



Non-delinted cotton seeds coating: Solution to improve germination and vigor

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Introduction

In many regions of the world, cotton is known as white gold. Four species of cotton genus (*Gossypium*) are cultivated around the world which a large area of Iran is dedicated to hirsutum cultivation (Hu et al., 2021). Cotton fiber is usually eliminated in the cultivation industry. Cotton fiber is a unicellular trichome that arises from the outer layer of the seed coat. The cotton lint degradation process is a huge challenge during harvest until sowing (Lima et al., 2023). Different methods such as chemical, physical, thermal and biological are used to achieve delinted cotton. Some treatments of cotton lint degradation led to a decrease in seed germination and vigor. Increasing cotton seed germination and vigor without cotton lint degradation is important both physiologically and economically. Seed coating treatments caused physiological process improvement in many seed crops planted in the field and also, economic costs declined. This study attempts to do this by coating treatments on non-delinted cotton seeds to evaluate germination potential and vigor.

Materials and methods

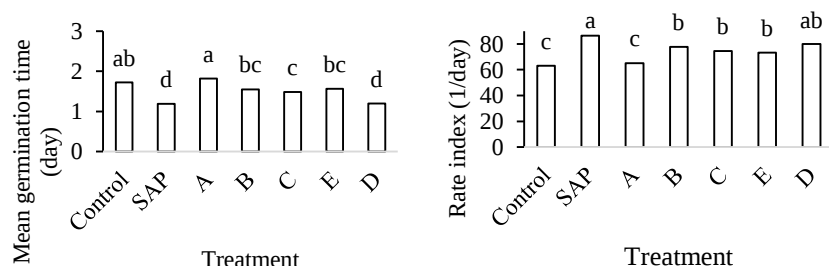
Cotton seeds (*Gossypium hirsutum* L. Cv. Sajedi, certification class) produced in 2023 were used. The cotton lint degradation process was done in the Gorgan cottonseed factory. Seed coating and germination were evaluated in the laboratory of the Seed and Plant Certification and Registration Institute (SPCRI).

Sample /code	Treatments
Control	Non-delinted and non-coating cotton seeds
SAP	Non-delinted cotton seeds + Iramontco liquid super absorbent polymer (SAP) AB200 (Superab A200)
A	Non-delinted cotton seeds + 20 gr NPK / 2 lit SAP
B	Non-delinted cotton seeds + 40 gr NPK / 2 lit SAP
C	Non-delinted cotton seeds + 80 gr NPK / 2 lit SAP
E	Non-delinted cotton seeds + 50 gr Zn-sulphate / 2 lit SAP
D	Delinted cotton seeds

Non-delinted cotton seeds were film coated by a rotary seed coating laboratory set. Four replications of 25 seeds from different treatments were put in Petri dishes using between paper method, then transferred into the incubator and kept for 14 days to assess germination (Anonymous, 2021). Germination tests were implemented by factorial analysis based on a complete randomized design. Seed germination was counted daily to investigate the germination rate until they were stable. Seed germination and vigor indices were evaluated.

References

- Anonymous. (2021). International Seed Testing Association (ISTA). International rules for seed testing. Zürichstr. Bassersdorf, Switzerland.
- Behboudi, R., Moradi, A., Farajee, H. (2021). Film coating with sodium alginate improves seed germination of sweet corn (*Zea mays* var. Saccharata) under osmotic stress conditions, Journal of Plant Process and Function, 9(40), 33-42.



Results and Discussion

Results derived from analysis variance demonstrated that normal seedling percentage showed no significant difference among all assessed treatments. However, it was recorded in another study that delinted cottonseeds had 90% germination and also cottonseeds with lint displayed 82% germination (Nowrouzieh et al., 2024), even though it was different from the results of this study (non-significant difference). Indices of mean germination time (MGT), rate index (RI), and radicle length showed a 1% probability level and length index of seedling vigor had a significant difference at 5% probability level. Results showed that the highest MGT and lowest RI were observed in the control and A treatment. Results claimed that the coating process of these three treatments led to decreased MGT and rise RI compared with control. Important note delinted cottonseeds had higher RI compared to the control, SAP treatment had a similar germination rate to D treatment. The highest radicle length was recorded in B and E treatments. The lowest amount of this index was observed in C (80gr NPK / 2l SAP), D (delinted cotton seeds) and control. It was reported that film coating of sweet corn seed with micronutrients increases seedling vigor compared to control which was consistent with the result of this research (Behboud et al., 2021).

Conclusion

In conclusion, the results demonstrated that if the cotton lint degradation process has no damage on the seed embryo, it will raise the germination rate, but cotton seeds' vigor after delinting will decline which could decrease seedling establishment in the field. Therefore, according to laboratory results, it is probable that non-delinted seeds show a lower germination rate in the field condition. Seed-coating treatments (essential nutrients) like B (40gr NPK / 2l SAP) and E (50gr Zn-sulphate) on non-delinted seeds could partially solve problems related to germination rate and enhance cotton seedling vigor compared to other treatments. Hence, it was suggested that non-delinted cotton seeds along with nutrient coating were used to upgrade the germination rate and seedling vigor of cottonseeds.

Keywords

Cotton seeds, Germination rate, Seed coating, Seedling vigor and establishment.

