



# Effects of Seed Coating with Gibberellic Acid and Ethephon on Seed Quality and Seedling Growth of Cucumber

Miss. Pachara khampan

Department of Plant Science and Agricultural Resource  
Faculty of Agriculture, Khon Kaen University, Khon Kaen.





# INTRODUCTION

year 2017

THAILAND



- Cucumber (*Cucumis sativus* L.) is the economic vegetable of Thailand
- **Used in Thailand:** Value 298.20 million baht
- **Exported :** Quantity 64,321.61 kg , Value 291 million baht



# INTRODUCTION

Cucumber seed production for economic is still have obstacles.



SEED PRODUCTION



Seed Deterioration

Decrease uniformity of seedling

Decrease seed vigor

Decrease seed storability



HARVEST



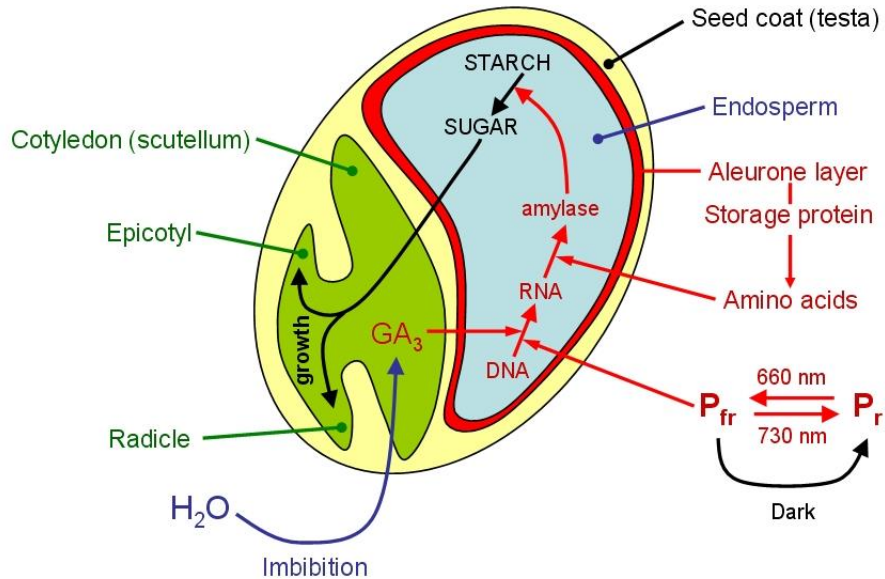
SEED STORAGE

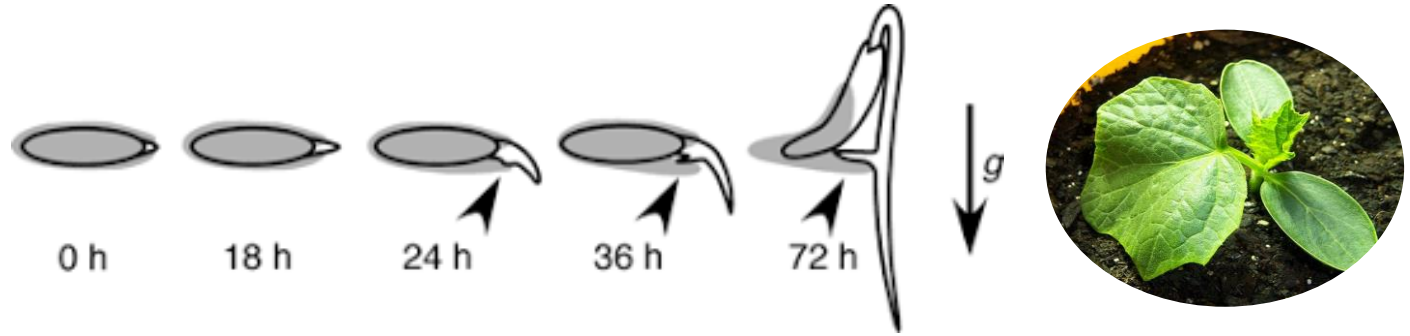
Obstacles for planting and crop production\*\*



# INTRODUCTION

## Seed Germination





# Plant Growth Regulators (PGRs)

Most of seed growth is controlled by plant PGRs because PGRs is an active ingredient that can control, promote growth and development of plants. (Qing, 2006)



# INTRODUCTION



**GA<sub>3</sub>**

Gibberellic acid is plant growth regulators. It can induce  $\alpha$ -amylase activity in starch digestion into glucose for embryo and stimulates cell division, cell hyper elongation, and resulting to seed germination.

