Improvement of RD31 rice seed germination using DBD plasma treatment

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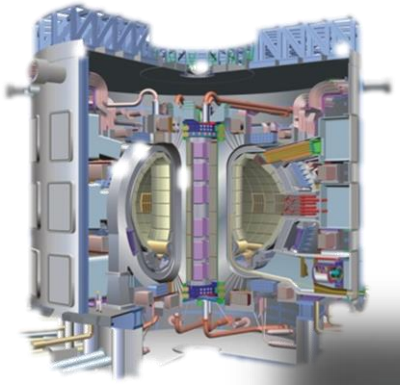
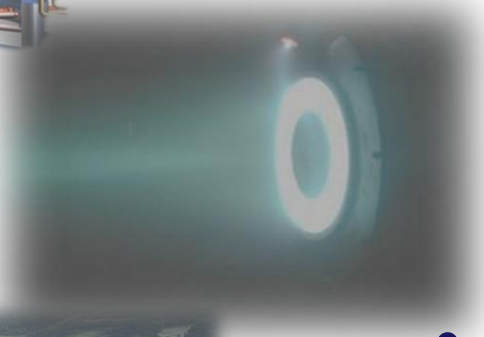
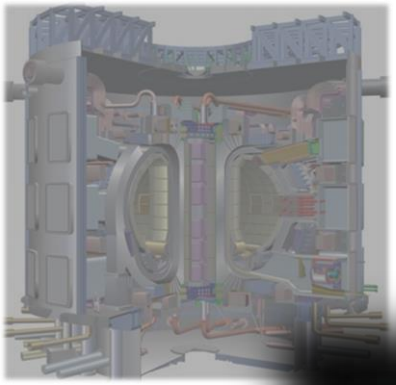
High temperature plasma and nuclear fusion





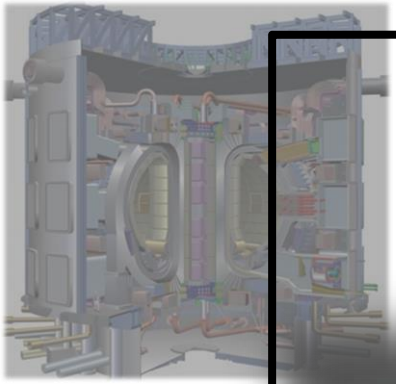
- Magnetic Confinement Fusion (MCF)
  - Basic plasma, transport, MHD instabilities, plasma-wall interactions
  - Fusion reactors
- Dense Plasma Focus (DPF)
  - Radiation sources: X-ray, neutron, proton
  - Radioactive material

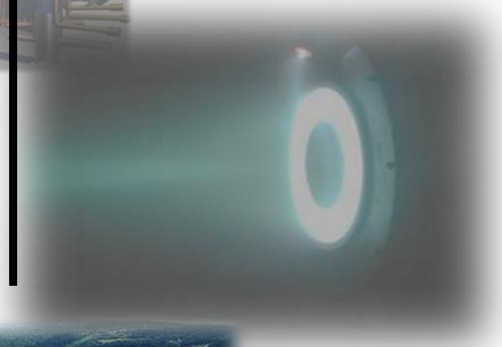
Low temperature & atmospheric pressure plasma



- Atmospheric pressure plasma for agriculture and health
  - Improvement of seed germination and production
  - Sterilization
- Dense Plasma Focus (DPF)
  - Radiation sources: X-ray, neutron, proton

Utilization of nuclear fission technology





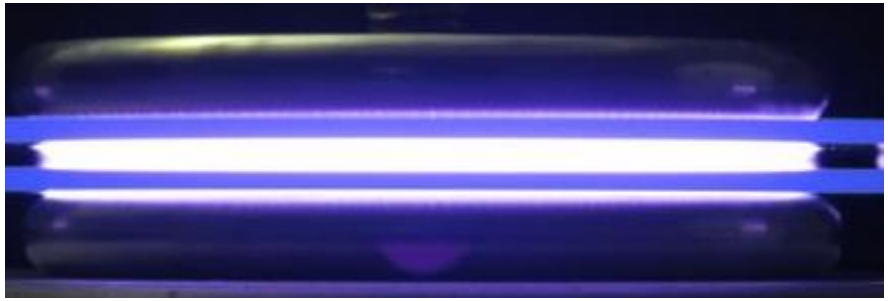
- Nuclear reactor technology
  - Nuclear power plants: Conventional and innovative nuclear reactors
  - Siting in Thailand
  - Policy and Roadmap for nuclear development
- Nuclear for health
  - Neutron and proton technology for cancer treatment

