts on rice: *M. vaginalis* is a C₃ weed. Its trait of discontinuous germination allows it to survive and evade weed control. It reduced yield of rice by 16% when it was allowed to compete within 7 to 40 days at 100 plants/m². Competition until maturity at the same population level reduced yield by 25%.


*(Photos taken at PhilRice Negros, Murcia, Negros Occidental; and Dingle, Iloilo)*
Murdannia nudiflora (L.) Brenan

Local names: Kulasi, kulkulasi, alikbangon
Family: Commelinaceae
EPPO Code: MUDNU

Grows in: rainfed lowland ricefields
Life cycle: perennial
Means of reproduction: seeds and vegetative parts

Distinguishing characteristics: has branched and creeping stems. Its leaves are long, narrow, and lanceolate. Its flowers are small and purple. Flower-stolons are long, measuring 3 to 7 cm.


(Photos taken at PhilRice Negros, Murcia, Negros Occidental)
**Pistia stratiotes** L.

Local names: Kiapo, kiyapo  
Family: Araceae  
EPPO Code: PIIST

**Grows in:** irrigated lowland ricefields  
**Life cycle:** perennial  
**Means of reproduction:** seeds and vegetative offshoots connected by stolons

**Distinguishing characteristics:** a floating weed with yellowish-green leaves that form like cabbage plant. It has short flowers and feathery roots. It also bears small plantlets called offshoots that are connected by stolons.


*(Photos taken at Nasugbu, Batangas; Butuan City, Agusan del Norte)*
**Physalis angulata** L.

Local names: Asisiu, kugut, potokan, sisiu, tutulakak, tino-tino  
Family: Solanaceae  
EPPO Code: PHYAN

Grows in: rainfed lowland ricefields  
Life cycle: annual  
Means of reproduction: seeds

Distinguishing characteristics: an erect and branched weed. It has ovate to oblong leaves and pale-yellowish flowers. Fruits are oblong to ovoid.


*(Photos taken at PhilRice Negros, Murcia, Negros Occidental)*
**Portulaca oleracea L.**

Local names: Alusiman, kantataba, ngalug, olasiman  
Family: Portulacaceae  
EPPO Code: POROL

Grows in: rainfed lowland ricefields  
Life cycle: annual, sometimes perennial  
Means of reproduction: seeds and stem cuttings

**Distinguishing characteristics:** an herb with prostrate or spreading growth. It has stems that are branched, succulent, smooth and reddish. Its leaves are fleshy, alternately arranged, obtuse, oblong-ovate, sessile, and base cuneate. Flowers are yellow with 5 petals.

**References:** Koo et al. (2005), Moody et al. (1984), Pancho and Obien (1995)

*(Photo taken at Miag-ao, Iloilo)*
Salvinia molesta D.S. Mitchell

Family: Salviniaeeae  
EPPO Code: SAVMO

Grows in: irrigated lowland ricefields  
Life cycle: perennial  
Means of reproduction: cut fragments and spores

Distinguishing characteristics: it is a hairy floating weed with branched stems. Young leaves are flat and oblong to oval while mature leaves are cordate and slightly folded upward. Leaves are also covered with spine-like hairs. S. molesta usually proliferates to form wide mats. Each node of the slender stem produces three leaves (two are green and floating, and one is brown, root-like, and submerged).

Reported impacts on rice: can reduce yield of rice by 12.5%. Spread of this weed in ricefields was due to mistaken identity as azolla plant.


(Photos taken at San Carlos City, Negros Occidental; and Los Baños, Laguna)
Sphenoclea zeylanica Gaertn.

Local names: Balabalanob, burat-aso, mais-mais, silisilihan, ukim-ukim
Family: Sphenocleaceae
EPPO Code: SPDZE

Grows in: irrigated and rainfed lowland ricefields
Life cycle: annual
Means of reproduction: seeds

Distinguishing characteristics: an erect and branched weed with soft and hollow stems. Leaves are oblong to lanceolate, narrow, and pointed at the tips with short stalks. It has green and cylindrical inflorescence, and white to greenish flowers.

Reported impacts on rice: can reduce yield of rice by 45%. Some variants of the weed have also been reported resistant to 2,4-D.

