

Original Research Article

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Effect of Halo Priming, Osmo Priming and Hydro Priming on Fresh and Accelerated Aged Seeds of Baby Corn (*Zea mays* L.) on Germination, Seedling Dry Weight, Seedling Length

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ABSTRACT

Keywords

Vigour Index, Priming, Cell membrane, CaCl₂, KNO₃

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This experiment was laid down in Post Graduate Laboratory, Department of Agronomy Lovely Professional, University, Phagwara, Punjab which is situated at Latitude at 31.253 N and Longitude at 75.703E at the altitude of 240.0 m above the sea level. To check the effect of halo priming, osmo priming, and hydro priming on the fresh and accelerated aged baby corn seeds. Different dose of priming solution with different time duration was tested. T₀- Unprimed (control) T₁ Distil Water 12 hours, T₂ Distil Water 24 hours, hydro priming, T₃ KNO₃ 1% 12 hours, T₄ KNO₃ 1% 24 hours, osmo priming, T₅ CaCl₂ 1% 12 hours, T₆ CaCl₂ 1% 24 hours, halo priming. It was observed that all primed seeds showed significant difference among each other in both seeds slot (fresh and aged) in term of germination percent, seedling length, seedling dry weight, and vigour index I II. It was observed that seeds treated with hydro priming for 24 hours had showed maximum values in all the above parameter in both seed slots.

Introduction

Baby corn is a nutritive and delicious product continuously gaining popularity in big cities and towns. Because of its sweet and nutritive values it is highly demanded in hotels and restaurants. It consist of carbohydrates, vitamins, proteins, fat and minerals in sufficient, and in digestible matter. Baby corn is a rich source of phosphorus (82 mg /100 g of portion in compare to other common vegetable only contain 21 to 57 mg of

phosphorus contain) Less calorie, higher fiber contain, very less cholesterol containing very little amount of vitamin B and zinc make a good option for people suffering from heart disease. Beside its nutritive and test it is also one of the most free post effect of pest chemical as it is harvested within 2,4 days of tassel growth and most important baby corn is covered up strongly with husk and protected from harmful pest (Pradeep Kumar *et. al.*, 2004).

Baby corn has been gaining popularity in countries like US, EU, China, Japan and south East Asia. Developing countries like Zambia, South Africa and Vietnam has also started their cultivation. Today China and Thailand is the most producers of baby corn as well as top in consuming. Besides being domestically consumed it has also a huge potential of export. So as a cash crop it can be grown in India by small farmers to gain income between two seasons as well as its byproduct can be also used as fodder crop which can help in our dairy farming. By huge market possibility farmers of Meghalaya, western Uttar Pradesh, Karnataka and Bihar has started cultivating baby corn (Ramachandrapa *et al.*, 2004).

Some Common food recipes made by using Baby corn

- Baby corn soup with Manchurian.
- Baby corn pizza
- Moroccan Couscous plate of mixed greens with Baby Corn
- Baby Corn fry with Carrots and mushroom

Materials and Methods

This experiment was laid down in Post Graduate Laboratory, Department of Agronomy, Lovely Professional, University, Phagwara, Punjab which is situated at Latitude at 31.253 N and Longitude at 75.703E at the altitude of 240.0 m above the sea level. To check the effect of halo priming, osmo priming, and hydro priming on the fresh and accelerated aged baby corn seeds. Different dose of priming solution with different time duration was tested. T₀-Unprimed (control) T₁ Distil Water 12 hours, T₂ Distil Water 24 hours, hydro priming, T₃ KNO₃ 1% 12 hours, T₄ KNO₃ 1% 24 hours, osmo priming, T₅ CaCl₂ 1% 12 hours, T₆ CaCl₂ 1% 24 hours, halo priming. Total 1.4 kg of baby corn seed were taken each was

further divided into 100 grams of packet total 14 packet were created.

Accelerated ageing

The Baby corn seeds were accelerated aged from (Delouche and Baskin, 1973) method. For accelerated ageing seed sample were placed on monolayer wire gauze in a controlled humidity .Chamber maintained or adjusted at 40 0C ± 1 0 C and 100 percent relative humidity. The humidity in chamber was maintained for 24 hours in all three replications for analyses. All the observations on seed quality and biochemical parameters recorded were the average of three replications.

Seed priming method

For T₀ (control) 100 grams of seed were taken and without any treatment it was stored in air tight zip bags. For T₁ (Hydro priming) 100 grams of seed were soaked in 200 ml of double distil water in 500 ml of glass beaker for 12 hours. For T₂ (Hydro priming) 100 grams of seed were taken and soaked in 200 ml of double distil water for 24 hours (Ahammad, 2014). For T₃ (osmo priming) for osmo priming KNO₃ was used as a solvent. 1 % of KNO₃ solution was prepared. 2 gram of KNO₃ was taken in 200 ml of distil water in a beaker. Seed of 100 grams was soaked in that solution for 12 hours. For T₄ (osmo priming) same solution and same seed weight used in T₃ treatment was used but the timing for soaking of seed was increased for 24 hours (Kumari *et al.*, 2017 and Soleimanzadeh, 2013). For T₅ (Halo priming) for halo priming CaCl₂ was used as solvent. 1% of solution was to be made. For preparing 1% of solution 2 gram of CaCl₂ was taken and 200 ml of distil water was used. 100 grams of seed was soaked for 12 hours. For T₆ (Halo priming) same solution and same quantity of seed was soaked for 24 hrs (Debnath *et al.*, 2017).