Outline

- Background
- What is Dielectric Barrier Discharge (DBD) ?
- Experimental setup and Procedure
- Result and Analysis
- Summary

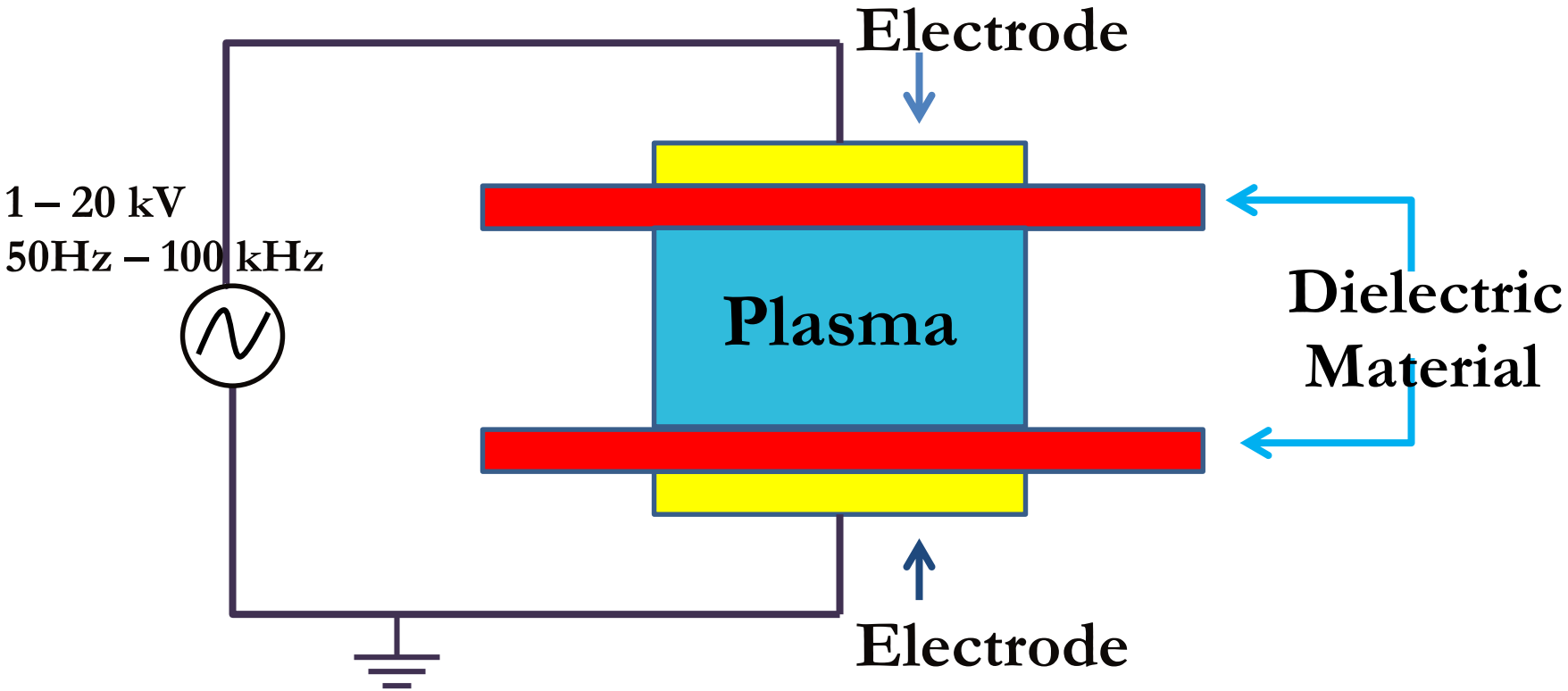
Backgrounds

- The problem of keeping the seeds for a long time. The rate of seed germination decreases.
- RD31 (Pathumthani 80) is plant around Thammasat university

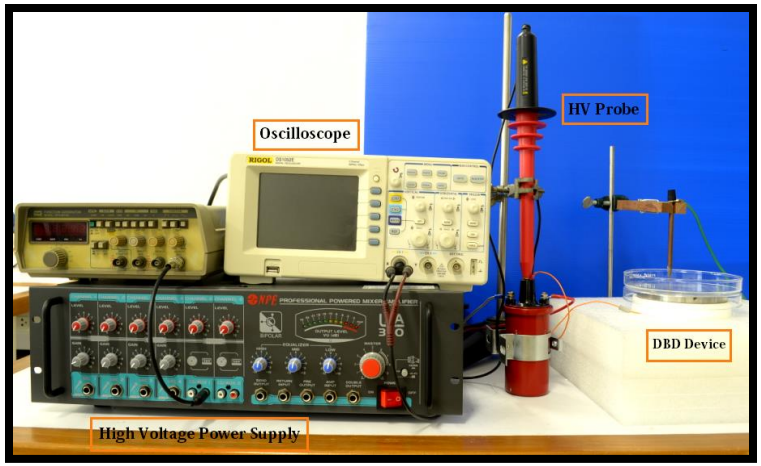


- DBD plasma techniques to solve problems.