**Ethylene**

Ethylene releases dormancy in various seeds (Esashi & Leopold, 1969) and promotes roots and stems in many plant seedlings. (Schaller, 2012)





# Examples for use of PGRs in agriculture



FLORAL STIMULUS



FRUIT STIMULUS



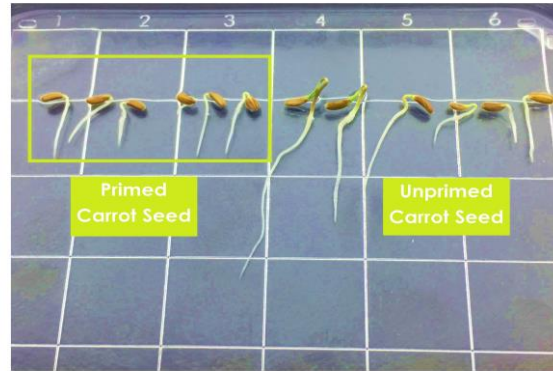
ROOT STIMULUS



STIMULUS RIPENING



TISSUE CULTURE



SEED PRIMING

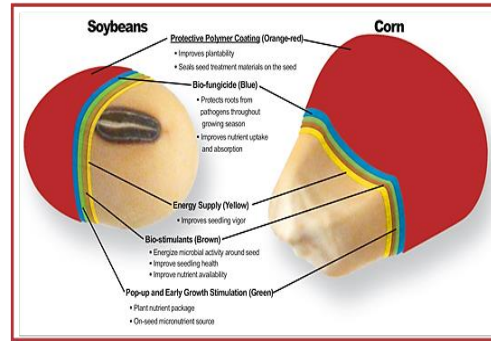


PELLETING SEED

# SEED TECHNOLOGY



## SEED COATING



Seed coating is a process that seed is thinly coated with polymer film (Taylor and Harman, 1990) and it is a intermediate which can active ingredients to coat and enhance coating more durable on seed. (Halmer, 2006)





**COATED SEED**



# Plant Growth Regulators



**GA<sub>3</sub> ETHEPHONE**

**Seed Coating**



# OBJECTIVE



This study was conducted with the objective to evaluate cucumber seed quality and seedling growth after seeds coated with gibberellic acid ( $GA_3$ ) at 1,000 ppm, Ethephon (ET) at 250 ppm and  $GA_3$  at 1000 ppm mixed with ET at 250 ppm 5% (w/v) of polyvinyl alcohol (PVA) was used as coating substance.





# DATA ANALYSIS AND STATISTICS

- ❑ The experiment was carried in Completely randomized design with four replications.
- ❑ Compare the average of each treatments by Least Significant Difference (LSD).
- ❑ Differences in parameters were statistically analyzed by analysis of variance (ANOVA), (Steel and Torie, 1984) using the PC program SAS 9.1. to determine the level of significant at  $p < 0.05\%$







