

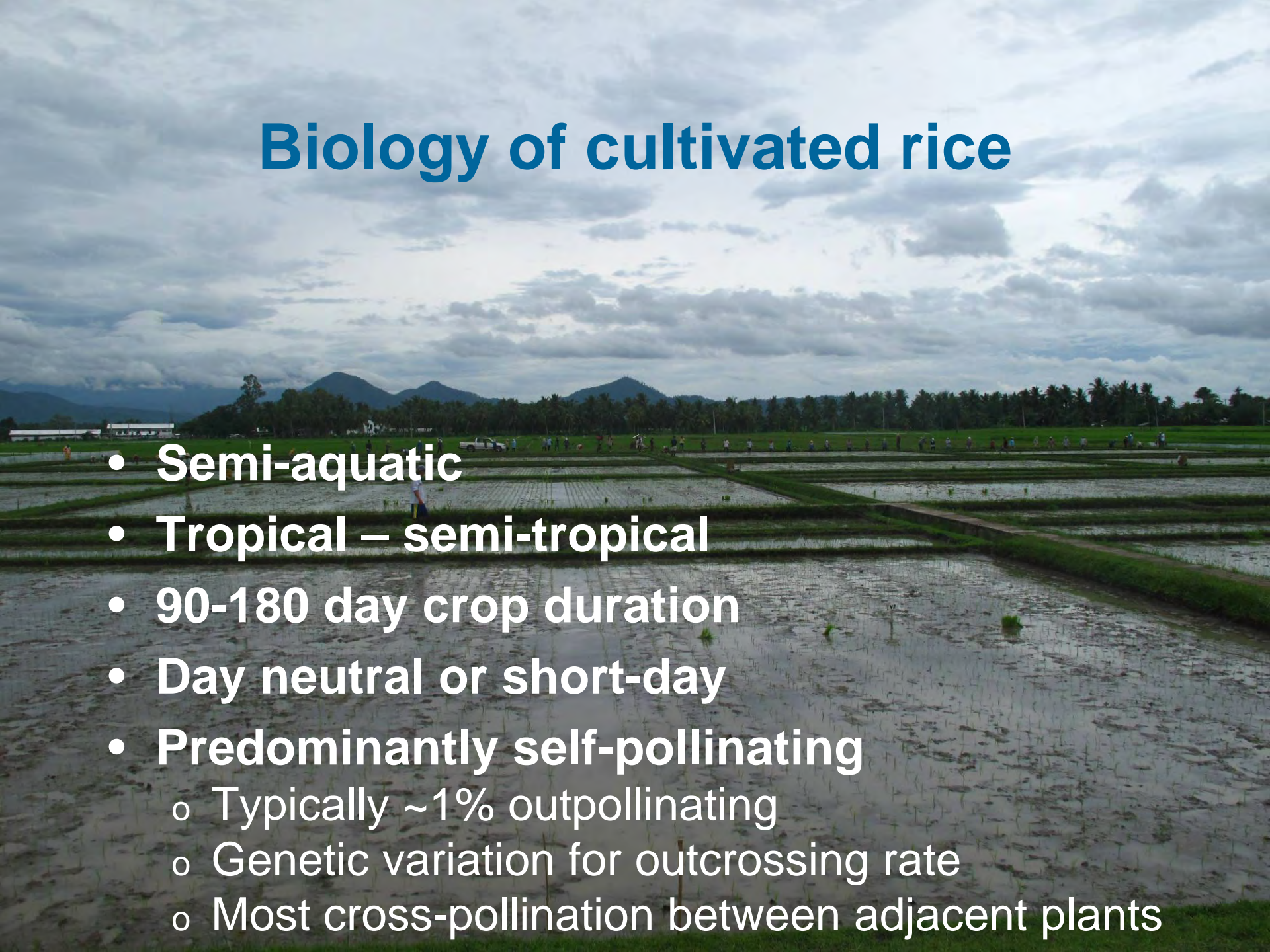


**Regeneration of cultivated rice**  
*Oryza sativa* L.

**Ruaraidh Sackville Hamilton**  
**Renato Reaño**

**T.T. Chang Genetic Resources Centre**  
**International Rice Research Institute**

# Biology of cultivated rice

- **Semi-aquatic**
  - **Tropical – semi-tropical**
  - **90-180 day crop duration**
  - **Day neutral or short-day**
  - **Predominantly self-pollinating**
    - Typically ~1% outpollinating
    - Genetic variation for outcrossing rate
    - Most cross-pollination between adjacent plants
- 

