ROLE OF HYDROGEN PEROXIDE (H2O2) AND UREA (NH2-CO-NH2) IN MUNG BEAN (VIGNA RADIATA) SEED GERMINATION PROCESS

S. Karthikeyan[1]
Department of chemical Engineering, Adhiyamaan College of engineering, Hosur,
Krishnagiri - 635109, Tamil Nadu, India.

ABSTRACT

The imbibition of mung bean seeds with hydrogen peroxide(H_2O_2) and urea(NH_2-CO-NH_2) increase germination as well as the seedling growth, producing an the invigortion of the seeds . We propose that and could acts as signaling molecule in the beginning of seed germination involving specific changes protermic and hormonal Levels.These findings have practical implication in the content of seeds priming technologies to invigorate law vigour seeds.

Keywords: Signaling Molecular, Protermic, Hormonal, Vigour Seed.

1. Introduction

Germination process is associated with many metablolic, cellular, and molecular events, coordinate complex regulatory network.The germination seed has often been considered as a negative effect that might affect the germination process, but provided that their accumulation is tightly regulated by the balance between production and scavenging, these toxic molecular now appear as benefic for germination. Strategies for improving the growing and development of crop species have been investigated for many year. Seed priming is a pre-sowing strategy to investigated seed germination metabolic activity prior to emergence of the radicle and generally enhances germination rate plant performance. From a biochemical and molecular point of view, studying germination is difficult because a population of seed does not complete the process synchronously. Seed priming has been found as technology to enhance rapid and uniform emergence, and to achieve high vigour and better yield s. This process generally causes faster germination and faster field emergence, which has practical agronomic implication, notably under adverse germination condition.

2. Normal Germination of mung bean seed

Seed, in 50g aliquots, were imbibed for 24hrs at room temperature (**20^0C**) in distilled H_2O. The seed were than drained, rinsed twice with distilled H_2O, and germination continued on moist filter paper in the dark. After the desired period of germination the seed were rised with distilled H_2O, and the cotyledons dissected free of the seed coats and axes. Cotyledons were frozen at (–20^0C) until needed. Germination time was reckoned from the beginning of inhibition.

Fig (a) Seed Germination

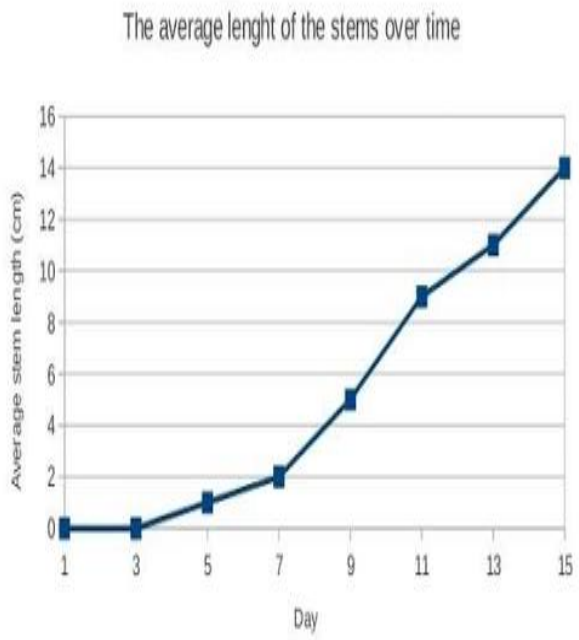
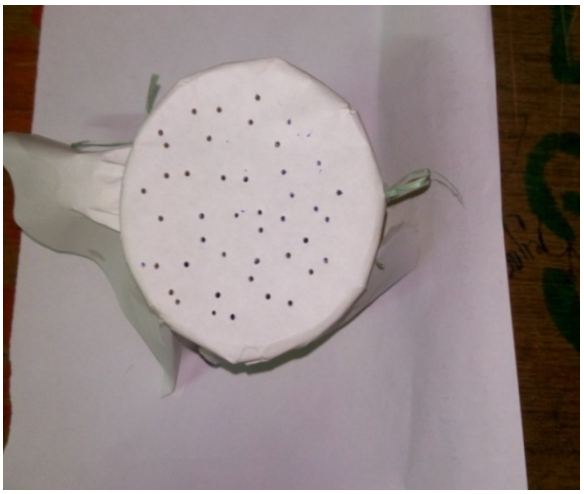


