Rice Planting

Agronomy Team

Indonesian Center for Agricultural Training (ICAT)
Lembang

After this session participants
Will able to explain about the important of rice population, plant spacing and the planting method

Rice yield = Number of rice plant / hectares x grain yield/ plant

https://bit.ly/riceplt

The Importance of Plant Population

Internal Factor

Genetic

Individual plant

External Factor

- Climate
  - Precipitation
  - Temperature
  - Humididty
  - Solar radiation
  - Wind velocity
- Soil
- Physiographic

GENETIC FACTOR

- Genes affect the characteristics and traits of living things which in plants affect body shape, flower color, and fruit taste.
- Genes also determine the metabolic ability so that it greatly affects the growth and development of the plant
- High yield ability; early maturity; resistance to lodging, drought, flood and salinity tolerance; tolerance to insect pest and disease; chemical composition of grains

Temperature

Precipitation/ rain fall

Sun light

Humidity

Wind velocity

Plant population and row spacing determine the onset of competition between plants for resources and different biomass production. Spacing arrangements can avoid overlapping between plant crowns, provide space for root development and plant crowns and increase the efficiency of seed use

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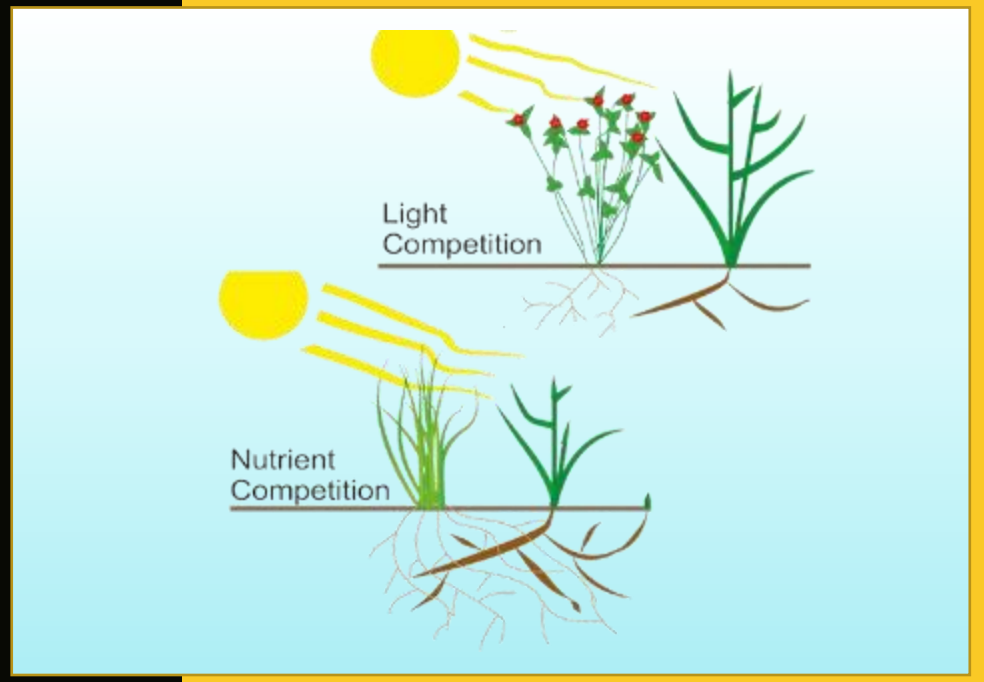
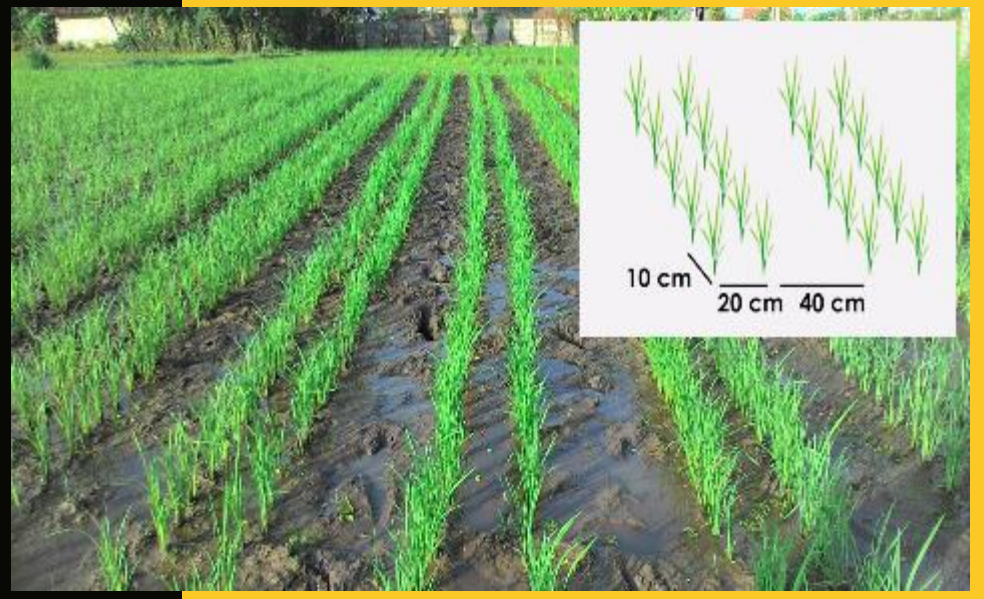
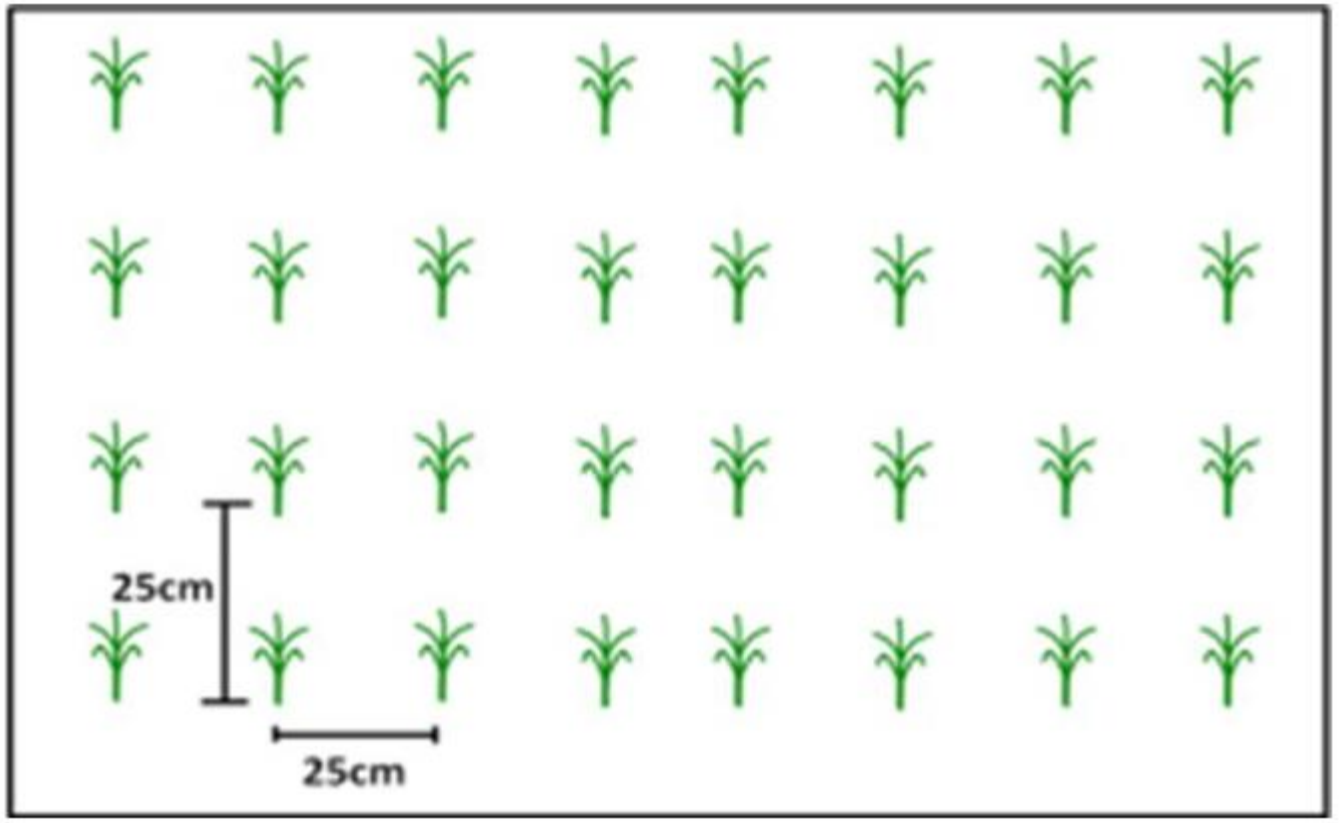




