

# Preliminary Evaluation of Thai *Erianthus* germplasm

Y. Terajima<sup>1</sup>, W. Ponragdee<sup>2</sup>, A. Tippayawat<sup>2</sup>,  
T. Sansayawichai<sup>2</sup>, S. Tsuruta<sup>1</sup>,  
A. Sugimoto<sup>1</sup> and H. Takagi<sup>1</sup>

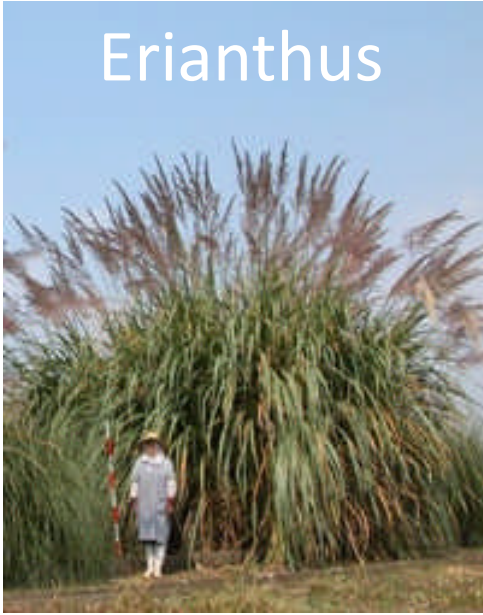
<sup>1</sup> *Japan International Research Center for Agricultural Sciences*

<sup>2</sup> *Khon kaen Field Crops Research Center, Thailand*

# Why *Erianthus* ?

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Erianthus



## 【Good characteristics of *Erianthus*】

- High yielding
- Vigorous ratooning
- Big and deep root system
- Tolerance to drought, water logging, low fertility soil, low pH soil, etc.
- Disease resistance
- Insect resistance ( P. Jackson, 2011)

***Very good genetic resources  
for sugarcane breeding  
(yielding, stress tolerant, etc.)***

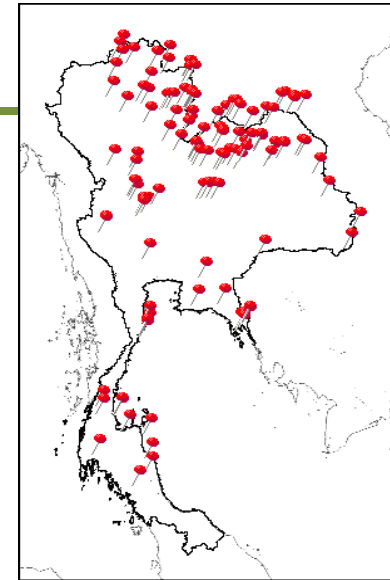
## 【Breeding use of *Erianthus*】

Australia, China, India, USA, etc.

# *Erianthus* germplasm in Thailand

## Huge germplasm

- 1997 : start the collection (KKFCRC and JIRCAS)
- 150 accessions in KKFCRC
- *E. procerus* and 3 type of *E. arundinaceus*  
( Tagane et. al. 2012, GRACE)



*E. procerus*  
(2n=40)



Type I (2n=60)



Type II (2n=60)



Type III (2n=40)

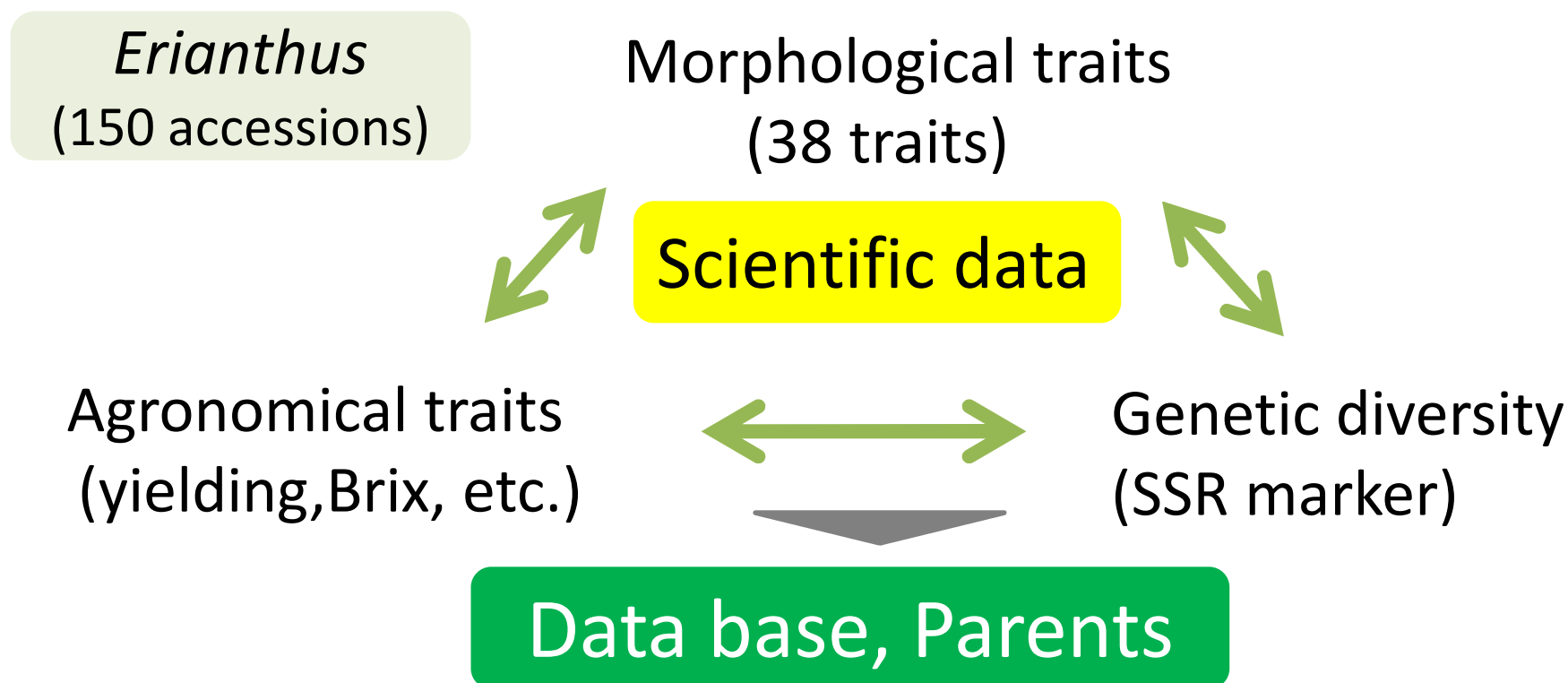
*E. arundinaceus*

***Valuable breeding materials for sugarcane breeding in Thai***

# JIRCAS-KKFCRC (Thailand) collaborative project

Development of new type of sugarcane with high biomass productivity under adverse agricultural environments by using *Erianthus* germplasm(2011 – 2015)

