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Effect On Various Types Of Priming Techniques On Biochemical Changes In Fresh And Accelerated Aged Seeds Of Baby Corn (Zea Mays L.)

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ABSTRACT: ***This experiment was conducted in Agronomy research lab of Lovely Professional University Phagwara (Punjab). The experiment carried out effect on different priming techniques as viz.T_1 (Hydro priming for 12 hr.), T_2 (Hydro priming for 24 hr.), T_3 (osmo priming, 1 % KNO_3, for 12 hr.), T_4 (Osmo priming, 1 % KNO_3, for 24 hr.), was used as a solvent solution was prepared. Seed of 100 grams was soaked in that solution for 12 hours and for 24 hours. T_5 (halo priming 1 % $CaCl_2$, for 12 hr.), T_6 (halo priming 1 % $CaCl_2$, for 24 hr.), T_7 (Hormonal priming at 100 ppm for 12 hrs) and T_8 (Hormonal priming at 150 ppm for 24 hr.) The significant different EC and amylase test in hormonal treatment T_8 (G.A. at 150 ppm for 24 hr) on fresh seed was observed 0.326 and 5.24, respectively as compared to aged seeds of baby corn.***

Keywords: Hydro priming, Halo priming, Osmo priming, Hormonal priming, Gibberellin acid, electrical conductivity, α – amylase.

1. INTRODUCTION

Baby corn is widely consumed all around the world and it is very popular in developed countries like US, Russia and European countries. Toady its demand is also growing in developing countries especially in south Asian counties .Besides being consumed domestically it has huge potential of export. It is a short duration crop and after harvest corn plants could be utilized as fodder for animals. Today china and Thailand is top at baby corn production but some Indian states like Meghalaya, Karnataka, Uttar Pradesh are picking up its higher production (Ramachandrappa *et al*,.2004; ChitraMani & Kumar, P. (2020); Sharma, M., & Kumar, P. (2020); Chand, J., & Kumar, P. (2020); Naik, M., & Kumar, P. (2020); Kumar, P., & Naik, M. (2020); Kumar, P., & Dwivedi, P. (2020); Devi, P., & Kumar, P. (2020); Kumari, P., & Kumar, P. (2020); Kaur, S., & Kumar, P. (2020); Devi, P., & Kumar, P. (2020); Sharma, K., & Kumar, P. (2020); Kumar, S. B. P. (2020); Devi, P., & Kumar, P. (2020); Chand, J., & Kumar, P. (2020). Accordingly yield loss due to poor germination of seeds is a important concert in agriculture sector (Barnard and Calitz., 2011). One of the possible method to improve seeds quality and germination is throw priming method. It also help seeds to retain high vigour promote growth speed and to maintain biochemical activity (Rahman *et al*., 2014) Seed priming is a method in which seeds are controlled hydrated in a

desired solution still completed pre- germination metabolic activity. There are several methods of seed priming like halo priming, hormonal priming, sand matrix priming, hydro priming and etc. Out of which hydro priming is most common as its is one of the most effective, cheap and traditional method of priming (Anonymous, 2019). The most effective method of all for baby corn seed priming is hormonal priming in which use of gabberellic acid for concertation of 150 ppm at 24 hrs is most effective. Use of $G.A_3$ need to synthesis to break its dormancy and a external apply of artificial $G.A_3$ help it to break its dormancy much earlier (Tina., *et al*,. 2014). This method is very useful for herbs seeds and some trees seeds remain at dormancy for very long time and to break its dormancy is a challenge for its nursery raising. So there is a huge scope of this method to be used at commercial level as it is one of the most cheap and best method of retaining seed quality and to break seeds dormancy (Matthew, *et al.*,2012; Kumar, P. (2019); Kumar, D., Rameshwar, S. D., & Kumar, P. (2019); Dey, S. R., & Kumar, P. (2019); Kumar et al. (2019); Dey, S. R., & Kumar, P. (2019); Kumar, P., & Pathak, S. (2018); Kumar, P., & Dwivedi, P. (2018); Kumar, P., & Pathak, S. (2018); Kumar et al.,2018; Kumar, P., & Hemantaranjan, A. (2017); Dwivedi, P., & Prasann, K. (2016). Kumar, P. (2014); Kumar, P. (2013); Kumar et al. (2013); Prasann, K. (2012); Kumar et al. (2011); Kumar et al. (2014).

