



## Comparative study on biochemical analysis of moth bean (*Vigna Acitnifolia*) when treated with hot water and $\text{HgCl}_2$

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### Abstract

The present study aimed at investigating the effects of Hot water and Mercuric chloride on Biochemical parameter of Moth bean. Carbohydrate, Protein and Amylase consequently increase with hot water and  $\text{HgCl}_2$ . The amylase activity at 3<sup>rd</sup> day of germination was highest in all the treatments hence recommended at 3<sup>rd</sup> day as optimum period for utilizing moth bean as a diet.  $\text{HgCl}_2$  treatment for seed is recommended for germinating moth beans for crop purpose as highest enzymatic activity was observed in 5<sup>th</sup> day of germination.

**Keywords:** Moth bean, Mercuric chloride, Carbohydrate, Protein, Amylase.

### Introduction

The moth bean (*Vigna Acitnifolia*) also called Mat bean or Turkish gram in some parts of the world is native to India, Pakistan and Burma. It is an important pulse crop of arid and semi-arid region of India and Pakistan. It has multi-uses and adapts to extremes or uncongenial ecological riches particularly, in areas receiving fewer rains with erratic distribution. Moth bean is a hot weather, drought resistance legume. The plant resembles a small mat; it is a ground hugging plant and only about a foot high. The densely matted branches, which grow horizontally and have deeply noched leaflets on long leaf branches, are somewhat similar to the leaves of certain varieties of sweet potatoes. The crop is generally grown in northwestern deserts regions of India and Pakistan, especially in area where moong bean suffers from drought production of moth bean varies greatly with in India, and all production is consumed within the country<sup>1,2</sup>.

There are different factors affecting seed germination like abiotic and biotic factor such as Temperature, Moisture or Water Soil, Light, Viability of the seeds, Dormancy period<sup>5</sup>.

Seed treatment is commonly used to ensure uniform stand established by protecting against soil borne pathogen and insects<sup>6</sup>. Infect this may be applicable to the other pulses in which only germination in the soil for production is important where as the germination with respect to moth. As a seed for the productivity and pulse as a sprouted dish is concern the seed treatment which should be easily acceptable to the farmer or consumer practicable acceptable and economical is required<sup>7</sup>.

The germination of seed a massive breakdown of the substances begin with the help of lipolytic, amylolytic, and proteolytic enzyme products are tram spouted to the growing seedling for

their development. The small amount of remaining protein represent enzyme concerned in metabolic process<sup>8,9</sup>.

In view of all these the following seed treatments is therefore proposed and applied in the present study are Hot water treatment,  $\text{HgCl}_2$  treatment, Plain water treatment with Carbohydrate, Protein and Amylase activity.

### Material and methods

An experiment was carried out in Akola under normal conditions to estimate total carbohydrates, proteins and amylase activity of Moth bean at 1, 3, 5<sup>th</sup> days from germination. Following treatments were selected for experiment.

**Plane water treatment:** Dip the seeds in plane distilled water for 10 min and then inoculated seeds into pots containing soil.

**Hot water treatment:** Heat the dist. water at 121°C at 12 lbs for 15 min. then soaked for 10 min in heated water and inoculated seeds into small petri dish containing soil.

**$\text{HgCl}_2$  treatment:** Dip seed in 1%  $\text{HgCl}_2$  solution for ten min. then inoculate seeds in petridish containing soil.

**Biochemical analysis:** i. Estimation of carbohydrate [by anthrone method]<sup>4</sup>, ii. Estimation of protein: [By Biuret method]<sup>3</sup>, iii. Estimation of amylase activity: [By DNSA Method]<sup>3</sup>.

### Results and discussion

Result of experiment conduct to study the comparative study of biochemical analysis of treated dicot (Moth bean) (*vigna acitnifolia*) during germination.

**Carbohydrate:** The carbohydrate concentration in different seed treatments during 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> day of the germination were estimated and presented in Table-1 and graphically presented in Figure-1.

