RICE SEED PRODUCTION MANUAL

សៀវភៅមគ្គទេសក៍ផលិតកម្មពូជស្រូវ

AGRICULTURAL PRODUCTIVITY PROMOTION PROJECT IN WEST TONLE SAP (APPP)

គម្រោងបង្កើនផលិតភាពកសិកម្មក្នុងតំបន់ទន្លេសាបប៉ែកខាងលិច

The rice seed production system in this manual is based on “APPP Recommended Seed Production Technology” compiled by Mr. Yoshitoshi Tsutsui, former Farm Management Expert, JICA.

PREFACE

THE RICE SEED PRODUCTION MANUAL has been prepared by the Agricultural Productivity Promotion Project in West Tonle Sap (APPP), jointly implemented by the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Cambodia and Japan International Cooperation Agency (JICA). This manual is intended to provide instruction and guidance for rice seed production and serve as clear reference for agricultural extension staff and rice seed farmers.

This manual is developed based on "National Seed Standards" of MAFF, Cambodia, in addition to practical experience of APPP with consideration of social and agro-economic conditions at grass root.

Improved food security is a priority of the Cambodian government and rice is the most important crop in terms of energy source of people and commercial value. In this sense, using high quality seed is increasingly becoming important to raise productivity and increase yields of rice together with modernizing cultural practices.

The leader of one of Seed Growers Group (SGG) in Battambang Province under the Project won the first prize for"High Quality Seed Production Technology" in "the Annual Excellent Farmer Contest 2013" which is sponsored by the General Directorate of MAFF. It is our pleasure as a project that our effort for improved seed production has been publicly recognized in Cambodia.

We wish this manual is utilized to produce good quality rice seed to contribute to sustainable rice production.

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AGRICULTURAL PRODUCTIVITY PROMOTION PROJECT IN WEST TONLE SAP (APPP)

Battambang, Kingdom of Cambodia
December 2014

CONTENTS

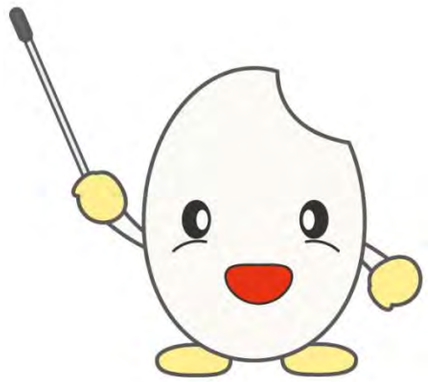
PART I. OUTLINE OF RICE SEED PRODUCTION

Why do we need to renew the seed ?

Yield and quality of rice reduce due to seed degeneration, if same source of seed is used repeatedly. Seed degeneration could occur approximately from the third year after seed renewal.

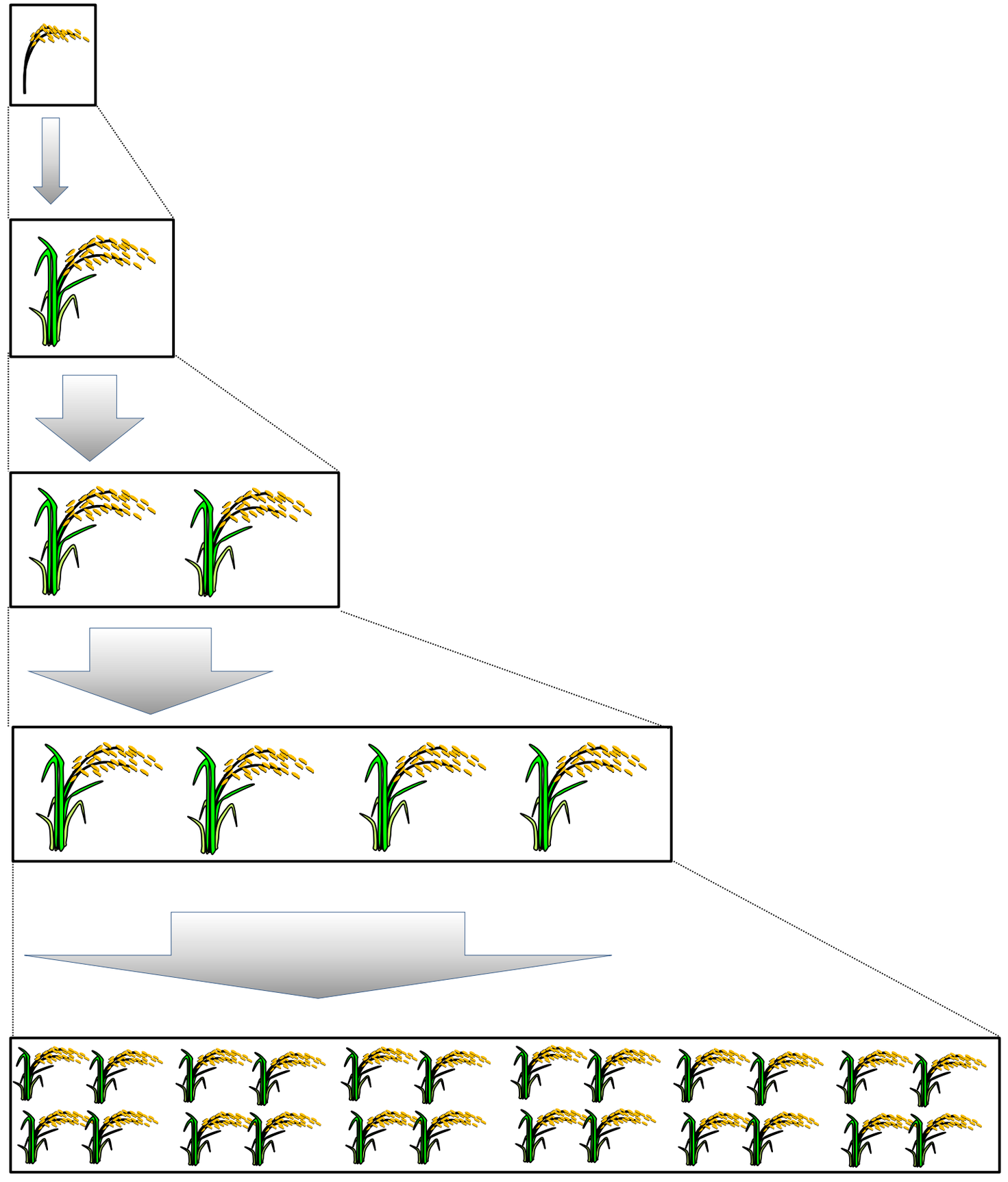
Why is it important to use good quality seed?

Using good quality seed is important to maintain the yield and quality of the variety. It is also important to avoid seed-borne diseases.



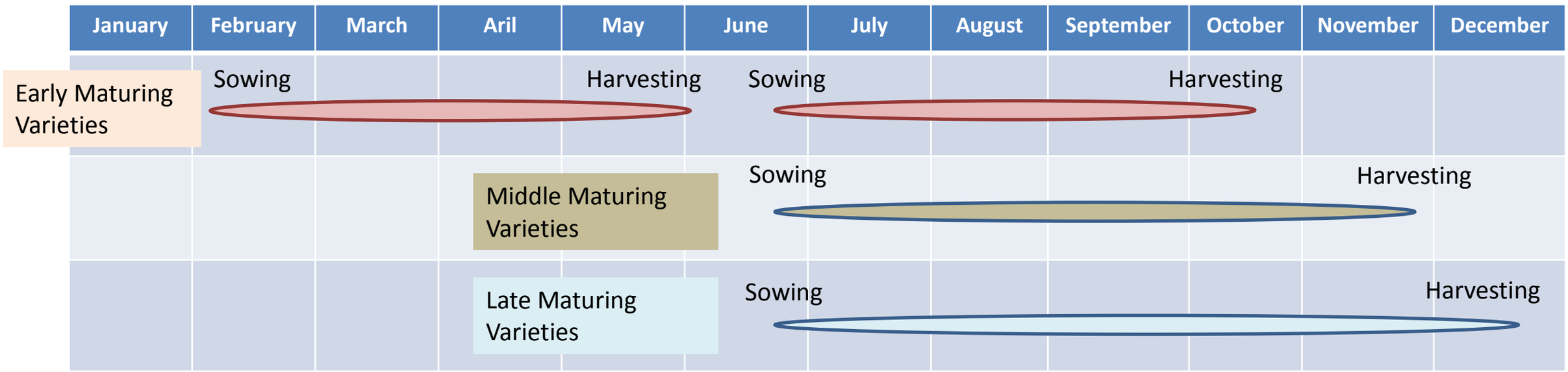
1-2. THE CLASSIFICATION OF RICE SEED

Breeder Seed by CARDI	Source of Seed produced by the breeder (CARDI)
Foundation Seed by CARDI	Progeny of Breeder Seed produced by CARDI
Registered Seed by SGG	Progeny of Foundation Seed produced by SGG
Certified Seed by SGG	Progeny of Registered Seed produced by SGG
Ordinary Rice Cultivation by Farmers	Certified Seed is used by farmers.



1-3 OFFICIAL RICE VARIETIES OF CAMBODIA

Approximate Growing Seasons of Rice in Cambodia



Official Rice Varieties of Cambodia

Early Maturing Varieties	Middle Maturing Varieties	Late Maturing Varieties
IR66	Phka Rumduol	Riang Chey
Chul'sa	Phka Rumdeng	CAR4
Sen Pidao	Phka Romeat	CAR6
	Phka Chan Sen Sar	

Foundation seeds are produced and provided for the 10 Official Rice Varieties by CARDI .

In the APPP target provinces, Phka Rumduol accounts for nearly 100% in the plated areas of seed production.

