

Integrated of Weed Management

Lalu M. Zarwazi

**INDONESIAN CENTER FOR RICE RESEARCH (ICRR)
INDONESIAN AGENCY FOR AGRICULTURE STANDARDIZED INSTRUMENTS (IAASI)
MINISTRY of AGRICULTURE**

Labors on transplanting and weeding



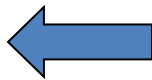
Transplanting with women labor



Weeding with mattock

Hand weeding

Herbicide Weeding





Gasrok







GARUDA PADDY POWER WEEDER

DESIGN & DEVELOPED WITH TNAU - COIMBATORE



What is a weed?



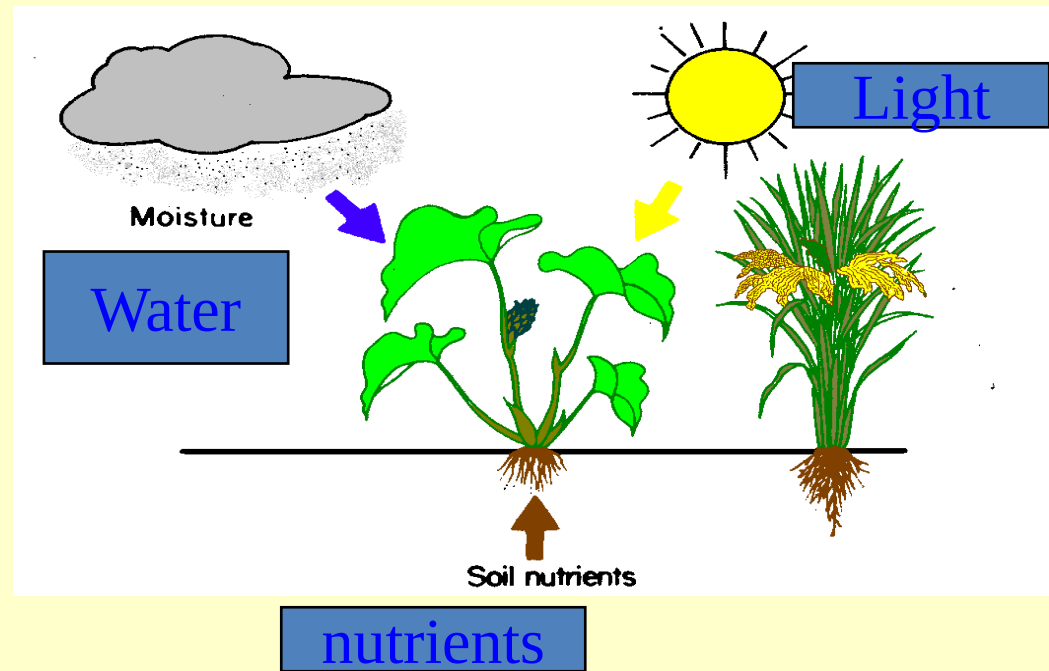


**How many species of weed
on rice?**

**More than 1,800 species
(Moody, 1989)**

Why the weed harmful for farmers?

Weed decrease the yield by competition on light, water, space and nutrient



Disadvantages of weed

- Weed decrease the quality and the quantity of harvested crop due to nutrients, water, light and space of growing competition.
- Complicating the land preparation.
- Decrease of water efficiency.
- Increase of sanitation cost.
- Allelopathy character to detain rice



Free from weed



Weed dominance

The Character of *NOXIOUS WEEDS*

- a) Vegetative rapidly
- b) High adaptation
- c) Fast vegetative production and rapidly on seed
- d) Seeds, bulbs have a long dormancy
- e) High competition
- f) High seed spread

Why do weed gain more success?

- Rapid on production, seed dormancy in the soil.
- Vegetative growing, ex; sedges
- Similarly character with crop



Tiller of *L. chinnensis*



Rice tiller and tiller of *L. chinensis*

3 classification of weed:

- **Grasses**
- **Sedges**
- **Broad leaf**



Grasses

Characters:

- **Stem: node and bladdery segment**

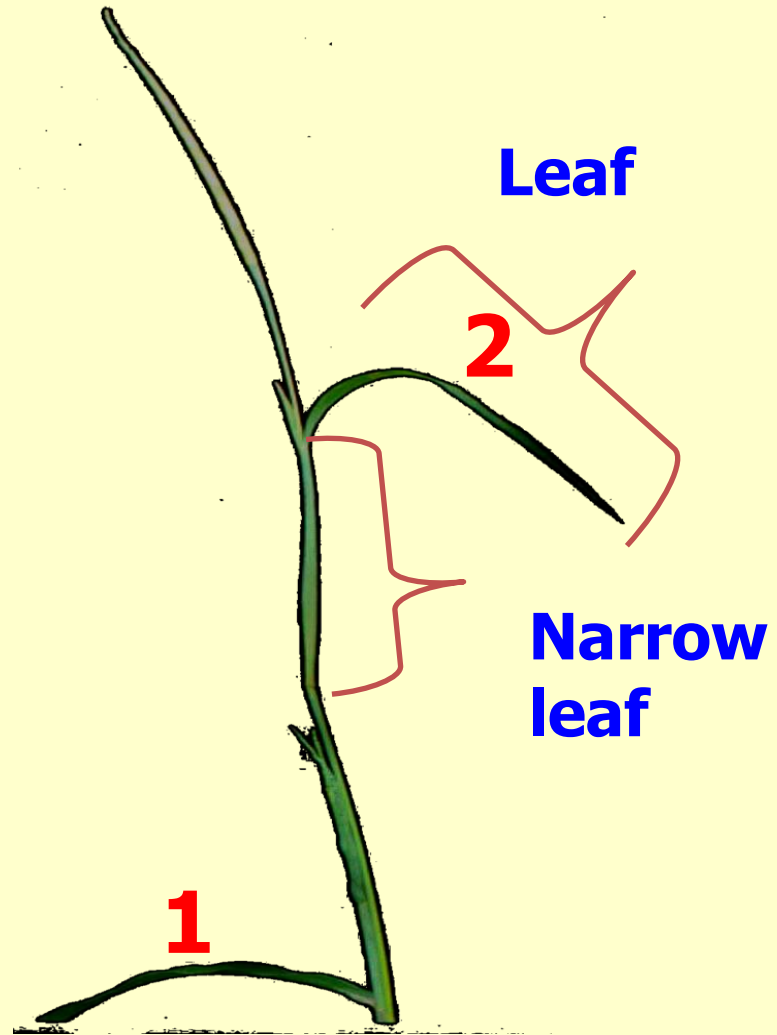
Bladdery
segment



(node)