# MATERIALS AND METHODS



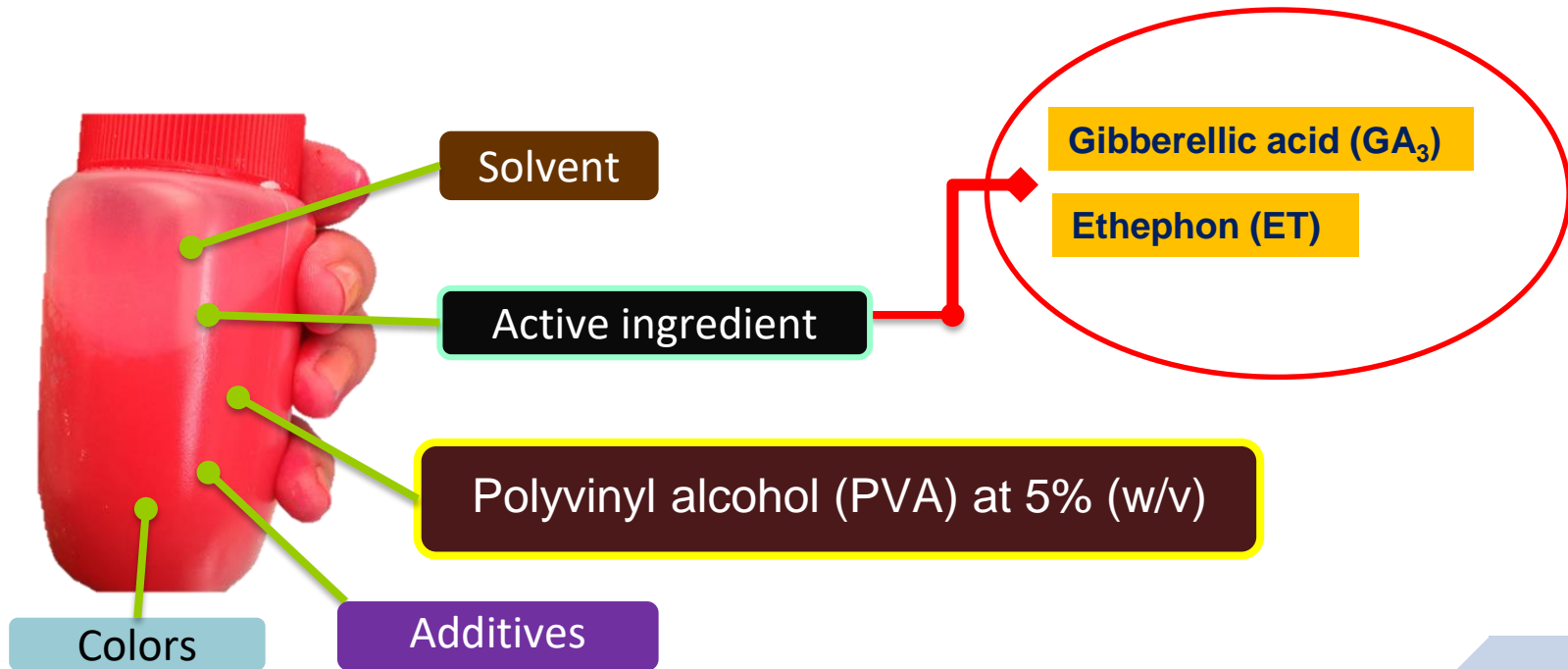
# Venue of the Study



Faculty of Agriculture, Khon Kaen University

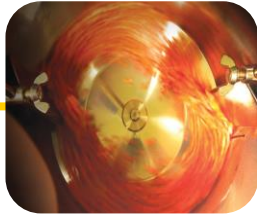


# Seed coating with PGRs



# Seed Coating With Plant Growth Regulators (PGRs)

Treatments	
T1	Control
T2	PVA 5%
T3	PVA 5% + GA <sub>3</sub> 1000 ppm
T4	PVA 5% + ET 250 ppm
T5	PVA 5% + GA <sub>3</sub> 1000 ppm + ET 250 ppm