Inspection Process

Field Inspection 1

Field Inspection 2

Field Inspection 3

Field Inspection 4

Product Inspection

Growth Stage of Rice

Pass

Nursery

Pass

Transplanting

Pass

Heading

Pass

Maturing

Pass

Harvesting

Pass

Seed Rice

No Pass

No Pass

No Pass

No Pass

No Pass

Eating Rice

PART II. SEED TREATMENT AND NURSERY MANAGEMENT

2-1 UREA WATER TREATMENT FOR SEED SELECTION
(1) HOW TO PREPARE UREA SOLUTION

① Prepare 20kg of UREA fertilizer.

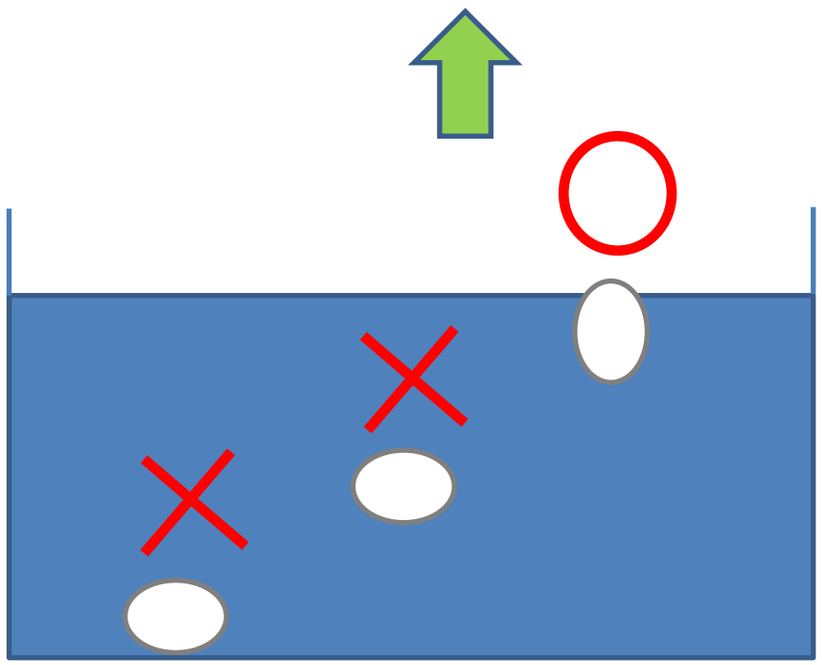
② Put the fertilizer into 40 liters of fresh water.

③ Stir the water until the fertilizer is completely dissolved.

④ Put eggs into the Urea solution to check the specific gravity.

Salt solution can substitute Urea solution. Use 8 kg of salt for 40 liters of fresh water.

The Urea solution is poisonous. Keep away from children and animals.



2-1 UREA WATER TREATMENT FOR SEED SELECTION
(2) HOW TO SELECT FULFILLED SEED

Some unfulfilled grains mixed in the seed

All the seeds fulfilled

① Get registered seed ready.

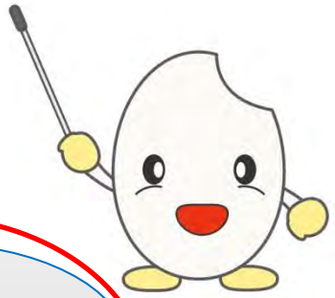
② Put the seed into a net bag.

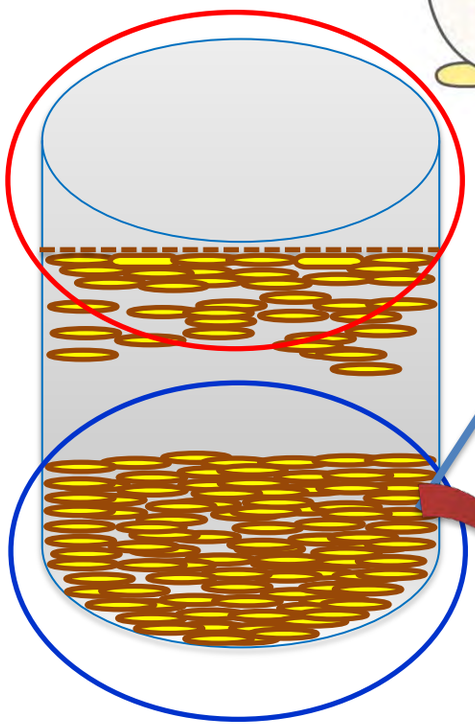
③ Put the seed in a net bag into the Urea water.
Gently stir the seed in the Urea water.

④ Remove all of the floating grains.

⑤ Wash the seed with fresh water. Drain water from the net bag for next step.

2-2 WHY IS FULFILLED SEED NECESSARY?





WHY DO WE NEED TO USE FULL FILED SEED?

Good germination

Healthy growth

Minimize diseases

Increase the yield

2-3 HOT WATER TREATMENT FOR SEED DISINFECTION

① Heat up water. Use clean water.

② Keep water temperature at 60˚C. Observe the water temperature by using thermometer

③ Put seed into hot water of exactly 60˚C for 10 minutes. Gently shake the seed bag from time to time.

④ Take out the seed bag from hot water after 10 minutes. Put the seed bag into cold water for cooling down.

⑤ Drain water. Do not place the seed directly on the ground.

⑥ APPP recommends to go on to soaking & incubation right after this hot water seed treatment process.

2-4 SOAKING AND INCUBATION

Soak the treated seed in the fresh and clean water for 24 hours.

Incubate the seed in a clean place for another 48 hours and cover something to keep it warm.

Observe the sprouts of 1-2mm. Incubation may be extended another one day if the sprout is too short.

2-5 RICE HUSK CHARCOAL MAKING

① Prepare for a stove and chimney. An 18 liter tin can could be used for the stove.

② Set fire in the stove.

③ Make sure that there is momentum to fire.

④ Put the chimney on top of the stove.

⑤ Cover the stove with dry rice husk.

⑥ You can make rice husk charcoal either in an open space or in a drum.

⑦ When parts of the heap surface turned out black, cut back the husks.

⑧ When the husks turned out black completely, put out the fire with water.

⑨ Dry the rice husk charcoal and keep it in bags for future use.

2-6 NURSERY PREPARATION AND SOWING

① APPP recommends seed growers to make a seed bed of 1.2m wide with 30- 50cm passage.

② Apply rice husk charcoal to the seed beds (approximately 1 bag/10 m^2). Apply manure if it is available.

③ Mix the rice husk charcoal with soil.

④ Level the nursery beds.

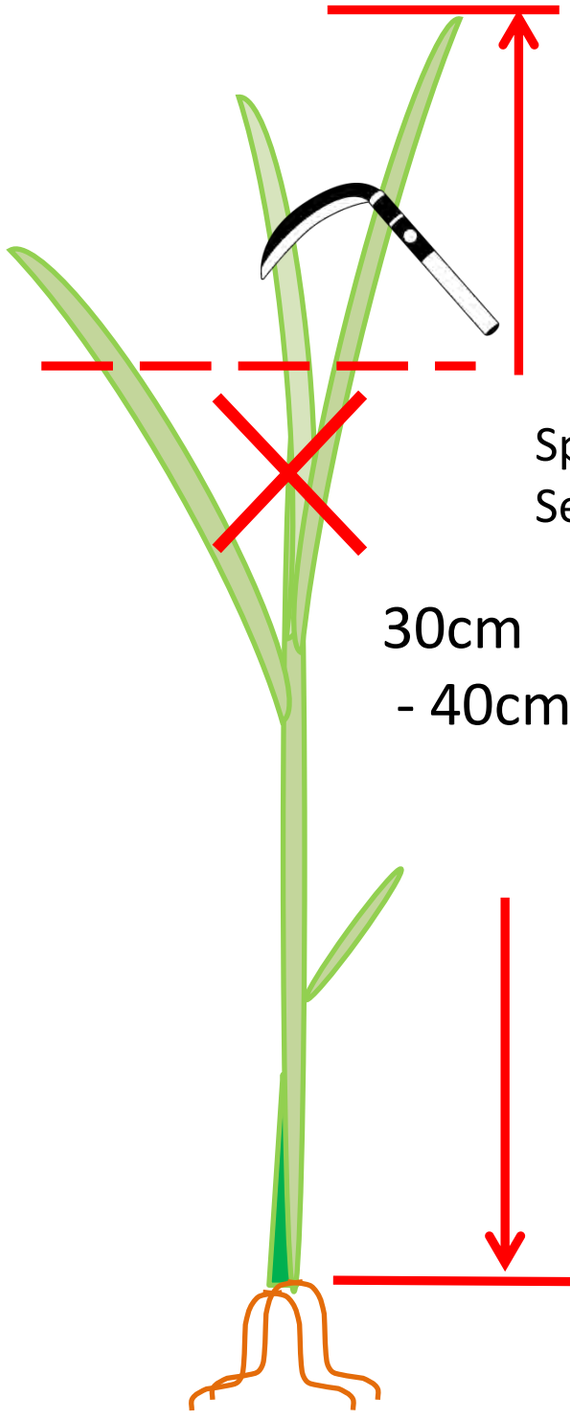
⑤ Apply DAP (18-46-00) at a rate of 9 grams /m^2.

⑥Broadcast pre-germinated seeds. Recommended seed rate is 50 grams / m^2.

