Rice Production System in Japan

NARO Agricultural Research Center

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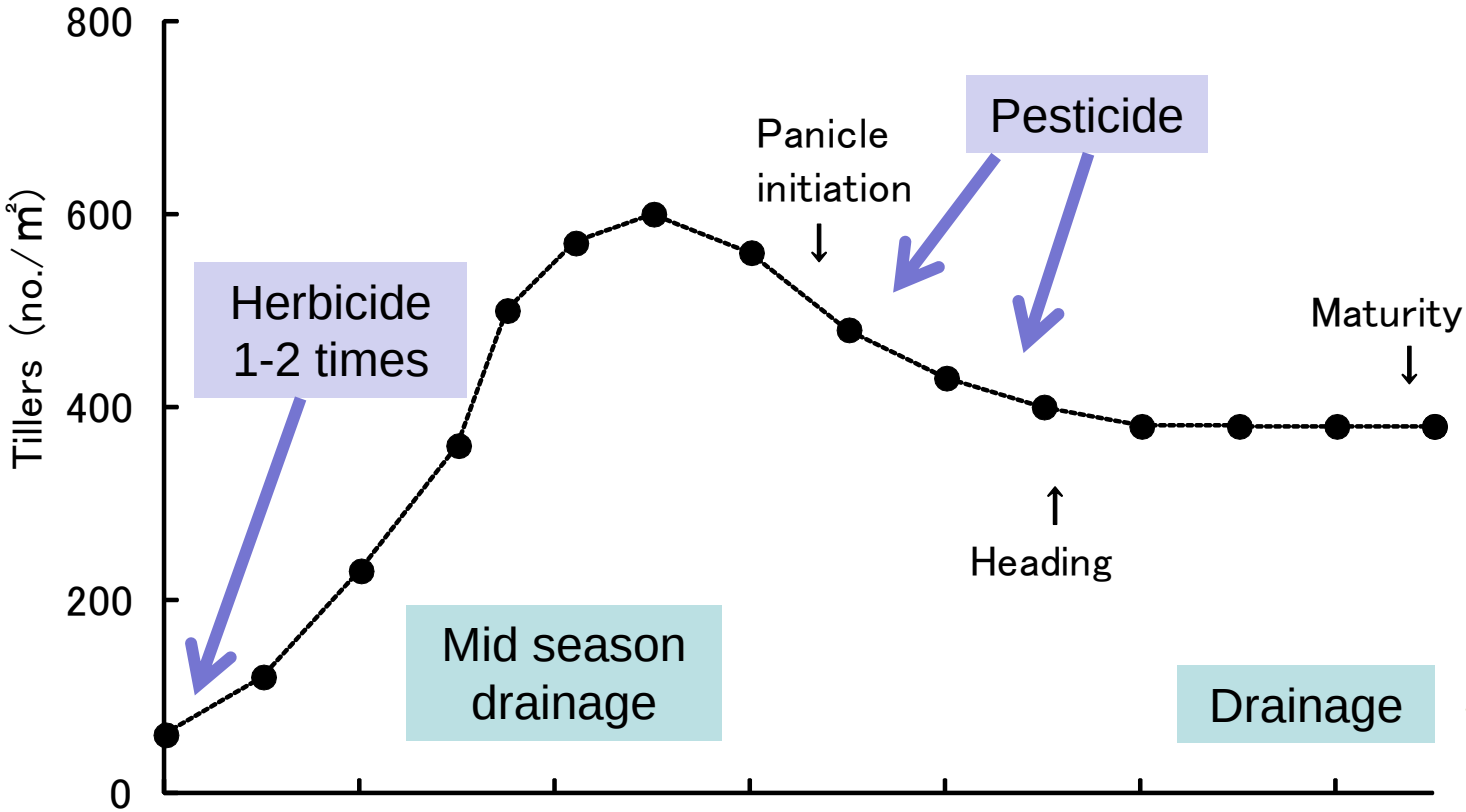
Situation of rice production

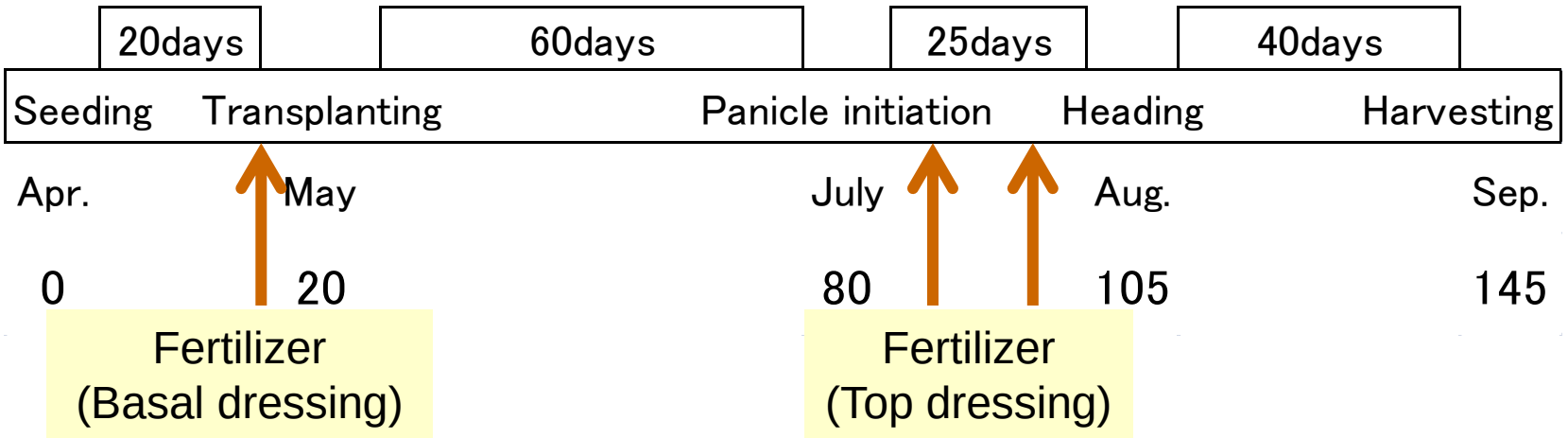
- One cropping season in a year.
- 98% of cultivated area are transplanted.
- Almost all paddy fields are irrigated.
- Machinery have been widespread.
  (Tractor, Transplanter, Harvester, etc.)
- The amount of applied chemical fertilizer and pesticide are decreasing recently.
- Average of cultivated area: 2ha/farmer
- National average yield: 5.3t/ha (brown rice)

