EFFECTS OF SILVER NANOPARTICLES ON SEED GERMINATION, GROWTH & DEVELOPMENT OF DAI THOM 8 RICE VARIETY IN THUA THIEN HUE

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SUMMARY

Silver nanoparticles (AgNPs) are one of the most commonly applied nanomaterials in various fields of agriculture. This study evaluated the impact of silver nanoparticles (AgNPs) on plant growth, some biochemical aspects of Dai Thom 8 rice variety in Thua Thien Hue. The result showed that the treatment of rice seeds with AgNPs had significantly improved the germination rate of the seeds, significantly increased α-amylase, total soluble sugar content, catalase activity, and H2O2 content during seed germination compared with the control. Futhermore, plants treated with AgNPs at 1mg/L showed enhanced growth parameters including plant height (cm), number tillers per plant, reproductive tiller per plant and leaf area. Elevated levels of catalase (CAT), ascorbate peroxidase (APX) activities were recorded in all the AgNPs treated plant with improved growth. Changes in the content of chlorophyll, carotenoid was observed at various growth stages in AgNPs treated plant, compared to control. The current use of AgNPs in agricultural sciences opens up the possibility of studying their effects on different plant in the future.

MATERIAL & METHODS

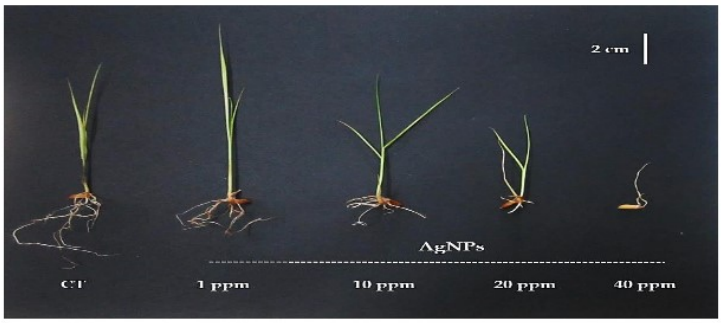

Fig.1. Morphology of rice seedlings grown in the presence of different concentrations of AgNPs after 72 hours (left to right: control, 1, 10, 20 and 40 ppm, respectively)

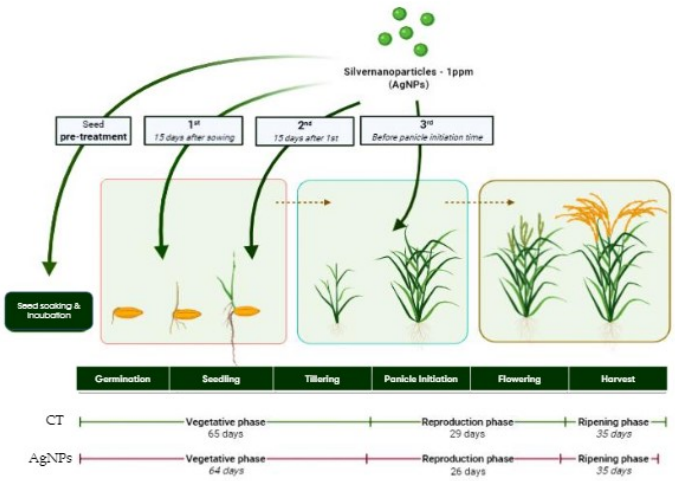

Fig.2. Schematic diagram of the experiment to assess the effect and possibility of silver nanoparticles (AgNPs) on germination, growth & development of Dai Thom 8 rice variety (*Oryza sativa* L.)

RESULTS

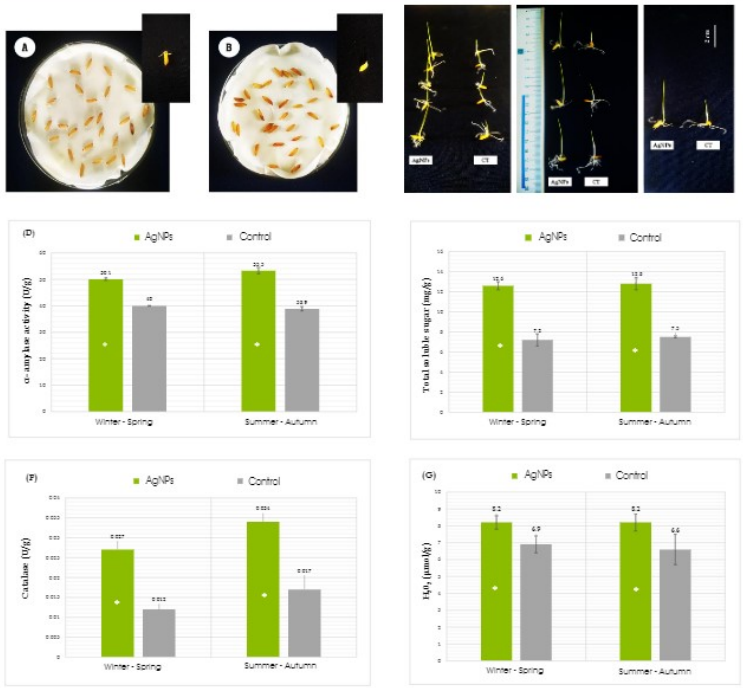

Fig.3. Impacts of silver nanoparticles treatments on seed germination & starch metabolism of Dai Thom 8 Rice variety