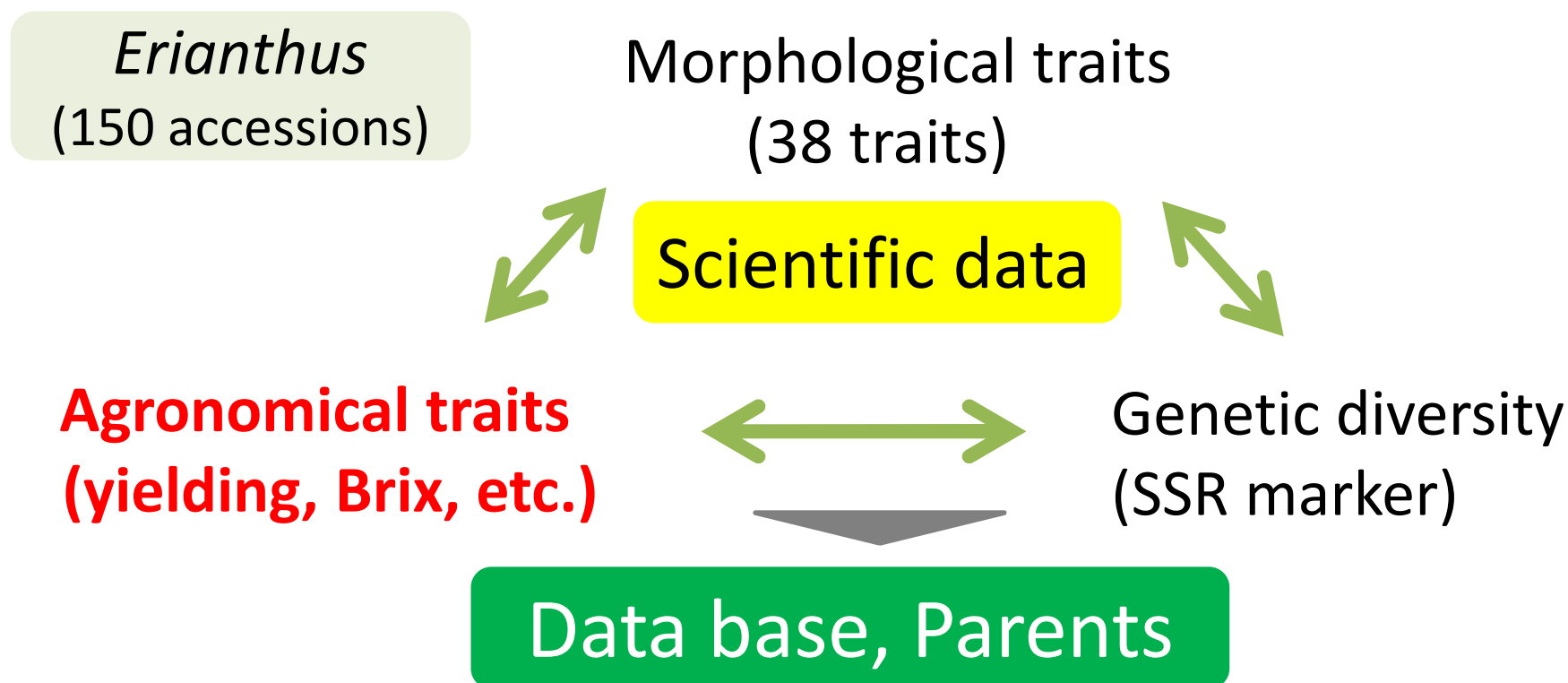
## *Evaluation of Erianthus germplasm in Thai*



# JIRCAS-KKFCRC (Thailand) collaborative project

Development of new type of sugarcane with high biomass productivity under adverse agricultural environments by using *Erianthus* germplasm(2011 – 2015)

## *Evaluation of Erianthus germplasm in Thai*





# *Erianthus* germplasm evaluation in Thailand

## Experimental site

- Khon Kaen Field Crops Research Center (North East Thailand)
- Sandy soil
- Annual precipitation: 1000mm/year



Sever drought from Nov. to April

## Materials

- 150 accession (*E. arundinaceus*, *E. proceus*)
- Sugarcane (KK3、K88-92)
- Inter-specific hybrids (TPJ03-452)
- Napier

## Method

- 1 stool/plot
- inter-row space :2m
- inter-hill space :2m
- 3 rep. (randomized block design)

Data collection: 10 Agronomical traits (Dry matter yielding, stalk no., brix, etc.)

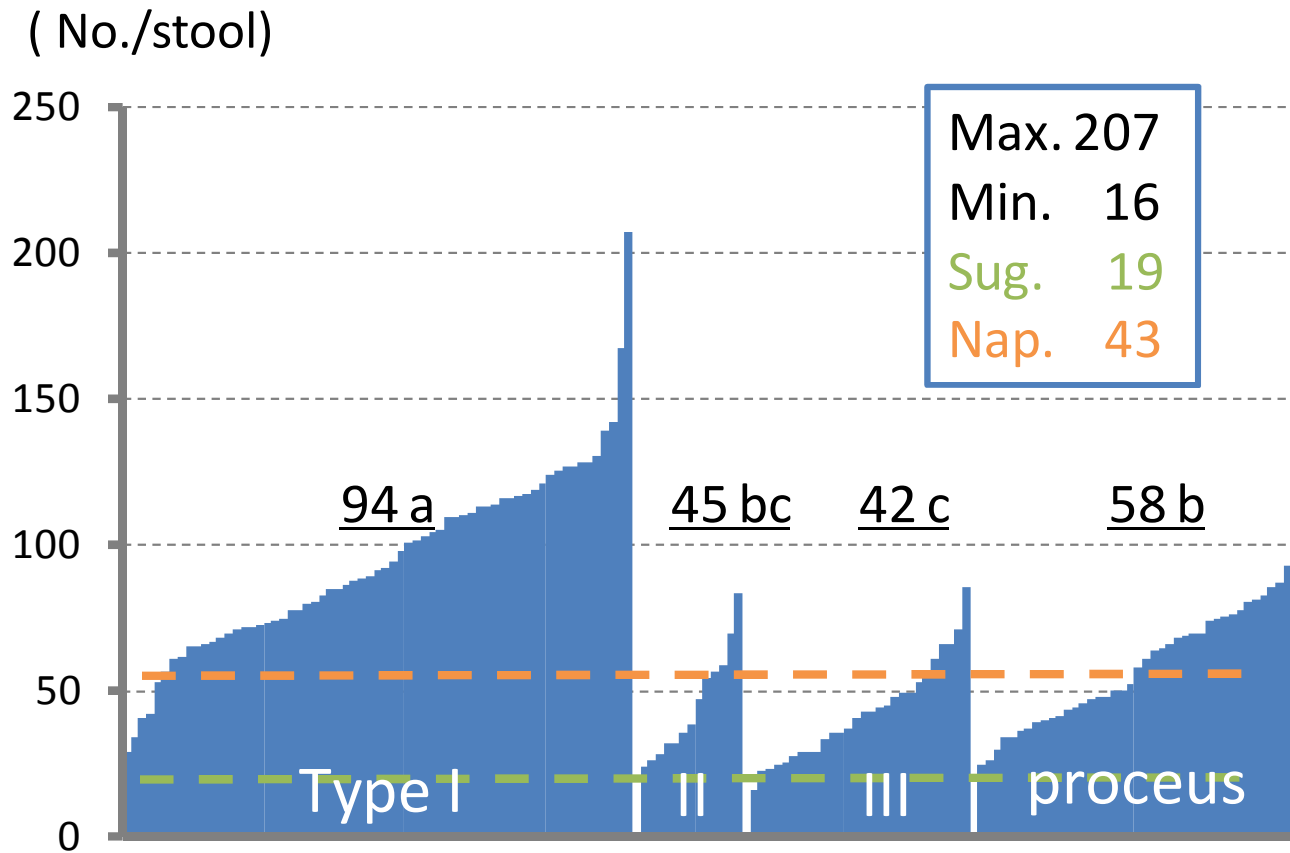


Planted on May 2011



Harvested on March (Dry season) 2012, 2013, 2014

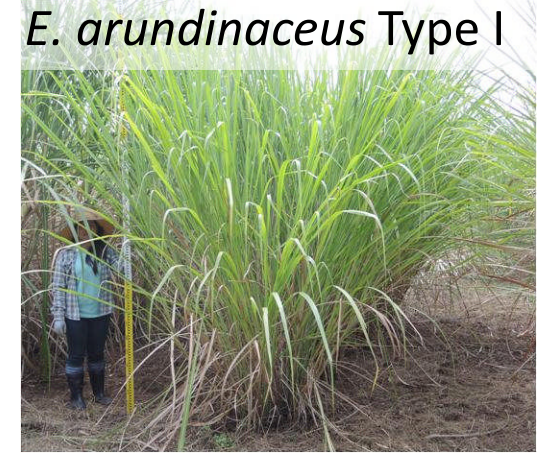
# Number of stalks (No. /stool)