Contents

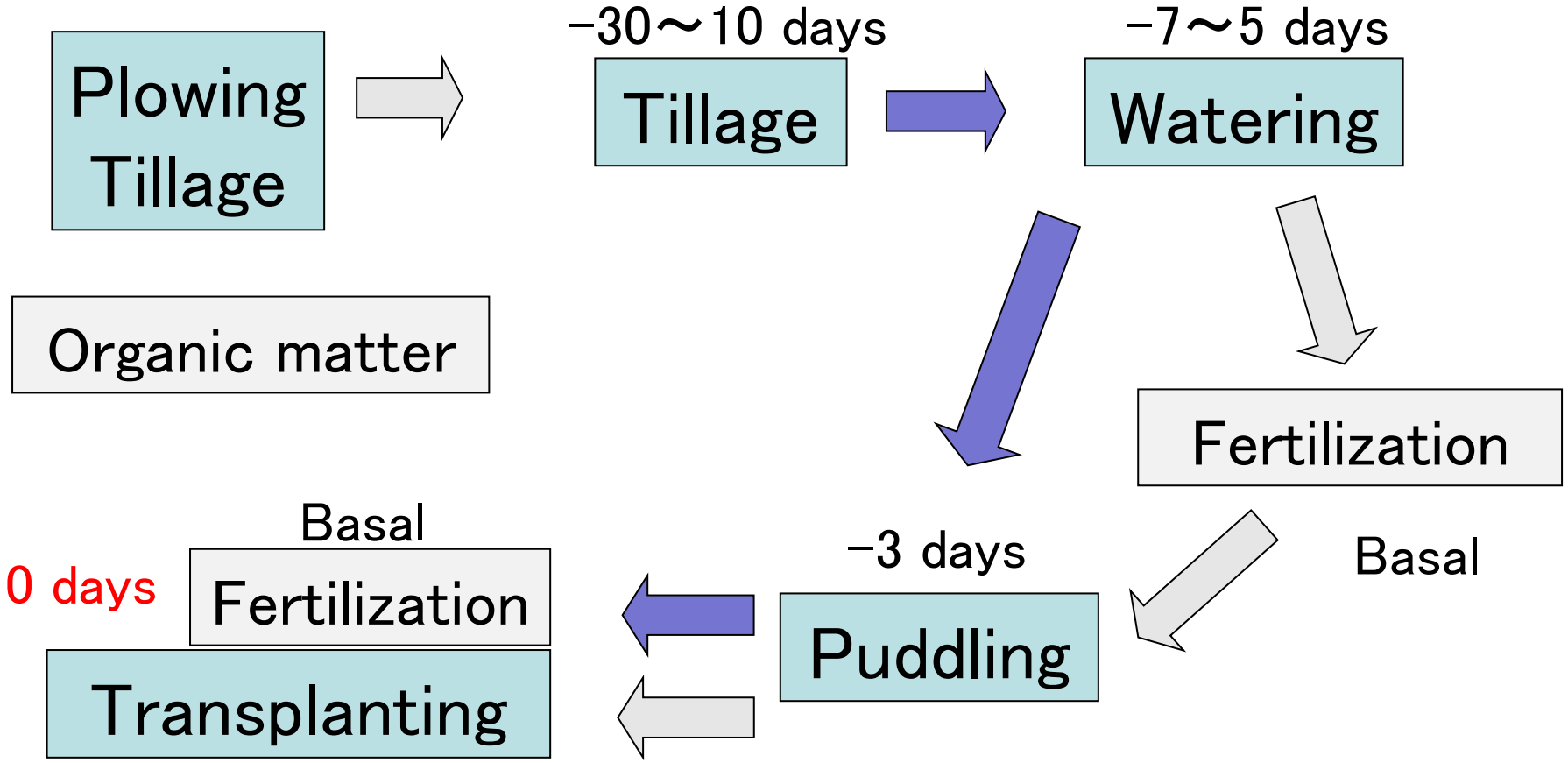
1. Land preparation
2. Seedling nursery
3. Transplanting
4. Water management
5. Fertilizer application
6. Herbicide and Pesticide
7. Harvesting and post harvest procedure

Typical management of rice production





1. Land preparation



The times of tillage change depending on field conditions.
Specific transplanter can operate fertilization and transplanting.