Weakness: susceptible to infection by Alternaria alternata (Fr.) Keissler f.sp. sphenocleae. S. zeylanica inoculated with 10 spores/ml of the fungus showed blighting and wilting after 24 hours of inoculation. At 6 days after inoculation, all S. zeylanica plants died due to severe infection.


(Photos taken at PhilRice Negros, Murcia, Negros Occidental; and Bohol Experiment Station, Ubay, Bohol)
**Sphaeranthus africanus** L.

**Family:** Asteraceae (Compositae)  
**EPPO Code:** SPSSE

**Grows in:** rainfed lowland ricefields  
**Life cycle:** annual  
**Means of reproduction:** seeds

**Distinguishing characteristics:** an erect weed with stems and branches that have broadly winged leaves. Leaves are obovate to oblong, with wide margins that are finely toothed. It has many round-shaped heads that bear clusters of greenish-white flowers.

**References:** Moody et al. (1984), Pancho and Obien (1995)

*(Photo taken at PhilRice Negros, Murcia, Negros Occidental)*
Weed Management Options

Use clean rice seeds

This technique is very effective in preventing contaminations and further entries of weed seeds in the field. Using clean rice seeds that are pure, full, and uniform in size ensures a minimum of 85% germination rate as well as better growth of seedlings that are healthy.

Practice field sanitation

Keeping the seedling nurseries, irrigation canals, and field bunds clean and weed-free helps prevent entries of volunteer weed seeds and asexual propagules into the fields. Using clean equipment also helps prevent further contamination in the field.

Keeping fields weed free after harvest and during fallow period before the next cropping season will help reduce weed seed populations in the soil seedbanks, and reduce weed infestations in the next cropping season.

Practice thorough land preparation

This helps control weeds by burying them under the soil, separating shoots from
roots, encouraging germination of dormant seeds, desiccating shoots, and exhausting carbohydrate reserves of perennial weeds.

Flood the field within 1-2 days whenever water is available and enough to supply the area. Plow the field and keep it submerged for 1 week to soften lumped soil and decompose organic materials. Allow the water to drain naturally to enhance germination of weed seeds and are killed later by harrowing. Harrow the field 2-3 times at 1-week interval and then level it evenly by any means. Evenly leveled field facilitates good management of water, nutrients, and pests particularly weeds and golden apple snails.

Use the stale-seedbed technique to manage troublesome weeds such as *C. rotundus* and weedy rice (*O. sativa*). This technique involves plowing and harrowing 2-3 times during fallow period, plus follow-up application of selective herbicides when necessary.

The technique reduces weed population in the soil by flushing out all weed seeds and other asexual propagules (tubers, rhizomes, stolons, etc.) that are capable of germinating and forming into new seedlings. Weeds that emerge then are eradicated by repeated plowing and harrowing, and application of herbicides.
Practice good water management

This helps suppress or inhibit weed growths in the field especially when applied at the right time and level. For irrigated lowland fields, introduce water 3-4 days after transplanting at 2-3 cm level; 7-10 days after direct seeding at 3-5 cm level. Increase the water level and maintain at 5-7 cm as the rice plants grow later in the season.

Do manual and mechanical weeding

Manual weeding is basically handweeding and may involve the use of small hand tools like sickles and bolos. This technique is very effective and efficient in removing weeds that grow within rows and hills of rice. It is also effective in preventing the spread of resistant weed biotypes by pulling the whole weed plant or by removing the inflorescence that carries the weed seeds.

Mechanical weeding involves bigger tools. This technique is best accomplished in straight row-planted rice plants using a rotary weeder.
Growth of weeds is suppressed by cutting, trampling, and burying weeds and plant parts into the soil.

**Use biological control**

This approach involves the deliberate use of beneficial organisms (plant-feeding insects, disease-causing microorganisms, and growth-suppressing plants) to inhibit weed growth or reduce its population to a level where yield of rice is not affected. This method is highly recommended for organically grown rice where use of synthetic pesticides is strictly prohibited.