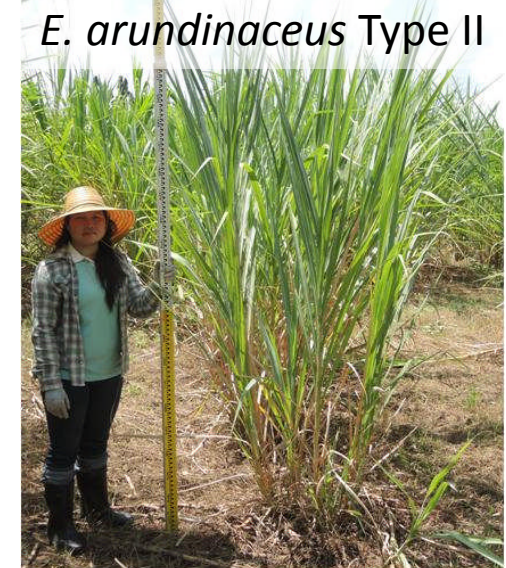
Erianthus > sugarcane, Napier

Type I > Type II, III, Procerus

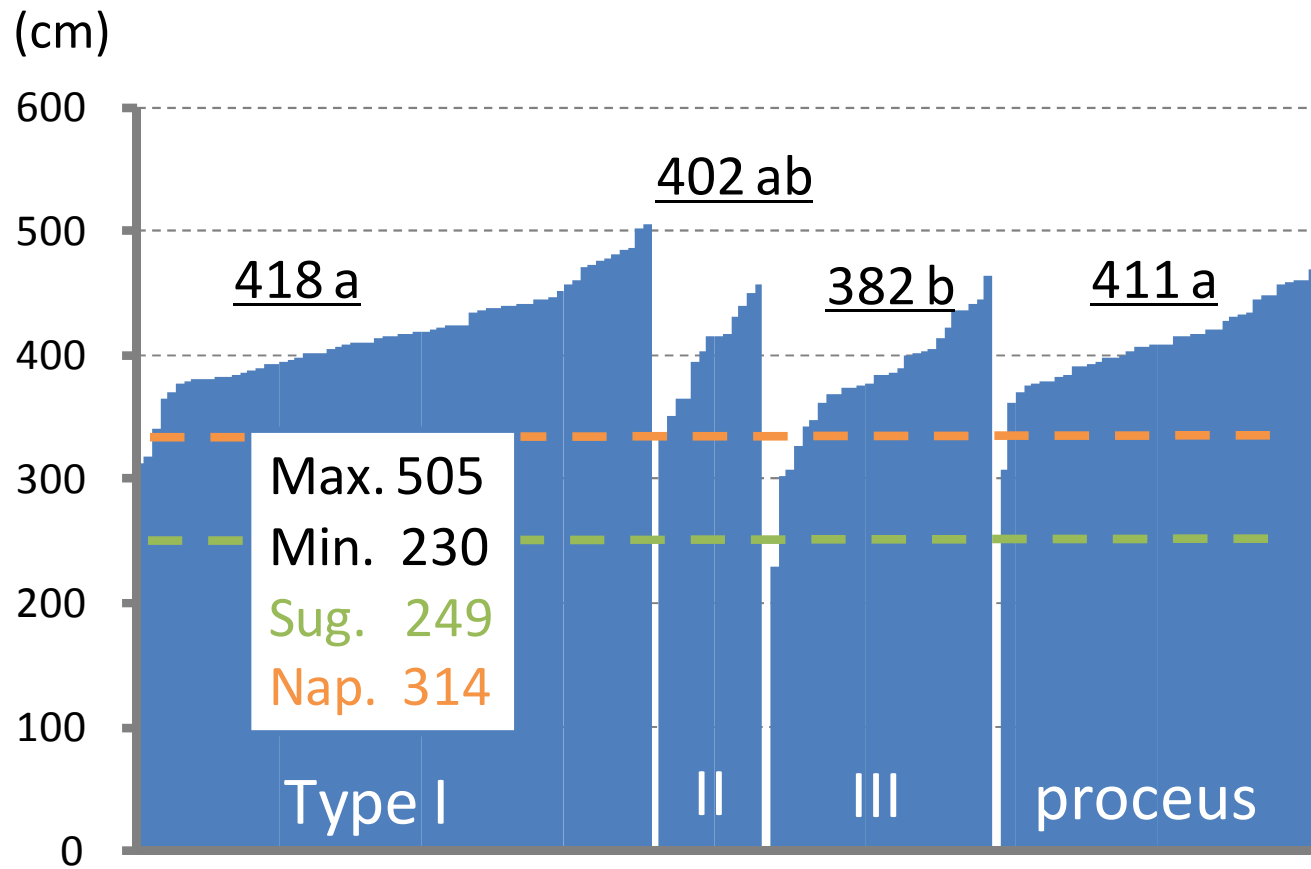
ThE10-9



ThE98-242



# Stalk length (cm)



Erianthus > sugarcane, Napier

Type I, Procerus > Type III

ThE09-5 *E. procerus*

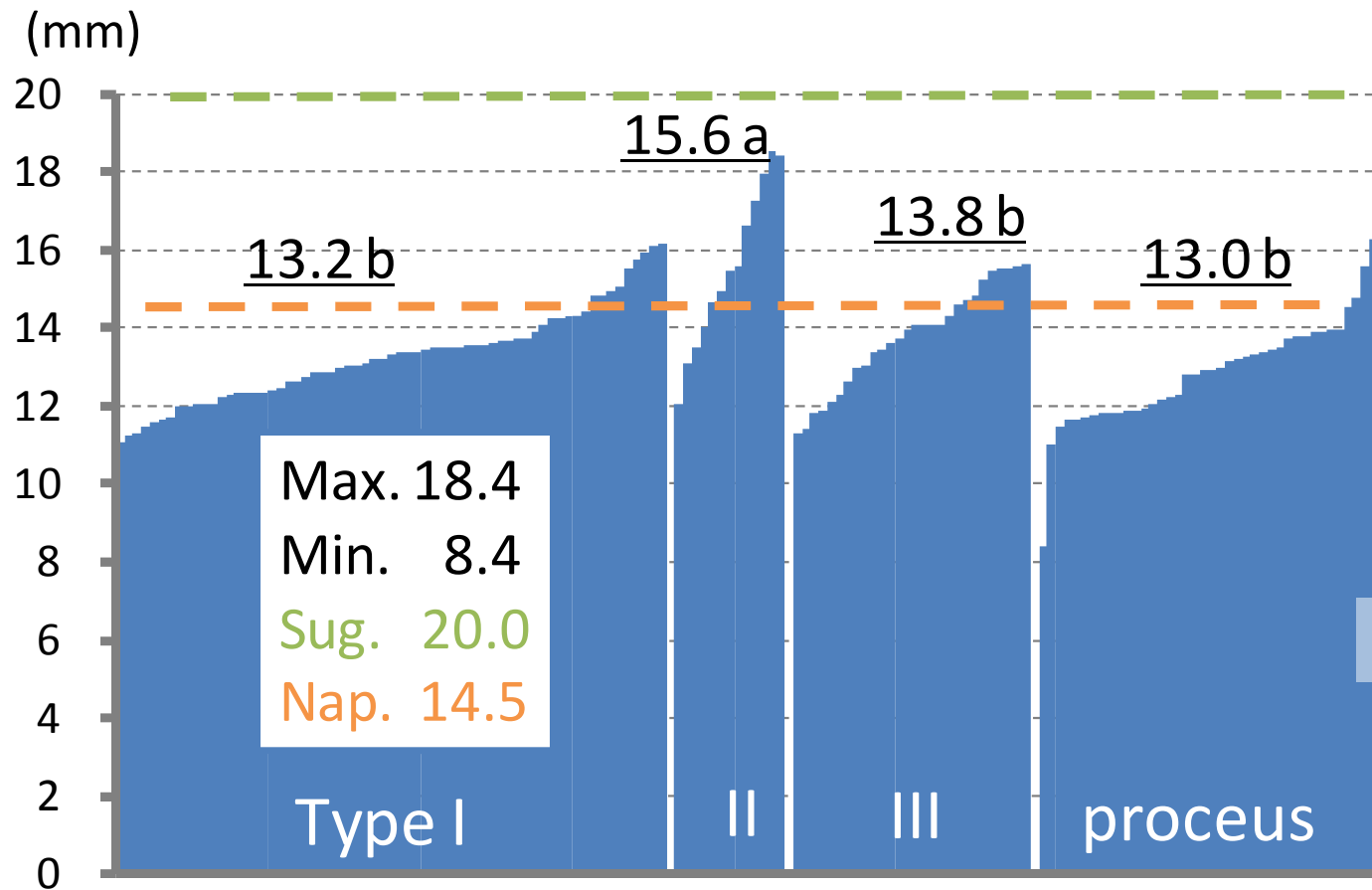


Open 3 Type III





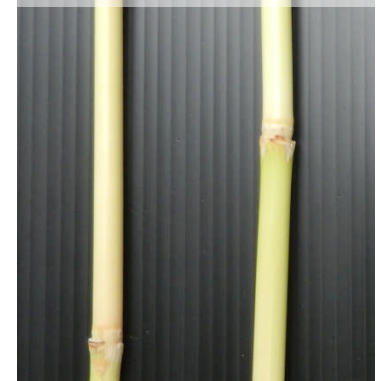
# Stalk diameter (mm)