1. Land preparation

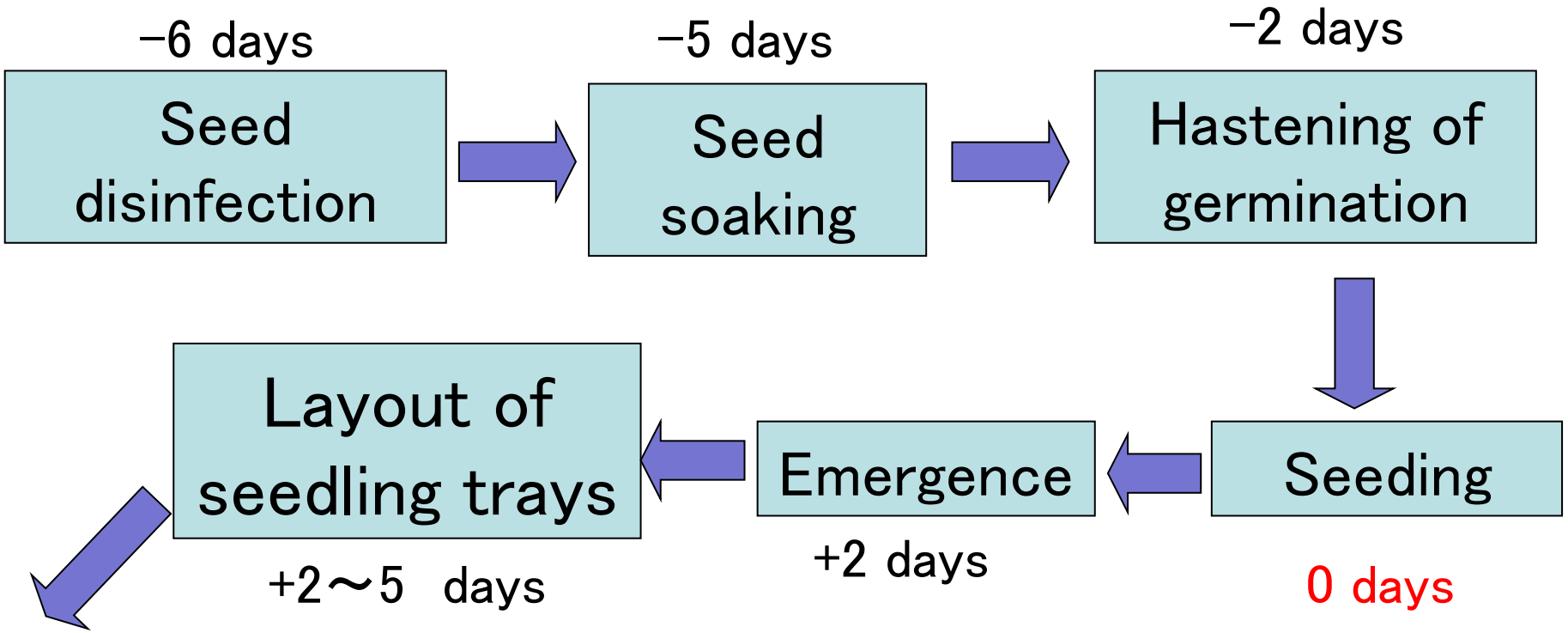
Movie
Plowing, Tillage

Plowing

Puddling

Tillage

2. Seedling nursery



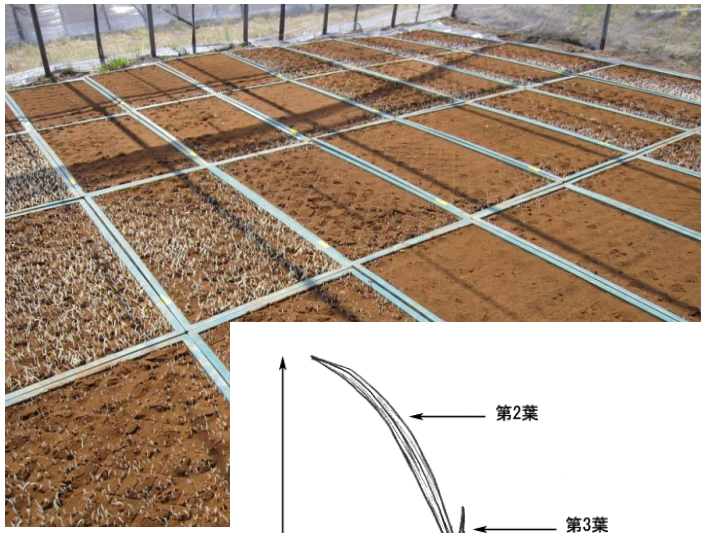
Temperature for the hastening of germination ; 25-30°C
Nursery period ; 20～30 days
Seedlings with 2-3 leaves, 12~15cm length