2-7 RAISING GOOD SEEDLINGS

The seedlings could have approximately 4 – 5 leaves and ready for transplanting at 20 days after sowing

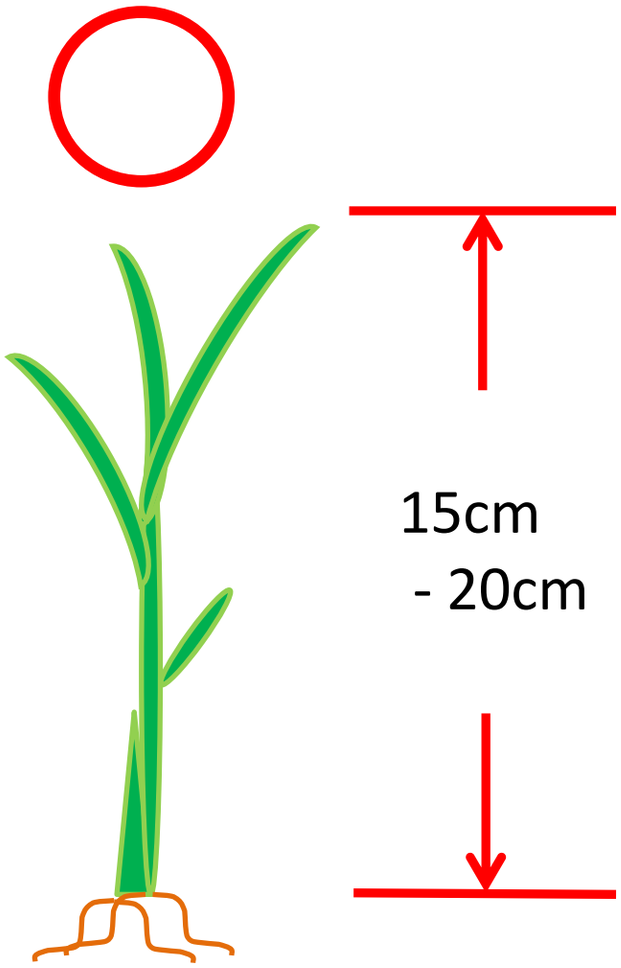
Observe the standard seed rates to raise healthy seedlings. Avoid excessive application of water, not to get spindly seedlings.



However, leaf tips of spindly seedlings should be cut off for transplanting, as it is traditionally practiced.

Spindly Seedling

30cm
- 40cm



15cm
- 20cm

Healthy Seedling

2-8 PEST CONTROL AT NURSERY
(1) RICE BLAST

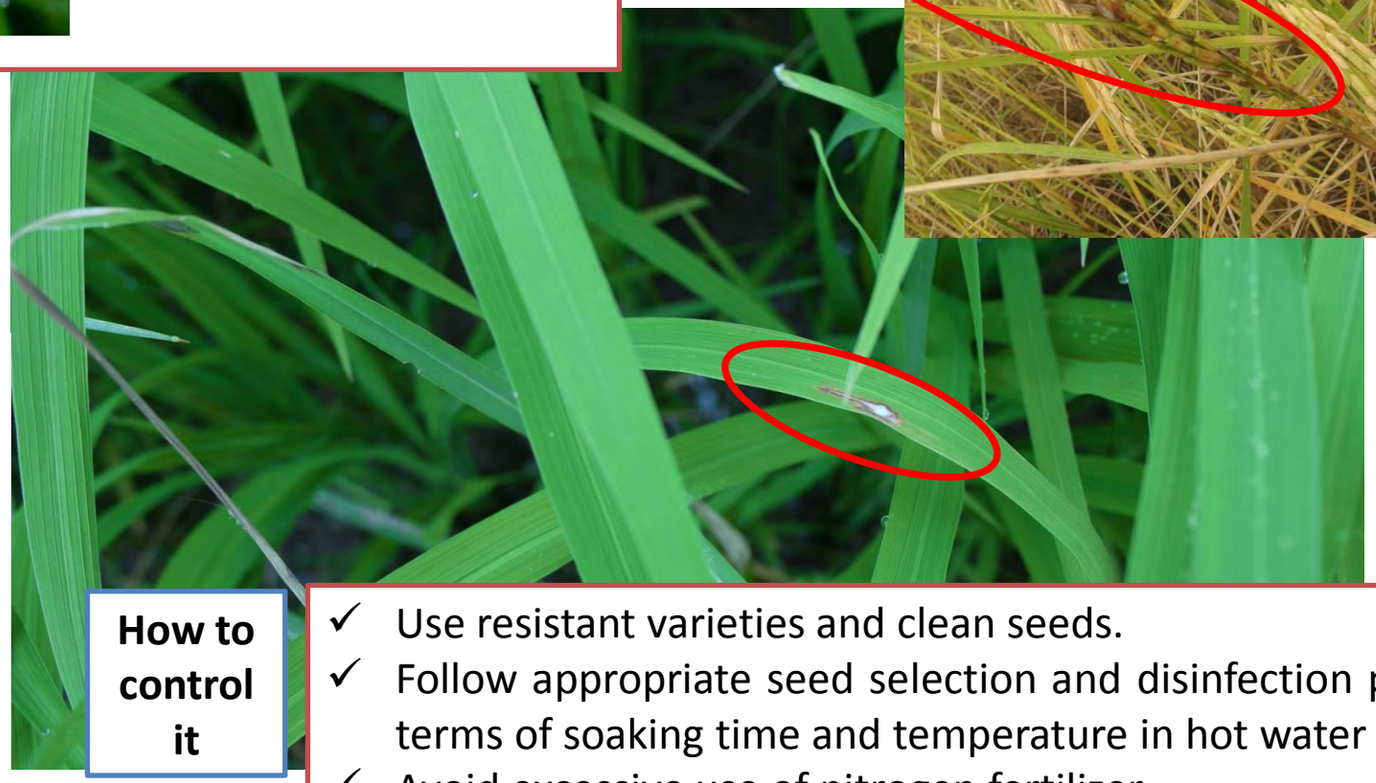
What is Rice Blast?

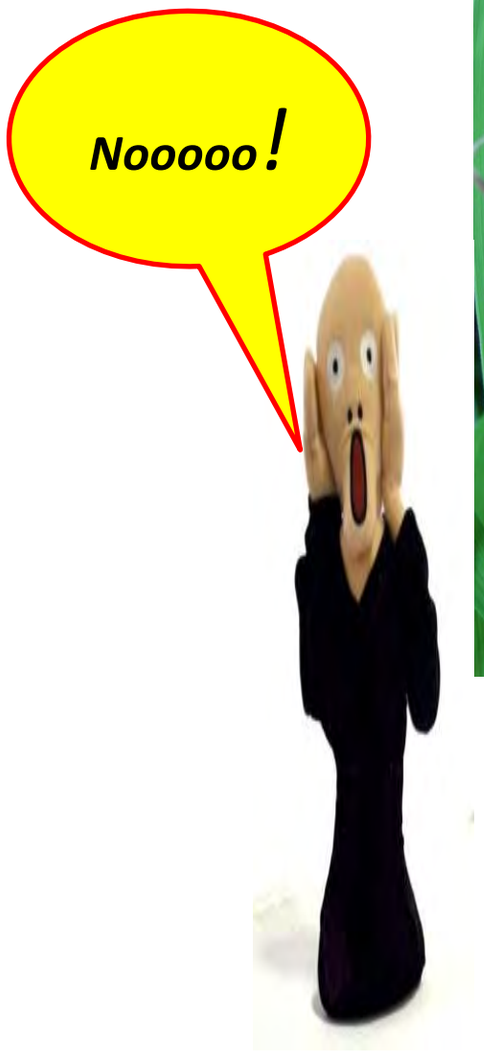
Rice blast is caused by a fungus.

How does it occur?

Seeds could be a primary source of the disease, when they are collected from the field infected by rice blast.

Infected leaves, straws and weeds could be other sources of the disease.

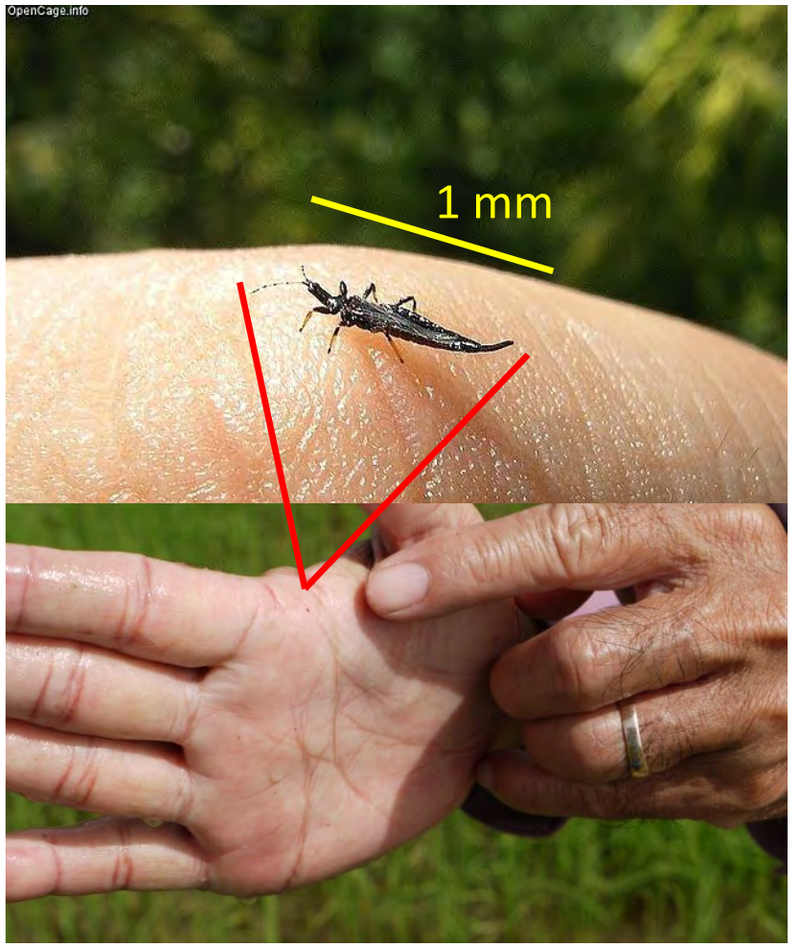




How to control it

- ✓ Use resistant varieties and clean seeds.
- ✓ Follow appropriate seed selection and disinfection procedures, especially in terms of soaking time and temperature in hot water treatment.
- ✓ Avoid excessive use of nitrogen fertilizer.
- ✓ Secure good ventilation in nursery and main field.
- ✓ Use appropriate chemical for chemical control.
  Ex) SAWANT (Isoprothiolane 40%)
- ✓ Do not transplant infected seedlings.
- ✓ Remove seriously damaged seedlings from nursery and burn or bury them.