ThE10-6 Type II



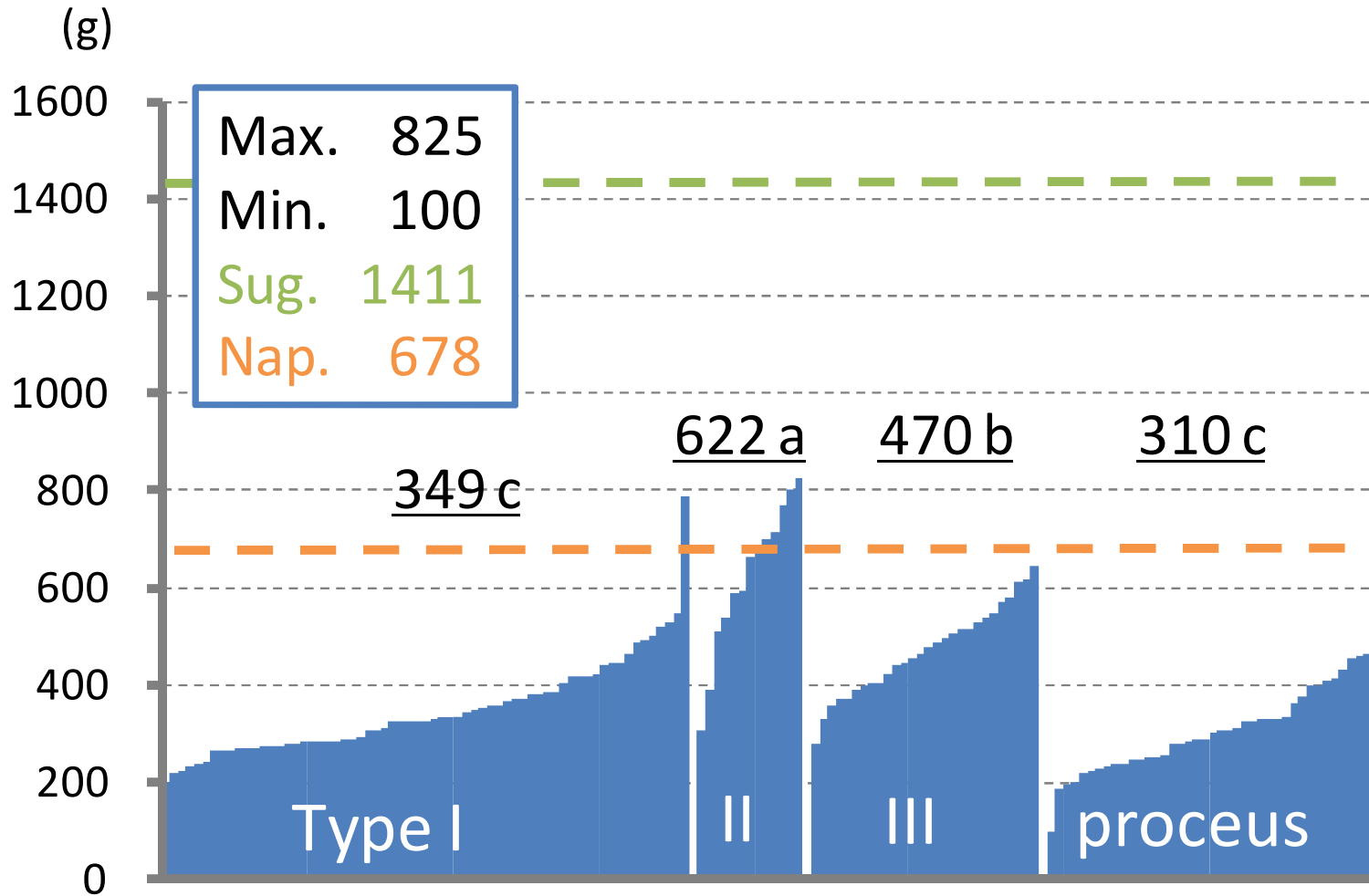
ThE01-46 E. procerus



Sugarcane > Erianthus

Type II > Type I, III, Procerus

# One stalk weight (g)

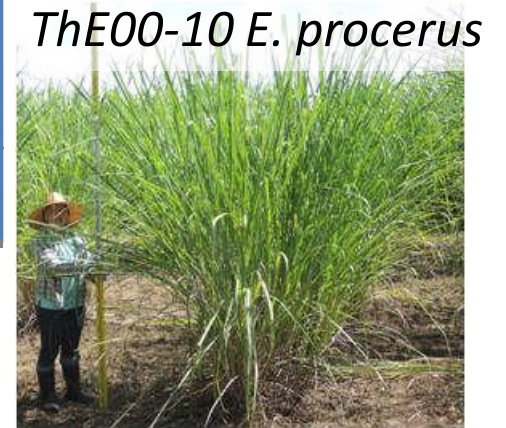
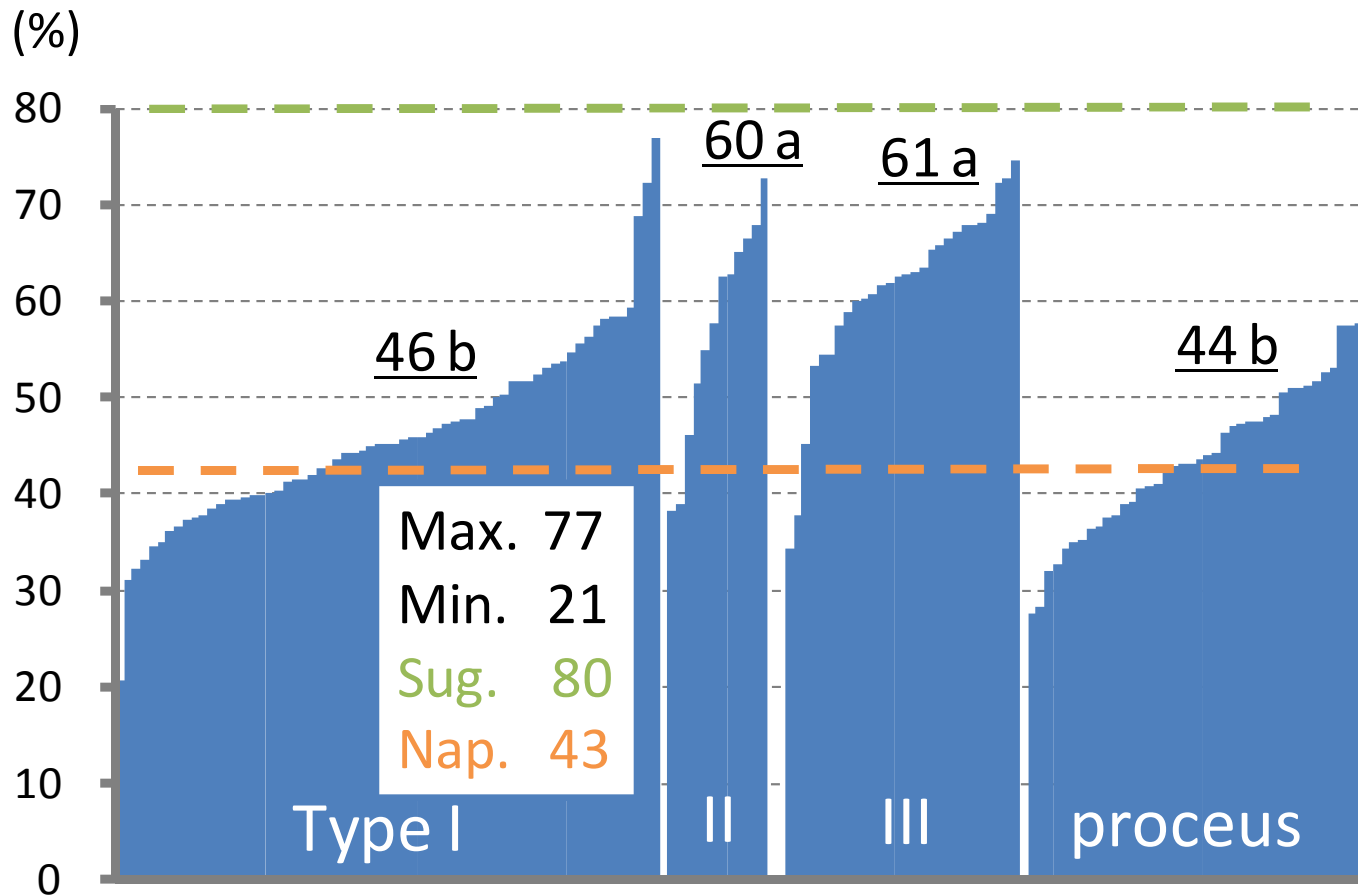