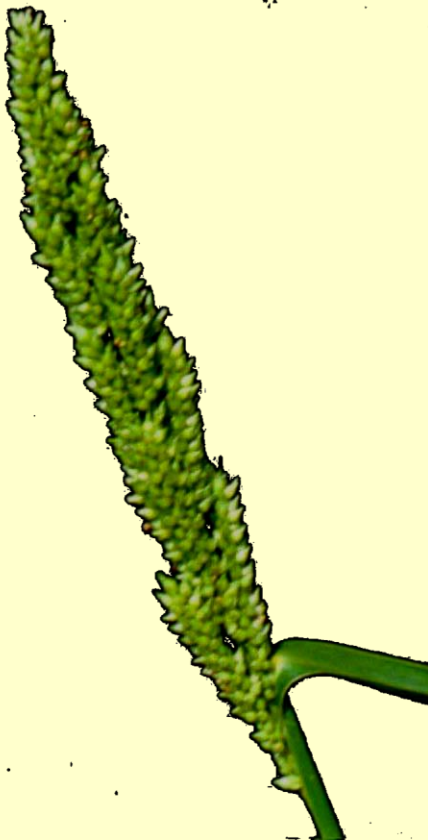
Sedges

- Regularly of leaf growing
- Leaf steam
- Narrow leaf



Grasses

- The flower of grasses





POACEAE (GRAMINEAE)

Echinochloa glabrescens

Munro ex Hook. f.

Syn. ***E. crus-galli*** (auct. Div.) non
(L.) Beauv.



POACEAE (GRAMINEAE)

Leptochloa chinensis (L.) Nees

Syn. ***L. tetraquetra*** Presl;

Poa chinensis L.

Sedges

- Sedges flower





CYPERACEAE

Fimbristylis miliacea (L.) Vahl

Syn. ***F. littoralis*** Gaud.

Broadleaf weeds

Leaf – Broad leaf and more shape



Monokotil

- fibrous



Dikotil

- mesh

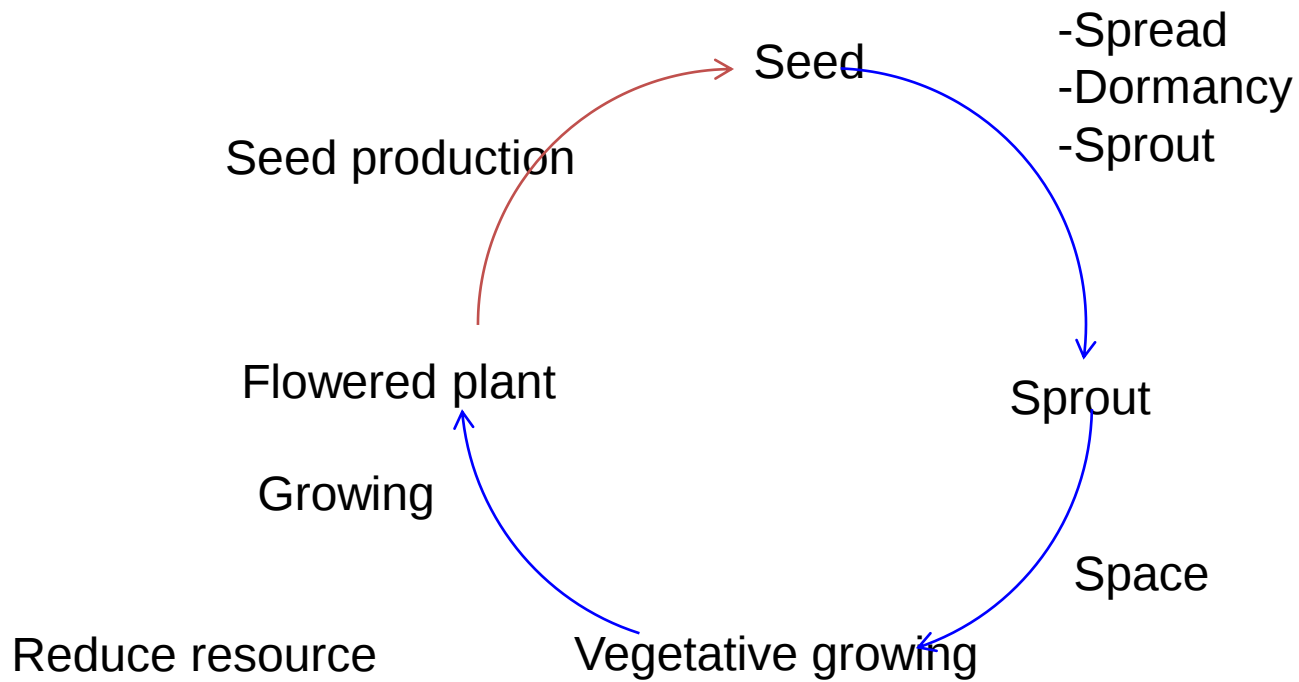


The Live Cycle

Annuals –

Biennials –

Perennials –



Gambar. Annual cycle (Grime, 1979)