Optimum economic populations vs. optimum agronomic populations



20 x 20 cm = 250.000 clumps / hectares

22,5 x 22,5 cm = 196.078 clumps / hectares

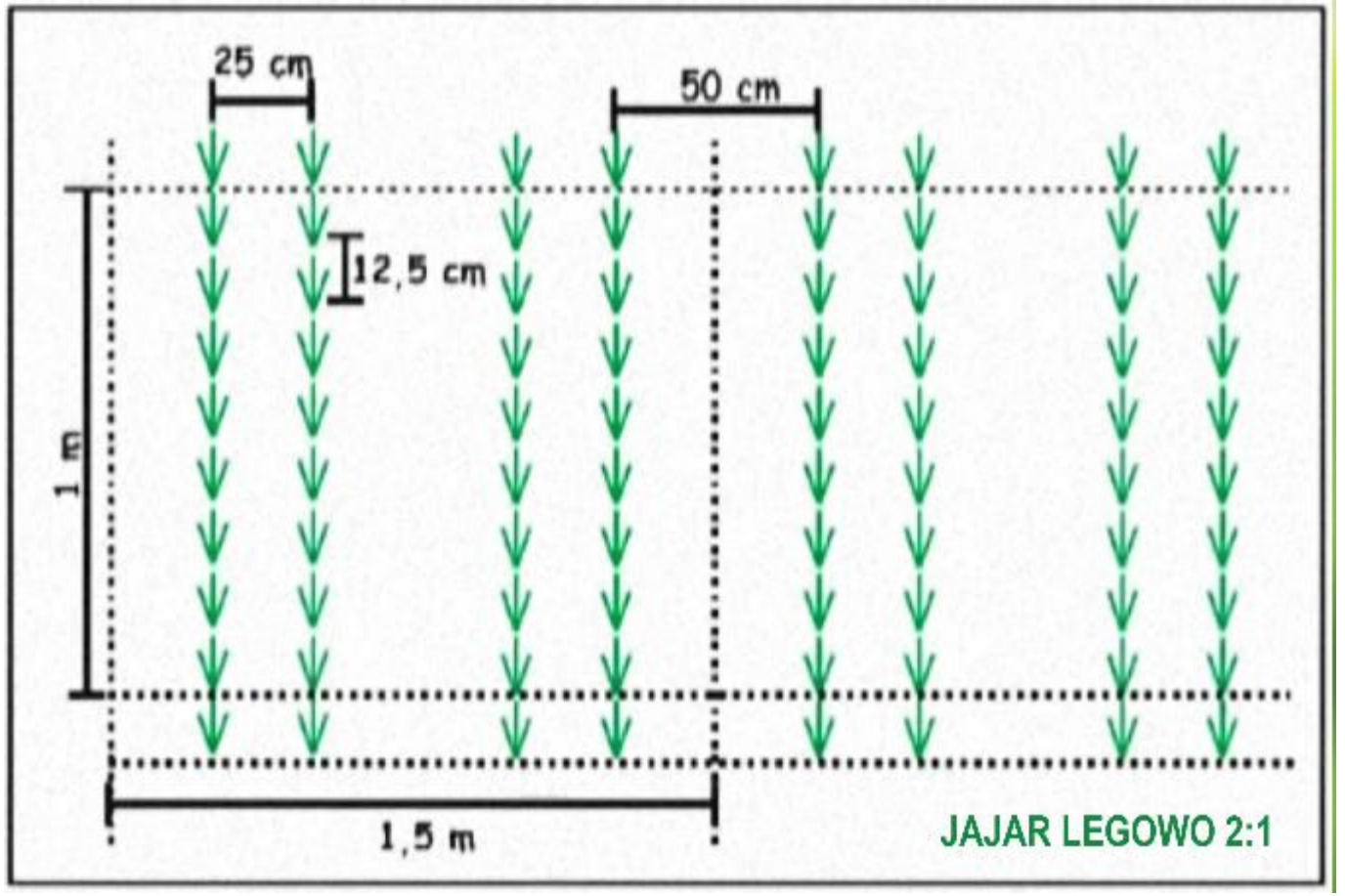
25 x 25 cm = 160.000 clumps / hectares

27 x 27 cm = 137.174 clumps / hectares

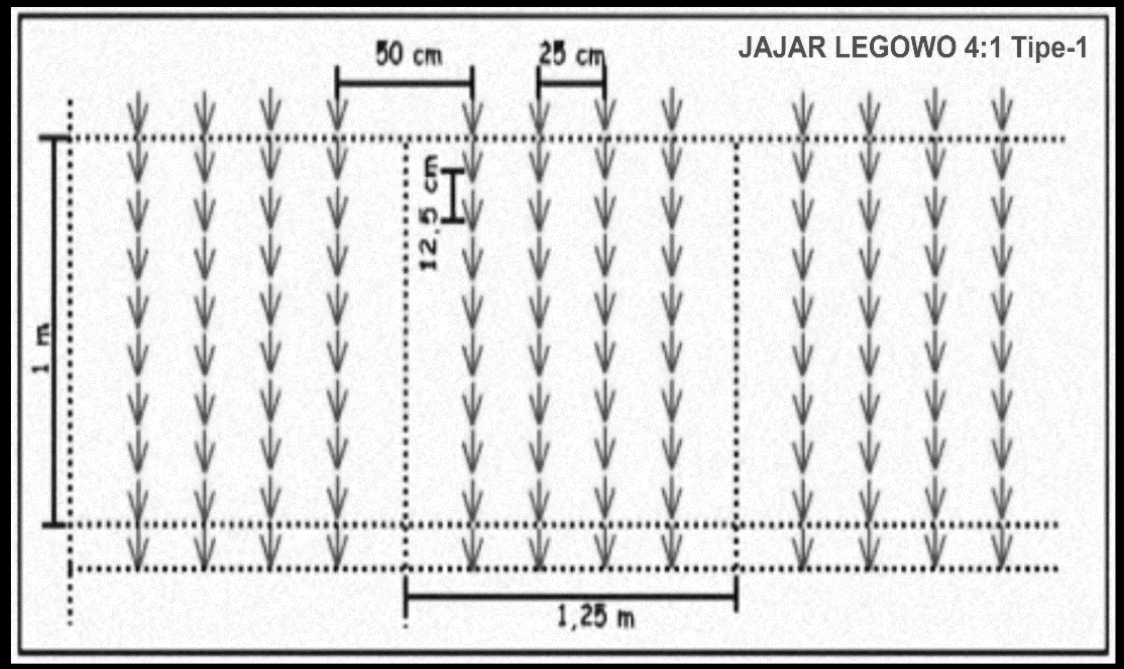
$$Population = \frac{10.000\ m^2}{\text{Plant Spacing } in\ m^2}$$