Sugarcane > Erianthus

Type II > Type I, III, Procerus

# Ratio of stem part (%)

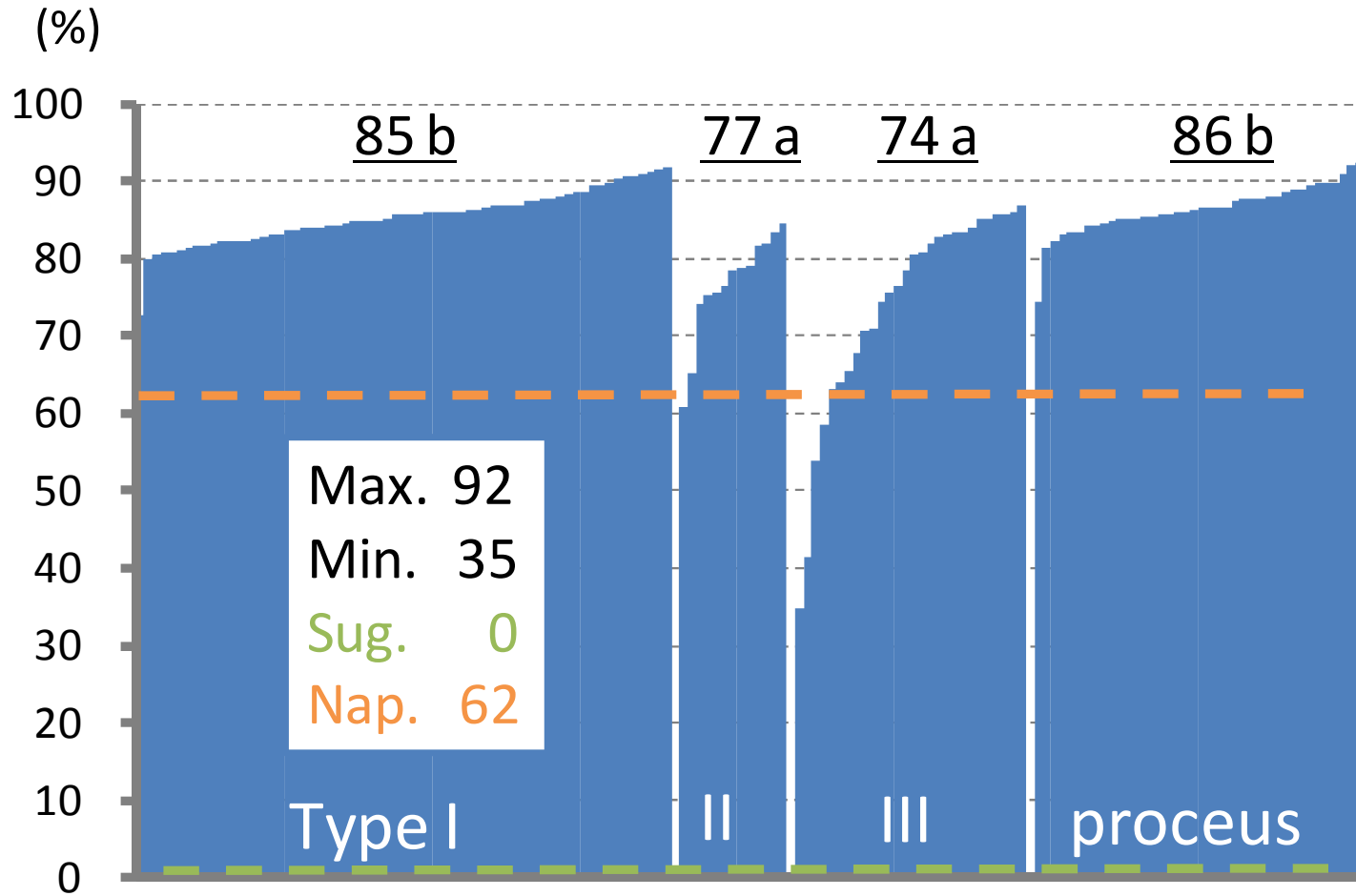
$$\text{Ratio of stem part} = \frac{\text{Stem dry weight}}{\text{Total dry weight}} \times 100 (\%)$$