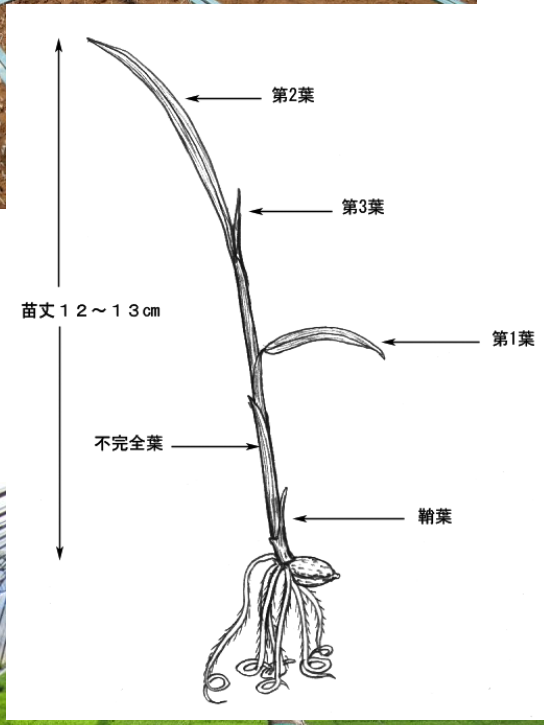
2. Seedling nursery

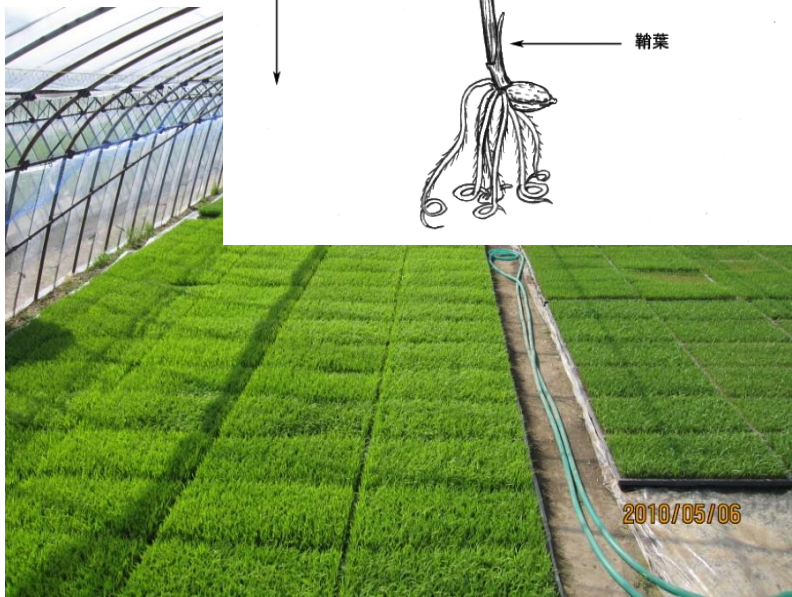
Movie
Seeding

Seeder for
seedling trays

Incubator
(30°C 2days)







3. Transplanting

150–220 seedling trays /ha

−1～0 days

Drain of standing water

0 days

Transplanting

0～+1days

Watering 5–8cm depth

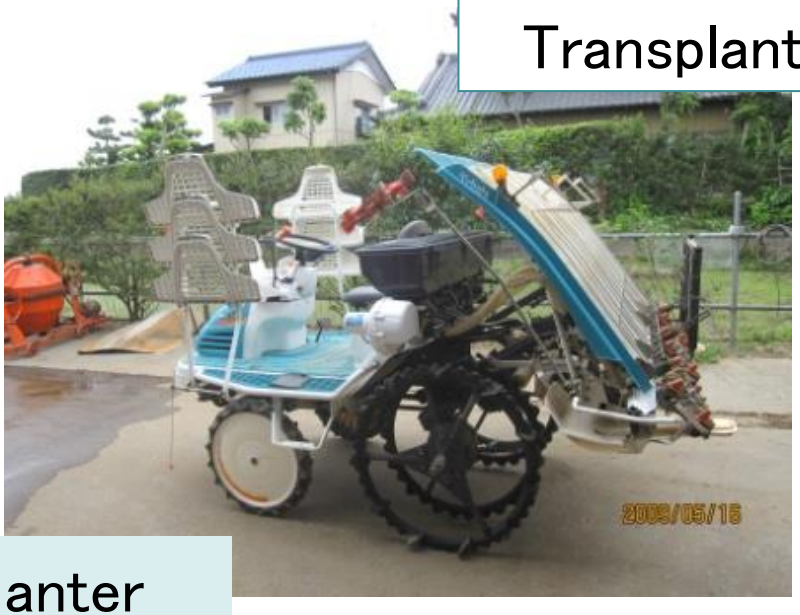
Herbicide

0～+10 days

Specific transplanter can apply herbicide and fertilizer.
Plant density; 30cm between rows and 16-22cm between hills
Number of seedlings; 3-5 plants in a hill
Planting depth; 3-4cm
Suitable temperature; higher than 13°C (Daily average)