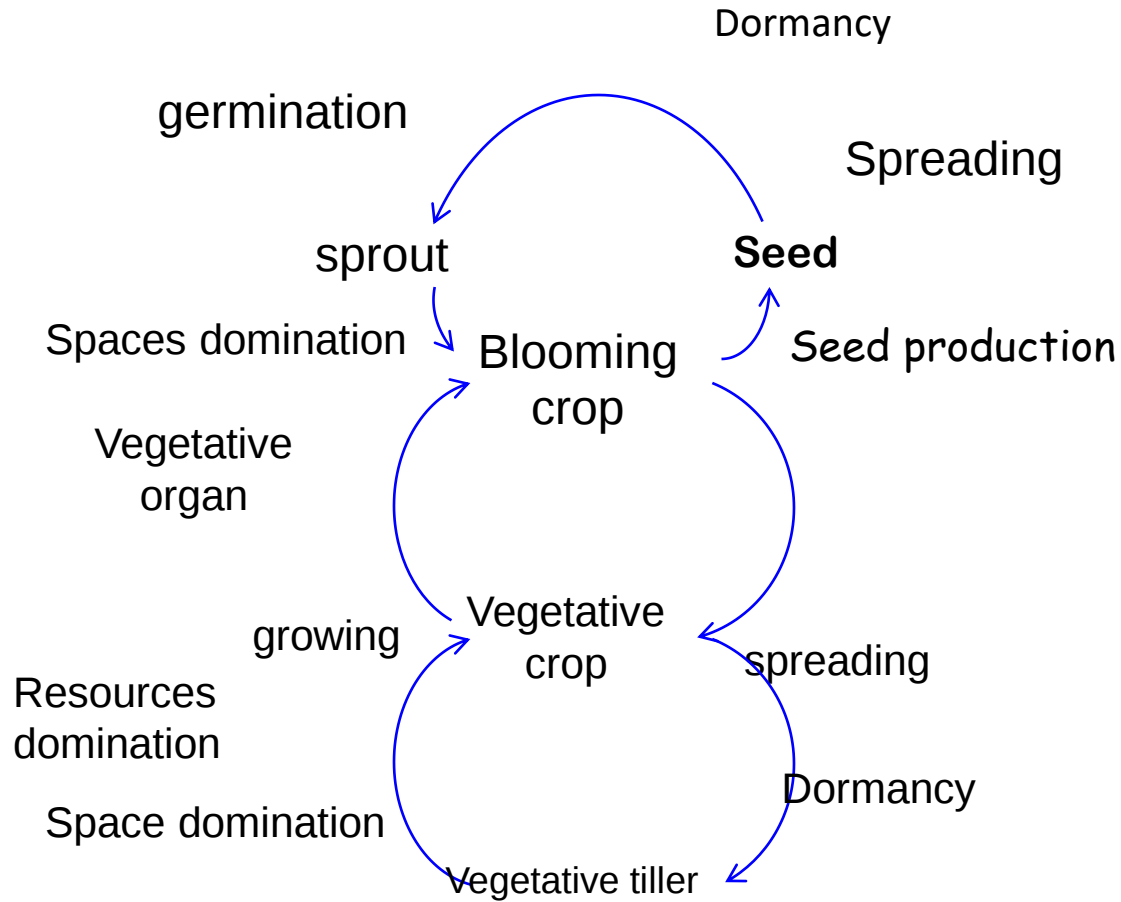


Figure. vegetative perennials weed cycles and vegetative reproduction (Grime,1979)