It is observed from the table that the carbohydrate concentration in control, HgCl<sub>2</sub>, and hot water treatments were 0.0416 + 0.0076, 0.0583 + 0.0175 and 0.035 + 0.005 respectively in 1<sup>st</sup> day of germination. The carbohydrate concentration during 3<sup>rd</sup> day of germination in control, HgCl<sub>2</sub> and hot water were found to be 0.111 + 0.0104, 0.025 + 0.005, 0.13 + 0.01 respectively. Similarly the carbohydrate concentration at 5<sup>th</sup> day germination were 0.045 + 0.005, 0.056 + 0.0104 and 0.11 + 0.01 respectively in control, HgCl<sub>2</sub> and hot water treatments.

**Proteins;** The protein concentration in different seeds treatment i.e hot water and HgCl<sub>2</sub> treatments during 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> day of

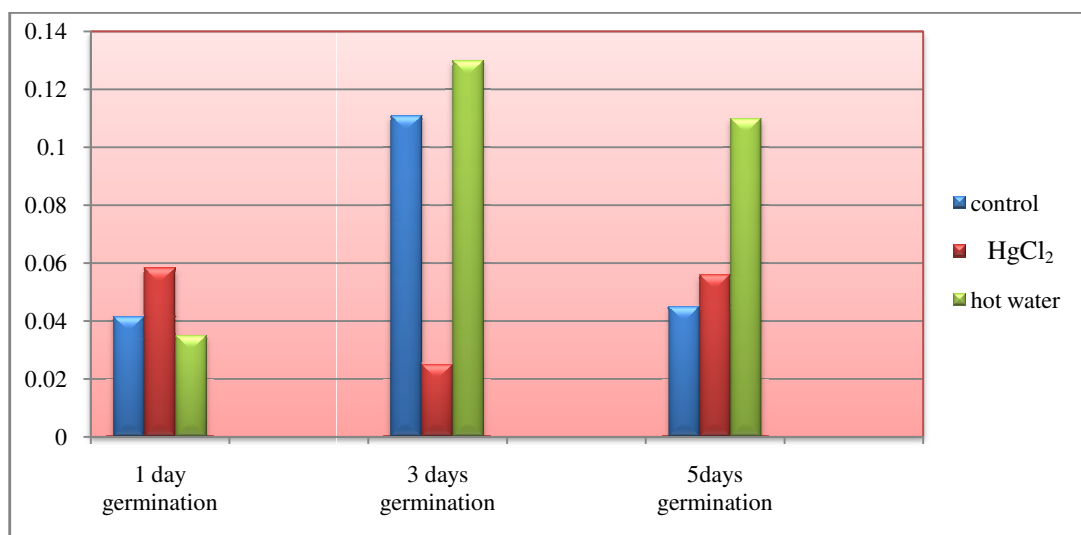
germination were estimated and presented in Table-2 and graphically presented in Figure-2.

It is observed from the table that the protein concentration in control, HgCl<sub>2</sub>, and hot water treatment were 2.93 + 0.404, 3.26 + 0.25, 3.1 + 0.65 respectively in 1<sup>st</sup> day of germination. The protein concentration during 3<sup>rd</sup> day germination in control, HgCl<sub>2</sub> and hot water were found to be 4.033 + 0.251, 4.5 + 0.5 and 3.267 + 0.251 respectively. Similarly the protein concentration at 5<sup>th</sup> day of germination were 3.1 + 0.6, 2.94 + 0.404 and 2.86 + 0.55 respectively in control, Hgcl<sub>2</sub>, hot water treatments.

**Amylase:** The amylase activity in different seeds treatments during 1<sup>st</sup>, 3<sup>rd</sup>, and 5<sup>th</sup> day of germination were estimated and presented in Table-3 and graphically presented in Figure-3.