Seeds were coated  
by Centric coater,  
model SKK 10



Seeds were dried by  
dehumidifier model  
SKK 09



Measured the moisture  
of seeds by HR73  
Halongen  
Moisture Analyzer

# AFTER COATING PROCESS

1. after coated



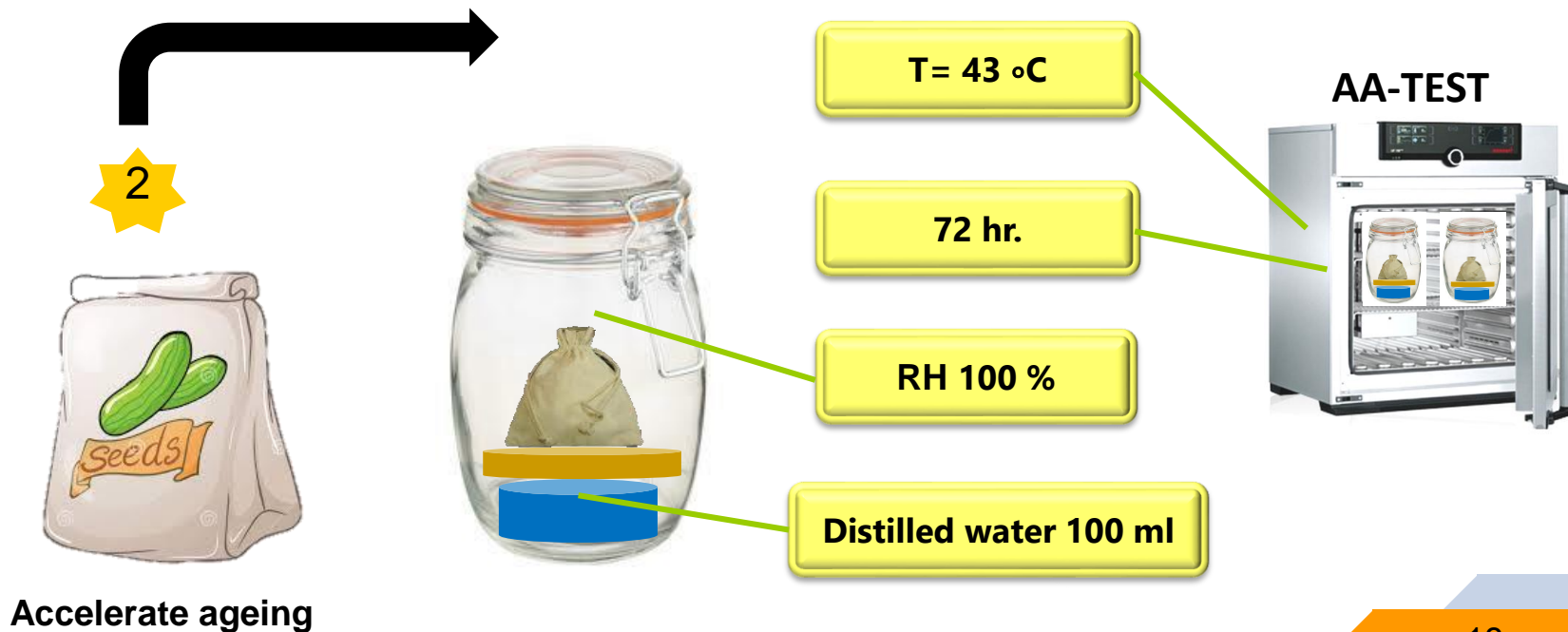
2. accelerate ageing



**Divided seeds into 2 parts.**



## Investigation of seed vigor on seedling after coated with plant PGRs







# Data Collection

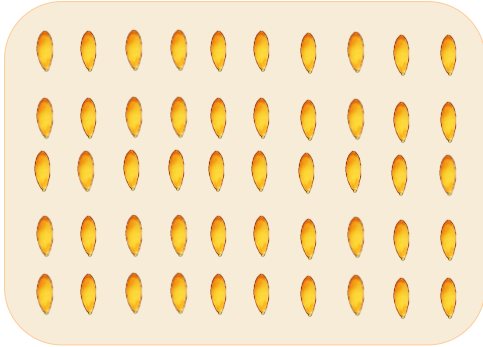


- ☐ Radicle emergence
- ☐ Speed of radicle emergence
- ☐ Abnormal seedling
- ☐ Germination percentage
- ☐ Speed of germination
- ☐ Seedling growth





## Investigation of seed quality in laboratory condition



BP (Between paper)

☐ Radicle of emergence test

Evaluated radicle emergence and speed of radicle emergence

☐ Germination test

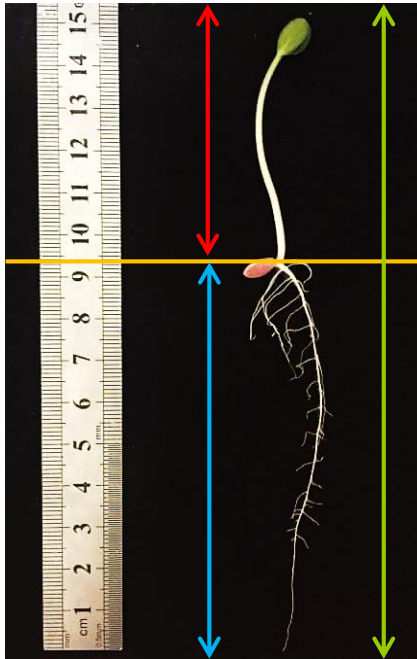
Evaluated germination test and speed of germination

☐ Abnormal seedling





## Investigation of seedling growth in laboratory condition



□ Seedling at 8 days after test

Measured shoot length, root length and entire of seedling (cm)

Measured seedling dry weight.