Perennial weed

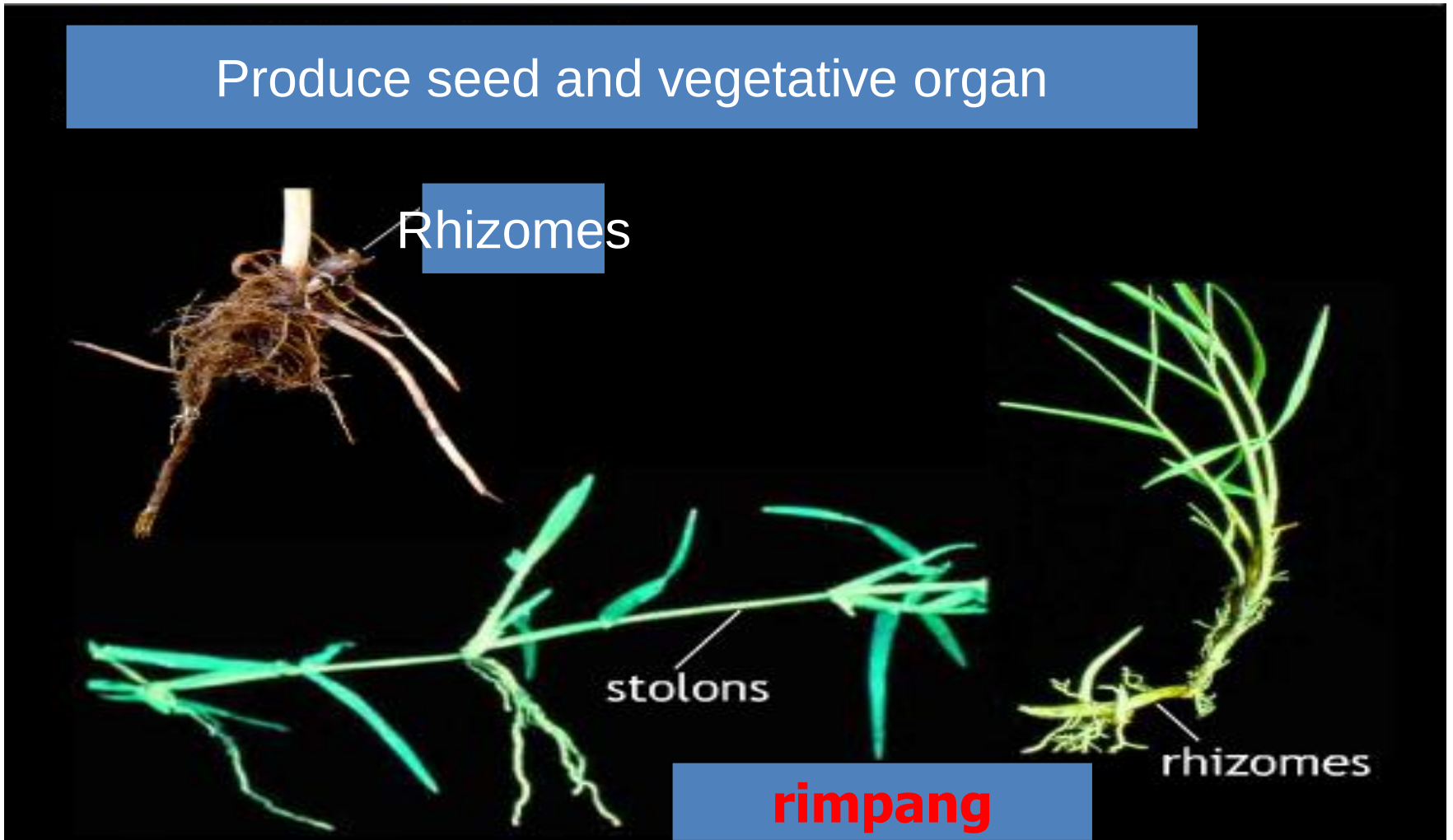
Produce seed and vegetative organ

Rhizomes

stolons

rhizomes

rimpang



**Tabel 1: Common species of irrigated weeds
(Sukamandi site research, 2013)**

No	Spesies	Local name	Family
Grasses weed			
1	<i>Echinochloa</i> ssp.*]	Jajagoan; gagajahan; jawan;	Poaceae/ Gramineae
2	<i>Leptochloa chinensis</i>	Bebontengan; timunan; jampang pi'it leutik	Poaceae/ Gramineae
3	<i>Paspalum distichum</i>	Lamhani; grintingan	Poaceae/ Gramineae
4	<i>Ischaemum rugosum</i>	Jukut randan; bkembem; lalang air	Poaceae/ Gramineae
Sedges weed			
6	<i>Fimbristylis milacea</i>	Babawangan; bulu mata munding; adas-adasan; riwit; sunduk welut; tumbaran	Cyperaceae
7	<i>Cyperus difformis</i>	Jukut pendul; jebungan; ramon brendelan	Cyperaceae
8	<i>Cyperus iria</i>	Rumput menderong; dekeng wangin; rumput jekeng kunyit; umbung	Cyperaceae
9	<i>Scirpus juncoides</i>	Kambo mancik; babawangan; kucaya; wawalingian	Cyperaceae

Tabel 1: (Cont')

No	Spesies	Nama lokal	Family
Broad leaf weed			
10	<i>Monochoria vaginalis</i>	Eceng; eceng padi; eceng lembut; eceng leutik; bengok; wewehan; weweyan	Pontederiaceae
11	<i>Limnocharis flava</i>	Genjer; berek; bengkrok; centongan	Butomaceae
12	<i>Ludwigia octovalvis</i>	Cacabean; lakum air; salah nyowo	Onagraceae
13	<i>Ludwigia adscendens</i>	Pangeor; rubah sila; tapak doro; rubahsila	Onagraceae
14	<i>Salvinia molesra</i>	Kayambang; kiambang	Salviniaceae
15	<i>Marsilea crenata</i>	semanggi	Marsileaceae

*] *Echinochloa crus-galli* (L.) Beauv. ssp. *hispidula* (Retz.) Honda
E. glabrescens Munro ex Hook.f.
E. oryzoides (Ard.) Fritsch
E. colona