2-8 PEST CONTROL AT NURSERY
(2) THRIPS



Thrips are common pests found in rice nursery. They damage seedlings by sucking juice.

The seedlings could be twisted and die by damages of thrips.

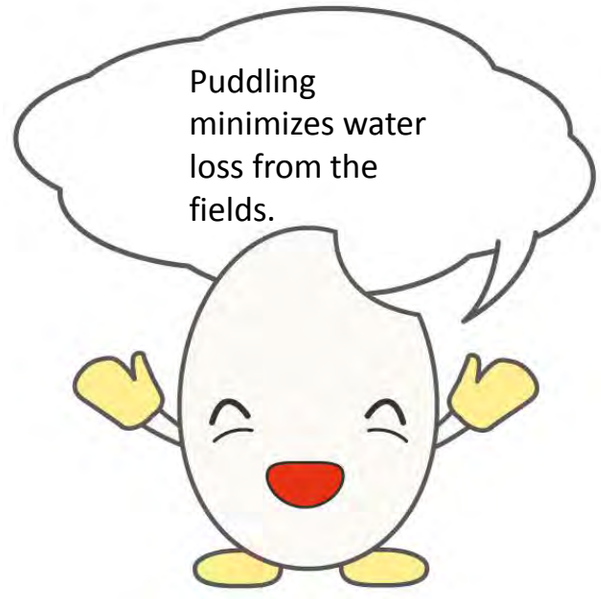
Catch thrips by using nets in nursery.

PART III. CULTURAL PRACTICES IN MAIN PADDY FIELD

3-1 LAND PREPARATION
(1) PLOUGHING AND PUDDLING

- Start ploughing when the field is wet enough.
- Ploughing should be done more than twice and weeds are ploughed into soil for weed control.
- The soil should be ploughed approximately 15 – 18 cm deep so that rice plants could develop their root systems.

- Submerge the field and start puddling.
- Puddling is undertaken to break up soil clods and to mix soil and water.



3-1 LAND PREPARATION
(2) LEVELLING

Land preparation is so important for seed production.

The paddy growth is not uniformed
When land leveling is so poor.

The irrigation water is not equally provided.

Some parts are getting more than enough water and the others are getting less.

Land leveling is one of the important factors to carry out high quality seed production.

Good land preparation enables uniform growth and even water provision.

3-2 BASAL FERTILIZER APPLICATION

Adjust the amount of fertilizer depending on conditions of your fields.

- Apply one bag of DAP fertilizer per hectare (50kg/ha) as basal.
- Nutrient content of inorganic fertilizer is written on the bags; for example “NPK 18-46-00” means that N18%,P(P2O5)46%, K(K2O)0%
- One bag of DAP contains
  N:9kg, P_2O_5:23kg, K_2O:0kg/ha.

Rais to Hectares Conversion Table

Rais	Hectares	Amount of DAP(kg)
1 0	1.60	80
9	1.44	72
8	1.28	64
7	1.12	56
6	0.96	48
5	0.80	40
4	0.64	32
3	0.48	24
2	0.32	16
1	0.16	8

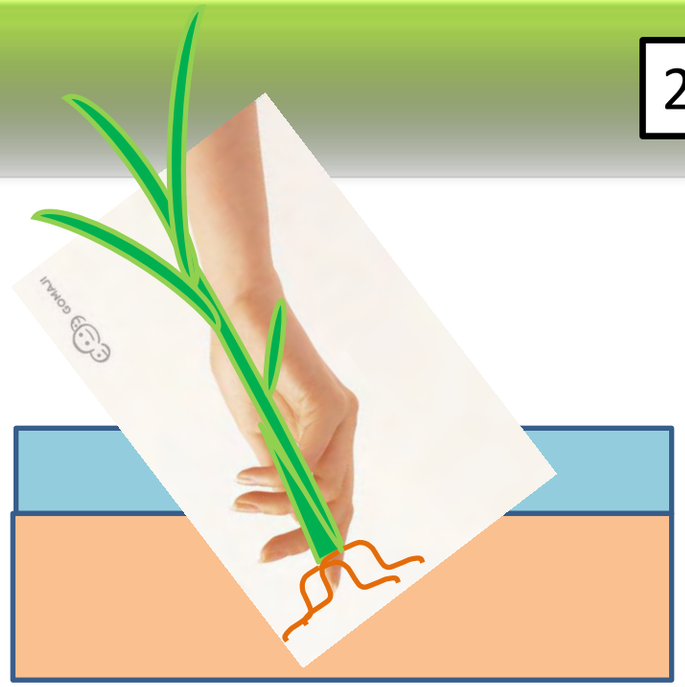
Hectares to Ares Conversion Table

Hectares	Ares	Amount of DAP(kg)
1.0	100	50
0.9	90	45
0.8	80	40
0.7	70	35
0.6	60	30
0.5	50	25
0.4	40	20
0.3	30	15
0.2	20	10
0.1	10	5
0.01	1	0.5

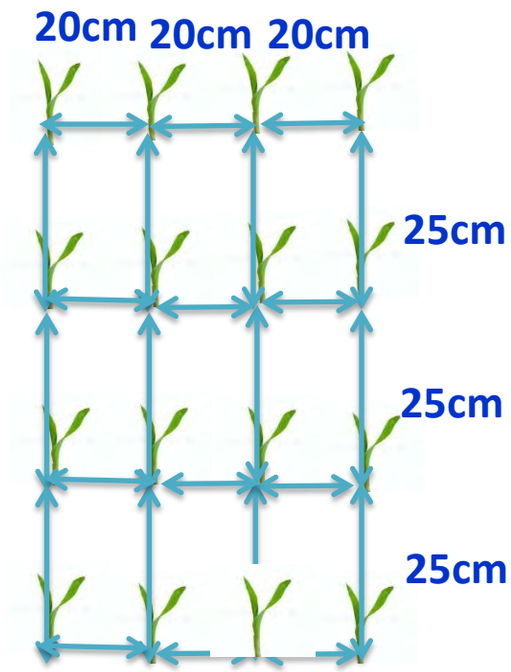
3-3 TRANSPLANTING

① Uproot the 18-20 days of seedlings at the day of transplanting.

② Get a planting rope ready with marks in every 20 cm. Transplant seedlings in row with 20 cm interval.



③ Transplant 1 seedling per hill. Insert the seedling into soil about 2 -3 cm deep.



④ After completing transplanting in a row, move to next row.

⑤ Keep water depth about 3 - 5 cm deep after transplanting.

⑥After 1 or 2 weeks of transplanting, retransplant seedlings in missing hills. Remove supplementary seedlings from the paddy fields after retransplanting.

3-4 WEED CONTROL

Weed Free Plot

A Plot with Weeds

- Remove weeds at early growth stage.
- Weeds compete with rice in terms of sunlight, nutrients, and water and they grow faster than rice.
- Remove weeds also to minimize habitats for insects and fungus.
- Keep approximately 5cm water depth or keep soil surface saturated to prevent weeds to grow.
- If post-emergence herbicide is applied, use it when weeds have 2 -3 leaves.
- Once weeds produce seed, volume of weeds will be much larger next growing season.
- Cut grasses on ridges.
- Try keeping rice fields weed free.

3-5 FIRST TOP DRESSING

- Apply one bag of Urea fertilizer per hectare (50kg/ha) for the first top dressing as follows:
  Early Maturing Varieties: 15 - 20 days after transplanting
  Middle Maturing Varieties: 30 days after transplanting.
  Late Maturing Varieties: 30 - 40 days after transplanting
- Urea fertilizer contains N46%,P(P2O5)0%, K(K2O)0%
- One bag of Urea contains
  N:9kg, P_2O_5:23kg, K_2O:0kg/ha.

Rais to Hectares Conversion Table

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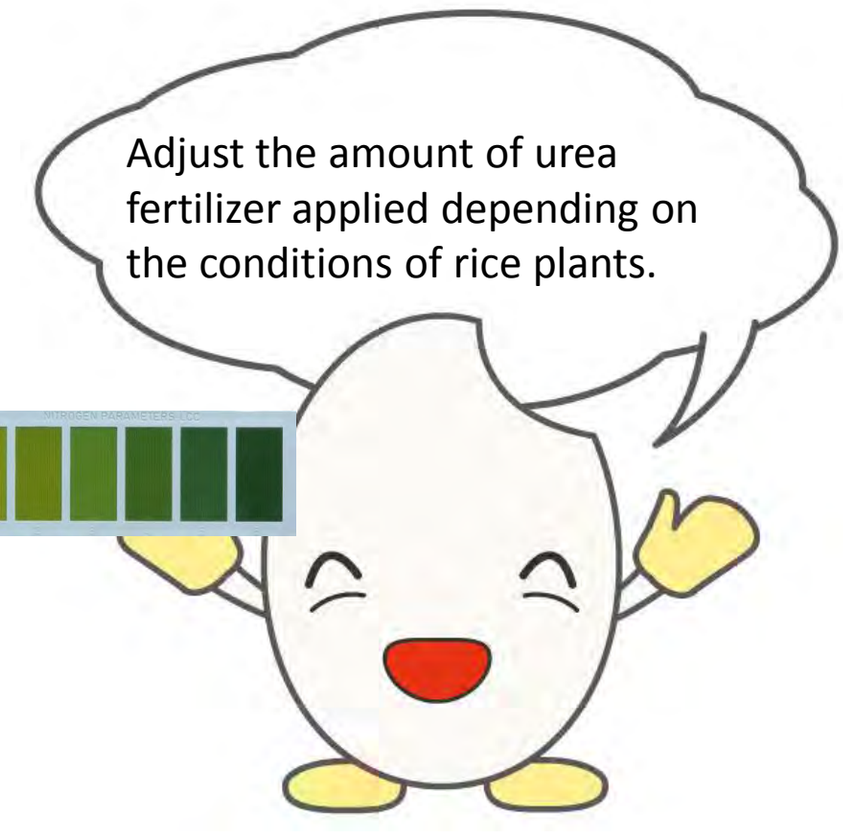
0.5	50	25
0.4	40	20
0.3	30	15
0.2	20	10
0.1	10	5
0.01	1	0.5

3-6 SECOND TOP DRESSING

- Apply one bag of Urea fertilizer per hectare (50kg/ha) for the second top dressing at 20 days before heading.
- Decide the timing of second top dressing by observing young panicles. The length of the young panicles should be 1 -2 mm.
- Urea fertilizer contains N46%,P(P2O5)0%, K(K2O)0%
- One bag of Urea contains
  N:9kg, P_2O_5:23kg, K_2O:0kg/ha.