Sugarcane > Erianthus

Type II, III > Type I, Procerus

# Pith(%)

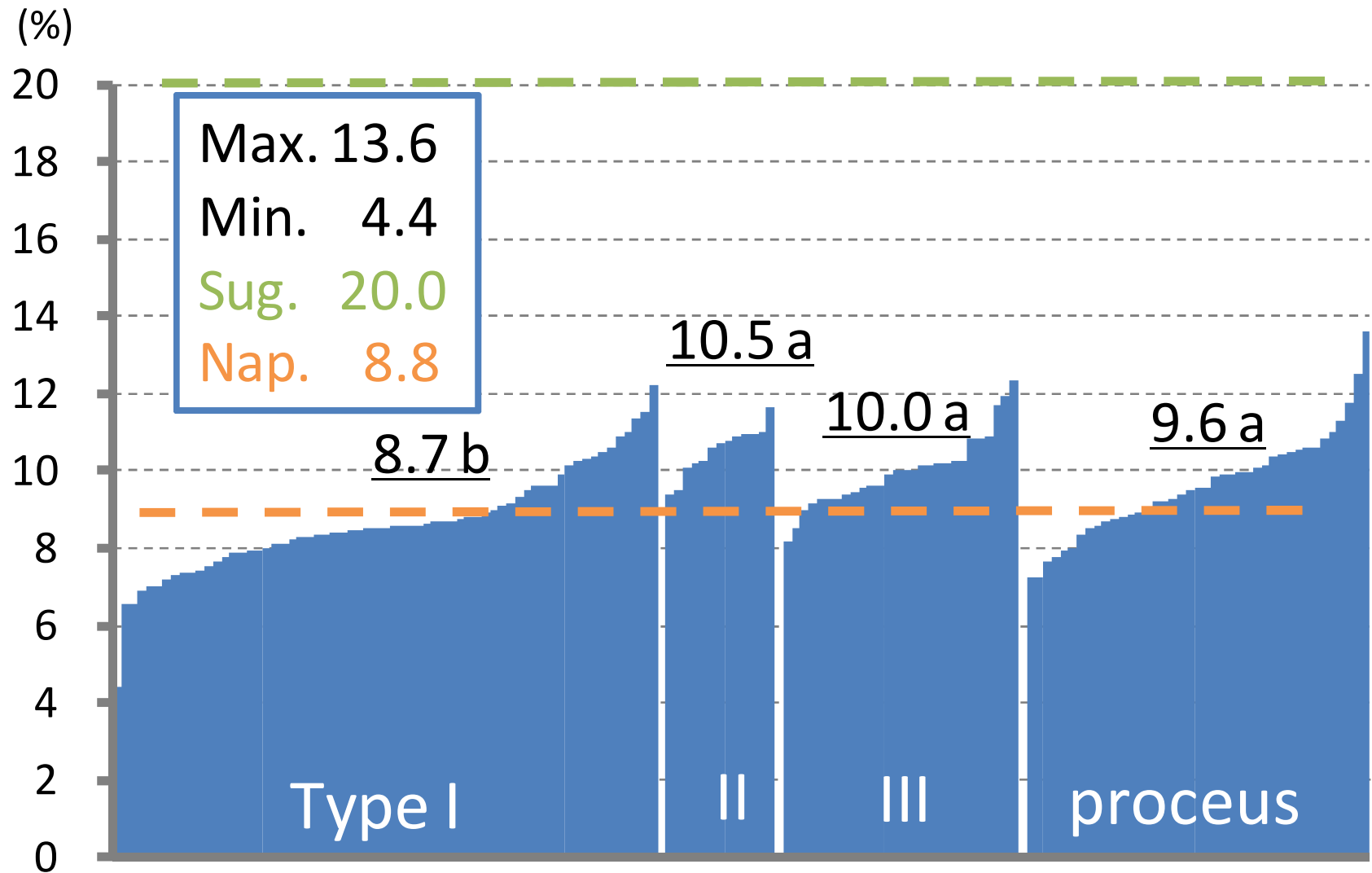


Erianthus > sugarcane, Napier

Type I, Procerus > Type II, III



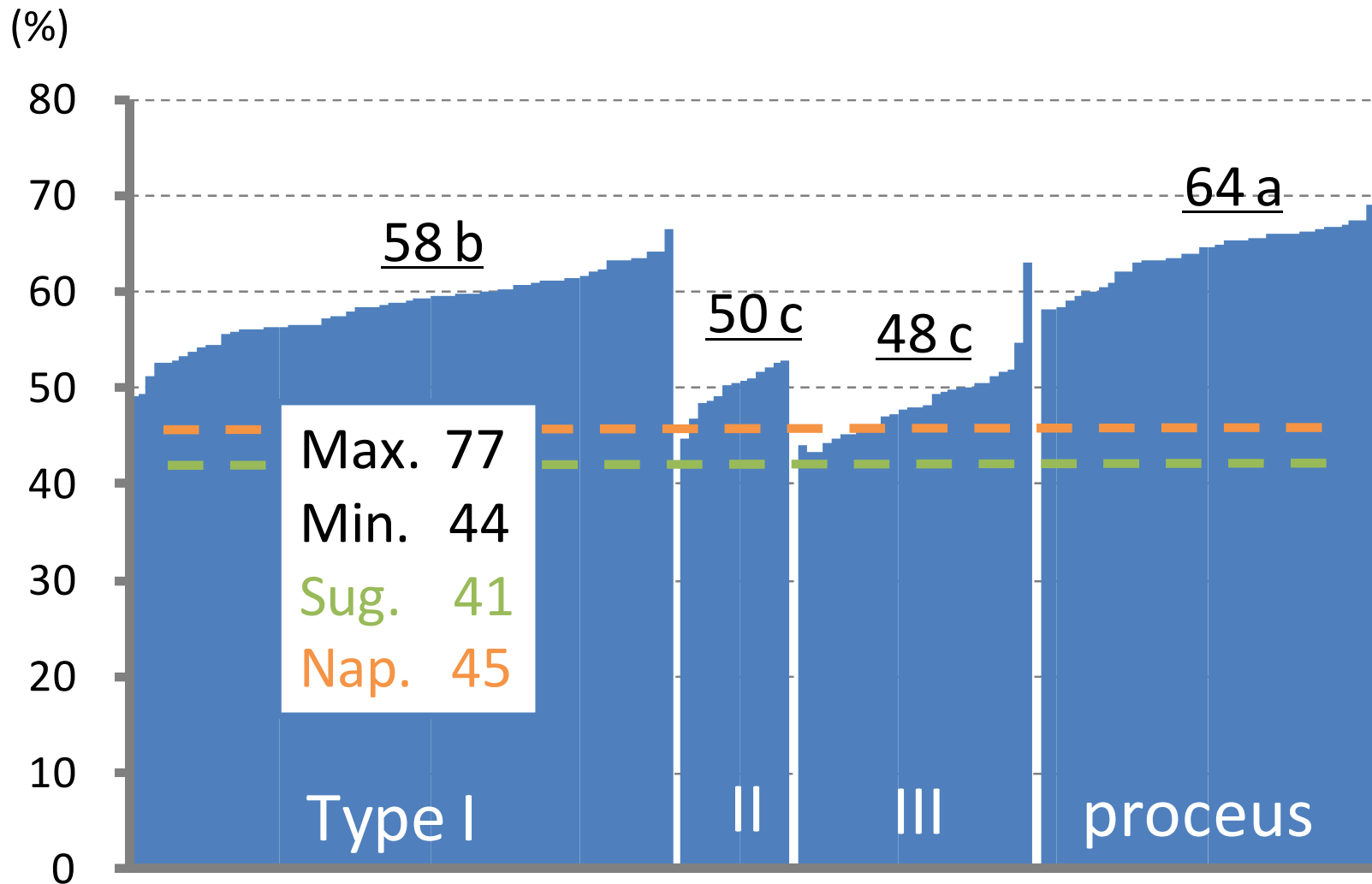
# Brix (%)



Sugarcane > Erianthus

Type II, III, Procerus > Type I

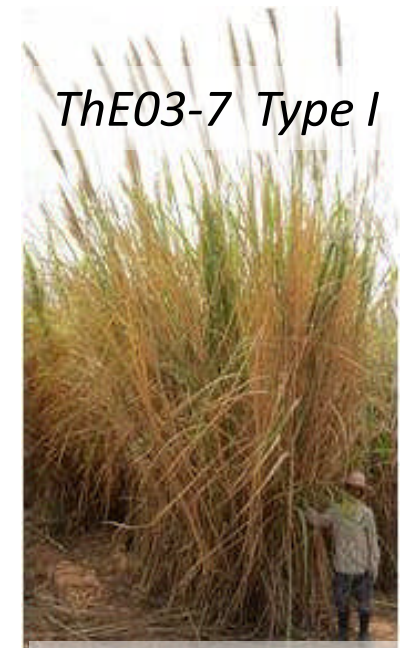
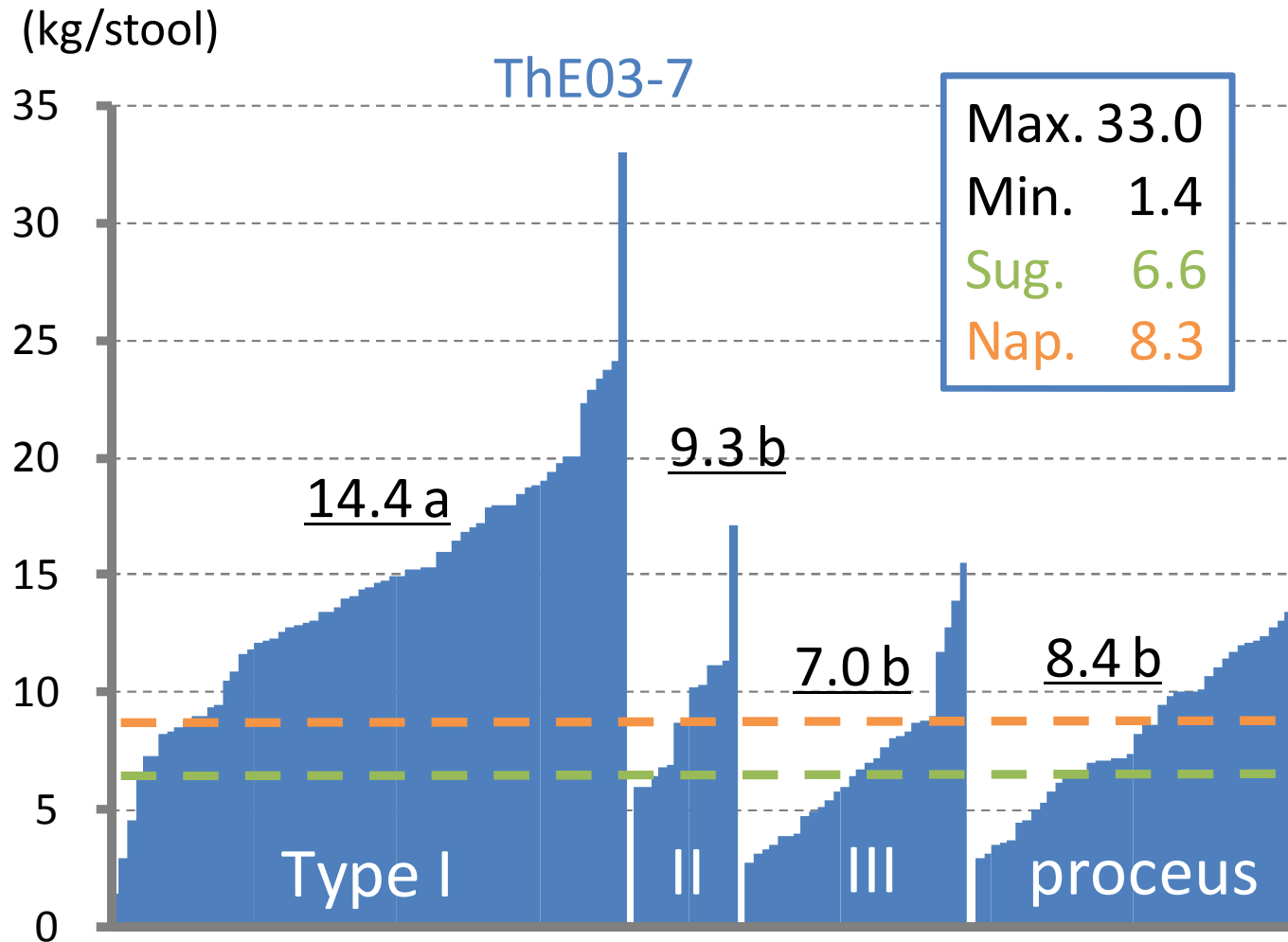
# Dry matter content (%)