Technology Component of Weed Management

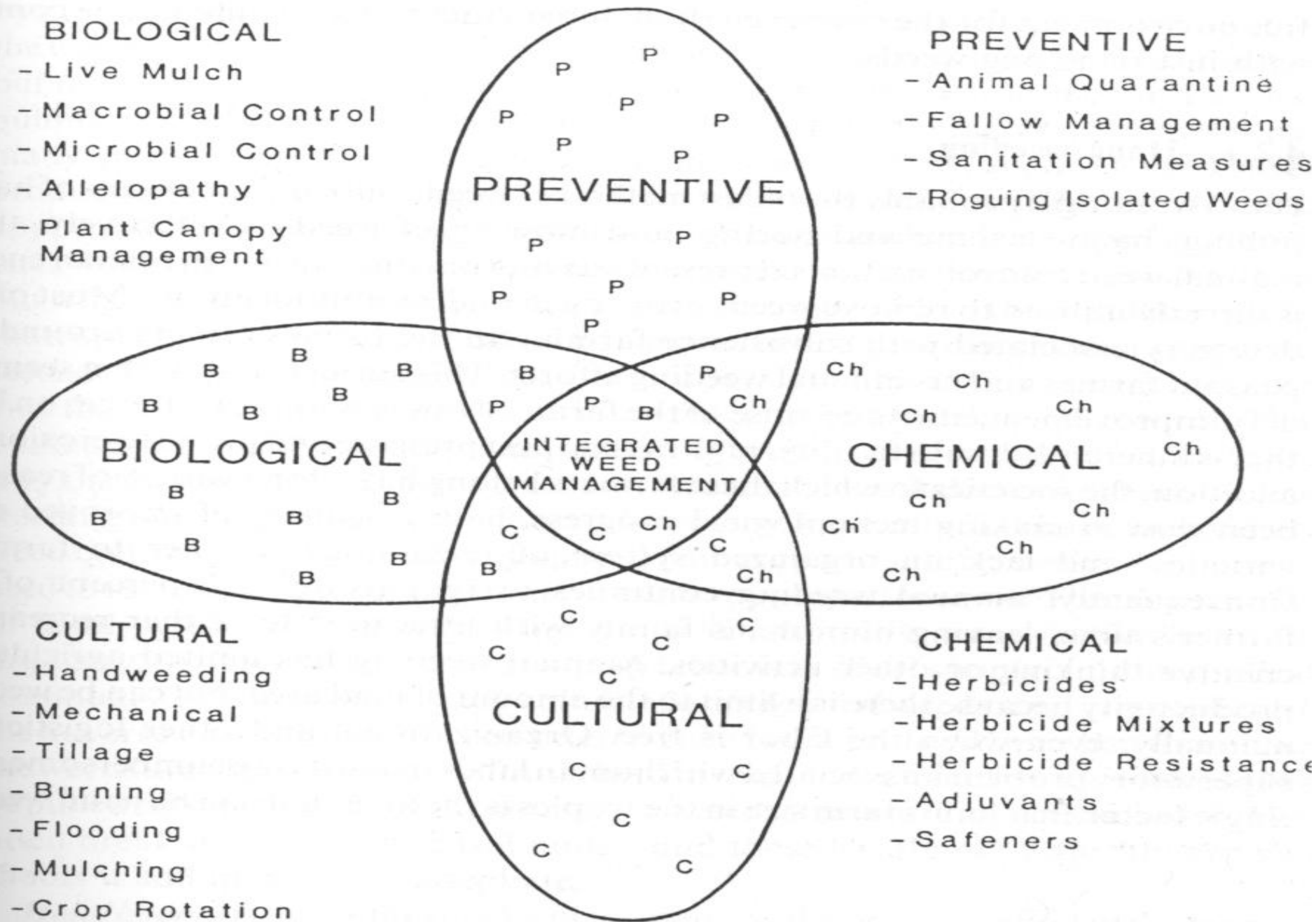


Figure 4.1 Weed management systems and strategies for integration

I. Preventive action

- **The first alien weeds must be prevented**
- **Shut out of weeds is easier than controlling the spread of weeds**

The preventive action of alien weed species to an area:

1. Usage pure seed
2. Manage the mechanism tools and livestock
3. Cleaning the irrigation canal and land.

Pure seed Environment Sanitation



II. Manual Technique

- o Hand weeding or by tools**
- o Some advantages of manual weeding :**
 - 1. Effective on weeding control**
 - 2. Easy practice even weed in difficult space**



III. Mechanical technique

- o Rotary weeder and gasrok. Need to line spacing of crop**
- o Weeding by land preparation, gave more advantages:**
 - 1. Burying weed. Weed would be buried with land preparation activities and its tools.**

III. Mechanical technique (cont.....)

2. Disturbing shoot system.

o Advantages:

- a. More faster than manual technique**
- b. More cheaper than manual technique**

Mechanical weeding “GASROK/ LANDAK”





III. Mechanical technique (cont)

- o **Disadvantages**

1. **Unweeding the weed that growing near the crop**
2. **Ineffective if the land more dry or more wet**
3. **The using of land preparation tools gave negative effect to rice.**

IV. Ecological/cultural technique

Done by:

1. Land Preparation: “*stale seedbed technique*”.

2. Selected cultivars.

- High morphological rice stem, top leaf able to compete by weed.
- The rice varieties that have more tiller compete better
- The long age rice varieties compete better than the short age

IV. Cont.....

3. Varieties

- Allelopathic **varieties**
- **Effect of allelopathic chemical on rice:**
To detain germination of weed.

IV. Cont.....

4. Crop population/ crop abundance

- ❖ Transplanting system with double spacing give more ability to compete with weed.
- ❖ In direct seeded rice, more seed will be able to compete better, which known as “sonor system”

IV. Cont...

5. Fertilizer

- o Nitrogen fertilizer as a first fertilizer give more advantages for weed growing.
- o Proper timing of nitrogen fertilizer application decrease population of weeds.

V. Herbicide

Weed management and control by herbicide application is important thing due to less labor and high cost of weeding.

Knowing herbicide classification and application time, usage and biological effect are important for efficiency

VI. Cont....

A. Application time

1. *pre-planting* herbicide

a. Herbicide for leaf of weeds –

b. Mixed herbicide on land preparation

A. Cont.....

2. *Pre emergence* – Herbicide is used before the weed growing.
3. *Post emergence* – herbicide is used after the weed growing

B. Application techniques

- 1. Herbicide is applied to the leaf of weed**
- 2. Herbicide is applied to the surface of the land. By the first target is weed growing**

C. Biological effect

1. Based on “*mode of action*”

a. Contact herbicide—

Biological effect (cont...)

b. Systemic herbicide

- ✓ Disturbing metabolism
- ✓ Absorbed and translocated. Broad effect to all crop.
- ✓ Effectively for perennial weed
- ✓ Selective and non selective character'
- ✓ The symptoms effect seen on 2 – 4 WAA
- ✓ Ex: 2,4-D, 2,4,5-T, dalapon, Glifosat

C. Cont.....

2. Based on herbicide selectivity

- a. Selected herbicide- herbicide control selected kind of weeds**
- b. Non selected herbicide – herbicide can control all kind of weed.**