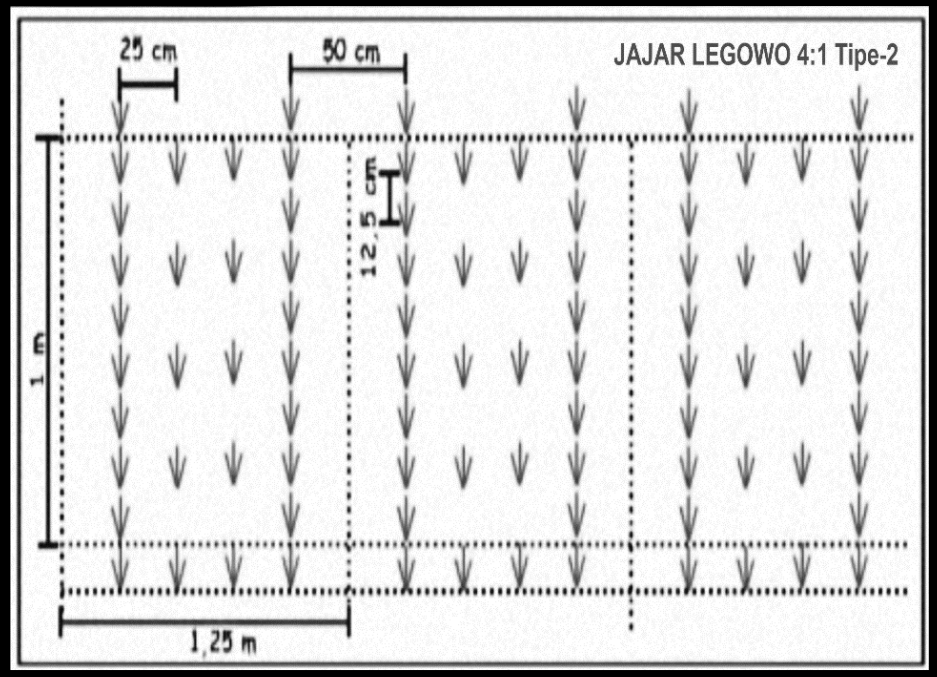
Square / Tile system

Jajar legowo is a technology engineer to get a plant population of more than 160,000 per hectare. The application of Jajar Legowo can increase the crop population, and also increase the circulation of sunlight and air around the plant so that plants can have a better photosynthesis.