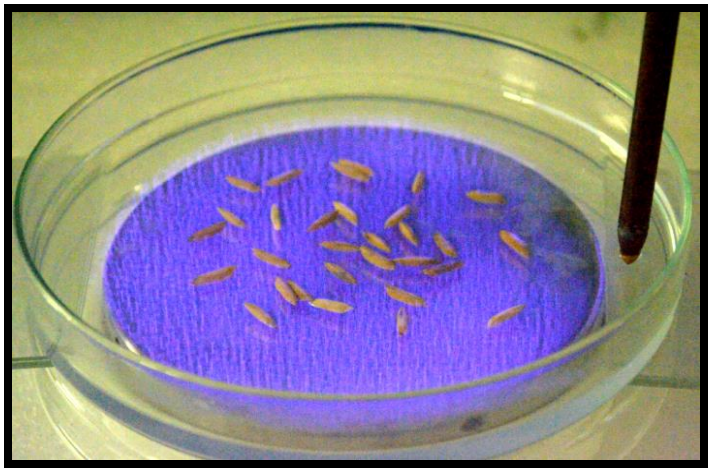
What is Dielectric Barrier Discharge (DBD) ?



My work

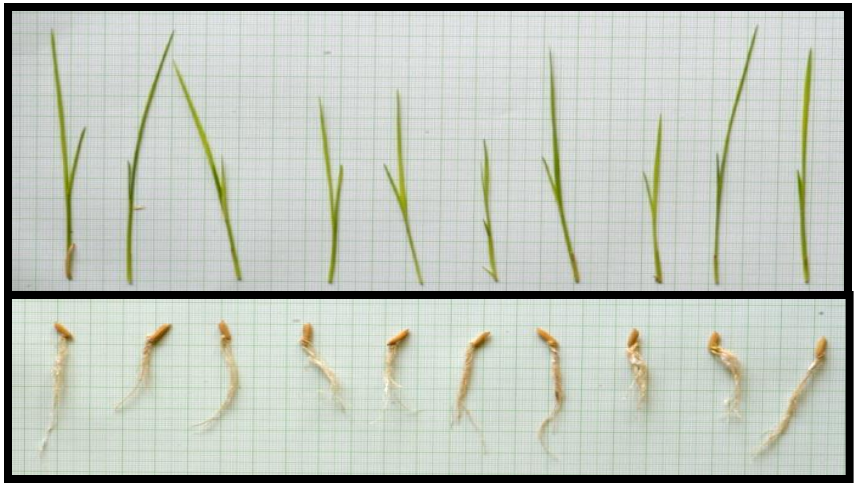


Setup DBD



Treat rice seeds with plasma.

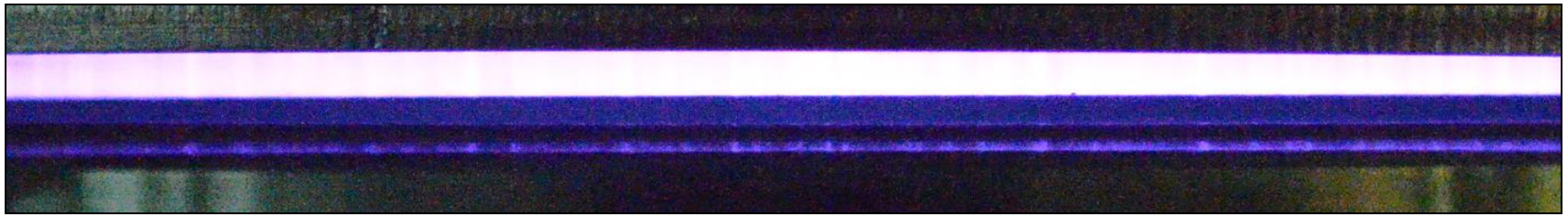
Observe seedling stage for 15 days



Measure the result

Experimental setup

- Applied High Voltage : 18 kV 5 kHz
- Discharge Power : 0.5 mW
- Dielectric Materials : 2 glasses
- Gas gap (Air) : 3 mm
- Seed : RD 31 rice seed kept 2 years