## Investigation of seed quality in greenhouse condition

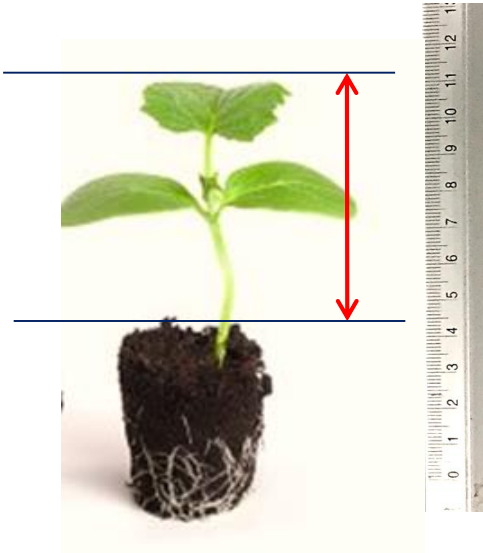


- Sowed in peat moss
- Germination percentage after 4 days
- Evaluated germination percentage and speed of germination.





## Investigation of seedling growth in greenhouse condition



- Seedling at 8 days after test
- Measured shoot length of seedling (cm)
- Measured seedling dry weight (g)

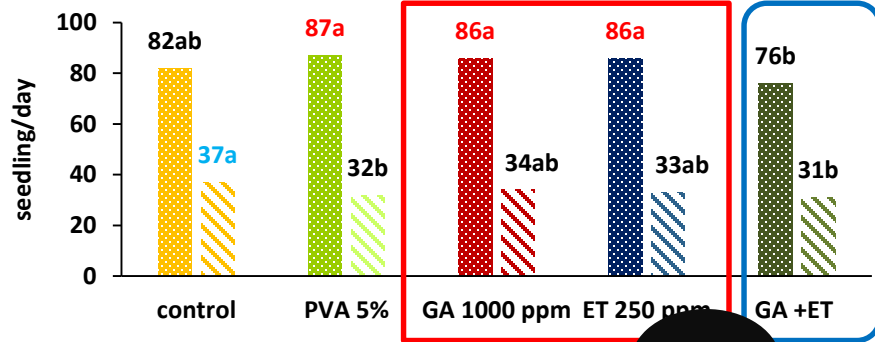




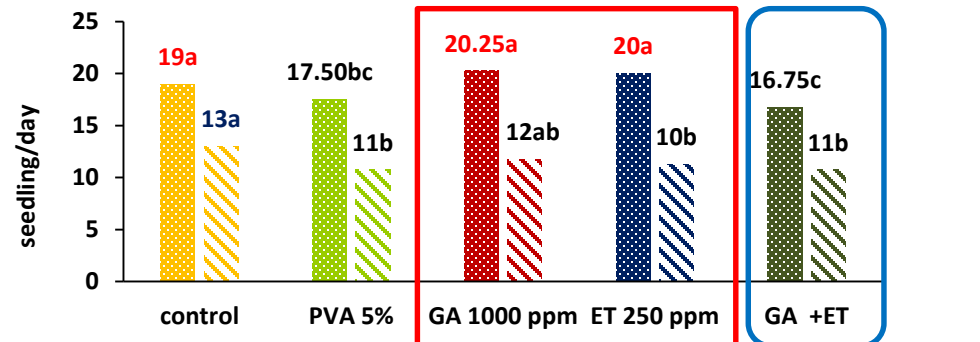
# RESULTS

# Seed quality after coating with different PGRs, tested under laboratory condition.

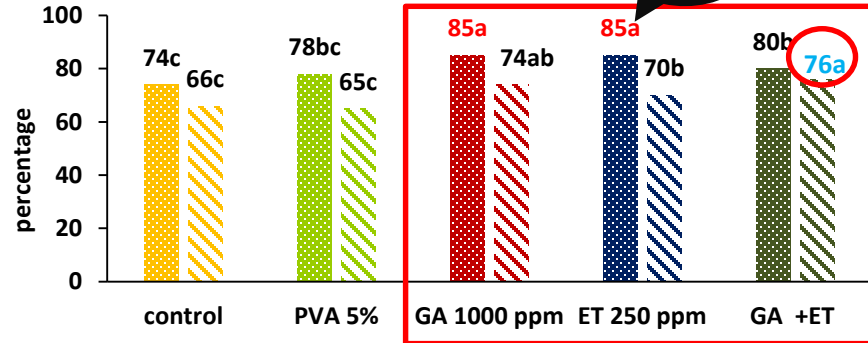
## Radicle emergence (%)