Germination test

Stander germination test was conducted by paper germination test method. Before using this paper it was to be kept for overnight soaked in water. Next day on one butter paper two germination paper well soaked in water is to be kept. On that paper 100 seeds were kept in proper rows and Coolum and then it is covered with one more paper soaked in water. After this it is covered with butter paper and is folded in round bundle while folding it must be kept in mind that seeds position in paper should not be disturbed. Butter paper is used here to cover the paper roll by both sides so that to minimize water loss through evaporation. Three replication of each treatment was maintained. Then this all paper folds are kept in a tray with 2, 3 inch of water in tray. And this tray along with paper fold should be kept in germination chamber. Temperature of germination chamber should be kept between 23 °C to 27 °C but ideal temperature for baby corn seed germination is 25°C. So germination chamber temperature was kept at 25°C for 12 days.

Results and Discussion

Significant variation was observed between fresh and aged seed slot and within different treatment of priming which is mentioned in table 1.

According to table the mean germination percent of fresh seed was calculated 73.9 % in which highest germination percent was observed in T₆ in hydro priming for 24 hours followed by other hydro primed treatment for 12 hours and lowest germination was observed in T₀ in control. Mean germination for aged seed was calculated 68.9 % in which T₆ hydro priming for 24 hours followed by hydro primed treatment 12 hours and lowest was in T₀ Soleimanzadeh (2013).

This difference in germination percent between fresh and aged seed may be due to the embryo injury of aged seed and metabolic slowdown. Second possible reason may be due to slow mobilization of soluble molecules of sugar which ultimately delay the germination process (Mc Donald, 1999 and Powell *et al.*, 2000).

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

Significant variation was obtained between the fresh and aged seed slots as well as difference in value was also obtained within different type of priming methods as mentioned in table 2.

The mean value of fresh seed seedling length was obtained 9.11 cm and highest seedling length was observed in T₂ hydro priming 24 hours and lowest length was observed in T₀ control. On other hand mean seedling length for aged seeds was calculated 8.1 cm in which hydro priming for 24 hours showed maximum seedling length and minimum was obtained in control. Present results are justified by Ahammad (2014).

Better growth in hydro priming could be due to better absorption of water by seeds which further help seeds in imbibition process followed by other steps needed for germination. Reduce in length in aged seeds may be due to slow physiological reaction in cell membrane occurring due to reduce in soluble sugar molecule. Second possible reason for reduce in seedling length may be due to damage in embryo and due to leakage.

Mean seedling dry weight for fresh seed slot was calculated 151.4 mg in which highest dry weight was obtained in hydro primed seed for 24 hours and lowest was control. And mean seedling dry weight in aged seed was

calculated 134.6 mg in which again hydro primed seeds for 24 hours had showed maximum results and lowest was obtain in control Rahman *et al.*, (2014).

Improvement in seedling length can be partially related to dry matter contain as it is not compulsory that if long seedling growth will have more dry weight. But in most of the case length can effect directly to weight of seedling. In present study primed methods

had helped the seeds to repair and nourish the cell membrane, complete first two steps of seed germination. As from data mention in table 1 and 2 it is clear that although mean value of aged seed is less than fresh seed in germination, seedling length and seedling dry weight but still some primed aged seeds had showed better results in compare to control of fresh seed slot (Hussaini *et al.*, 1988 and Ramamoorthy *et al.*, 1989).

Table.1 Paper germination test

Treatment	Fresh seed	Aged Seed
T ₀	69.3 ^a ± 2.7	61.0 ^c ± 0.5
T ₁	80.0 ^a ± 2.0	73.6 ^{ab} ± 0.8
T ₂	81.3 ^a ± 1.4	75.0 ^a ± 1.4
T ₃	70.0 ^a ± 1.7	66.3 ^{bc} ± 1.7
T ₄	72.3 ^a ± 0.8	68.0 ^{abc} ± 0.8
T ₅	70.0 ^a ± 2.0	68.0 ^{abc} ± 1.0
T ₆	74.0 ^a ± 2.0	70.3 ^{ab} ± 1.7

Table.2 Seedling length and seedling weight

Treatment	seedling length (cm)		seedling dry weight (mg)	
	Fresh seeds	Aged seeds	Fresh seeds	Aged seeds
T ₀	8.85 ^c ± 0.01	7.84 ^b ± 0.04	134.3 ^b ± 10.7	122.0 ^b ± 2.00
T ₁	9.30 ^a ± 0.02	8.25 ^{ab} ± 0.05	159.3 ^a ± 4.09	142.6 ^{ab} ± 4.84
T ₂	9.39 ^a ± 0.01	8.48 ^a ± 0.22	160.0 ^a ± 4.04	143.6 ^a ± 1.76
T ₃	9.03 ^b ± 0.02	8.01 ^{ab} ± 0.01	147.0 ^a ± 2.30	130.3 ^{ab} ± 4.80
T ₄	9.12 ^b ± 0.01	8.06 ^{ab} ± 0.00	155.3 ^a ± 1.33	138.6 ^{ab} ± 4.17
T ₅	9.04 ^b ± 0.01	8.04 ^{ab} ± 0.02	148.6 ^a ± 3.71	132.0 ^{ab} ± 4.00
T ₆	9.08 ^b ± 0.00	8.06 ^{ab} ± 0.00	152.6 ^a ± 3.92	133.3 ^{ab} ± 1.66

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

From above experiment it can be concluded that priming technique is effective method to improve germination percent, promote

dormancy seeds, and improve seedling length and seedling dry weight mortally priming is very effective in aged seed as aged seed start

losing its qualitative character after some time. Among other priming methods like halo priming and osmo priming hydro priming for 24 hours had showed better results in both seed slot.

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