Jajar Legowo System





Method	Type / spacing	Population / Ha	Precentage
Square / Tile	25 x 25 cm	**160.000**	
Jajar Legowo	2 : 1	213,300	33.31%
Jajar Legowo	4 : 1 Type 1	256,000	60 %
Jajar Legowo	4 : 1 Type 2	192,712	20.44 %

Setting the spacing between square and Jajar legowo to improve the productivity of rice plants must still pay attention to other important factors that determine rice yields, such as adaptive varieties and soil fertility

PLANTING METHOD

TRANSPLANTING

- Transplanting can resist the effect of flooding in lowland areas.
- Transplanting rice also gives the crop a considerable advantage over weeds.
- Transplanting also helps save water and seeds and facilitates weeding and other crop management interventions.

Transplanting

Nursery

There are two types of nurseries usually used in transplanting, wet nursery and dry nursery.

Wet Nursery

Dry Nursery

Wet Nursery Preparation

- The nursery area for 1 hectare of land is 400 m^2 (4% of the planted area)
- Add 2 kg of organic matter such as compost
- Nurseries are carried out on the same land or adjacent to the plots of rice fields to be planted.
- Seeds needed to be planted on an area of 1 ha are 20-25 Kg.
- Seeds that want to be sown before must be soaked with water about 24 hours, and germinated in a bucket or other container.
- The land in the nursery must also be watery and muddy. Apply 2 kg of organic matter such as compost, urea and TSP fertilizer to the nursery with a dose of 10 g per 1 m^2 each.

Dry Nursery

Advantages of Dry Seed System

- Nurseries can be placed in a place that is easily observed (home yard), making it easier to care for and more controlled seeds from pests and diseases.
- Nurseries do not require a large area compared to wet seedlings in paddy fields which require at least 400 m^2 for an area of 1 ha of lowland rice cultivation.
- Ex-nursery land does not affect the quality of planting land (in wet/conventional nurseries, the growth of rice plants planted in former nurseries becomes worse)
- Practical in removing seeds, seeds that have grown and are ready to be transferred to the planting area are simply rolled up, do not need to be removed.
- Reducing the cost of removing seeds which are generally quite high
- Plant growth from dry seedlings is faster and less stressful.
- This system can be done first before cultivating the soil (abducted seedlings) so that it can speed up the planting time.

DRY NURSERY PREPARATION

Seed Treatment

- Soak the seeds for about 24 hours
- Then ripened for 2 x 24 hours, the aim is to eliminate the dormancy process, marked by the appearance of small roots on the seeds indicating ready for sowing
- Before sowing the seeds are treated with insecticides/fungicides

Preparation of Planting Media

- Use plastic as a base for planting media. The plastic is completely intact / not defective because if it leaks the water will run out quickly.
- Spread the plastic covering the size of the nursery 1 m X 5 m or as needed.
- Prepare seedling media in the form of a mixture of soil and compost that has been sifted in a ratio of 2:1 or 1:1 or 4:1 (depending on the type of soil).
- Then spread it with a thickness of 1.5 cm