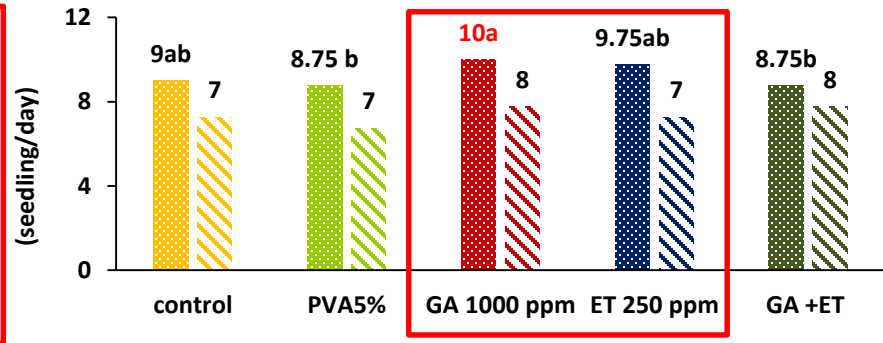
## Speed of radicle emergence (seedling/day)



## Germination (%)





## Speed of germination (seedling/day)

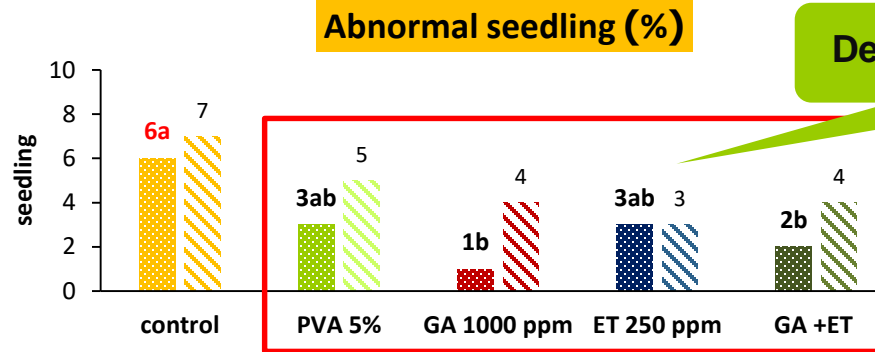


Treatments

Treatments

# Seed quality after coating with different PGRs, tested under laboratory condition.

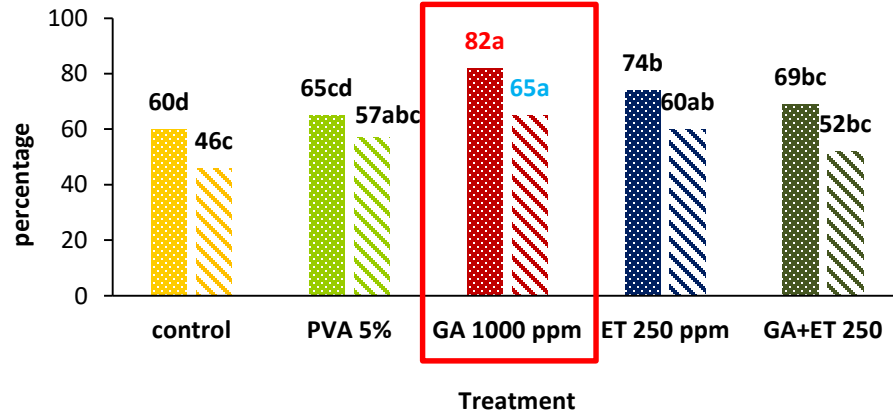
 After coated  
 After ageing



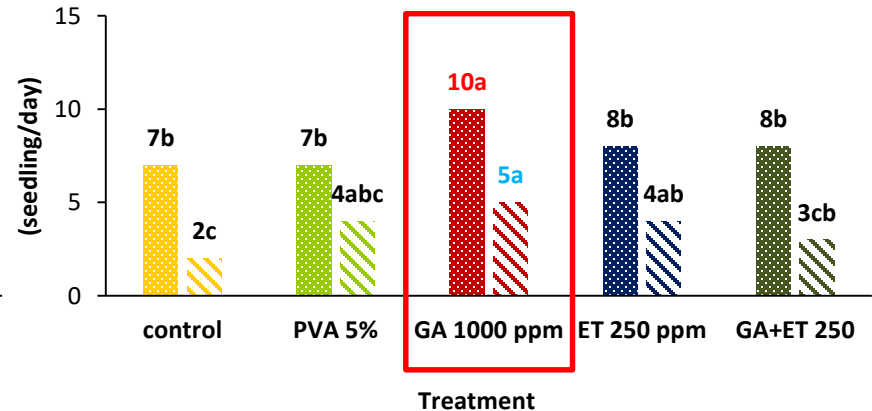
Decrease abnormal seedling