Plasma is occur between parallel plate

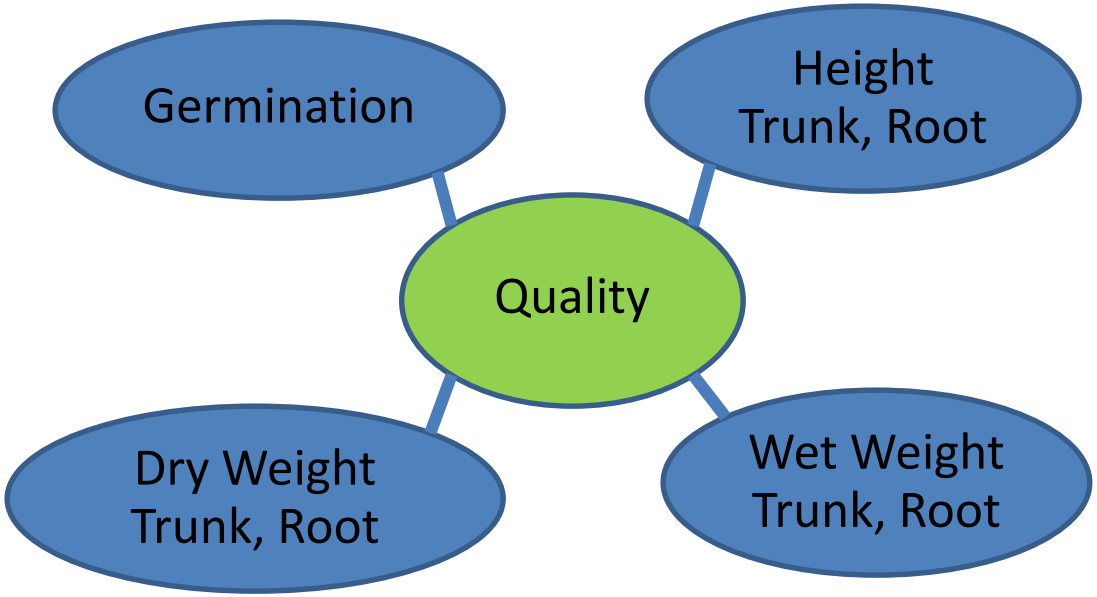
Experimental setup

- Experiment: 2 groups,
  100 seeds/group,
  5 repetitions

No treatment

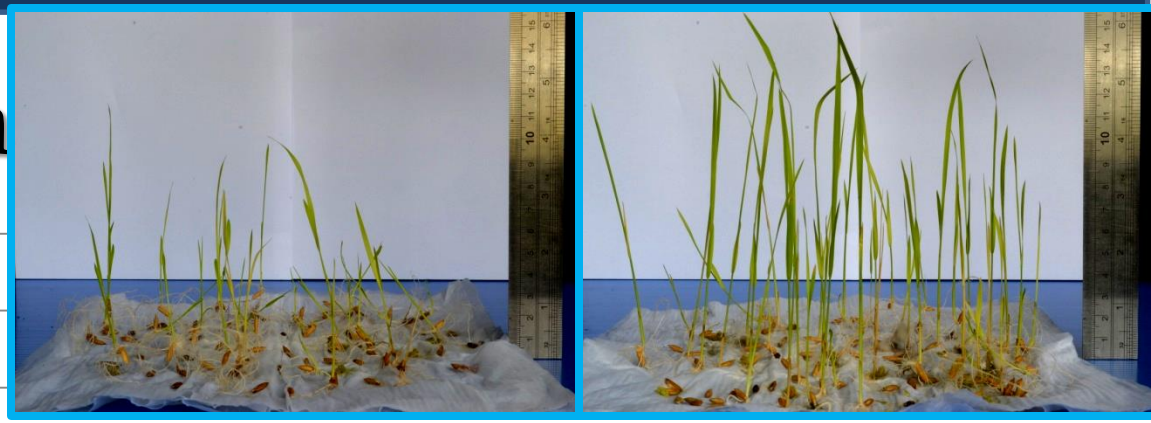