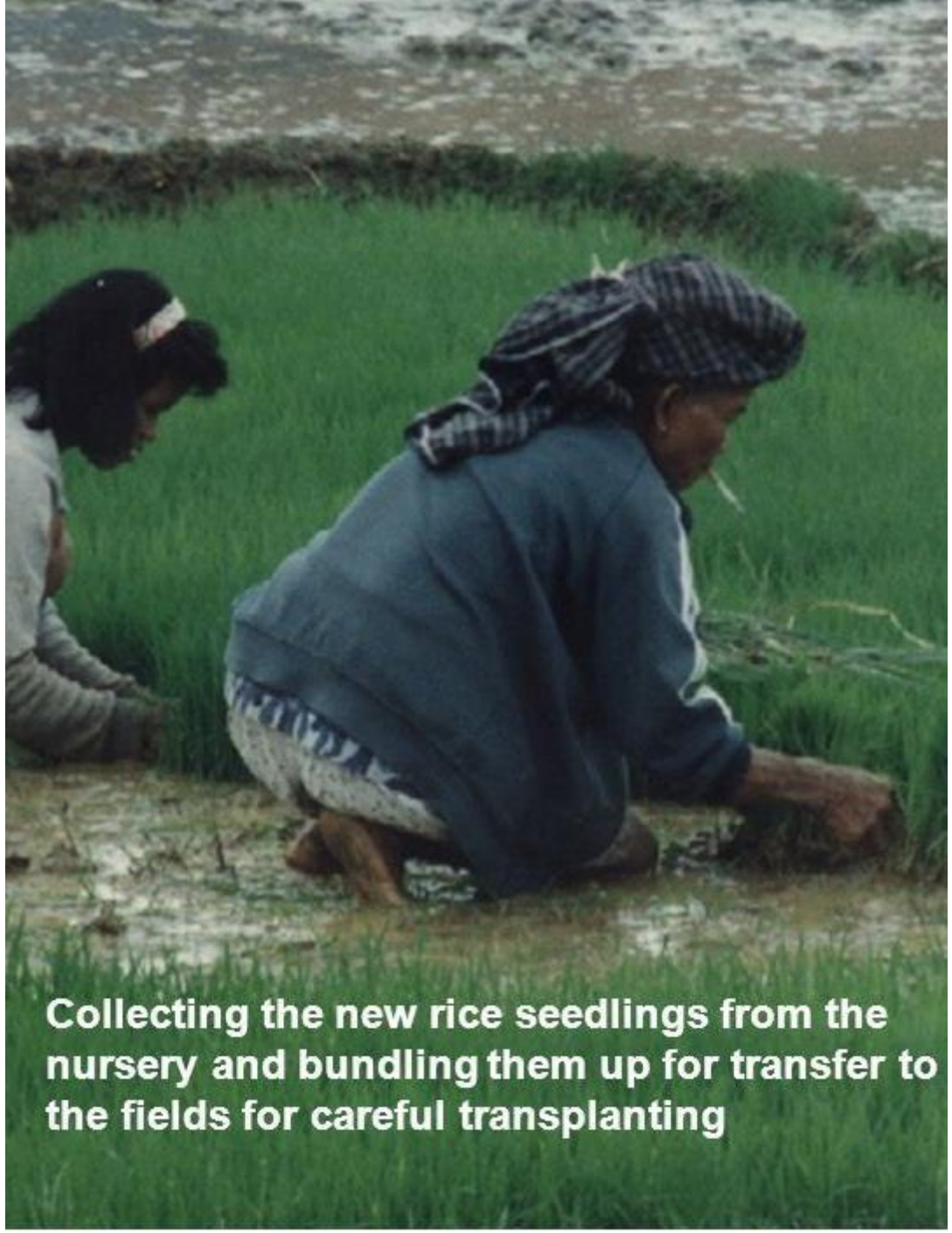
DRY NURSERY PREPERATION

Spreading the seeds

- After the planting medium is prepared, the seeds are spread evenly and covered again with 0.5 cm thick planting media.
- Seeds are spread with a density of 0.6 – 0.7 Kg/m2 of media.
- Cover with tarpaulin or straw, then flush with enough water with optimal humidity.

Nursery Maintenance

- After 3 days of sowing the seeds, open the tarpaulin/straw cover and leave it exposed to light (usually the seeds have grown about 2 cm).
- Furthermore, watering is done once a day in the afternoon (looking at the weather conditions) using hands prayer.
- If the growth of seedlings (yellowish leaves), it should be sprayed with fungicides and given sufficient N fertilizer.
- Seedlings are ready to be planted at the age of 10-14 days.



Transfer of Seedling to the field

- Seedlings that are ready to be planted are removed/harvested by cutting a bed of 50 cm wide, then the seeds are rolled up (such as rolling a carpet) and can be transported directly to the fields.
- After the land is ready for planting, tear or break the seedbed according to the required size.
- Planting seeds can be done manually or can use a rice planter.
- It is recommended to plant carefully and try not to face the roots up, because with the roots facing up, the seedlings need more energy to return to their normal position.

TRANSPLANTING

MANUAL

VS

MACHINE

MANUAL TRANSPLANTING

How to Transplant Rice Manually

- Pull out the seedlings at an average of 15 to 30 days after seeding (DAS) from nurseries and transport them to the main field.
- In a modified mat nursery, seedlings are ready for transplanting at 15-20 DAS and seedling mats are transported to the main field.
- Transplant the seedlings soon after pulling them from the nursery in puddled, leveled field (any delay will lead to slow revival and even death of some seedlings).

Limitations:

- Transplanting is tedious and time-consuming
- Difficult to get enough labour
- Low plant density with contract transplanting on an area basis lowers yields.
- Risk, in rainfed areas, that seedlings may get too old before the rain starts.