3. Transplanting

Movie
Transplanting

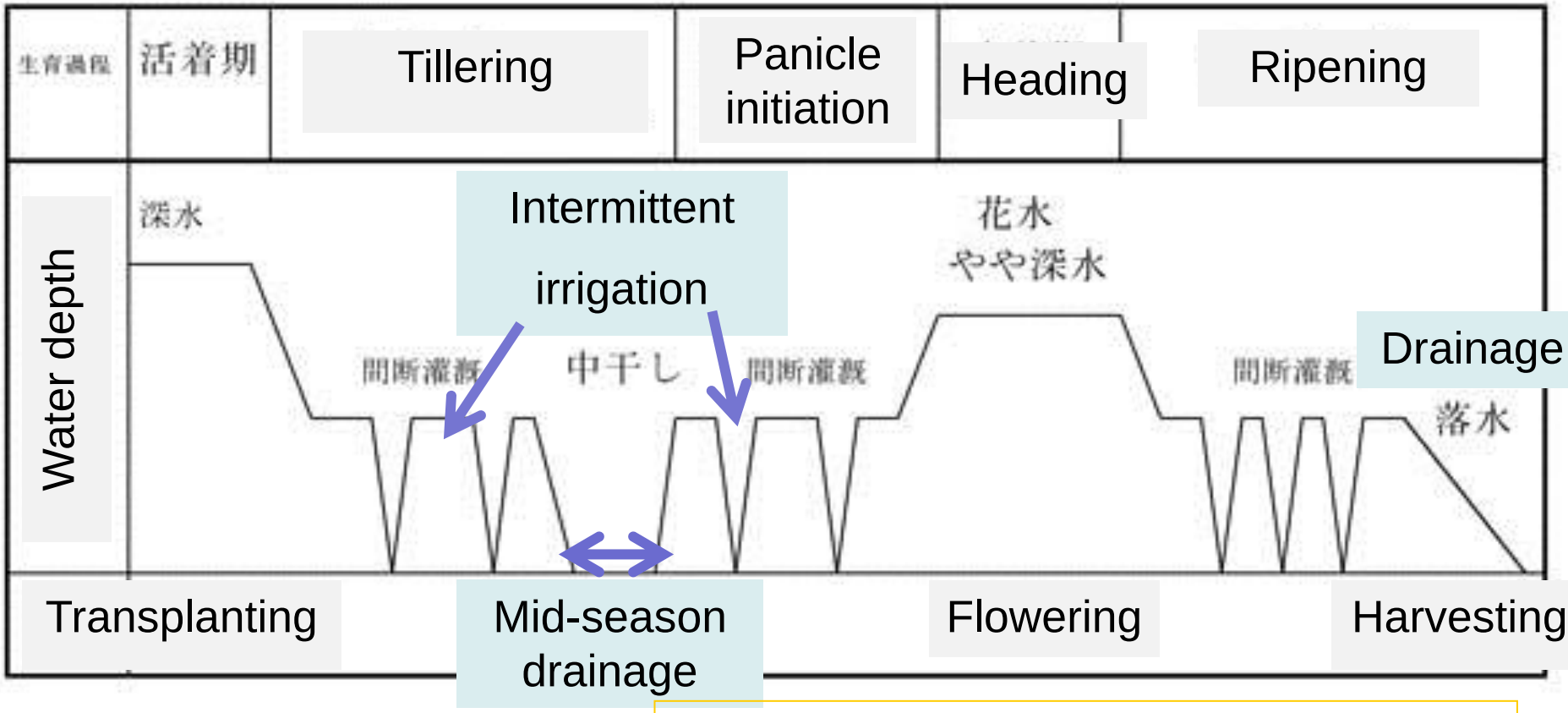


Rice transplanter

6rows; 1.8m planting width

4. Water management

Example of water management

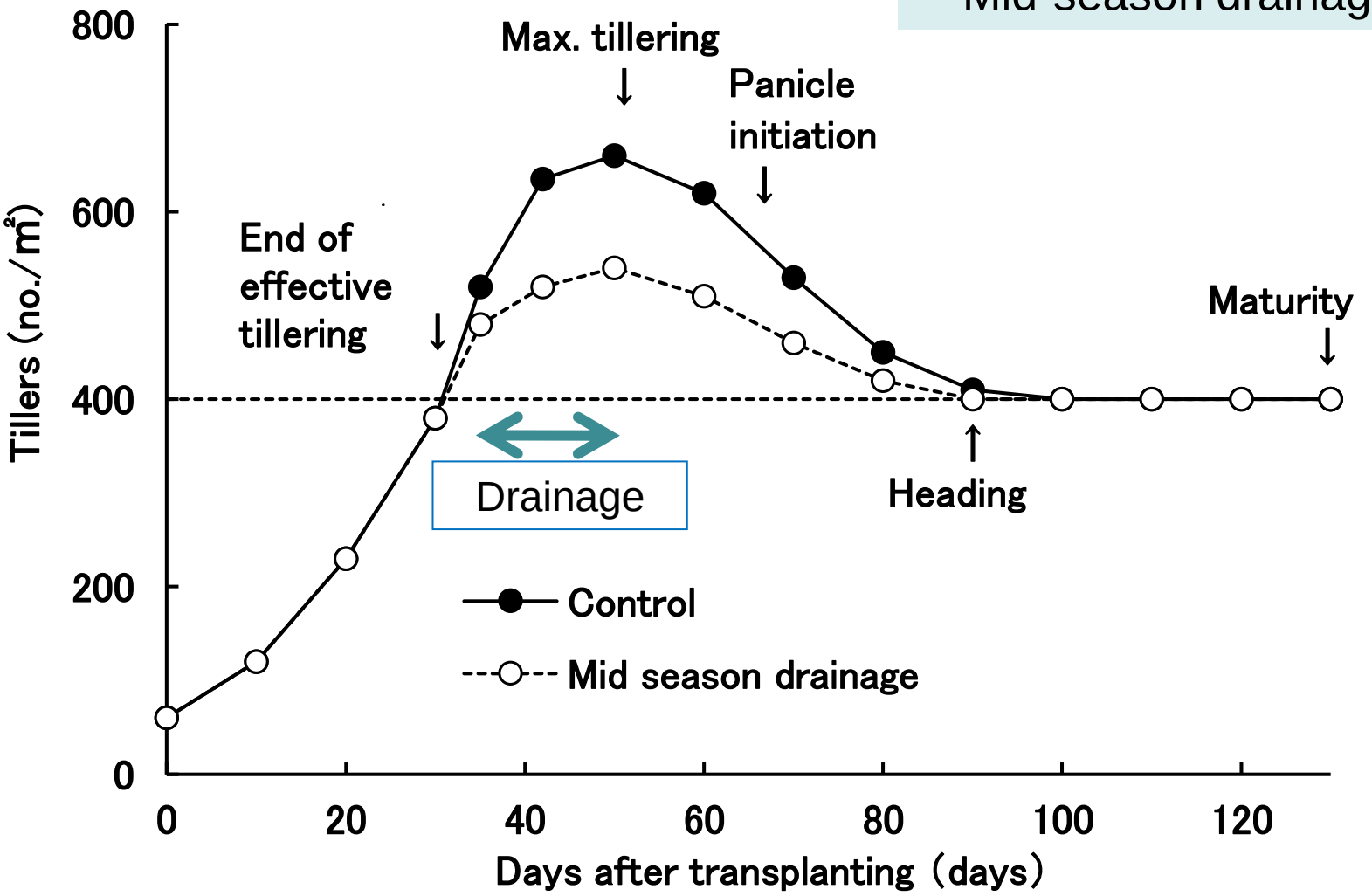


Favorable soil permeability; 2cm/day

Mid-season drainage, Intermittent irrigation, Deep water management; for the control of rice growth

4. Water management

Mid-season drainage



Mid-season drainage should be started from the end of effective tillering stage, in order to control of rice growth.

5. Fertilizer application

Basal application

Before puddling (Mixed with soil by rotary)
At transplanting (Side application by transplanter)

Top dressing

10～20 days before heading (Broadcast on soil surface)
1or 2 times

Average total amount of fertilizer; N-P_2O_5-K_2O : 7-8-6 (g/m2)
(For example; 5 g-N basal application + 2 g-N top dressing)

Compost or rice straw application is recommended.