Fig (b) The average length of the strem over time

3. H_2O_2 Signaling during seed Germination

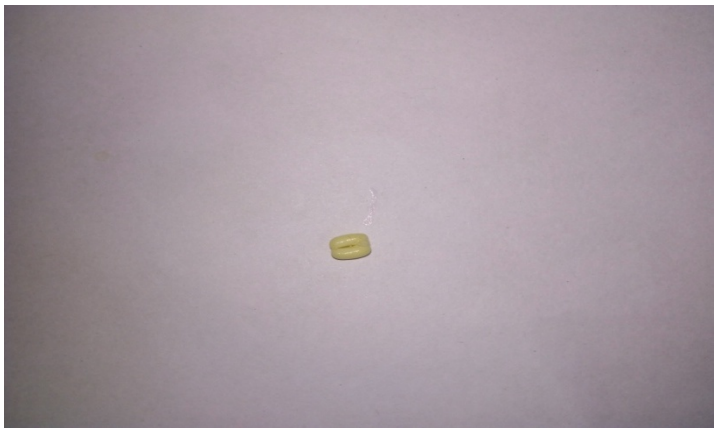
To carry out this work, mung bean were imbibed for 24hrs in dH_2O of in the compounds describesa different concentrations.Seeds were then washed twice with H_2O and place in petri dishes with two layer of filter paper moistened with dH_2O. Seed were incubated at 25^0C for 48hrs in darkness, in a cooled incubator



Fig(c) Dark room

Fig(d) Germination seed in 6hrs

Fig(e) Germination seed in 24hrs



Fig(f) Germination seed in 48hrs

Fig(g) Germination seed in 72hrs

The figures has shows germination rate of growth , except Hydrogen peroxide (H_2O_2) and Urea (NH_2-CO-NH_2), none of the assayed compounds had a positive effect on seed germination or seedling growth. Exogenous Hydrogen peroxide (H2O2) and Urea (NH_2-CO-NH_2) showed a priming effect in the germination of mung bean in a concentation depending manner obtaining more vigourous seedling, being 20Mm Hydrogen Peroxide (H_2O_2) and Urea the concentration that produced the but response in term of growth. The increase in seedling growth by 20mM (H_2O_2) and and Urea was also evident 24hrs after imbibition. The priming effect of H_2O_2 and Urea was also noticeable at shorter times of imbibition . After 12hrs of imbibition about 15% of seeds had germinated; however, no germination occurred at this time in seeds imbibed in water, At 24hrs of imbibition,this percenyage has reached nearly 75%, whereas preliminary experiments, we noticed that H_2O_2 andssssssUrea concentrations germination remained at low level. In preliminary experiments, we noticed that H_2O_2 and urea concentration higher than 20Mm also stimulated the germination rate after 24hrs imbibition. However, at short term of post-imbibition we observed that these H_2O_2 and Urea level the radicle at 24hrs and 48hrs post-imbibition.in addition, germination rate can improve seed germination in many plant species. The interplay between ROS and Hormone signaling pathways lead to change in gene expression or in cellular redox status that would play a role in the perception of environement factor by seed during their germination. Recently we have shown that Hydrogen Peroxide and Urea coordination the beginning of pea seed germination, acting as a priming factor that involves specific change at proteome, transcriptome and hormonal levels,resulting in an acceleration of the germination process most probably due to invigoration of the seed. As mentioned above, the H_2O_2 and Urea treatment also stimulates the early growth of mund bean seedling. Previously,we have described that the H_2O_2 induced increase in mung bean seedling growth was correlated with the induction of proteins related to plant growing, cellular signaling and cell cycle control, protein, profilin, proteasome, translationally controllred tumor, as well as with a substantial decrease in the level of the hormons.

4. Conclusion

The result suggest that seed priming with hydrogen peroxide (H_2O_2) and Urea (NH_2-CO-NH_2) is convenient method of seed priming to improved germination. They are of considerable interest, notably in the context of improving crop yield by invigoration seed treatments both in commercial applications and in developing countries.

5.Conflict of interests

The authors have not declared any conflict of interests.

6. Acknowledgment

The authors wish to thank Mr P.Kathirvel. This work was supported in part by a grant from experimental Part.

6.REFERENCES

1. Gregorio Barba-Espin, Jose Antonio HernandezandPedroDiaz Vivancos.Role of Hydrogen peroxide in pea seed germination.

2. Katzman LS,Taylor AG, Langhans RW. Seed enhancements to improve spinach germination.Hort sci 2001;36:979-81.

3. Ching Huei Kao. Role of Hydrogen Peroxide in Rice Plant.

4. G. Hemalatha, J. Renugadevi, T. Eevera. Studies on seed priming with Hydrogen peroxide for mitigating salt stress in rice.

5. Kazuhiro sasaki, Sachie Kishitani, Fumitaka Abe and Tadashi sato. Promotion of seedling Growth of seeds of Rice by Treatment with H_2O_2 before sowing

6. Elke Lorensen, Regina Prevosto and Karl A. Wilson. The Appearances of New Acive Form of Trypsin Inhibitor in Germinating Mung Bean.

7. Baily C, EL-Maarouf-Boutea H, Corbineau F. From intracellular signaling networks to cell death;the dual role of reactive oxygen species in seed physiology .C R Biol 2008; 331:806-14; PMID:18926495.

8. Black M, Bewley JD, Seed Technology and Its Biological Basis. Sheffield Academic Press Ltd., Sheffield 2000.

9. Hilton JL, Pillai P, Norman HA. Fate of safeningSagentL-2-Oxothiazolidine-4-Carboxylic acid in shorgum. Weed sci 1990; 38:201-5.