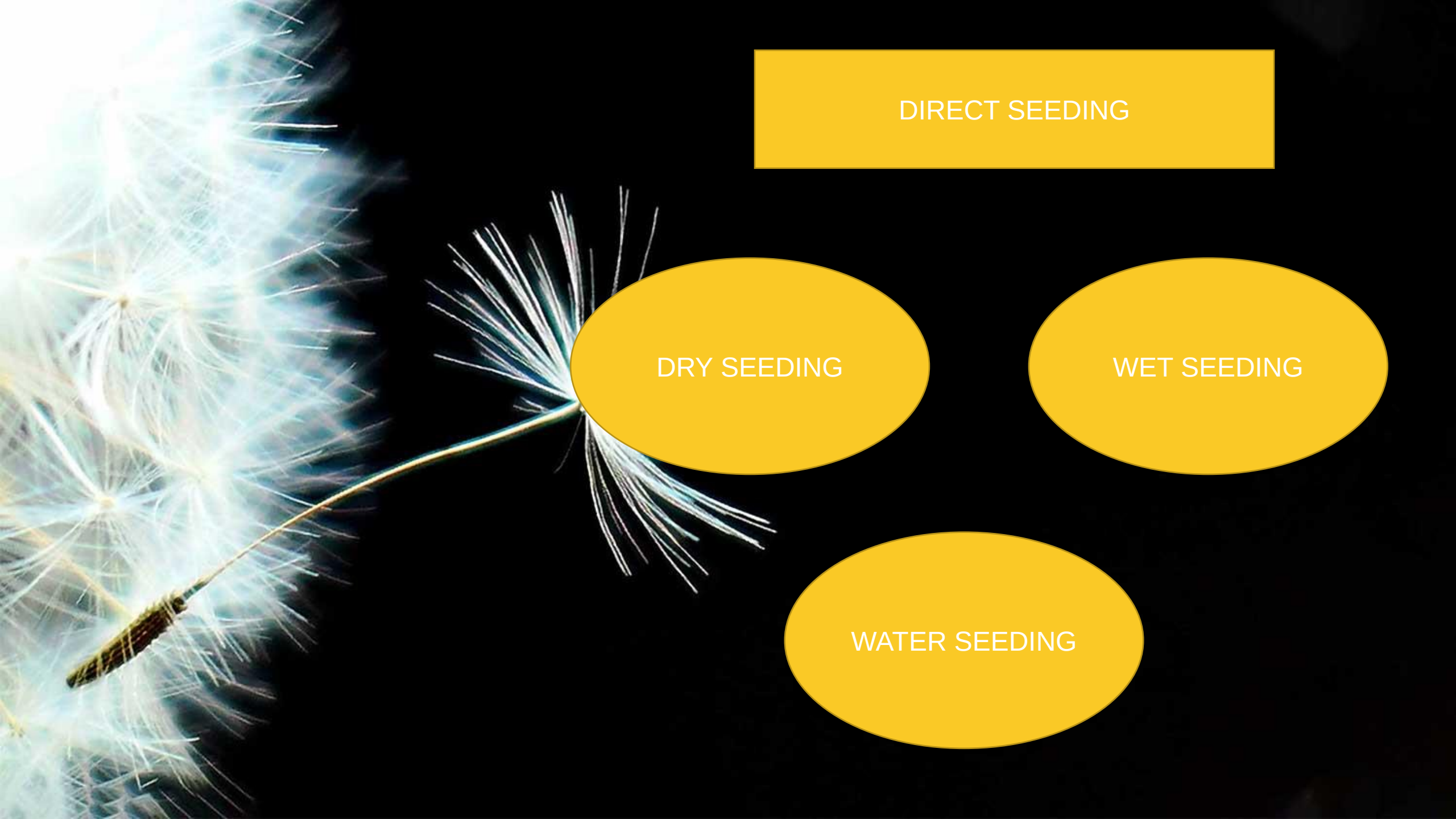
MACHINE TRANSPLANTING

How to transplant rice using Machine?

- Ensure that fields are well-puddled and leveled.
- Drain fields and allow mud to settle for 1-2 days after the final puddling.
- The subsurface soil layers need to be hard enough to support the transplanting machine.
- The soil is ready when a small “V” mark made in the puddled soil with a stick holds its shape. At this moisture level, the soil can hold the seedlings upright.
- Soil should not be so dry that it sticks to and interferes with planting parts or wheels of the transplanter.
- Load the seedling mats on the machine and transplant the seedlings at the selected machine setting.