Erianthus > sugarcane

Procerus > Type I > Type II, III

# Dry matter yielding (kg/stool)



Open 3 Type III

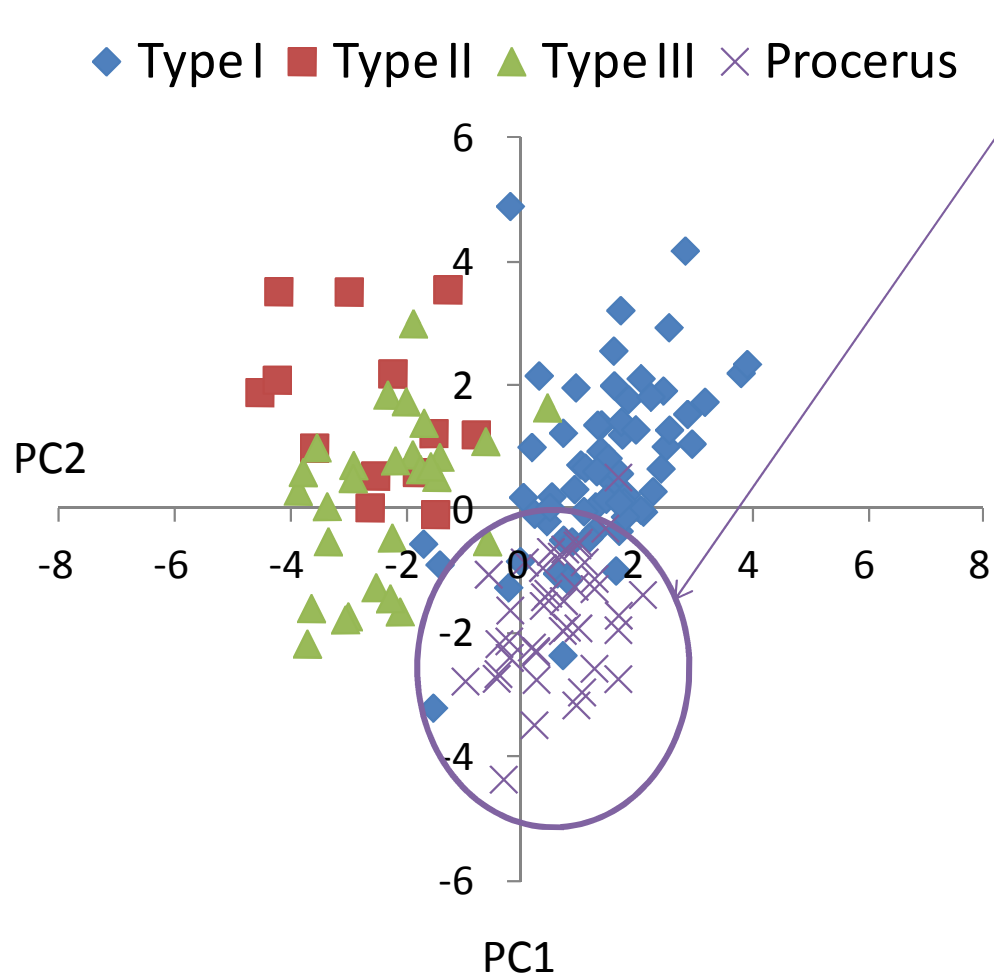


Erianthus (Type I) > sugarcane, Napier

Type I > Type II, III, Procerus

# Characteristics of *Erianthus* germplasm

## PC A (10 agronomic traits)



### *E. procerus*

- more stalks (< Type I)
- low ratio of stem part
- big pith
- higher dry matter content

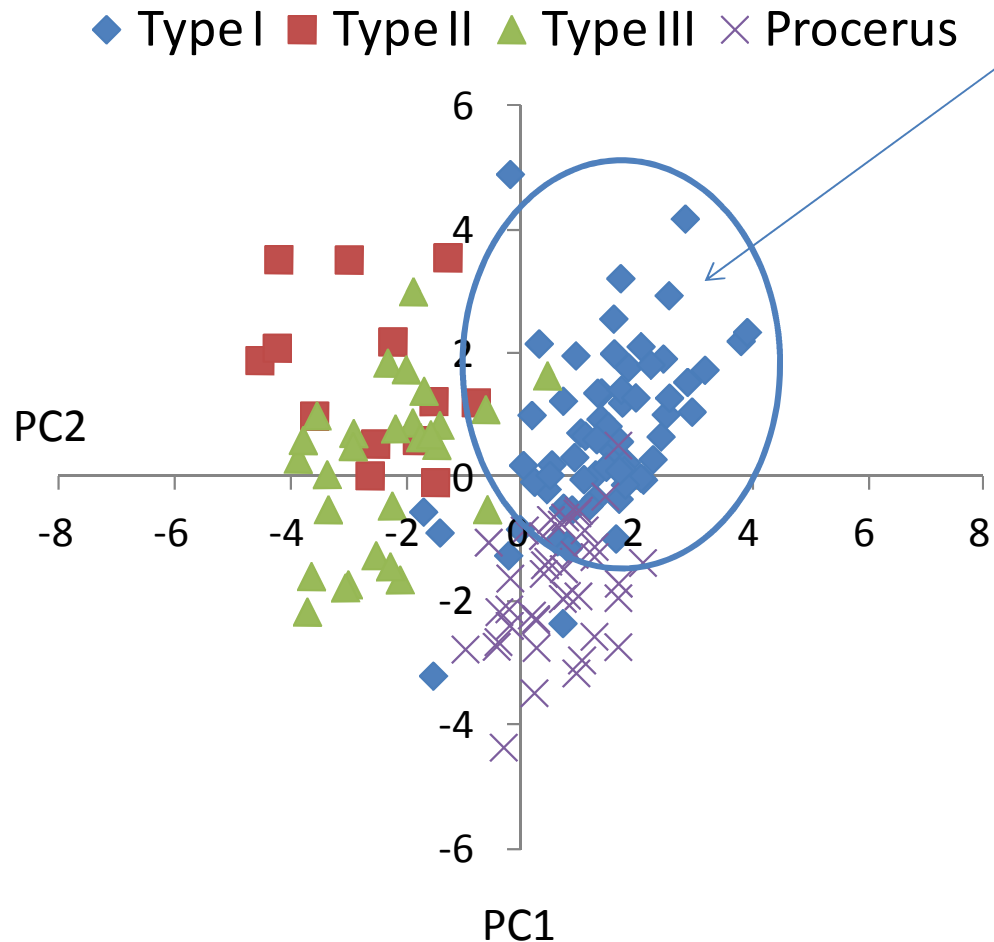


cumulative contribution ratio : 62 %



# Characteristics of *Erianthus* germplasm

## PCA analysis (10 agronomic traits)



cumulative contribution ratio : 62 %

### *E. arundinaceus* Type I

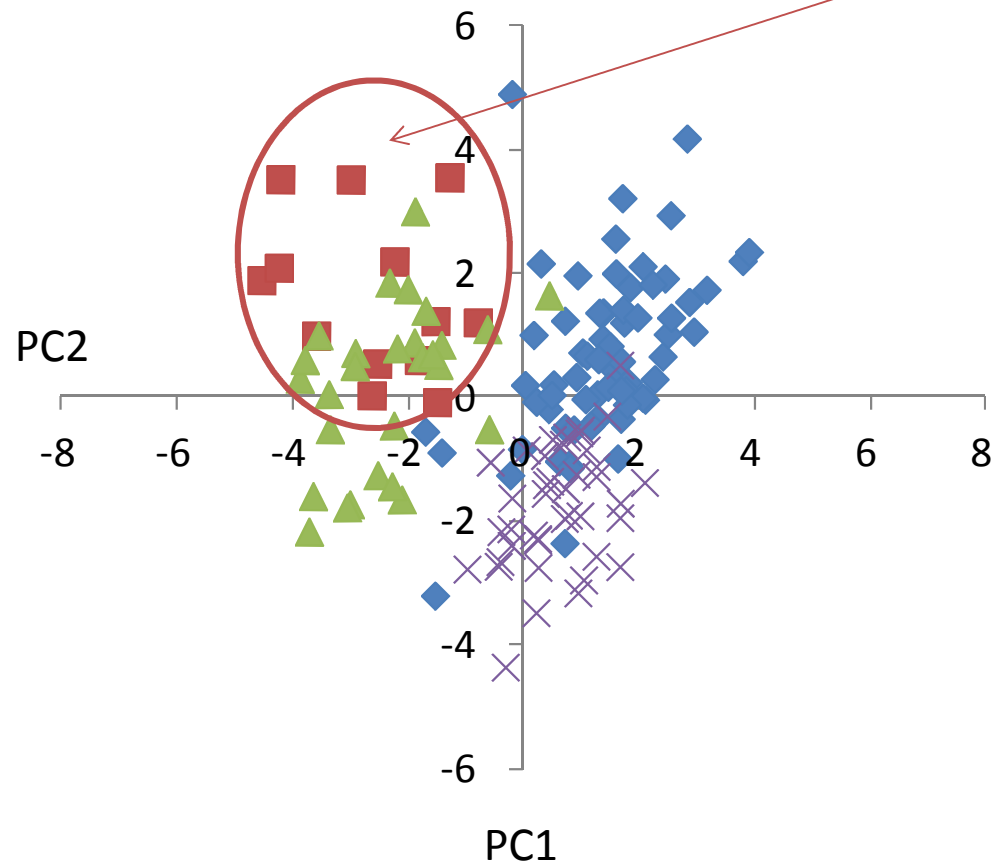
- higher yielding
- more stalks (good ratooning)
- low ratio of stem part
- big pith
- low Brix