treatment time

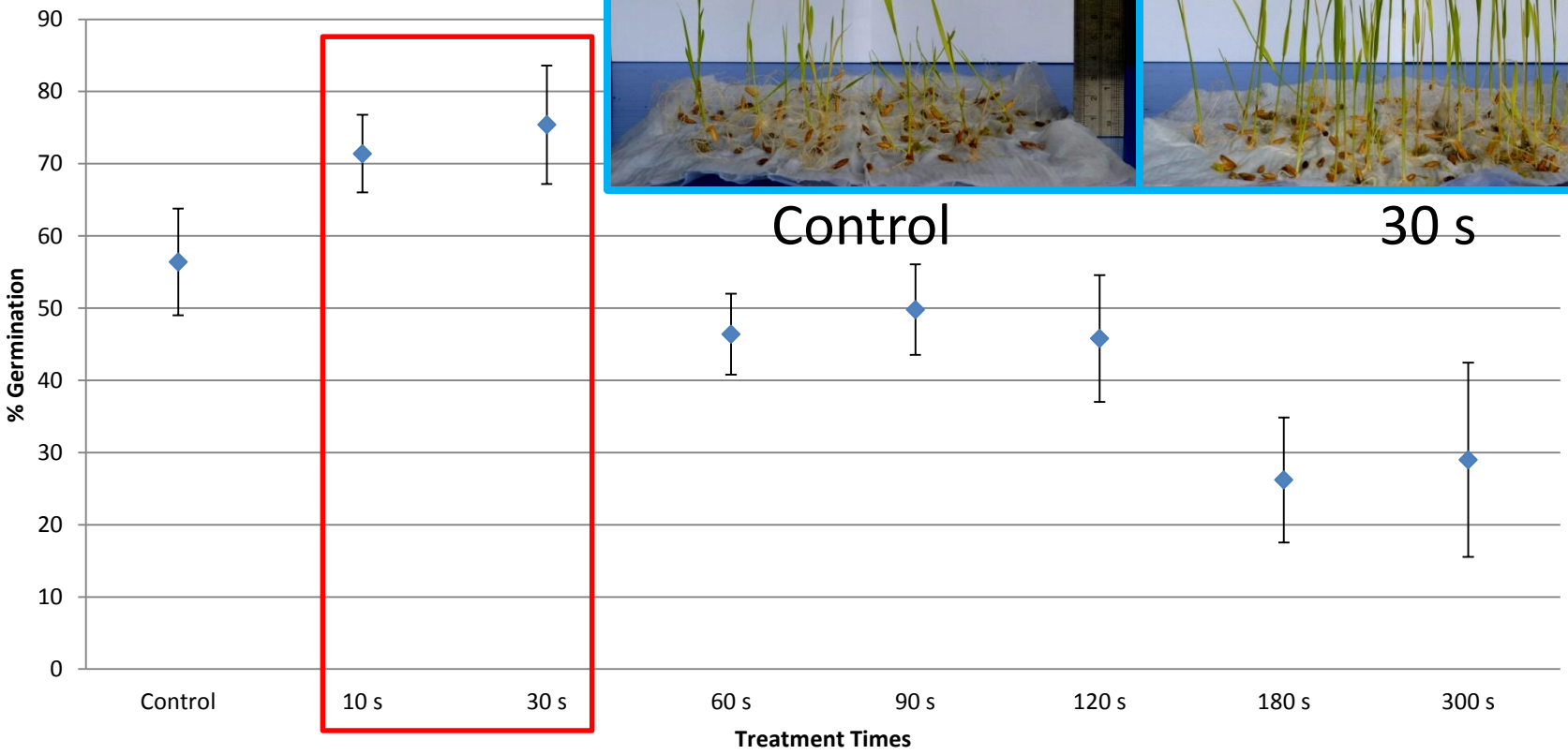
10s, 30s, 60s, 90s,120s,180s and 300s



- Observe seed germination and seedling stage for 15 days

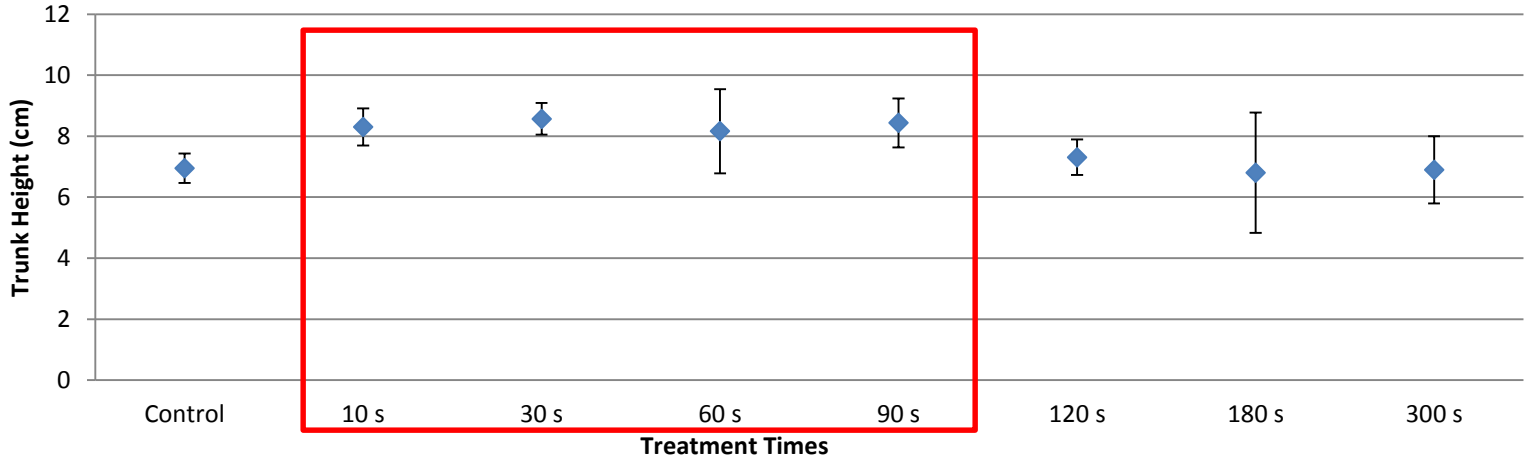
% Germination

