Damrongvudhi Onwimol 2014: Cell Cycle Activity and Gene Expression of Cucumber Seed during Seed Priming. Doctor of Philosophy (Agricultural Biotechnology), Major Field: Interdisciplinary Graduate Program. Thesis Advisor: Assistant Professor Thammasak Thongket, Ph.D. 101 pages.

Osmopriming, using of KNO_3 as an osmotic agent, was recognized as one of the methods to enhance germination performance in a laboratory for cucumber seed. Its principle is to initiate germination process to occur to some extent and cease it before radicle emergence taking place. The key factor controlling the effectiveness and success of seed osmopriming is the markers to cease the imbibition process when the desirable germination advancement is achieved. Therefore, the correlation between cell cycle activity and the advancement of seed germination process as well as the physical and biochemical changes during imbibitions periods of germination process and their correlation with the achieved seed quality after priming were studied with the aim to find the effective markers for cucumber seed priming.

Cell cycle activity study during imbibition periods of normal cucumber seed and heat deteriorated cucumber seed revealed that DNA content of (4C+8C)/2C ratio of the seedling radicle tip had a positive correlation with germination advancement by which it increased six hours prior to radicle emergence in normal cucumber seeds. However, it was not for heat deteriorated seeds. The results from the study of physical and biochemical changes during seed imbibitions periods of osmopriming revealed that the imbibition stage at which seed moisture content reached the beginning of phase II of tri-phases of imbibitions gave the best seed quality after priming for both before and after AA treatment. The down regulated expression of *Cucumis sativus EMB-1-like*, involving in desiccation tolerance, in the later stage of phase II of imbibitions coincided with the declining of achieved seed quality after priming indicating the negative effect of excessive imbibition time beyond the beginning of phase II. These results suggest that the seed moisture content at the level reaching the beginning of phase II of imbibition in combination with the expression of the *Cucumis sativus EMB-1-like* can be used as the effective markers to find the suitable time to cease the imbibition process of osmopriming for cucumber seed.

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