Advantages

- Machine transplanting requires considerably less time and labor than manual transplanting (1-2 hectare/person/day versus 0.07 hectare/person/day).
- Fast and efficient (1-2 hectare/day), and ensures timely planting.
- Reduces stress, drudgery, and health risks.
- Ensures uniform spacing and plant density.
- Seedlings recover fast, tiller vigorously, and mature uniformly.

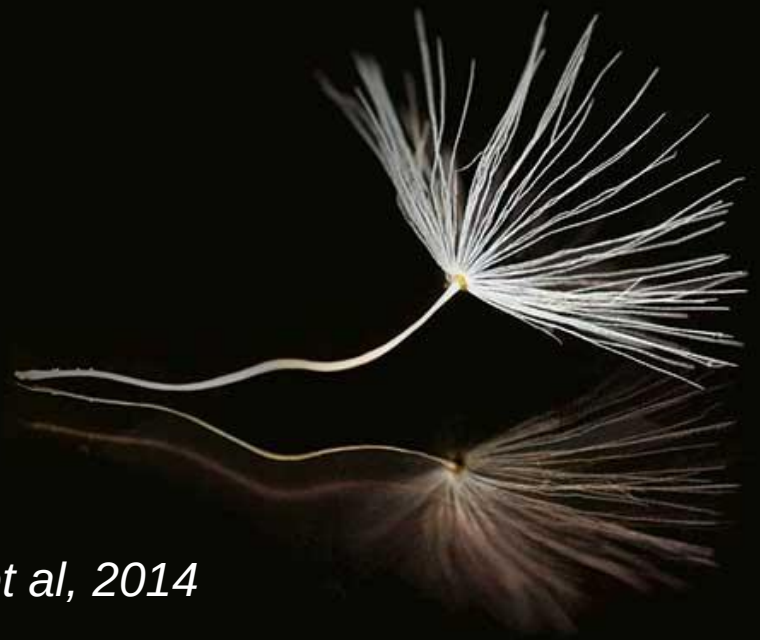

DIRECT SEEDING
DRY SEEDING
WET SEEDING
WATER SEEDING

Direct seeding system	Seed condition	Seedbed condition and environment	Seeding pattern	Where practiced
Dry direct-seeded	Dry	Dry soil, mostly aerobic	Broadcasting; drilling or sowing in rows	Mostly in rainfed areas and some in irrigated areas with precise water control
Wet direct-seeded	Pre-germinated	Puddled soil, may be aerobic or anaerobic	Various	Mostly in irrigated areas with good drainage
Water seeding	Dry or pre-germinated	Standing water, mostly anaerobic	Broadcasting on standing water	In irrigated areas with good land leveling and in areas with red rice problem

Row seeding (drum seeding)

Broadcasting seeding

Dry direct seeding



Liu et al, 2014


For Your
Information

Hazton Technology

Hazton cultivation technology for rice is a cultivation technology using old seeds 25-30 days after sowing with a number of seeds of 20-30 stems/planting hole

The varieties used in the Hazton system should have few tillers, long and thick panicles, such as Inpari 6 and Inpari 23 Bantul.

For areas that are endemic to pests or diseases, it is necessary to select varieties with resistance to the pest in question.

1

2

3

4

The results of the Hazton technology trials resulted various productivity, ranging from 4-9 tonnes/ha

Hazton cultivation has advantages , this technology is more resistant to golden snail pests and *Gryllotalpa* spp. /orong orong.

However, because the high number of plants per clump can cause competition for absorption of nutrients and humidity, the microclimate around the canopy becomes higher, making it susceptible to pest and disease attacks (Blast, HDB, WBC).

Salibu is a variation from ratoon rice technique

SALIBU technology (rice *ratooning* modification) is an innovation in rice farming technology allowing ratoon crops to be harvested up to 3–4 times annually with a yield equivalent to that of the main crop.

This technology is already well known by local farmers, who realize that with it, they need only sow and transplant once, and can then harvest repeatedly.

Accordingly, it includes scope to reduce the time taken to cultivate paddies and the usage of water, seed and labor.

Let it for 7-10 days

Cut the rice stalk for
3- 5 cm

7 days after cut

The main requirements that must be met in the cultivation of salibu rice include: (a) not an endemic area for Plant Pest Organisms (OPT), especially tungro disease, stem rot, bacterial leaf blight, golden snail, etc., (b) availability of water is easily conditioned and enough, (c) long periods of inundation and drought do not occur, (d) land conditions with good drainage, (d) and groundwater conditions two weeks before and after harvest preferably at field capacity (moist).


THANK YOU