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Comparative study of enzyme dehydrogenase activity in *Cicer arietinum* and *Arachis hypogea*

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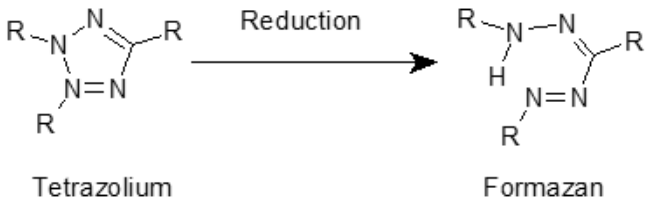
Abstract
Viability of seeds can be determined by the dehydrogenase activity of the constituent cells. Enzyme activity can be seen both inside and outside the cell. Dehydrogenase activity can be observed by the formation of formazan compound, a red dye, from 2, 3, 5, Triphenyl Tetrazolium Chloride (TTC). Dehydrogenase can catalyze the reaction. Initially red colour is observed in the seed tissues and gradually the whole solution turns red. Change in colour of the solution is observed with respect to time. A comparative study is conducted between *Cicer arietinum*(chick pea) and *Arachis hypogea*(ground nut). Higher enzyme content is reported in chickpea as the reaction is completed in 18 hours, as compared to groundnut where the reaction takes 48 hours to complete. It is seen that the content of enzyme and rapid leaching of formazan is responsible for the process.

Keywords: Viability, TTC, Formazan, Leaching.

INTRODUCTION

Dehydrogenase is respiratory enzyme whose activity proves that cell is alive. 2,3,5 Triphenyl Tetrazolium Chloride (TTC)is used in all seed test laboratories for viability test. In which the reduction of TTC(colourless) to Formazan(red) is the responsible chemical reaction. The tetrazolium test is widely recognized as an accurate means of estimating seed viability. Hydration of seed embryos increases the enzyme activity resulting in release of hydrogen ions which reduces TTC. This work is aimed on the same reaction to compare the enzyme activity between seeds of two commercially grown crops viz. *Cicer arietinum*(chick pea or Kabuli chana vern.) and *Arachis hypogea*(ground nut).



MATERIALS AND METHODS

Presoaked seeds (for 6 hours) of Kabuli Chana (*Cicer arietinum*) and Groundnut (*Arachis hypogea*) are taken. Seed coat is removed and the seeds are dipped in petriplates containing different concentrations of TTC solutions. The petriplates are kept under darkness at 30^0 C. The development of red colour in seed cotyledon is noted with respect to time.