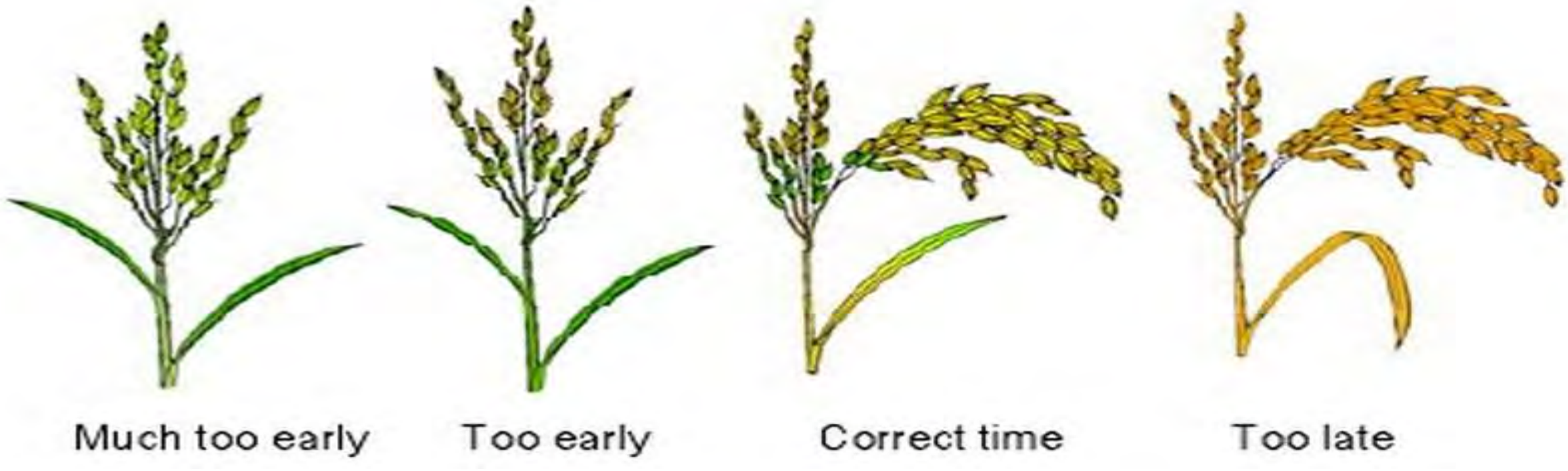
Reduce the amount of urea fertilizer applied when leaf color is too dark.

It would be advisable to stop second top dressing when leaf color is too dark and plant height is too high . The excessive use of N fertilizer could result in lodging.



3-7 JUDGING HARVESTING TIME

APPP recommends SGG members to harvest seed paddy when 80-85% of spikelets turned out yellow.



Source : IRRI

At maturity,
① 80 – 85 % of spikelets turn out yellow (straw colored).
② Paddy moisture content could be between 20 and 25 %.
③ Days after transplanting could be 100 – 120 days for early maturity varieties,
④ Days after heading could be 28 – 35 days.

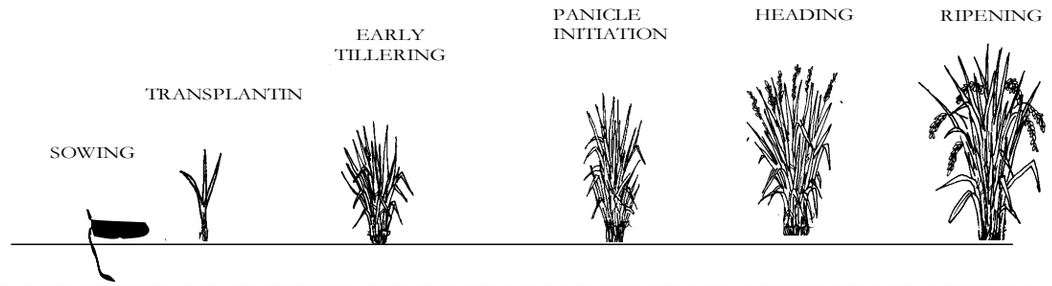
3-8 HARVESTING

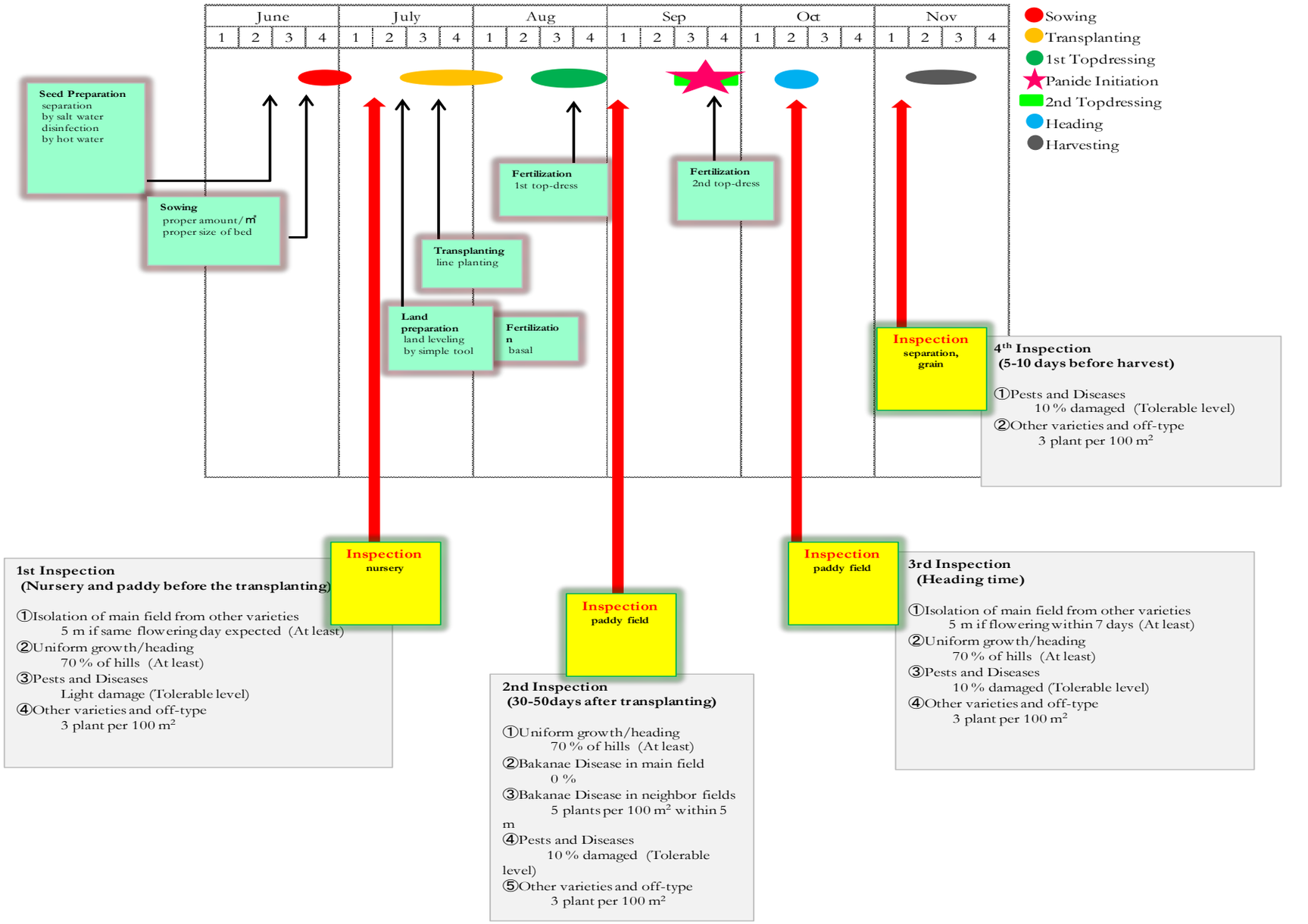
- The bundles of wet seed paddy should not be piled up in the fields because it could affect the grain quality.
- Minimize the time the harvested panicles remain lying in the fields; field drying could cause rapid deterioration of grain quality.
- Make sure that the panicles do not touch the ground to keep them dry.
- Threshing should be done as soon as possible after harvesting.
- Tentatively dry seed paddy with moisture content below 18 % to avoid a change of color.