An effective biological control agent is the *Azolla*, a freshwater plant that can fix Nitrogen through its symbiotic relationship with blue-green algae. It has been proven to suppress weed growths up to 80% both in transplanted and direct-seeded rice. Other biological control agents are the fungus *Alternaria alternata* f.sp. *sphenocleae* causing foliar blight to *Sphenoclea zeylanica*; *Puccinia philippinensis* causing leaf blight disease on leaves of *Cyperus rotundus*; and black beetle namely *Altica* sp. feeding on foliages of *Ludwigia* species.
Use herbicides

Herbicides are synthetic chemicals that are used to suppress growth or eradicate weeds. They are among the most commonly used weed control techniques by many farmers in the Philippines because of their efficacy and ease in application; wide range of coverage; and immediate visibility of the results after application.

Constant advisories are always presented to the public because incorrect usage of herbicides will endanger the health of humans and animals, and the environment. Continuous use of the same kind, incorrect dosages, and wrong timing of herbicide application may also result in evolution of herbicide-resistant weeds.
Timing of herbicide application

1. Pre-plant application. Herbicides are applied to the soil before rice is transplanted or sown. Examples are glyphosate, glufosinate, and paraquat.

2. Pre-emergence. Herbicides are applied to the soil after the crop has been established, but before the emergence of the rice plants or weeds. Examples are butachlor, pretilachlor, and pendimethalin.

3. Post-emergence. Herbicides are applied after both rice plants and weeds have germinated and emerged from the soil. Examples are bispyribac-sodium, butachlor + propanil, fenoxaprop + safener, fenoxaprop + ethoxysulfuron, metsulfuron + chlorimuron, oxadiazon, penoxsulam, penoxsulam + cyhalofop, bentazon, and 2,4-D.

Safety precautions during herbicide spraying

1. Always wear protective equipment. Use appropriate cover for head, eyes, nose, mouth and hands. Wear long-sleeved shirts, long pants, and covered footwear.

2. When mixing the poison, always stand upwind and wear protective clothing – especially face protection.

3. Wash contaminated clothes separately.

4. Clean blocked nozzles with a non-abrasive implement. NEVER use your mouth to clean nozzles.

5. Clean containers properly.
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Terminologies

Auricle – claw-like or ear-like appendage

Bulb – a modified underground bud

Calyx – the outer ring of a flower made up of separate or joined sepals; usually green and leaf-like

Capsule – a dry, dehiscent fruit composed of more than one carpel, having many seeds, and usually opening at maturity by valves or teeth

Digitate – a compound structure whose members arise and diverge from the same point; like the fingers of the hand

Elliptical – oval-shaped

Globose – almost spherical

Inflorescence – the arrangement of the flowers on a plant

Ligule – a thin membranous appendage at the junction of the leaf sheath and the blade in grasses

Lanceolate – lance-shaped, several times longer than wide; widest toward the base and tapering at both ends

Off-shoot – a shoot growing from the stem of the mother plant

Orbicular – nearly circular
**Ovate** – egg-shaped, widest toward the base

**Ovoid** – ovate or oval-solid

**Pneumatophore** – a specialized root which grows vertically upwards into the air from roots embedded in the mud

**Raceme** – a more or less conical inflorescence with flowers arising laterally from a common axis, the youngest toward the tip

**Rhizome** – an underground stem with bud and scales

**Serrate** – a toothed margin where the teeth are pointed and project forwards (saw-toothed)

**Spikelet** – a secondary spike of one or more flowers surrounded by bracts

**Sporocarp** – the spore-containing structure of the Marsiliaceae and Salviniaaceae

**Stolon** – a modified above-ground stem creeping and rooting at the nodes

**Tuber** – a short thickened underground stem

**Umbel** – an inflorescence in which a number of divergent flowers arise from the same point
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We are a chartered government corporate entity under the Department of Agriculture. We were created through Executive Order 1061 on 5 November 1985 (as amended) to help develop high-yielding, cost-reducing, and environment-friendly technologies so farmers can produce enough rice for all Filipinos. We accomplish this mission through research and development work in our central and seven branch stations, coordinating with a network that comprises 58 agencies and 70 seed centers strategically located nationwide. To help farmers achieve holistic development, we will pursue the following goals in 2010-2020: attaining and sustaining rice self-sufficiency; reducing poverty and malnutrition; and achieving competitiveness through agricultural science and technology.