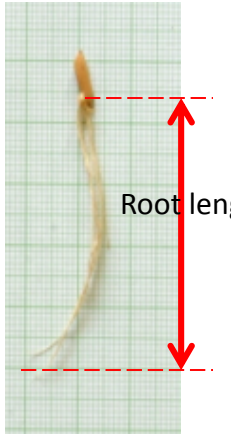


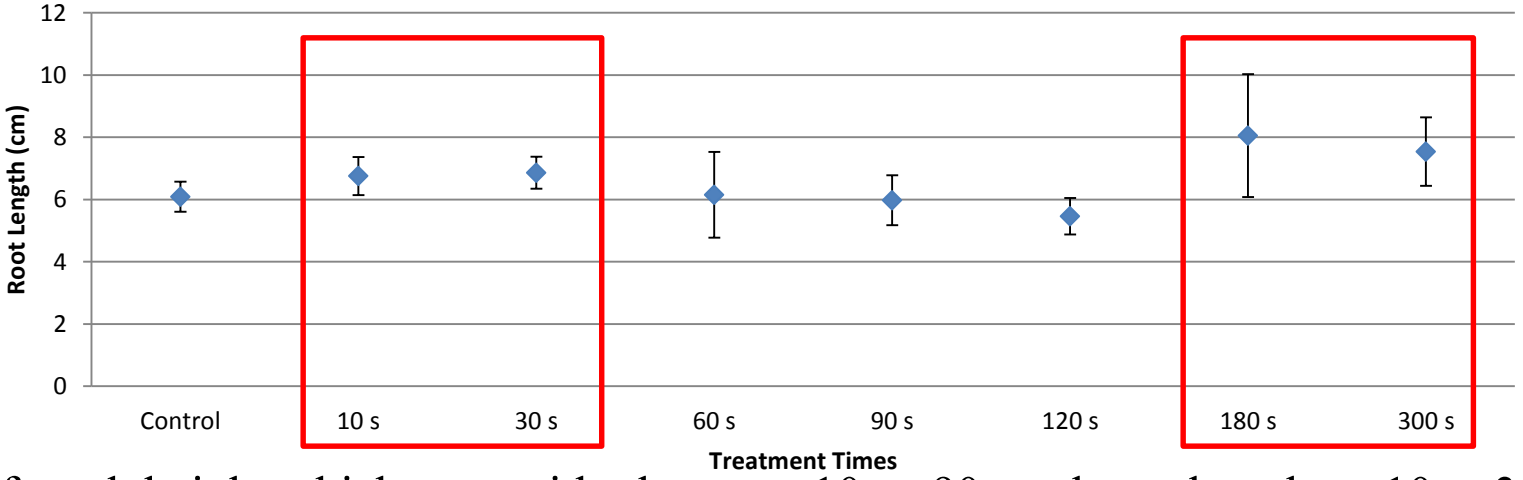


The best group of seed germination which treat with plasma at 10s and 30s is higher than the seed doesn't treat with plasma.