PART IV. FIELD INSPECTION & ROUGING OFF-TYPE

4-1 TENTATIVE SCHEDULE OF FIELD INSPECTION

Tentative Schedule of Field Inspection and FFS (Phka Rumduol)





1st Inspection
(Nursery and paddy before the transplanting)

①Isolation of main field from other varieties
5 m if same flowering day expected (At least)
②Uniform growth/heading
70 % of hills (At least)
③Pests and Diseases
Light damage (Tolerable level)
④Other varieties and off-type
3 plant per 100 m²

2nd Inspection
(30-50days after transplanting)

①Uniform growth/heading
70 % of hills (At least)
②Bakanae Disease in main field
0 %
③Bakanae Disease in neighbor fields
5 plants per 100 m² within 5 m
④Pests and Diseases
10 % damaged (Tolerable level)
⑤Other varieties and off-type
3 plant per 100 m²

3rd Inspection
(Heading time)

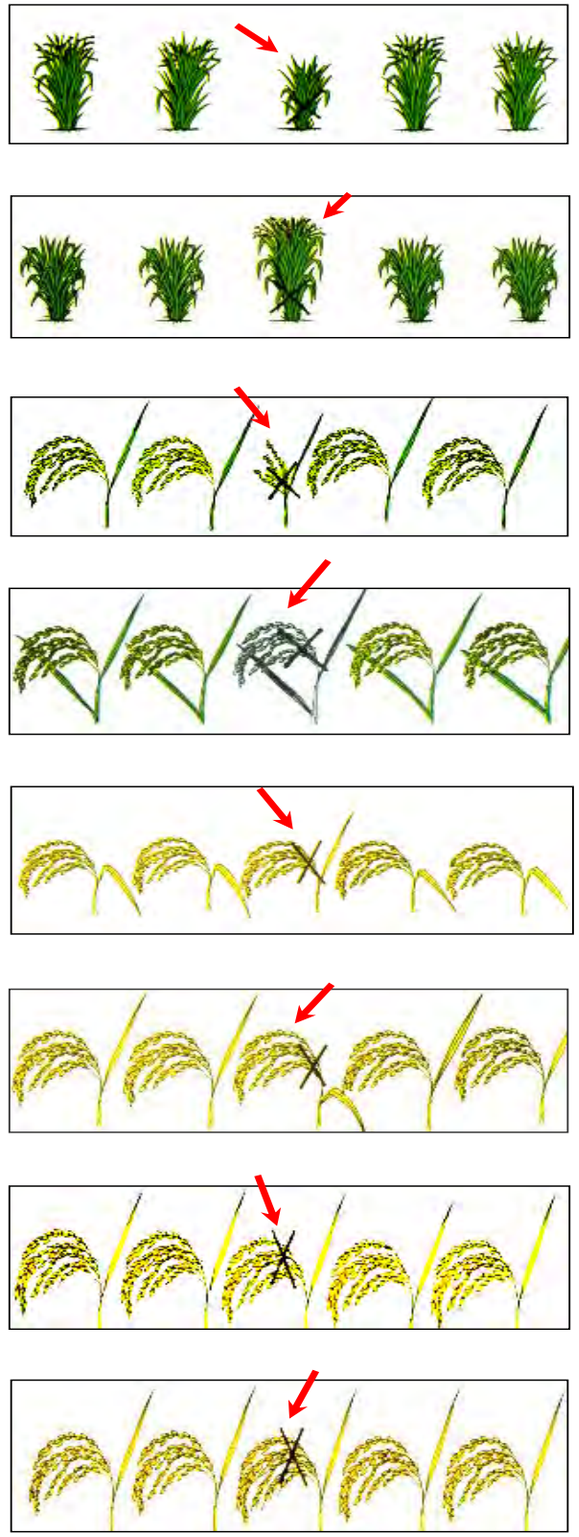
①Isolation of main field from other varieties
5 m if flowering within 7 days (At least)
②Uniform growth/heading
70 % of hills (At least)
③Pests and Diseases
10 % damaged (Tolerable level)
④Other varieties and off-type
3 plant per 100 m²

4th Inspection
(5-10 days before harvest)

①Pests and Diseases
10 % damaged (Tolerable level)
②Other varieties and off-type
3 plant per 100 m²

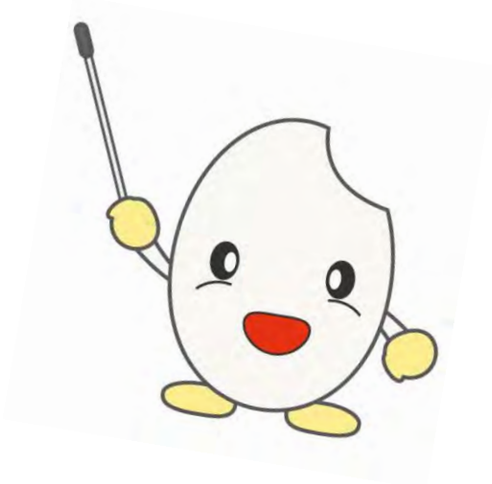
* Inspection Criteria for Certified Seed

Samples of off-type (must

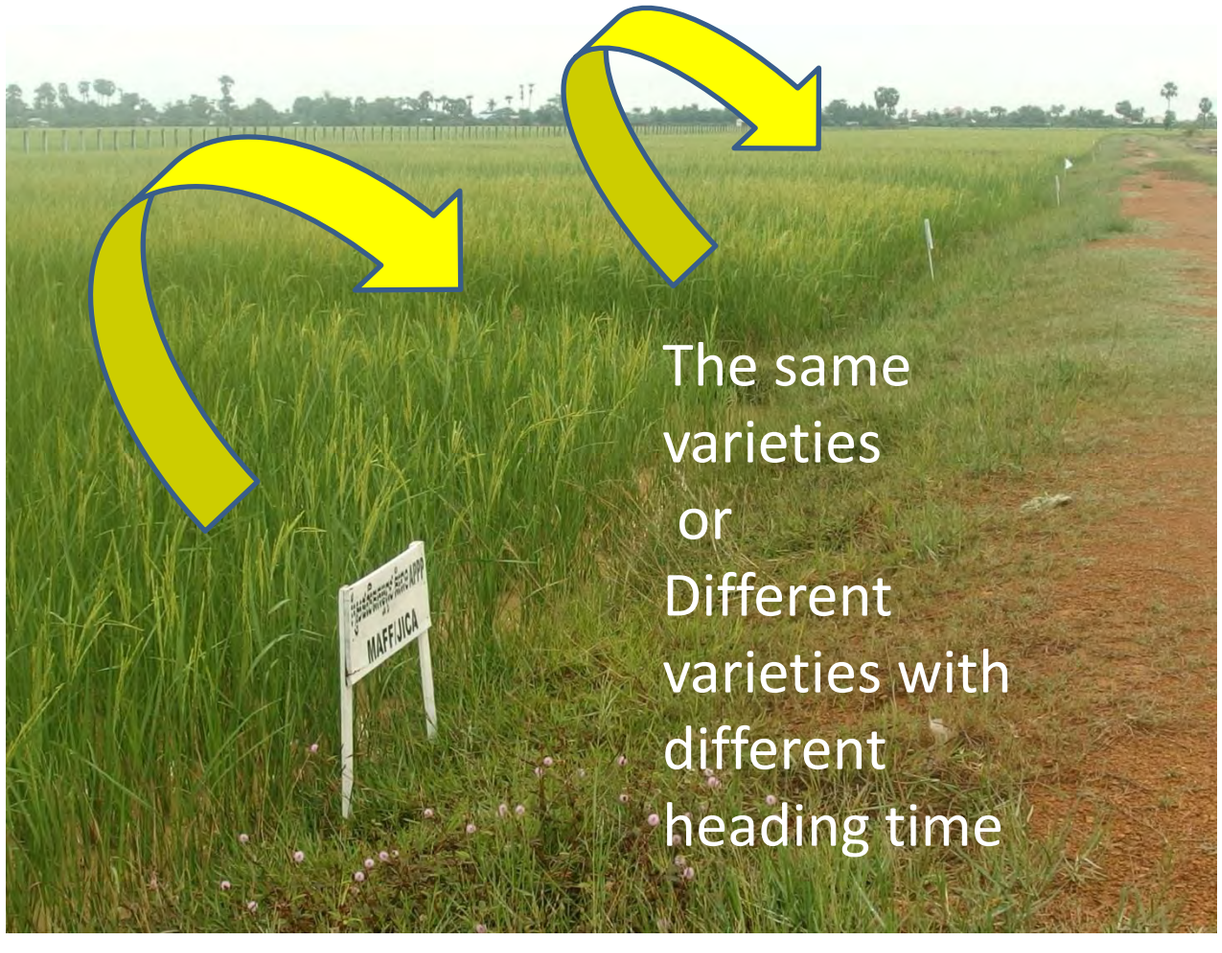


(Phil Rice)

4-2 ARRANGEMENT OF RICE FIELD



- One seed farmer plants one variety for seed production, not more than two varieties, to avoid mixing different seeds.
- Make sure you and your neighbors are not growing other varieties of same heading time, next to the seed plots to avoid crossing.
- A signboard should be displayed in the seed production plot to display the following information:
  ① Name of the Producer
  ② Member Code in SGG
  ③ Name of Variety
  ④ Classification of Seed (Seed Source)
  ⑤ Date of Sowing
  ⑥ Date of Transplanting



4-3 INSPECTION CRITERIA
(1) REGISTERED SEED

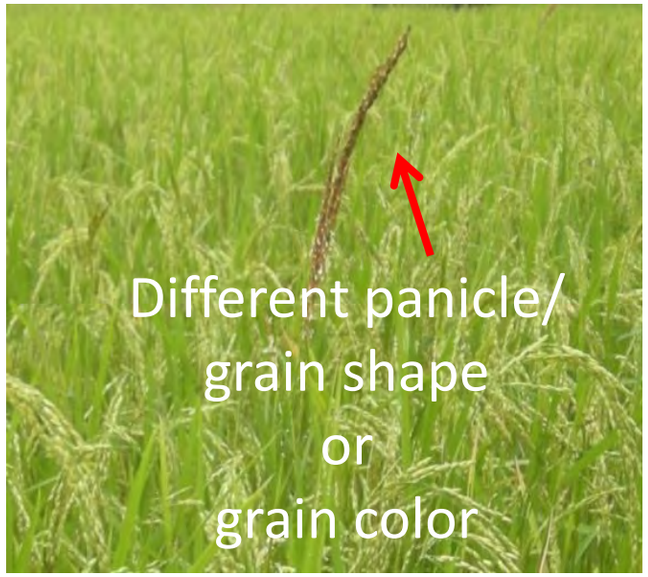
	Inspection 1 Nursery Stage	① Isolation of main field from other varieties: at least 10m apart if same flowering day is expected. ② Uniform growth: at least 80% ③ Light damage of pests and diseases (within the acceptable range) ④ No other varieties and off-types
	Inspection 2 30 days after transplanting	① Uniform growth: at least 80% ② Bakanae disease in the main field: 0% ③ Bakanae disease in neighboring field: 1 plant per 100m^2 within 50m. ④ Pests and diseases: 10% damaged (within the acceptable range) ⑤ Other varieties and off-types: 1 plant per 100m^2 ⑥ Row transplanting with 1-2 seedlings per hill
	Inspection 3 Heading Stage	① Isolation of main field from other varieties: at least 10m apart if flowering takes place within 7days ② Uniform growth/heading: at least 80% of hills ③ Pests and diseases: 10 % of hills damaged (within the acceptable range). ④ Other varieties and off-types: 1 plant per 100m^2
	Inspection 4 Maturity Stage	① Pests and diseases: 10% of hills damaged (within the acceptable range) ② Other varieties and off-types: 1 plant per 100m^2
	Inspection 5 Product Inspection	① Pure seed: 98%(minimum), Insert matter: 2% (maximum), Weed seed: 0.05% (maximum). ② Other varieties: 0.1% (maximum) ③ Moisture content: 13% (maximum) ④ Fulfilled grain ratio: 95% (minimum)