## Location: wide adaptability of rice

- **Most varieties can be grown in one location**
- **Day-length sensitive varieties not at equator**
- **Some extreme cold-adapted not easy in hot climates**
- **Some extreme heat-adapted not easy in more temperate climates**
- **Grain quality poor in wet environments**
  - In locations with two cropping seasons, use only drier season for regeneration
- **IRRI:**
  - Latitude 15°N, dry season November - March good for most

## Cultivation:

# The unusual diversity of rice ecosystems

**Upland rice**

**Soil waterlogged for < 30% of crop cycle**

**Most varieties yield well with controlled irrigation**

**Irrigated lowland**

**Temporary flooding by irrigation:  
waterlogged for > 30% of crop cycle**

**Rainfed lowland**

**Temporary flooding by rain:  
waterlogged for > 30% of crop cycle**

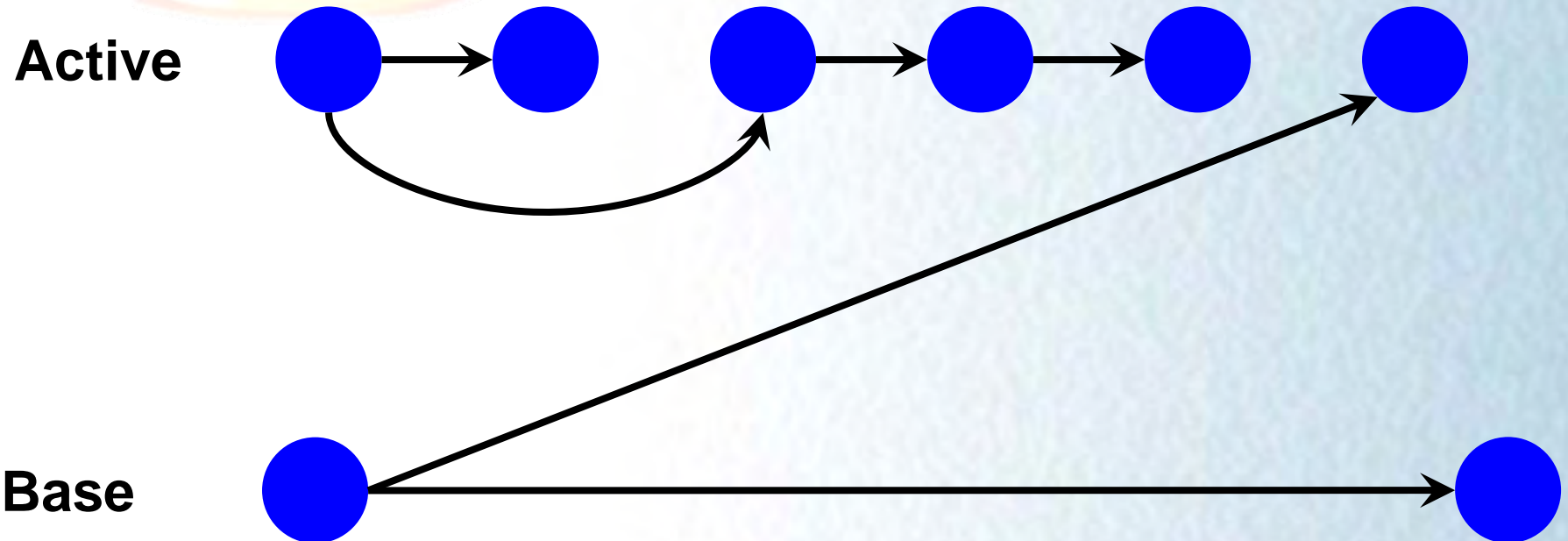
**Deepwater rice**

**Flooded to >1m deep  
Specialised varieties elongate stems**

# Annual selection of accessions: priorities for regeneration

- 1. Accessions with insufficient viability or poor health**
  - < 85% initial
- 2. Initial seed increase of newly-received samples**
  - With unknown, often poor quality
- 3. Special purpose seed increase**
- 4. Regeneration for long-term conservation**
- 5. Accessions with insufficient quantity**
  - < 60g (active collection)
  - < 120g (base collection)