OBSERVATIONS

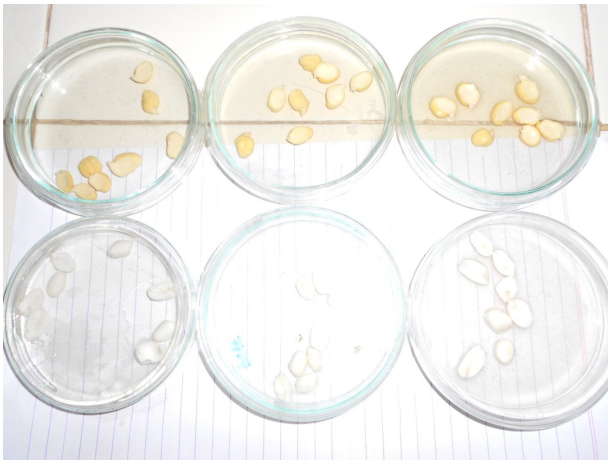


Photo plate 1. 20 minutes of incubation

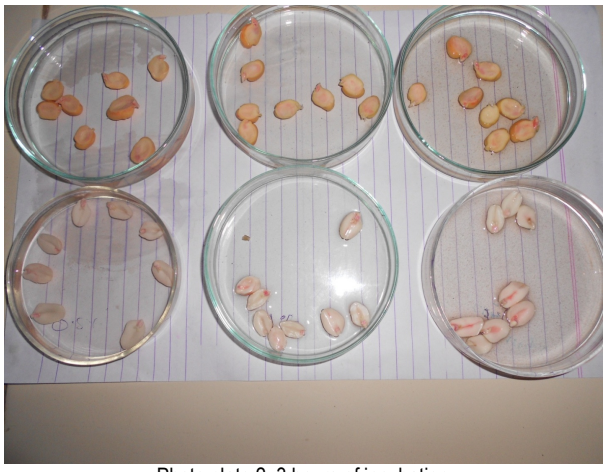


Photo plate 2. 3 hours of incubation

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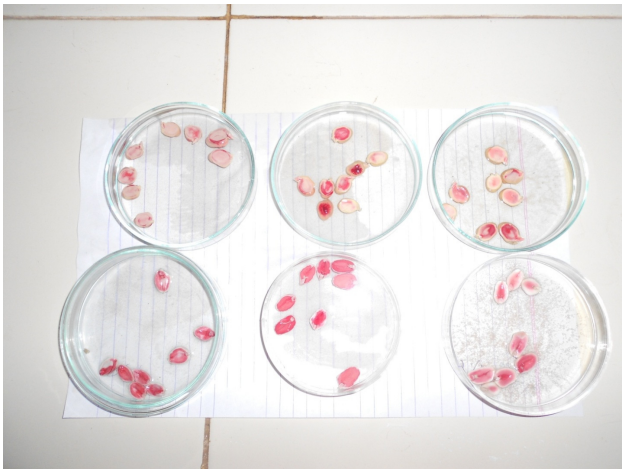

Photo plate 3. 12 hours of incubation

In each of the photographs above the plates are arranged in the order of increasing TTC concentrations viz.0.5%, 1.0% and 2.0%, the plates in upper row are of Chick pea and in lower row are of Ground nut.

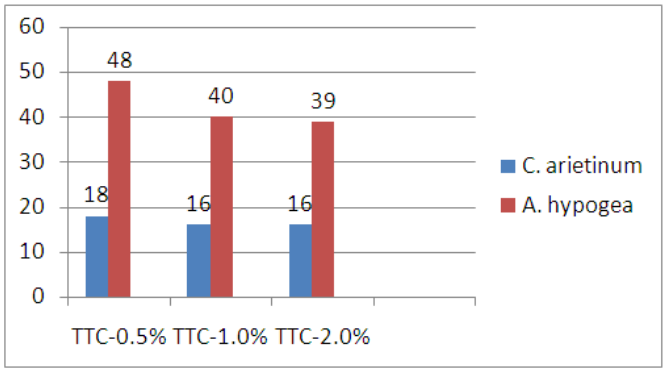

Chart 1.Time taken (hrs) for the complete colour change of the solutions.

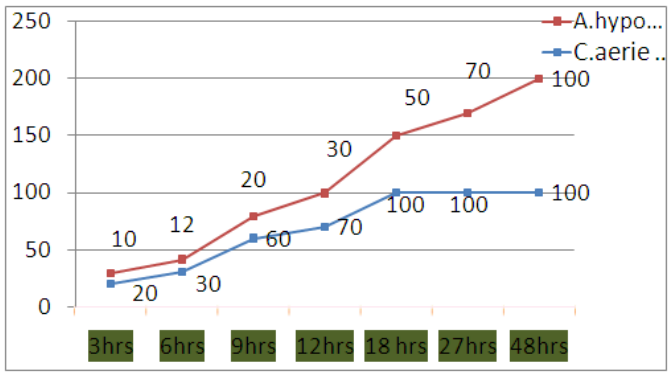

Chart2. Average % of Area of seed cotyledons getting red in colour with time in TTC 0.5% solution

RESULTS AND DISCUSSION

The enzymatic activity is observed in the embryonic cells first which is indicated by the change in colour (Photo plate 2), which is gradually followed by the cotyledons (Photo plate 3).

The % area showing activity in case of *C.arietinum* is more in 3,6,9 hours (Chart 2) which indicates more viable cells and more enzymatic activity in the tissues of cotyledons. Seeds of *C.arietinum* show higher activity than *A.hypogea* as the seeds become red early by 30 hours.

Higher enzyme content is reported in chickpea as the process is completed in 18 hours, as compared to groundnut where it takes 48 hours to complete. Gradually the whole solution turns red. This is because of rapid leaching of formazan from the cells.

The time taken to turn TTC solutions completely red is irrespective to substrate concentration.

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