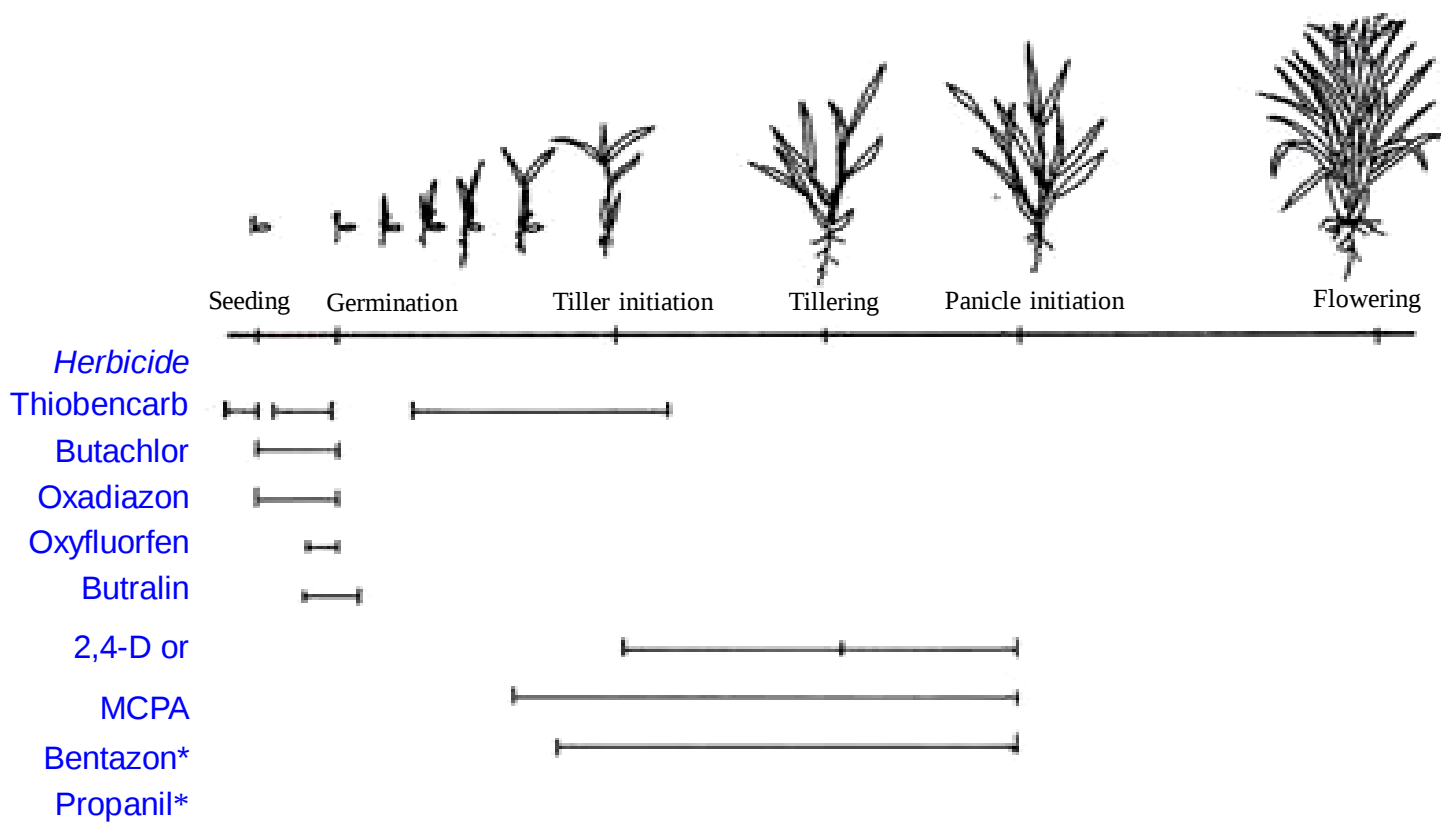


Figure 2. Application time of herbicide base on DSR growing phase on wet land

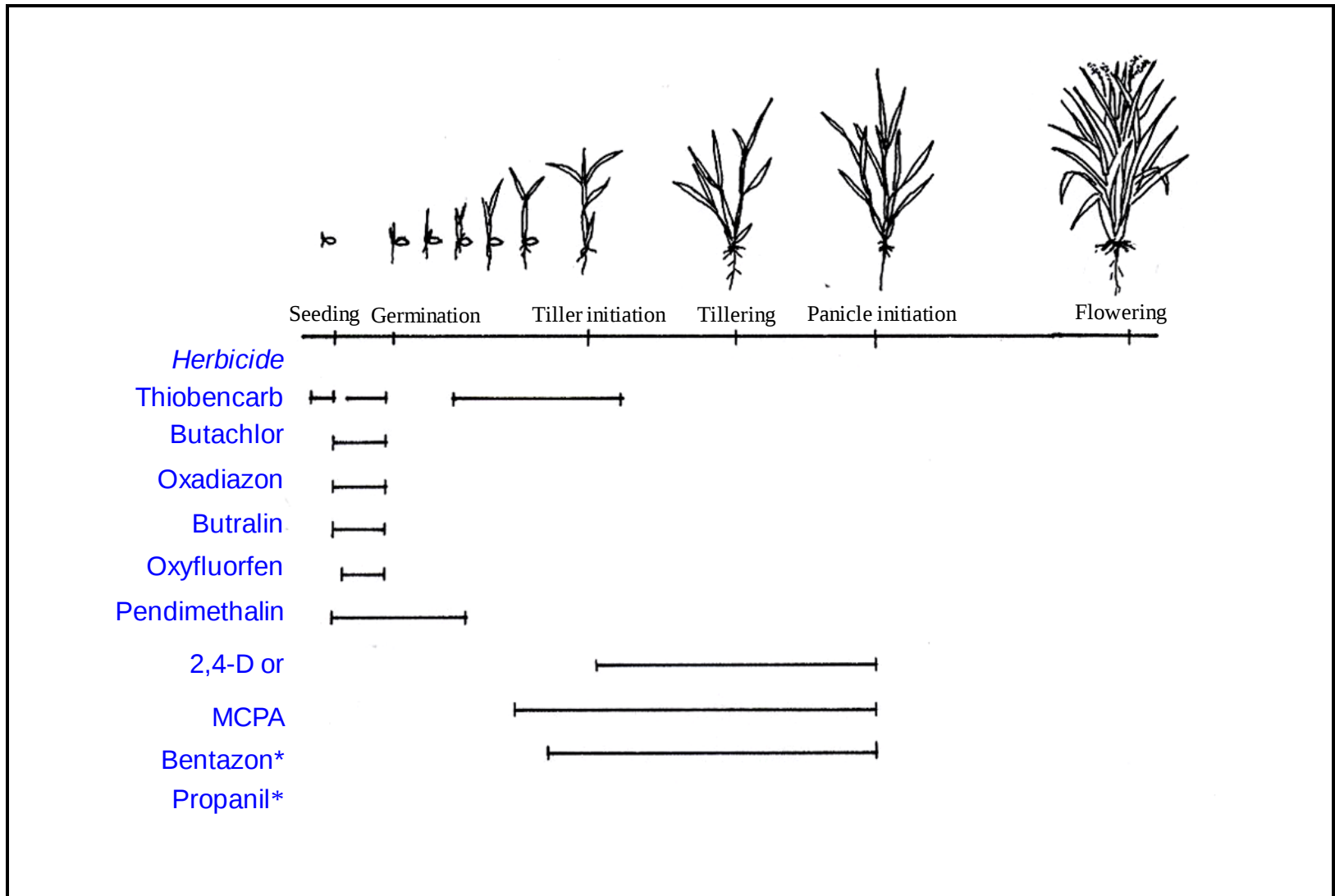


Figure 3. Application time of herbicide based on gogo ranch rain fed lowland rice phase growing on up land