2. MATERIAL AND METHODS

1 Accelerated aging

The sample of accelerated ageing seed were kept in a special design monolayer wire gauze. It was kept in a ageing chamber which was control and maintain humidity (Delouche and Baskin, 1973). The chamber temperature was maintained for 24 hours at 40 per cent and at 90 per cent of humidity (Hussein. J *et al* 2012). The experiment involve various priming techniques viz., T_1 (Hydro priming), in this treatment 100 grams of corn seed were soaked in 200 ml of double distil water kept 12 hours in 500 ml glass beaker. For T_2 (Hydro priming) in which 100 grams of seed were soaked in 200 ml of double distil water for 24 hours (Ahammad., 2014). For T_3 (Osmo priming) in this priming method, 1 % of KNO_3 solution was prepared by taken 2 gram of KNO_3 in 200 ml of distil water in a beaker. Afterwards seed of 100 grams were soaked in prepared solution for 12 hours. For T_4 (Osmo priming) same solution and same seed weight used in T_3 treatment but the timing for soaking of seed was increased for 24 hours (Kumari. *et al* 2017 and Soleimanzadeh, 2013). In case of T_5 (Halo priming) for halo priming $CaCl_2$ was used as solvent in which 1% of solution was to be made. For preparing 1% of solution add 2 gram of $CaCl_2$ was used in 200 ml of distil water and kept 100 grams of corn seed soaked for 12 hours. For T_6 (Halo priming) same solution and same quantity of seed was soaked for 24 hrs duration (Kumari. *et al* 2017). For treatment T_7 (Hormonal priming) $G.A_3$ was taken. For hormonal priming two solution was taken in one solution 100 ppm of G.A and 150 ppm of $G.A_3$ was used. For preparation of 100 ppm of solution 20 milligram of $G.A_3$ diluted in ethanol after that solution is diluted in 200 ml of distil water. For T_7 (Hormonal priming) 100 grams of seeds were soaked in 200 ml of solution in 100 ppm of $G.A_3$ for 12 hours. For T_8 (Hormonal priming) same amount of seed and same solution in same volume was taken and seed were soaked for 24 hours. For T_9 (Hormonal priming) 30 milligram of $G.A_3$ was taken and a solution of 150 ppm was made in 200 ml of distil water. Proses of preparing $G.A_3$ solution in ethanol remain same as mention above. Same quantity of seeds and same volume of solution was taken and seed was soaked for 12 hours. For T_{10} (Hormonal priming) same amount same volume used in same solution 150 ppm of $G.A_3$ was used for soaking of seed for 24 hours. (Kumari, *et al*., 2017 and Bhattarai. *et al.,* 2003). The study of biochemical analysis was performed by analyzing α – amylase activity and electrical conductivity of accelerated and aged seeds under different

priming methods. For determination of electrical conductivity (EC) thirty seeds of same size were taken from all three replication and soaked in 25 ml of double distilled water for 24 hours at room temperature. After that filter by Whatman No. 1 filter paper. The filter water is collected and EC was measured using a digital electrical conductivity meter. The EC was expressed as (µs/ppm) at 25+10C (Anonymous, 1996). The activity of α– amylase from seeds was extracted and assayed as per the procedure described by (Bernfeld, 1995).

3. RESULTS AND DISCUSSION

A. Effect of EC on fresh and aged seeds under different priming methods

Electrical conductivity is an important parameter which directly measures the membrane integrity and is one of the best methods to check seed vigour. In this experiment performed on seed electrical conductivity of fresh and aged seed slot as affected by different priming treatment is presented in Table 1. Significant difference was observed in the electrical conductivity between the two different slots of primed treatments. An average E.C of fresh seed and for aged seed was found 0.449 and 0.455 µs/ppm, respectively. The minimum EC was recorded in T_8 (G.A 150 ppm for 24 hours) in fresh seed slot and aged seed slot was found 0.326 and 0.493 µs/ppm, respectively. While, highest EC was calculated in control T_0 in fresh seed and for aged seed was recorded 0.62 and 0.80 µs/ppm, respectively.

The difference in E.C of different priming solution between the seed slot is primer due to seed ageing factor that could be reason for deterioration of seed or due to increase in permeability of seed membrane which result in leakage of electrolytes at the time of imbibition similar results were noticed by Parrish and Leopold (1978). In aged seed the value of E.C could higher in because of reduction in membrane integrity due to detrimental change occur in seed. Mc Donal (1979) given explanation on the ageing of seed which form lipid peroxidation which further make free charge radical ions resulting in electrical leakage and exudation of simple sugar.