5. Fertilizer application

Efficiency of N fertilizer

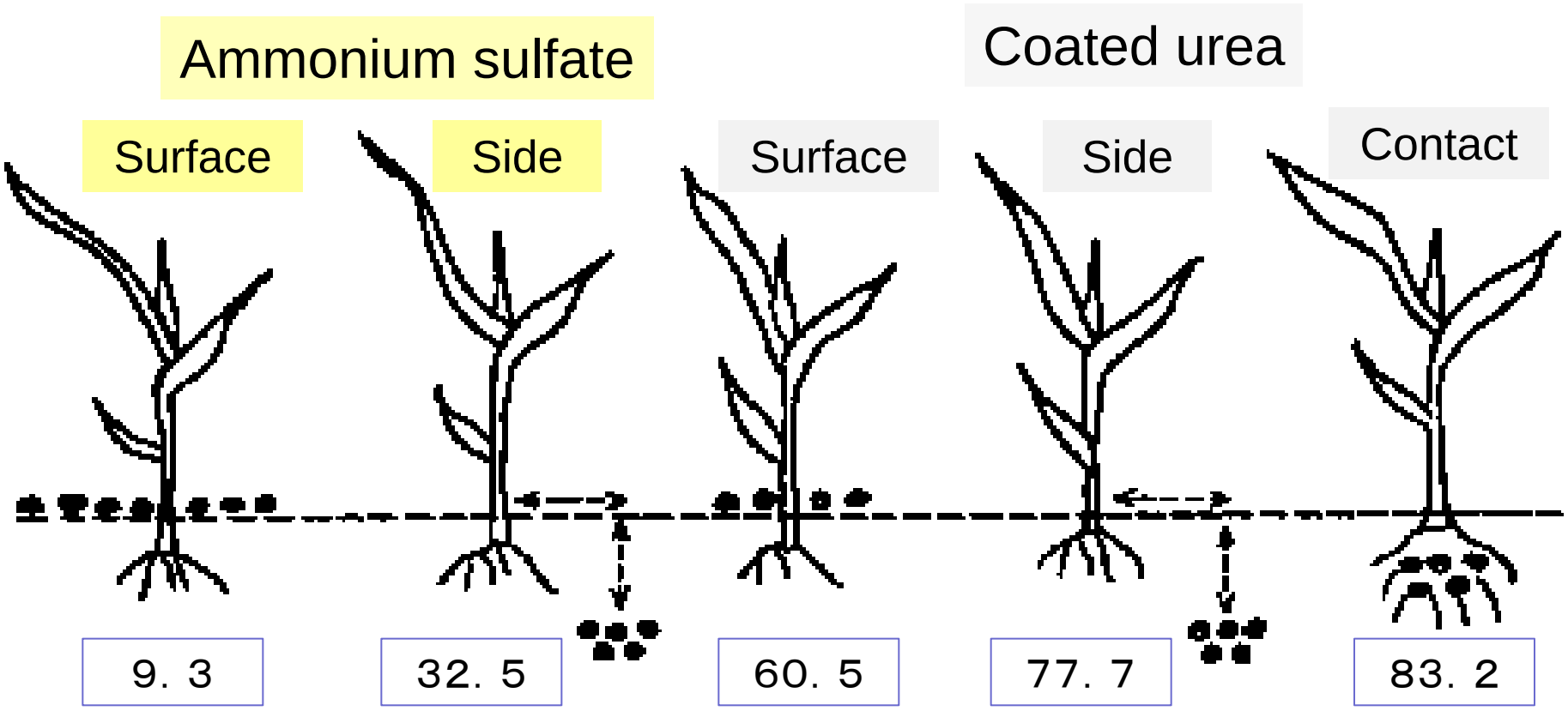


Fig. Efficiency of fertilizer (No-tillage)

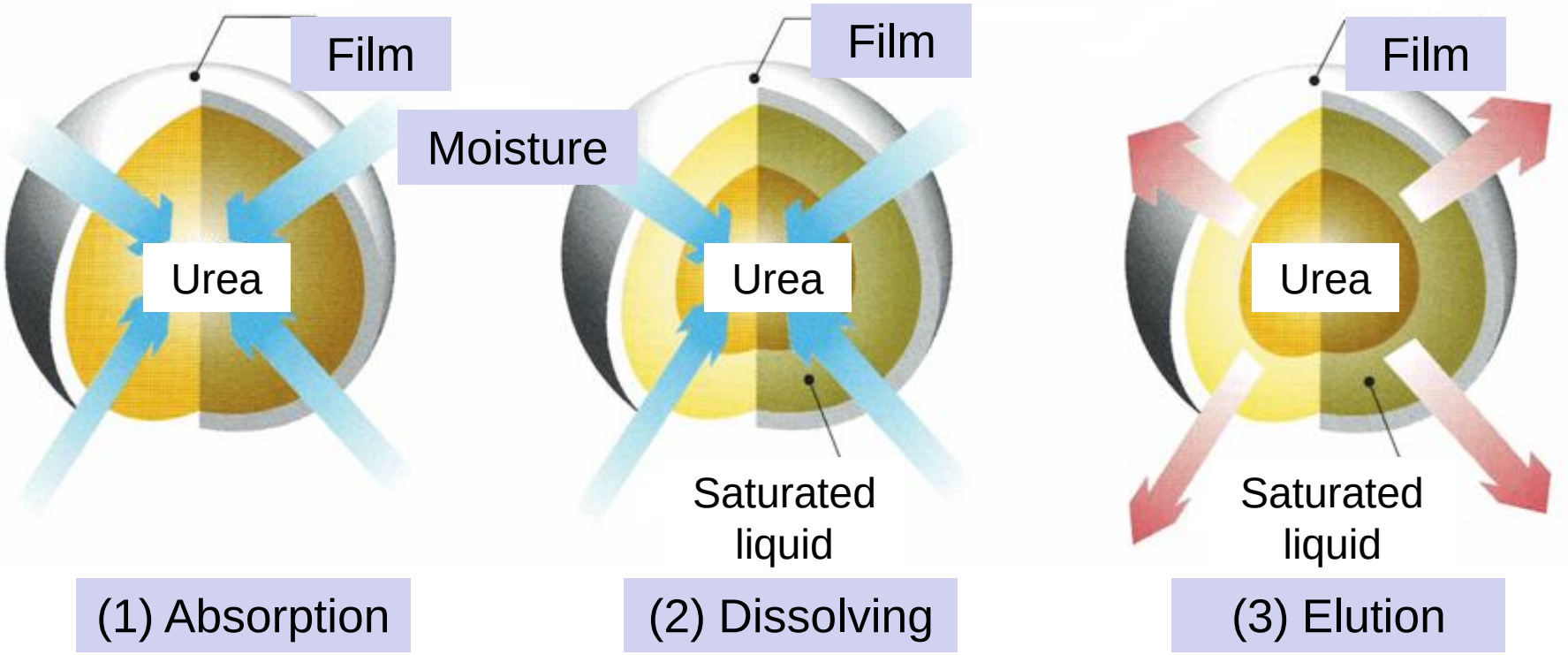
Kaneta et al. 1990

Efficiency (%) =100* Absorbed N / Applied N
The efficiency of ‘Release-controlled fertilizer’ is high even if they were applied on soil surface in a upland condition.

5. Fertilizer application

Coated urea

Mechanics of Release-controlled fertilizer



Urea coated with polyolefin is released gradually.
Price is high, but efficiency is also high even in an upland condition.