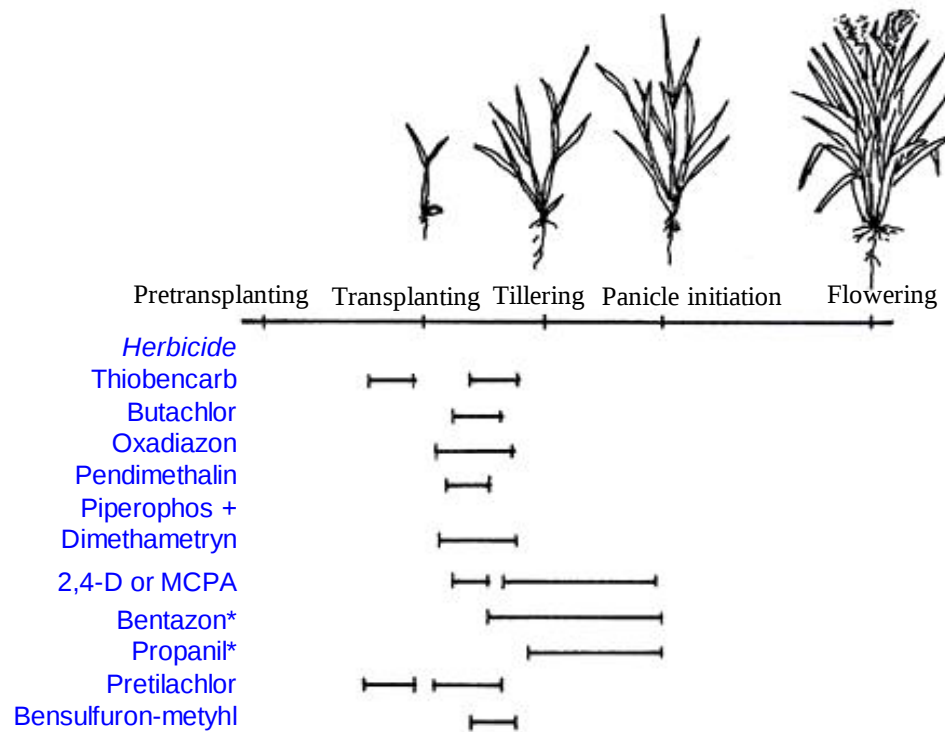
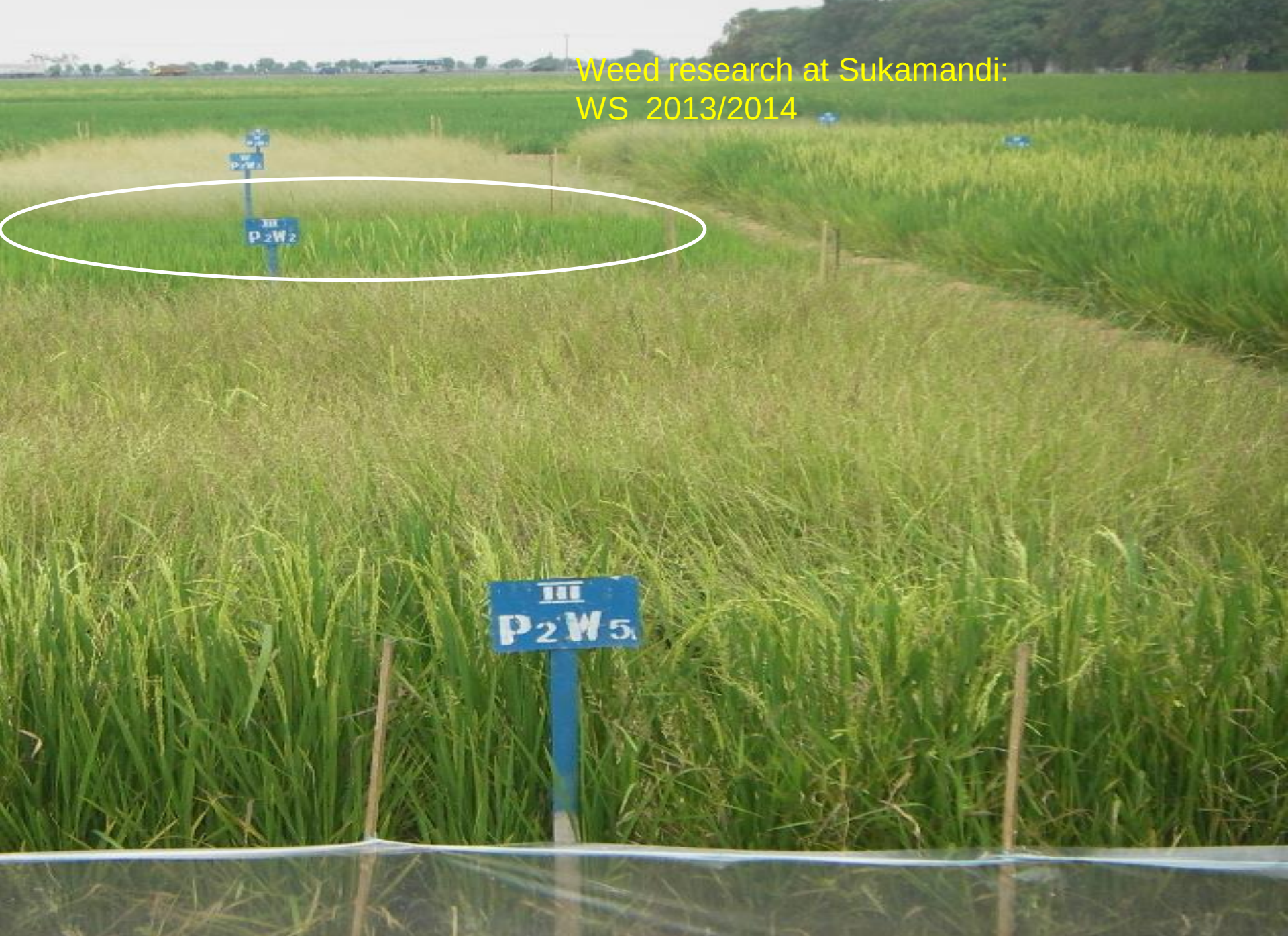
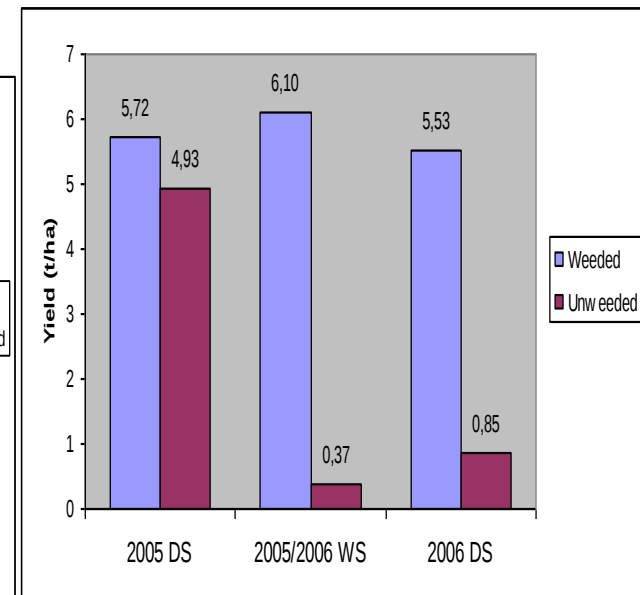
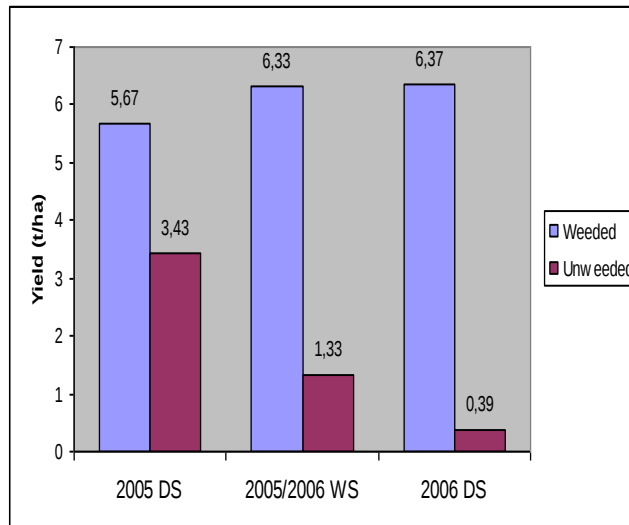
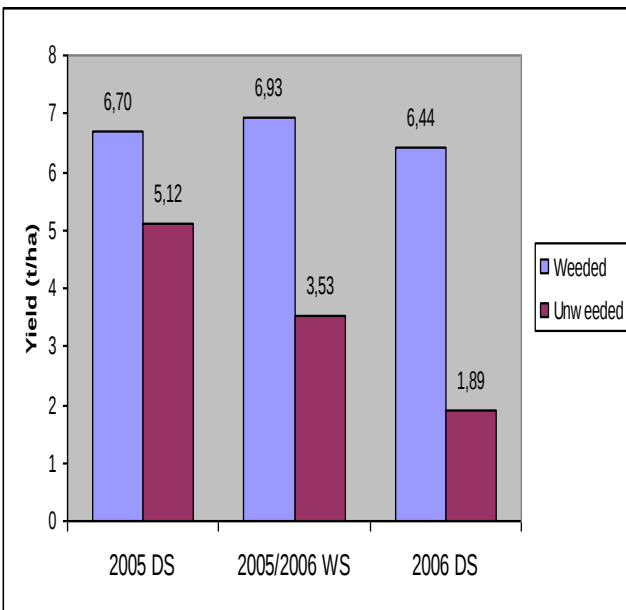


Figure 1. Application time of herbicide based on transplanting rice growing at wet land

Weed research at Sukamandi:
WS 2013/2014



Rice yield (t/ha, moisture.14%) from TPR plot (transplanting), WSR (wet direct seeding), and DSR (dry direct seeding) twice weeding and without weeding for 3 season, Sukamandi Experimental Field. Dry season 2010 and 2011



VI. Biological Technique

- Weed management and controlling using microorganism as an animal or bacterial organism: fungi and bacterial.
- Decrease of weed population until unharmed number reached by ecological and economical

- The advantages:
 1. Highly selective and decreasing of new insect
 2. The natural enemy addition from natural resource
 3. Spread and reproduce well
 4. Unresistance weed – slowly
 5. Self control

- The weakness

1. Biological agent did not differ between crop and weed
2. Un certain of agent evolution – un direct effect
3. Slow character and unguaranteed result
4. Could not control all weed at a place

GRAZING



Thank you