Table1. Effect of EC on fresh and aged seed of baby corn under different priming techniques

Treatment	**Electric conductivity (µs/ppm) at 25+10 °C)**	
	Fresh	Aged
T_0	$0.62^{a} \pm 0.01$	$0.80^{a} \pm 0.02$
T_1	$0.44^{bcd} \pm 0.00$	$0.606^{a} \pm 0.01$
T_2	$0.42^{cde} \pm 0.01$	$0.6^{a} \pm 0.01$
T_3	$0.52^{abc} \pm 0.02$	$0.68^{a} \pm 0.01$
T_4	$0.496^{bc} \pm 0.01$	$0.65^{a} \pm 0.01$
T_5	$0.536^{ab} \pm 0.01$	$0.686^{a} \pm 0.01$
T_6	$0.453^{bc} \pm 0.01$	$0.665^{a} \pm 0.01$
T_7	$0.35^{de} \pm 0.04$	$0.516^{a} \pm 0.01$
T_8	$0.326^{e} \pm 0.01$	$0.493^{a} \pm 0.02$
T_9	$0.37^{de} \pm 0.01$	$0.56^{a} \pm 0.02$
T_{10}	$0.373^{de} \pm 0.01$	$0.53^{a} \pm 0.01$

In present experiment difference in E.C value which was recorded among the different treatment indicate the capacity of different priming to protect the membrane, Kurdikeri (1993) and Sandyarani *et al.*,(2002).

B. Effect of α-amylase activity on fresh and aged seeds under different priming methods.

. In this experiment performed on seed α-amylase of fresh and aged seed slot as affected by different priming treatment is presented in table number 8 and figure number 7.

Significant difference was observed between both the Fresh seed slot as well as aged seed slot affected by different priming treatment. Different priming methods has different effect on amylase synthesis average value was calculated for each slot. Average value for Fresh seed slot was recorded 5.15 for aged seed it was 3.13.

Maximum value of amylase was calculated in T_8 hormonal priming in both slot fresh seed it was calculated 5.24 and in aged seed, it was calculated 5.39. Similar values were recorded within hormonal priming for different treatment. After hormonal priming hydro priming had got better results in both the slot. Minimum was observed in control of both the seed slot for fresh seed slot it was 5.07 and for aged slot it was 3.77 (Madane, *et al.,* 2019). The increase in activity of amylase due to priming method can be due to hydration during process of imbibition that led to increase in soluble sugar and reduce the construction of non-soluble sugar. This similar finding is conformed with Satvir kaur *et al*., (2002).

Table 2. Effect of amylase test on fresh and aged seed under different priming techniques

Treatment	**Amylase test**	
	Fresh	Aged
T_0	$5.07^{a} \pm 0.05$	$3.77^{b} \pm 0.06$
T_1	$5.12^{a} \pm 0.05$	$3.84^{ab} \pm 0.11$
T_2	$5.16^{a} \pm 0.05$	$3.84^{ab} \pm 0.05$
T_3	$6.13^{a} \pm 0.04$	$3.8^{ab} \pm 0.05$
T_4	$5.19^{a} \pm 0.04$	$3.81^{ab} \pm 0.07$
T_5	$5.1^{a} \pm 0.05$	$3.81^{ab} \pm 0.05$
T_6	$5.11^{a} \pm 0.06$	$3.83^{ab} \pm 0.06$
T_7	$5.22^{a} \pm 0.07$	$3.86^{ab} \pm 0.08$
T_8	$5.24^{a} \pm 0.05$	$3.93^{a} \pm 0.07$
T_9	$5.17^{a} \pm 0.05$	$3.86^{ab} \pm 0.06$
T_{10}	$5.15^{a} \pm 0.04$	$3.83^{ab} \pm 0.06$

The mean followed by different letters are significantly different at $p< 0.01$ according to tukey LSD for separation of mean.

4. CONCLUSION

From this above experiment we can conclude that all priming methods are effective as compare to unprimed seeds. The significant different EC and amylase test was found 0.326 and 5.24, respectively in hormonal treatment T_8 (G.A. at 150 ppm for 24 hr) on fresh seed as compared to aged seeds of baby corn. Although some more type of priming methods and their effect is yet to be tested but yet we can concluded that hormonal priming is one of the best method which has a lot of economical important in seed quality maintaining hence it can be commercial be used.

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