(A), (B), (C): The difference of *Speed of germination* (SG), *shoot length & root length* between AgNPs - treated group and control group, **(D)** *α-amylase activity*, **(E)** *Total soluble sugars*, **(F)** *Catalase activity*, **(G)** *Dehydrogenase activity*. Means denoted by the different letter are significantly different at $p < 0.05$

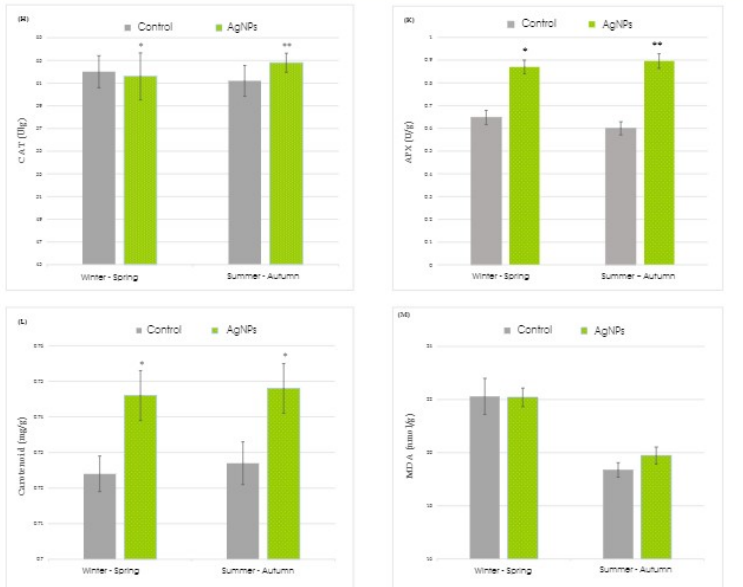

Fig.4. Effects of AgNPs on ROS system - *Reactive oxygen species* (Image H, K, L) and MDA (Image M) levels.

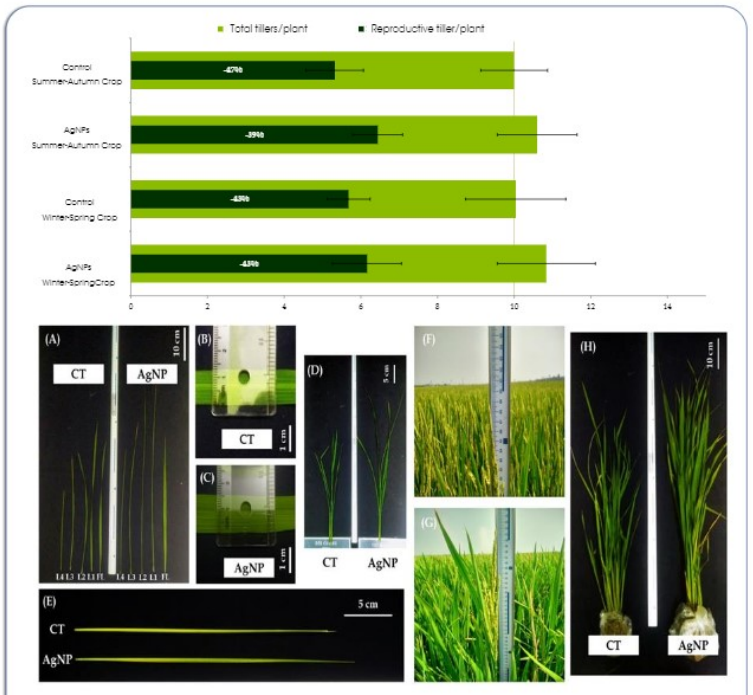

Fig.5. Comparison of leaf morphology and tillering potential of Dai Thom 8 treated AgNPs 1 ppm with control (CT)

CONCLUSION

- Silver nanoparticles (AgNPs) treatments improve the germination and early growth of *Oryza sativa* cv. Dai Thom 8 variety by promoting starch metabolism process (α-Amylase, catalase activity, total soluble sugar)
- Bio-synthesized silver nanoparticles (AgNPs) promoted the growth parameters of rice (plant height, leaf area, tillering potential)
- Exposure to AgNPs elevated the activities of CAT, APX. An efficient redox balance induced by AgNPs may