4-3 INSPECTION CRITERIA
(2) CERTIFIED SEED

 Inspection 1 Nursery Stage	① Isolation of main field from other varieties: at least 5m apart if same flowering day is expected. ② Uniform growth: at least 80%. ③ Light damage of pests and diseases (within the acceptable range). ④ No other varieties and off-types
 Inspection 2 30 days after transplanting	① Uniform growth: at least 70% of hills. ② Bakanae disease in the main field: 0%. ③ Bakanae disease in neighboring field, 5 plants per 100m^2 within 5m. ④ Pests and disease: 10% of hills damaged (within the acceptable range). ⑤ Other varieties and off-types: 3 plants per 100m^2 ⑥ Row transplanting with 1-2 seedlings per hill
 Inspection 3 Heading Stage	① Isolation of main field from other varieties: at least 5m apart if flowering within 7days is expected. ② Uniform growth/heading: at least 70% of hills. ③ Pests and diseases: 10 % of hills damaged (within the acceptable range). ④ Other varieties and off-types: 3 plants per 100m^2
 Inspection 4 Maturity Stage	① Pests and diseases: 10 % of hills damaged (within the acceptable range). ② Other varieties and off-types: 3 plants per 100m^2
 Inspection 5 Product Inspection	① Pure seed: 98%(minimum), Insert matter: 2% (maximum), Weed seed: 0.05% (maximum). ② Other varieties 0.2% (maximum). ③ Moisture content 13% (maximum). ④ Fulfilled grain ratio: 95% (minimum)

4-4 IDENTIFICATION OFF-TYPES AND DIFFERENT VARIETIES

The identification and removal of off-types should start from nursery stage and continue until ripening stage. Remove off-types by pulling or cutting at the bottom of hills .



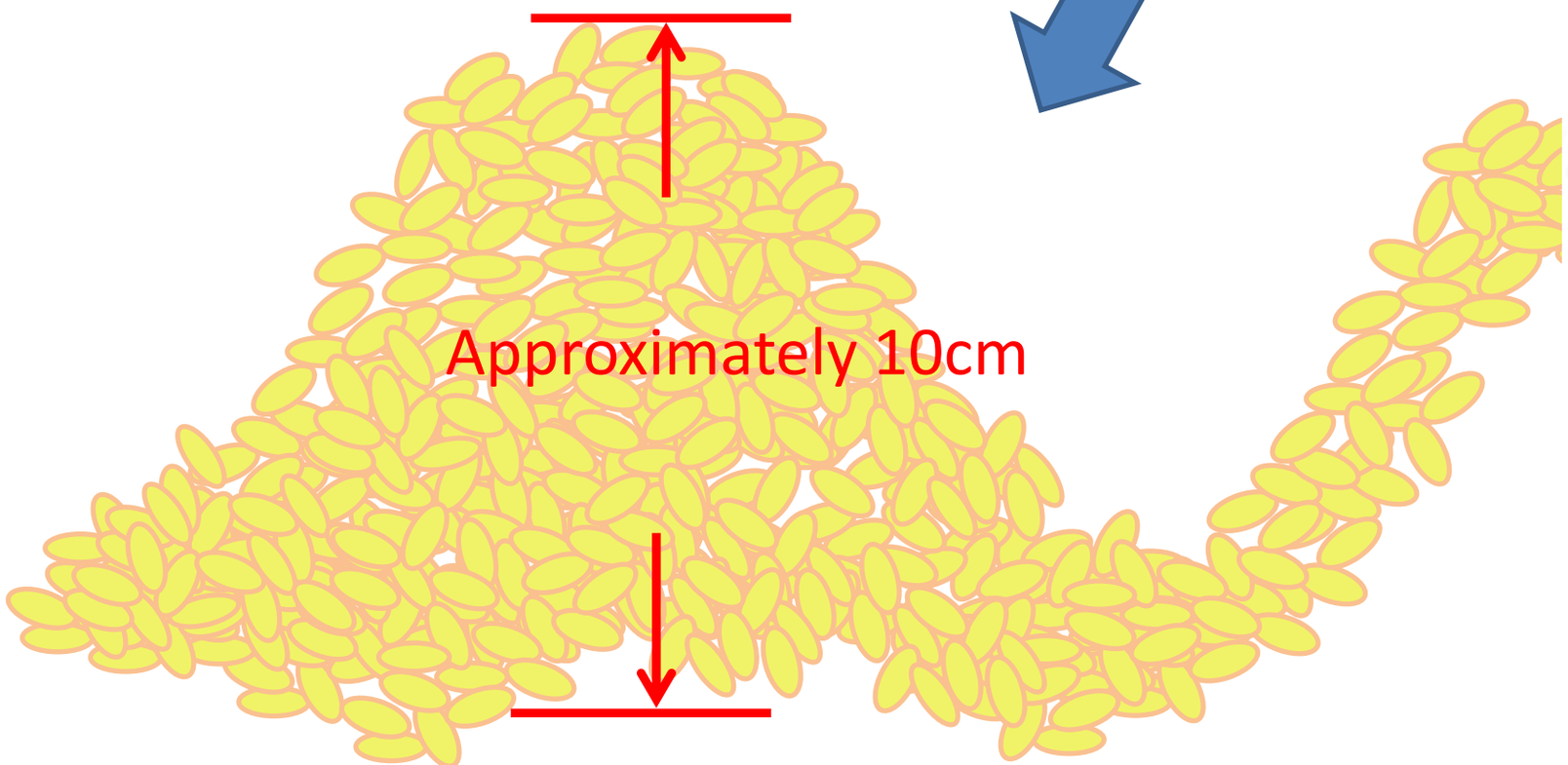
PART V. POSTHARVEST TECHNOLOGY

5-1 DRYING

① Start drying right after threshing. Use a plastic sheet or net. Make sure that the plastic sheet or net are clean to avoid any chances of mixing with other paddies.

② Make streaked “peaks and valleys”.

③ Stir the paddy from time to time to achieve uniform drying. Stop drying when the moisture content reached below 13%.



5-2 WINNOWING AND PACKING

① Check the moisture content of the paddy before starting winnowing.

② Remove unfilled paddy by winnowing. Adjust the winnower to get only fulfilled paddy.

③ Weigh 40kg of paddy in an official shipping bag.

④ Seal the shipping bag by sewing machine. Write seed information by marker.

⑤ All SGG members are requested to keep the final products in the warehouse of their SGG. Keep the warehouse always clean to avoid pests.

5-3 TENTATIVE SEED QUALITY STANDARD

Seed Quality Standard (%)

Factor	Registered	Certified
Pure Seed (min.)	98	98
Inert Matter (max.)	2	2
Weed Seed (max.)	0.05	0.1
Other Crop Seed (max.)	0.1	0.2
Other Varieties (max.)	0.1	0.2
Germination (min.)	85	85
Moisture (max.)	13	13
Filled Grain Ratio	95	95

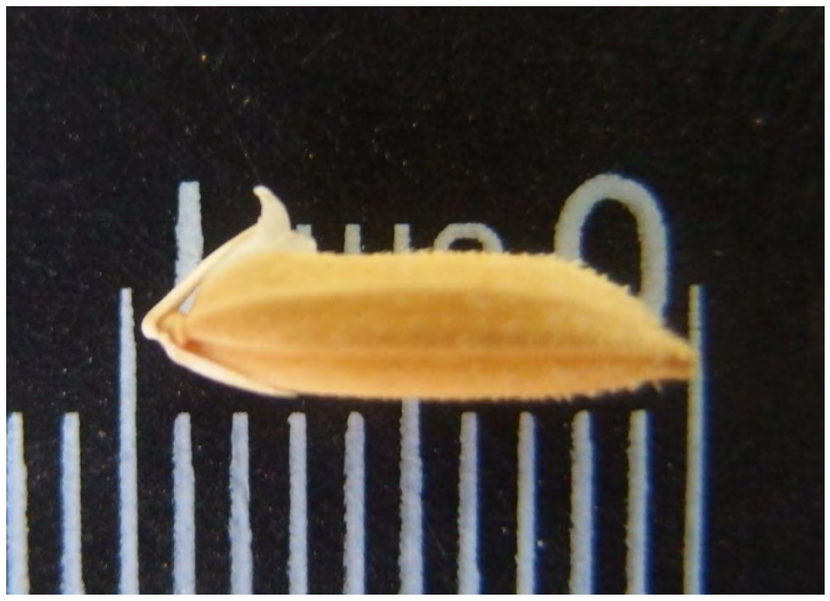
5-4 GERMINATION TEST

① Take paddy samples and soak them into water for 24 hours.

② Put a sheet of tissue paper in a container.

③ Place 100 soaked seeds on the tissue paper in the container. Gently put them in shallow water.

④ Count the number of germinated seeds after 2days.