## Seed quality after coating with plant hormone tested under greenhouse condition.

### Germination (%)



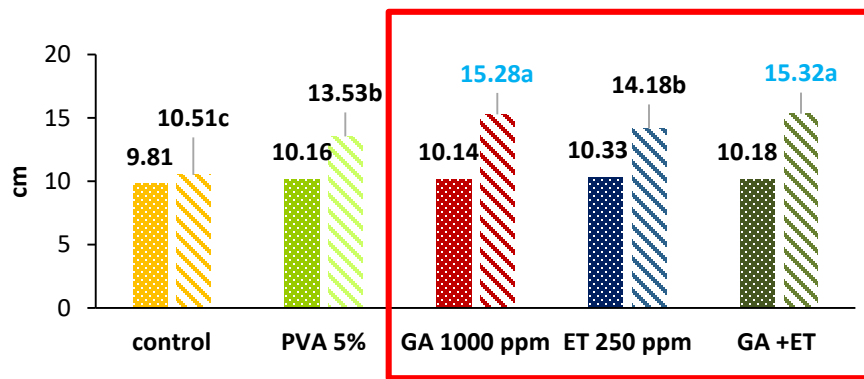
### Speed of germination (seedling/day)



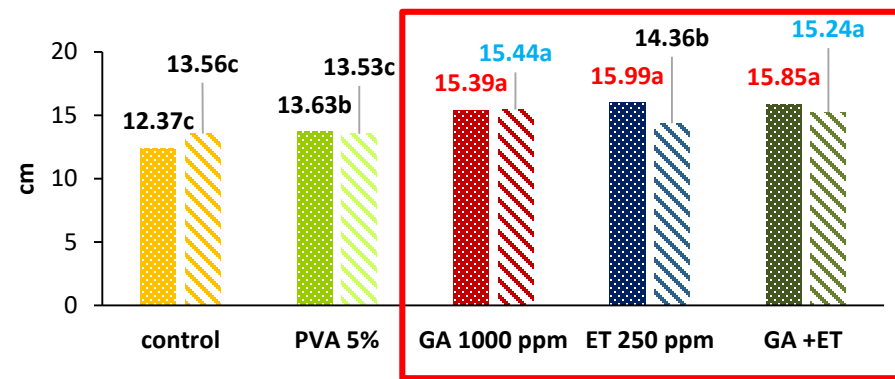
# Seedling growth after coating with different PGRs, tested under laboratory condition.

■ After coated  
▨ After ageing

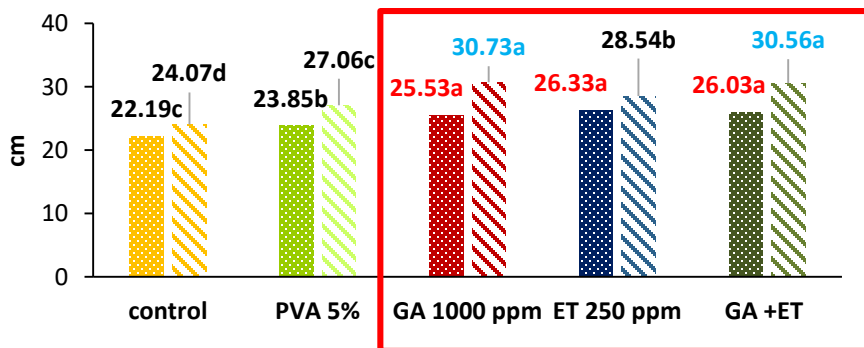
## Shoot length (cm)



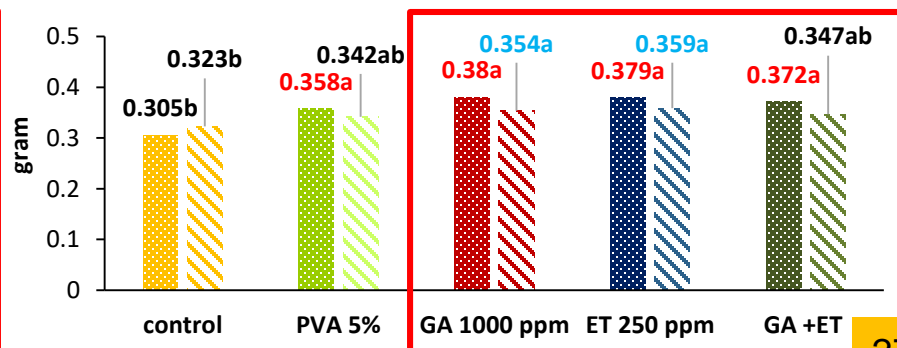
## Root length (cm)