# Choosing seed source



# IRRI

## Printed field book

Prior characterization data  
to confirm identity

Data entry fields to monitor  
progress

Apiculus Color

ORI	VG	AW	AP	LP	GR	GR	SC	SEED	PLT	HARV
		PR	CO	CO	LT	WD	CO	STAT	STAT	STAT

Awn Presence

BGR	2	1	020	053	8	3.8	010			
CHN	1	0	010	054	7.8	2.7	010			
KOR	2	1	070	020	7.4	3.1	010			
USA	2	0	010	020	8.6	3.3	010			
IND	1	0	020	020	7.4	2.9	010			





# Laying out seed packets



# Covering sown seeds



IRRI

**Germinating seedlings  
ready  
for transplanting**



Arranging seedlings  
in boxes

... and dipping in  
Zinc Oxide



IRRI

# Transplanting





## Replanting failures

## Hand weeding



**IRRI**

**Alternating early-late accessions,  
empty rows between plots**



IRRI

## Harvesting by hand

± bagging, ± sequential harvests, - border rows





**Seed blowing:  
1<sup>st</sup> stage cleaning  
after threshing**



**1<sup>st</sup> stage drying**

## Harvested, blow-cleaned, part-dried, bagged Ready for seed authentication



## Seed cleaning



**Manually remove:**

- **Immature seed**
- **Badly developed seed**
- **Chaff**
- **Diseased seed**
- **Off-types**

IRRI

# Viability test



# Packing and sealing bulk sample for active collection

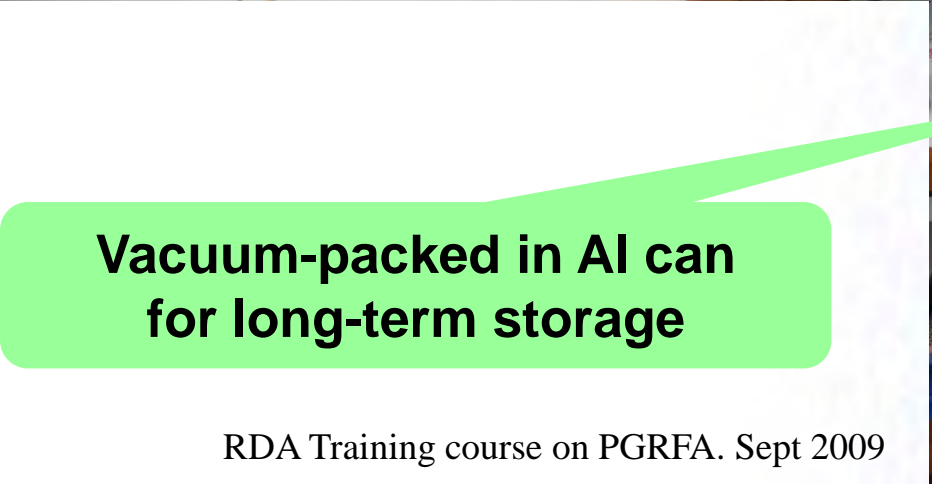


# Labelling and weighing for inventory



**Bulk sample for active collection**

**10g sample pre-packed ready for distribution**



**Vacuum-packed in Al can for long-term storage**



## Done! Ready for storage

### Major risks to genetic integrity from mis-handling:

- **Mislabelling / mixing up seed lots**
  - During preparation, sowing, transplanting, growing, harvesting, processing
- **Contamination with wrong seed**
  - During preparation, sowing, transplanting, growing, harvesting, processing