# Characteristics of *Erianthus* germplasm

## PCA analysis (10 agronomic traits)

◆ Type I ■ Type II ▲ Type III × Procerus



## *E. arundinaceus* Type II

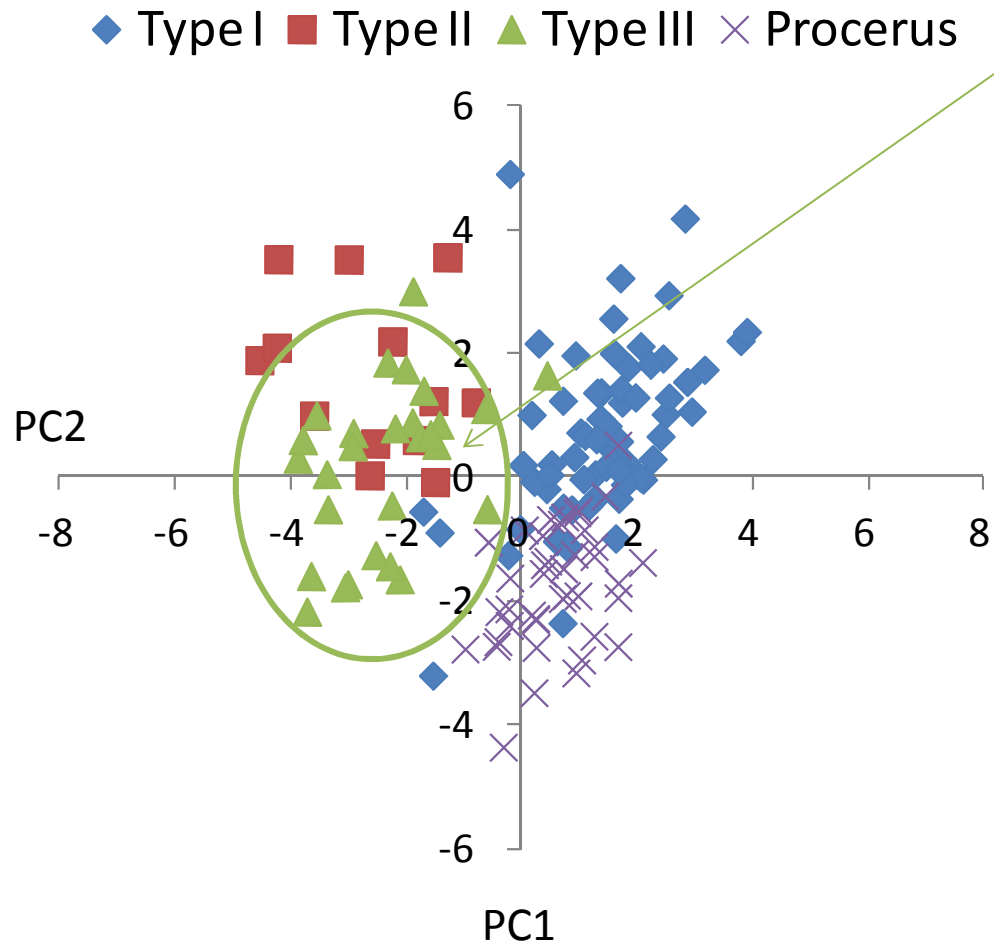
- bigger diameter
- high ratio of stem part
- lower dry matter content
- higher Brix



cumulative contribution ratio : 62 %

# Characteristics of *Erianthus* germplasm

## PCA analysis (10 agronomic traits)



### *E. arundinaceus* Type III

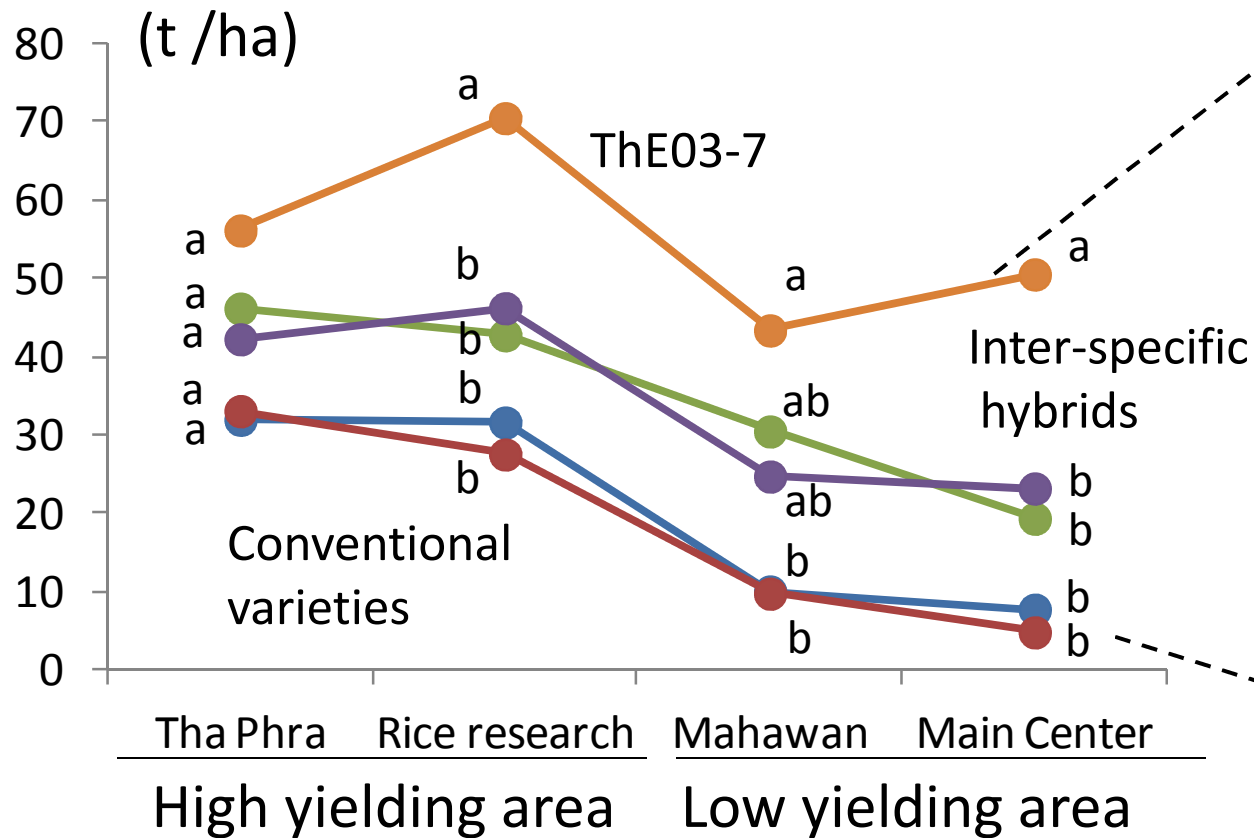
- few stalks
- high ratio of stem part
- less pith
- lower dry matter content

cumulative contribution ratio : 62 %



# Multi-site evaluation (1<sup>st</sup> ratooning, Dry weight)

● KK3 
 ● K88-92 
 ● TPJ03-452 
 ● TPJ04-768 
 ● ThE03-7 
 (4 low, 4m, 3 rep.)



A elite *Erianthus* clone show better biomass yielding on low yielding area in Thailand



# For further improvement of sugarcane

## JIRCAS-KKFCRC collaborative project

Development of basic breeding techniques

New sugarcane varieties

Breeding materials

3. Evaluation of hybrids

Hybrids

2. Development crossing techniques

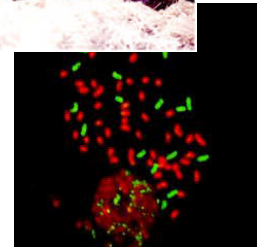
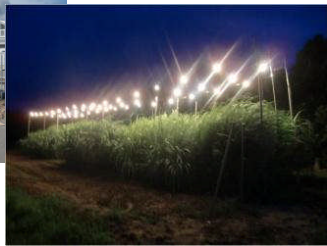
Parents

1. Evaluation of germplasm

*Erianthus*



Genetic resources



[breeding Target]

- High sugar and fiber yielding
- Adaptability to adverse environment