Efficiency of basal fertilizer	
Ammonium sulfate	23～33%
Coated urea	61～67%

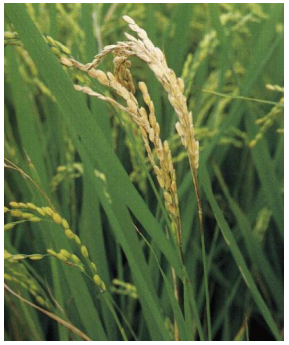
6. Herbicide and Pesticide

Herbicide

1st application after transplanting within 1week
2nd application is alternative for survived weeds

Pesticide

Insecticide; Brown planthopper, Stem borer, Rice leaffolder, Plant bugs …



Disinfectant; Rice blast, Sheath blight, Brown spot, Bacterial grain rot, Rice stripe virus, …

Application method changes depending on the field scale or forms of materials.

6. Herbicide and Pesticide (Application machinery)

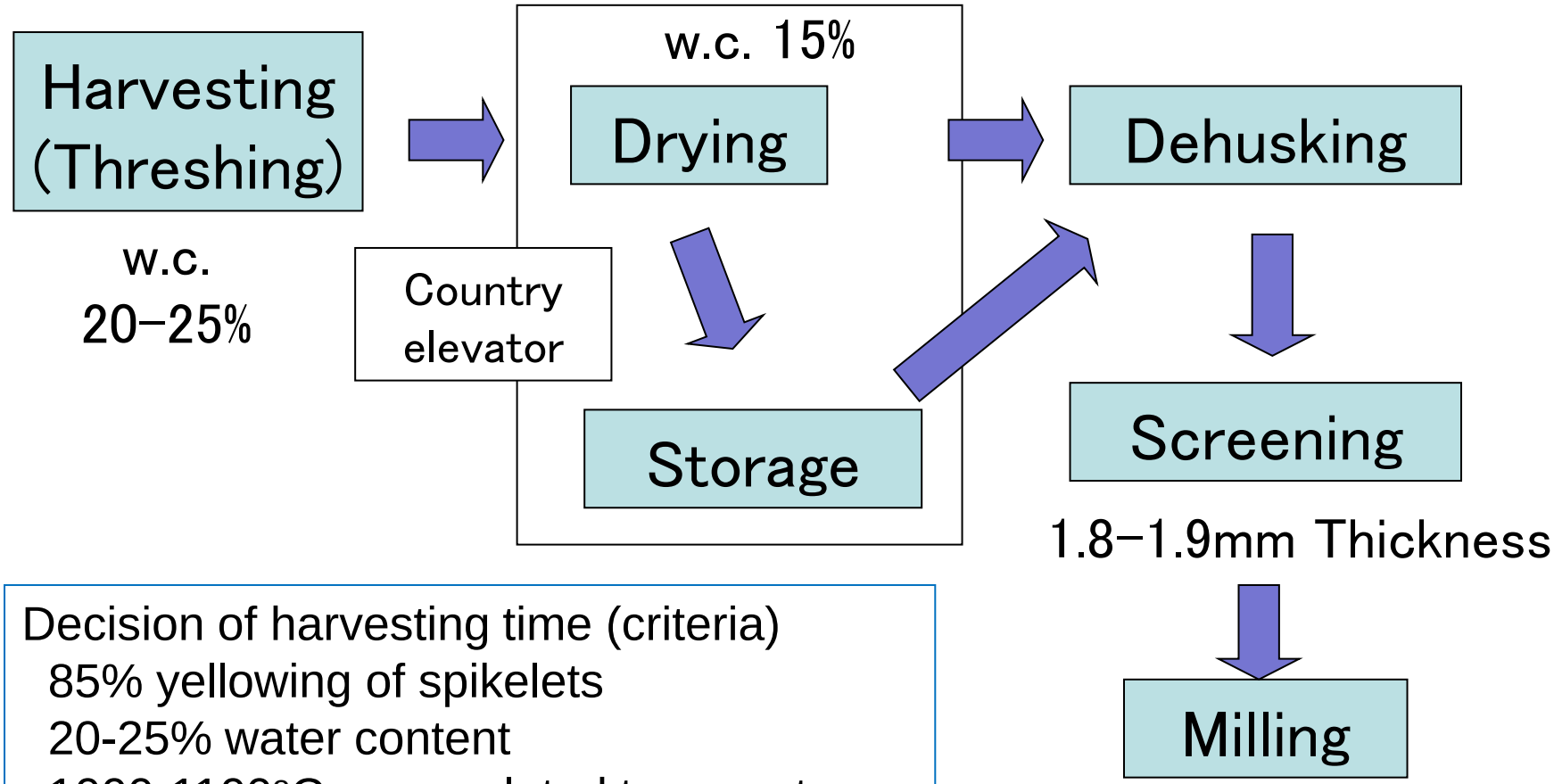
Transplanter

Broadcaster

Sprayer

Radio-controlled helicopter

7. Harvesting and Post harvest procedure



Decision of harvesting time (criteria)
- 85% yellowing of spikelets
- 20-25% water content
- 1000-1100°C accumulated temperature

Combine harvester can practice harvesting, threshing and broadcasting of straw.
Water content is important for the determination of operation.

7. Harvesting and Post harvest procedure

Movie
Harvesting

Combine harvester

Straw are broadcasted

7. Harvesting and Post harvest procedure

Country elevator

Weighing

Checking

Storage

Drying

Dryer (Owned by a farmer)

Husker