The trunk height and root length is also improve to seed

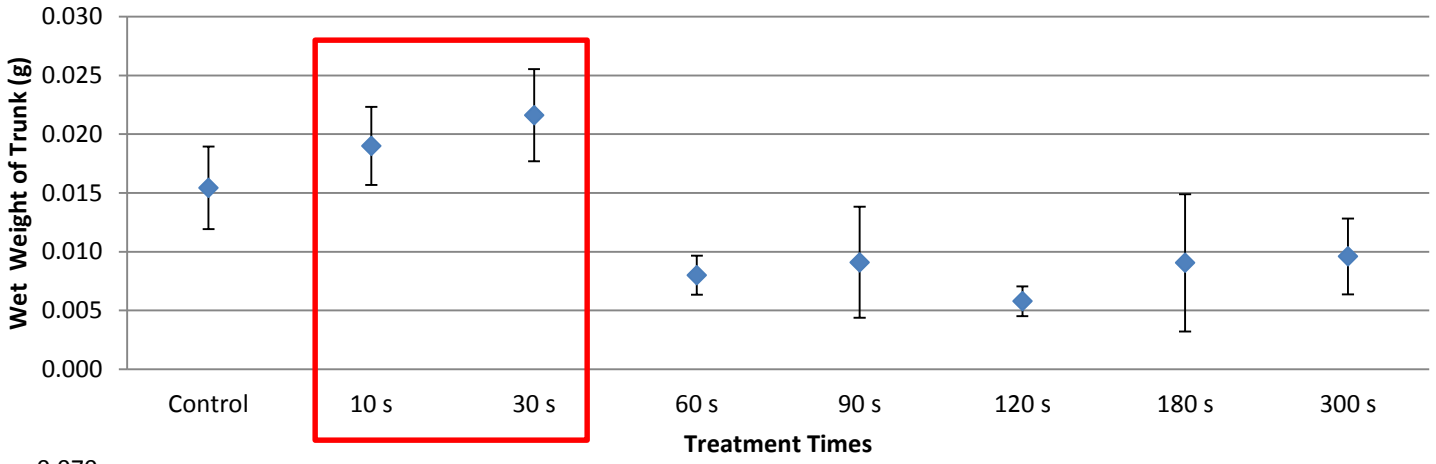


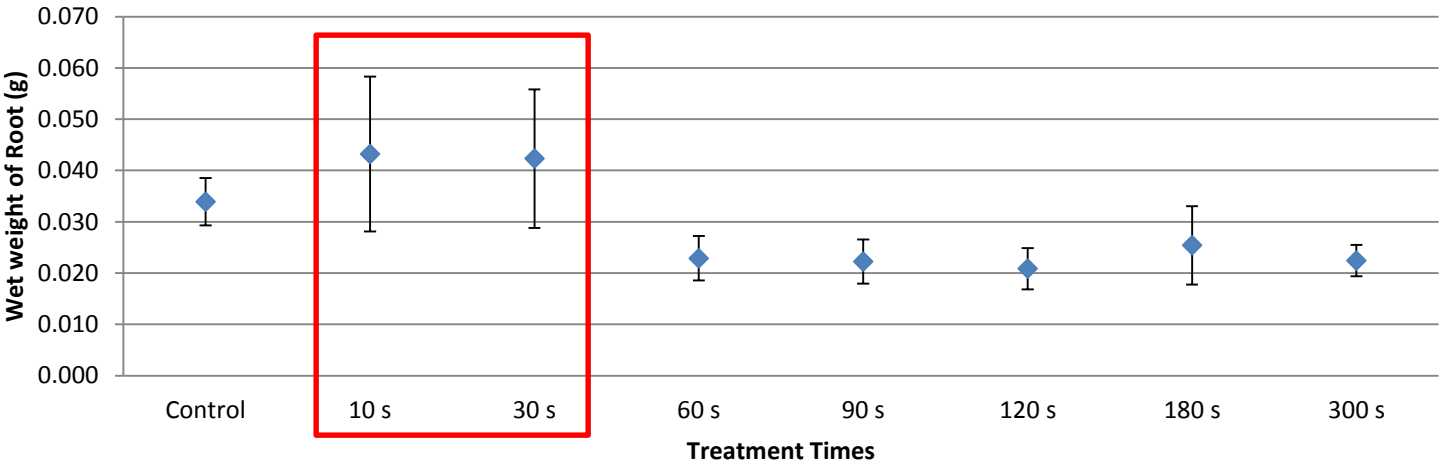




The best group of trunk height which treat with plasma at 10s – 90s and root length at 10s - 30s and 180s - 300s is higher than doesn't treat with plasma.