**Table-1:** The carbohydrate concentration in different seed treatment during germination (mg).

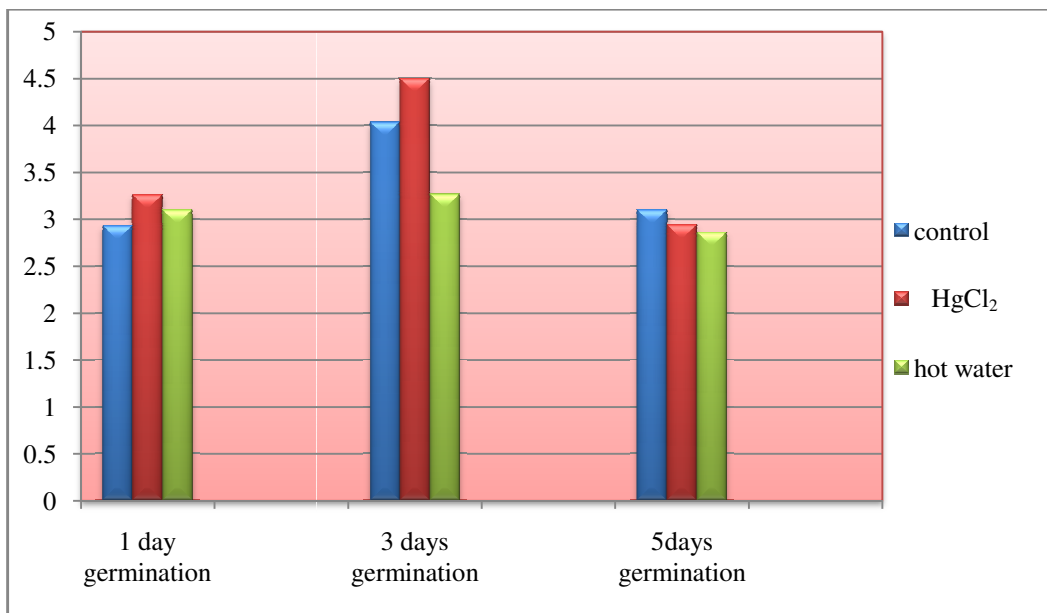
	1 day germination		3 days germination		5days germination	
Control	0.0416	+0.0076	0.111	+0.0104	0.045	+0.005
HgCl <sub>2</sub>	0.0583	+0.0175	0.025	+0.005	0.056	+0.0104
Hotwater	0.035	+0.005	0.13	+0.01	0.11	+0.01



**Figure-1:** Graphical presentation of carbohydrate concentration in different seed treatment during germination (mg).

**Table-2:** The protein concentration in different seed treatment during germination [mg].

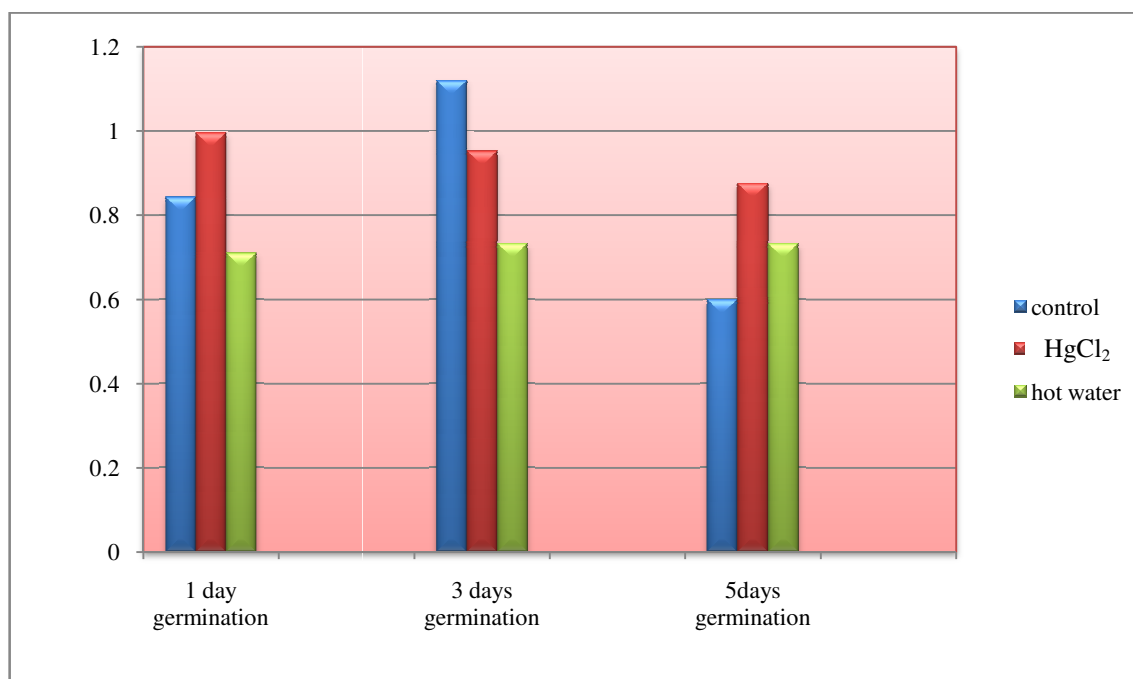
	1 day germination		3 days germination		5 days germination	
Control	2.93	+0.404	4.033	+0.251	3.1	+0.36
HgCl <sub>2</sub>	3.26	+0.251	4.5	+0.5	2.94	+0.404
Hotwater	3.1	+0.655	3.267	+0.251	2.86	+0.55