⑤ This is an example of germinated seed.

⑥ Calculate the germination rate

Ex.) When the number of germinated seeds is 95 out of 100 seeds examined.

95/100 =0.95

Germination Rate: 95 %

ANNEX

Inspection Record for Certified Seed Production

Inspection 1

_____ Seed Growers Group

Name of Seed Grower:_____

ID: _____

Date:_____

Name of Inspector 1: _____ Signature: _____

Name of Inspector 2: _____ Signature: _____

Seed Source	Registered seed of higher class	Pass ☐ No pass ☐
Nursery Isolation	By ridge	Pass ☐ No pass ☐
Isolation of main field From other varieties	At least 5m apart if same flowering day expected.	Pass ☐ No pass ☐
Uniformity of Growth	More than 70% of hills	Pass ☐ No pass ☐
Pests and Diseases	Less than light damage	Pass ☐ No pass ☐
Other varieties and off-types	Less than 3 plants per $100m^2$	Pass ☐ No pass ☐
Weeds	Minimum	Pass ☐ No pass ☐
Overall Evaluation		Pass ☐ No pass ☐

Comments:_____

Inspection Record for Certified Seed Production

Inspection 2

_____ Seed Growers Group

Name of Seed Grower:_____

ID: _____

Date:_____

Name of Inspector 1: _____ Signature: _____

Name of Inspector 2: _____ Signature: _____

Uniformity of Growth	More than 70% of hills	Pass ☐ No pass ☐
Number of seedlings	1 to 2 seedlings per hill	Pass ☐ No pass ☐
Bakanae Disease in main field	Nil	Pass ☐ No pass ☐
Bakanae Disease in neighboring field	5 plants per $100m^2$ within 5m	Pass ☐ No pass ☐
Pests and Diseases	Less than 10% damaged	Pass ☐ No pass ☐
Other varieties and off-types	Less than 3 plants per $100m^2$	Pass ☐ No pass ☐
Weeds	Minimum	Pass ☐ No pass ☐
Overall Evaluation		Pass ☐ No pass ☐

Comments: _____

Inspection Record for Certified Seed Production

Inspection 3

_____ Seed Growers Group

Name of Seed Grower:_____

ID: _____

Date:_____

Name of Inspector 1: _____ Signature: _____

Name of Inspector 2: _____ Signature: _____

Isolation of main field From other varieties	At least 5m apart if flowering within 7 days	Pass ☐ No pass ☐
Uniformity of Growth	More than 70% of hills	Pass ☐ No pass ☐
Pests and Diseases	Less than10% damaged	Pass ☐ No pass ☐
Other varieties and off-types	Less than 3 plants per 100m²	Pass ☐ No pass ☐
Weeds	Minimum	Pass ☐ No pass ☐
Overall Evaluation		Pass ☐ No pass ☐

Comments: _____

Inspection Record for Certified Seed Production

Inspection 4

_____ Seed Growers Group

Name of Seed Grower:_____

ID: _____

Date:_____

Name of Inspector 1: _____ Signature: _____

Name of Inspector 2: _____ Signature: _____

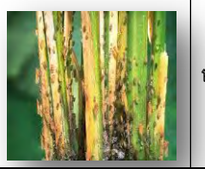
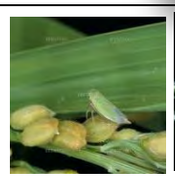
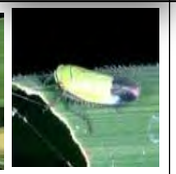
Pests and Diseases	Less than10% damaged	Pass ☐ No pass ☐
Other varieties and off-types	Less than 3 plants per 100m²	Pass ☐ No pass ☐
Weeds	Minimum	Pass ☐ No pass ☐
Overall Evaluation		Pass ☐ No pass ☐

Comments: _____

List of Diseases & Pesticides

Name of Disease		Usable Chemical	
Rice Blast 	ប្លាស់	SAWANT 400EC, CARBENZIM 500FL, SANASA 100SC, TANAXA 700WP, Flash 75WP	កាបេនស៊ីម, សាណាសា, សាវន្ត, តាណាហ្សា
(Bacterial) Leaf Blight 	ជំងឺរលាកស្លឹកដែលបង្កឡើងដោយបាក់តេរី	Not identified	
Sheath Blight 	ជំងឺរលាកស្រទបស្លឹក	SAKATA 500SC, VALIDAN 5SL	សាកាតា, វ៉ាលីដាន
Rice Stripe(virus) 		There is no chemical to control virus directly. Control of Brawn Planthopper (virus transmitter) is the first step, and usable chemicals are as follows. ACTION5SC NATO 55EC, SECSAIGON 25EC, OSIN 50WP	

List of Insects & Insecticides

Name of Insect		Available Chemical	
(English)	(Khmer)	(English)	(Khmer)
Rice Army Worm 	ដង្កូវហ្វូង	NATO 55 EC, VITASI 480EC、 ACTION5SC	ណាតូ, វីតាស៊ី, អូស៊ីន
Brawn Planthopper 	មមាចត្នោត	VITASI 480EC, CYRIPHOS 585EC, SECSAIGON 10EC, ACTION5SC NATO 55EC, SECSAIGON 25EC, OSIN 50WP, VINO 200SC, NAFAZA 350SC	វីតាស៊ី, ស៊ីរីផូស, ដ្យាហ្វូស, យេតាន, អូស៊ីន, ហ្វីប្រូនីល, វីហ្វូន, ណាផាហ្សា
Green Leafhopper  	មមាចខៀវ	VITASI 480EC, CYRIPHOS 585EC, OSIN 50WP, VIFONE 200SL, NAFAZA 350SC	វីតាស៊ី, ស៊ីរីផូស, អូស៊ីន, វីហ្វូន, ណាផាហ្សា
Leaf holder  	ដង្កូវមូរស្លឹក	VICARE 36EC, ALPHAN 5 EC, VITASI 480EC, CYRIPHOS 585EC, SECSAIGON 10EC, SECSAIGON 25EC, CYPENRAN 10EC, DIAZAN 50EC, VINO 200SC, VIGO 500EC, PERAN 50EC, KINALUX 25EC	វីយែរ, អាល់ហ្វាន, វីតាស៊ី, ស៊ីរីផូស, សិកសៃហ្គន, ស៊ីប៉ែរ៉ង់, ឌីអាស្យាន, វីណូ, ប៉ែរ៉ង់, គីណាលុច
Rice Bags  	ស្រែងជញ្ជក់ទឹកដោះ	CYRIPHOS 585EC, SECSAIGON 10EC, SECSAIGON 25EC, OSIN 50WP, VINO 200SC, NAFAZA 350SC	
Rice Case Worm 	ដង្កូវបំពង់កាត់ស្លឹក		វីតាស៊ី, ស៊ីប៉ែរ៉ង់, វីហ្គោ, គីណាលុច
Yellow Stem Borer 	ដង្កូវស្បែងដើម	NATO 55 EC, GOLDEN DRAGON 585EC, CYRIPHOS 585EC, CYPENRAN 10EC, DIAZAN 50EC, DIAPHOS 10H, NETOXIN 18SL, PERAN 50EC	ណាតូ, ហ្គោលដិនដ្រាហ្គន, ស៊ីរីផូស,ស៊ីប៉ែរ៉ង់, ឌីអាស្យាន, ដ្យាហ្វូស, ណោតូស៊ីន, ប៉ែរ៉ង់
Rice Thrips  		DIAZAN 50 EC, DIAPHOS 10 H	

Herbicides for Rice Culture available in the Cambodian Market

					
Trade Name	Nominee 10SC	BISONA 100SC	NO WORRY 100SC	Sre ors Smav	Bayon Smav
Active Chemical	Bispyribac sodium				
Target Weed	Annual Grasses, Broadleaf Weeds				
Application Information	・Post-emergence Type. ・Transplanted/Wet Direct Seeded: 2-4 leaf stage of weeds or 7-15 days after transplanting/seeding. ・Drain excess water before spraying to expose target weeds, irrigate 1-3 days after application to obtain desired weed control. ・Dilute 10 ml product per 16 litters of water. ・Spray Rate (water volume): 160 ℓ- 320 ℓ per ha. ・Spray on leaves of weeds (Not absorbed from roots).				

						
Trade Name	Vitoxomone		PYANCHOR 3EC	Smao Srov Prang		Xpert 70WP
Active Chemical	Propanil	24D	Pyribenzoxim	Quinclorac	Fenoxaprop-P-ethyl	Pyrazosulfuron-ethyl
Target Weed	Annual Grasses,	Broadleaf Weeds	Barnyard Grass Broadleaf Weeds	Grasses	Grasses (Crabgrass)	Grasses, Broadleaf Weeds
Application Information	・Post-emergence Type.	2.4-D is absorbed from leaves, stems, and roots of weeds	・Post-emergence Type.			

Contact Information of APPP/JICA Supported Seed Growers

Province	Seed Grower Groups		Contact Persons & Phone Numbers
Battam-Bang		SAMAKI SEED in Banan	Mr.Tong Simon : 088-488-8523 Mr.In Suon: 053-662-9696
		SAMAKI SEED in Moung Russei	Mr.Moul Meun: 089-359-995 Mr.Hou Pen : 053-631-1889 Ms. Pheung Vy: 092-875-673
		SAMAKI SEED in Bavel	Mr.Houl Khlim: 012-675-589 Mr.Seun Buntheun: 012-402-381 Mr.Srey Kov: 092-954216
Pursat		TAS-PDA	Mr.L. Chendamony:012-879-877 Mr.H.Chandara: 012-635-409
K. Chhnang		Phnom Touch SAMAKI SEED	Mr.Meas Soeurn: 012-681-523 Mr.Kheb Bou: 092-358-997 Ms.Kae Khan: 017-435-165

These seed growers all follow the seed production guideline introduced by APPP/JICA and use legitimate rice variety lines originally obtained from CARDI*. You can contact them to get your new seeds.