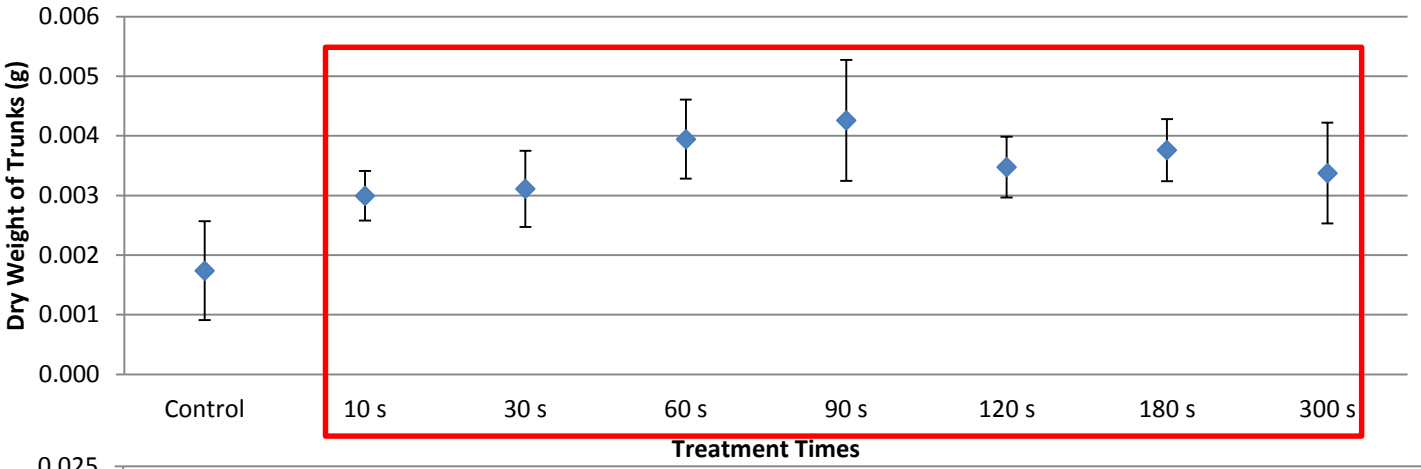
The wet weight of trunk and root is also improve to seed

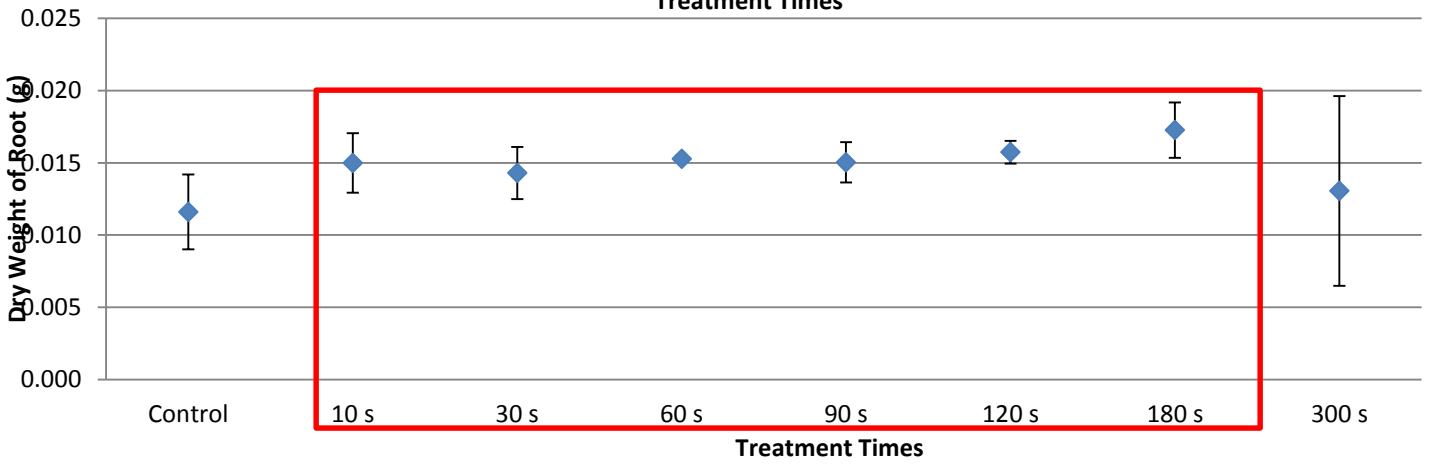




The best group of wet weight of trunk and root at 10s-30s which treat with plasma is higher than the trunk and root doesn't treat with plasma.

The dry weight of trunk and root is also improve to seed





The best group of dry weight of trunk which treat with plasma is higher than the trunk doesn't treat with plasma and dry weight of root at 10s - 180s is higher than doesn't treat with plasma.

Summary

- DBD plasma can help the germination of RD 31 rice seed.
- For germination, the best group is 10s-30s
- For Height, the best group of trunk is 10s-90s and root is10s-30s and 180s-300s
- For wet weight, the best group is 10s-30s
- For dry weight, the best group of trunk 10s-300s and root is 10s-180s

Thank you