**Figure-2:** Graphical presentation of protein concentration in different seed treatment during germination.

**Table-3:** The amylase activity in different seed treatment during germination.

	1 day germination		3 days germination		5 days germination	
Control	0.843	+0.102	1.12	+0.158	0.6	+0.07
HgCl <sub>2</sub>	0.996	+0.065	0.953	+0.09	0.876	+0.136
Hotwater	0.71	+0.202	0.733	+0.065	0.733	+0.135



**Figure-3:** Graphical presentation of amylase activity in different seed treatment during germination.

It is observed that from the table that the amylase concentration in control, HgCl<sub>2</sub>, and hot water treatment were 0.843 +0.102, 0.996 +0.065 and 0.71 + 0.202 in 1<sup>st</sup> day of germination. The amylase concentration during 3<sup>rd</sup> day of germination in control, HgCl<sub>2</sub> and hot water were found to be 1.12 + 0.158, 0.953 + 0.09 and 0.733 + 0.065 respectively, the amylase conc. at five day germination were found to be 0.06 + 0.07, 0.0876 + 0.136 & 0.733 + 0.135 respectively in control HgCl<sub>2</sub> and hot water treatment.

## Conclusion

**Carbohydrate:** The result presented in Table-1 indicated that the carbohydrate content on 1<sup>st</sup> day in the control and hot water were approximately similar but slightly increase in HgCl<sub>2</sub>. Whereas increase significantly on 3<sup>rd</sup> day but highest in hot water treatment followed by control and lowest in HgCl<sub>2</sub>. On 5<sup>th</sup> day in control and HgCl<sub>2</sub> group decreases significantly where as in hot water treatment the carbohydrate contents was comparably maintain indicating that this treatment maintain the energy level of the seed during germination and will utilize this energy for further growth of the plant.

**Protein:** The protein contents on 1<sup>st</sup> day range between 2.93 to 3.96 mg which is comparatively similar in all the treatment. The highest protein content was observed in 3<sup>rd</sup> day germination in the entire treatments group. Which were ranges between 3.2 to 4.5 mg. The protein content found to be reducing significantly in 5<sup>th</sup> day of germination in the entire treatment group. It indicate that germination moth beans is utilized as a diet the optimum period for soaking is 3days for better protein content irrespective of the treatment.

**Amylase:** The amylase activity in 3<sup>rd</sup> day of germination found to highest as compared to 1<sup>st</sup> day and 5<sup>th</sup> day of germination. The amylase activity on 3<sup>rd</sup> day was highest in control followed by HgCl<sub>2</sub> and lowest in hot water treatment where as on 5<sup>th</sup> day of germination the amylase activity was highest in HgCl<sub>2</sub> group. This may be due bacteriosidal effect of the inhibiting process of enzymic activity reduced and hence the amylase activity in HgCl<sub>2</sub> group is increase significantly taking into consideration the enzyme activity as highest in 3<sup>rd</sup> day of germination in the

entire treatment group. The 3<sup>rd</sup> day germination found to be suitable for germinating moth bean or matki as a diet.

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