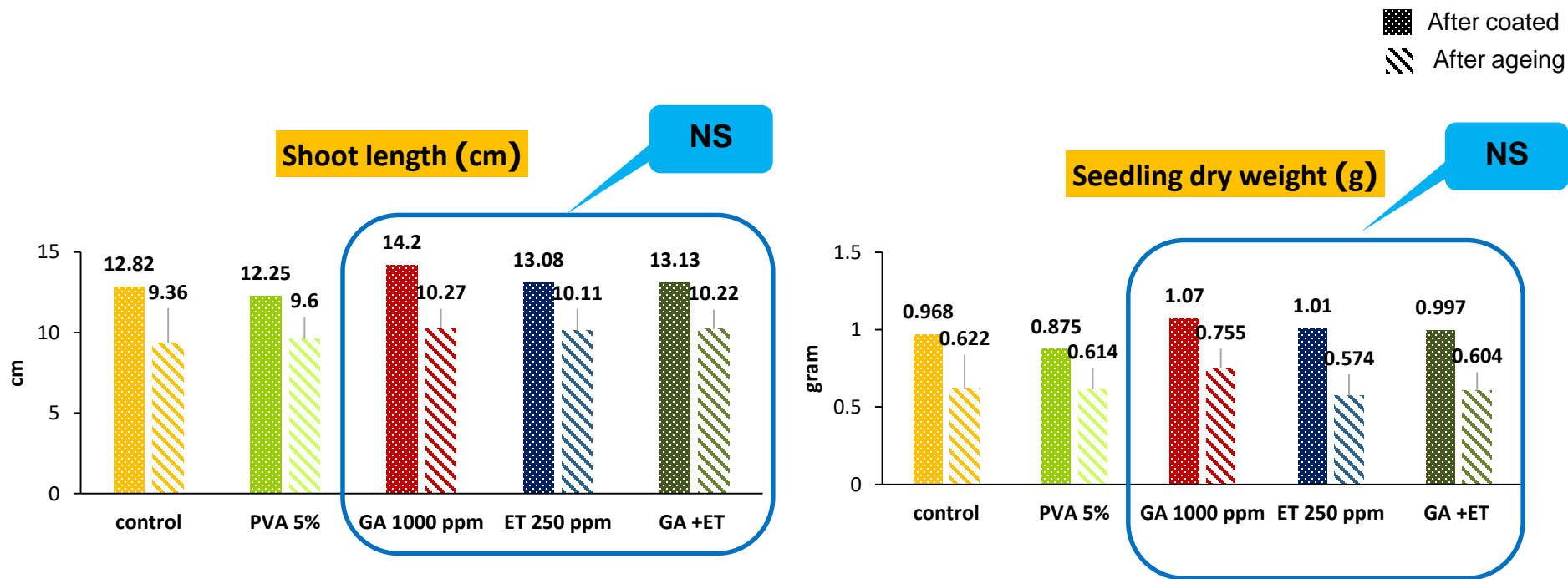
## Total of seedling (cm)



## Seedling dry weight (cm)



## Seedling growth after coating with different PGRs, tested under laboratory condition.







# CONCLUSIONS



- All treatment of seeds coated with PGRs **improve seedling growth** and **decrease abnormal seedling** when tested after coating process and after accelerated ageing.

- Seed coated with  $GA_3$  1000 ppm and Ethephon 250 ppm can **improve quality of seed** after coating process and after accelerated ageing.
- seed coated with  $GA_3$  1000 ppm mixed Ethephon 250 ppm **can solve the seed germination percentage problem but affect to radicle emergence and speed of radicle emergence to decrease** when tested after accelerated ageing under laboratory condition .

# THANK YOU



Assoc. Prof. Dr. Boonmee Siri



Research and Researchers for Industries-RRI



Ceres-international-Co-Ltd



Faculty of Agriculture, Khon Kaen University



Personal of Seed Processing Plant



Graduate School