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Evaluation of seed priming effect on yield performance of Nigella Sativa L.

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Abstract

To evaluate the effect of seed priming on grain yield and yield components Nigella sativa, an experiment was conducted at Research Station, Agricultural Research Centre of Urmia (western part of Iran), in growing season of 2012. Three priming treatments (Hydropriming, Hardening and Micropriming) and one non-primed control treatment in a factorial experiment based on randomized complete block design with three replications. Different characteristics such as grain yield, total seed weight, number of capsule per plant, number of branches per plant, oil content, and oil yield were recorded. Review the results of the study on the effect of priming suggest that priming characteristics linseed plants generally improves the performance of the Nigela Savita plant. The results show that the number of capsules, number of branches, total seed weight, seed yield of treated plants and micro elements have achieved better results. Weight of leaves per plant, oil content and oil yield hardening treatment will achieve a better performance. Based on these results, we can conclude that, in general, are Nigela Savita seed priming to improve crop yield, among these three elements can be treated as an application for micro and hardening suggested linseed plant.

Keywords: *Author Guide, Article, Camera-Ready Format, Paper Specifications, Paper Submission.*

1. Introduction

One of the most important problems facing the farmers in developing countries is the heterogenecity and lack of suitable conditions in soil that causes decreasing in germination percent, heterogeneous emergence, unbalanced seedling growth and competition for environmental resources such as light, nutrients and water. Subsequently, this makes difference in biomass and performance of a species of plants (Roa and Philipse, 1993).

One of the methods that can overcome to this problem is seed pre-planting treatments called priming that include water absorption at enough level to begin germination events that is accomplished by the subsequent drying. The purpose of priming is increasing germination percent, decreasing mean of germination time and improving growth and vigor of seedling at very wide favor and unfavored environmental conditions. This method is successful in small seed plants and the most medicinal plants that have great economic value with quick and uniform emergence requirement (Ellis and Roberts, 1981).

Seed priming is a technique of seed enhancement which improves germination or seedling growth and rate or uniformity of the seedling establishment (Taylor et al., 1998). Seed quality of most species is improved by preconditioning. Seed priming had also been reported to result in better seedling growth under water deficit stress conditions (Kaur et al., 2002). It has long been known that wetting treatments can improve seed germination. In recent years, an increasing range of chemical seed treatments have also become available (Halmer, 2000). Treated seeds are usually re-dried to primary moisture before use, but they would exhibit rapid germination when reimbibed under normal or stress conditions (Ashraf and Foolad, 2005).

Seed priming has been successfully demonstrated to improve germination and emergence in seeds of many crops, particularly seeds of vegetables and small seeded grasses (Bradford, 1986). The beneficial effects of priming have also been demonstrated for many field crops such as wheat, sugar beet, maize, soybean and sunflower (Parera, 1998; Singh, 1993; Roa, 1987). Dharmalingam (1990) reported beneficial effect of a hydration-dehydration seed treatment on germination of sunflower. Roa (1987) reports that primed Brassica seeds may reduce the risk of poor stand establishment in cold and moist soils.

Nigella sativa L. known as black seed or black cumin, is an annual herb from family of Ranunculaceae. The seeds of Nigella have been used in the Southeast Asia, Middle and Far East as a natural remedy to treat many diseases, including asthma, hypertension, diabetes, hypercholesterolemia, inflammation, arthritis, tumor, gastrointestinal disturbances and gynecological disorders

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for over 2000 years (Ali and Blunden, 2003, El-Din et al., 2006, Ramadan, 2007).
The paper is organized as follow, the second section describes the methods of the research, then the results are presented, and at the end we have discussion and conclusion.

2. Materials and Methods

In order to determine the impact of different primes on germination of Black Cumin seeds, an experiment was conducted at Agricultural Research Center at West Azarbaijan, Iran. The field study was conducted during the cropping season of 2011 and 2012. A 40x100 m piece of land was cleared with machete and spade, the debris burnt and minimum tillage operation consisting of opening up the spot to dibble in the seeds using a hand hoe, adopted. The field was divided into 3 blocks, each with 12 plots of 1.5x1.5m and separated from each other by boundary of 20c m. Treatments laid out in randomized complete block design were as follows Seeds were primed with various materials as follows:
Nonprimed (control): Sowing of dry seeds
Hardening: Alternate soaking of seeds in tap water for 24 h and drying (one cycle) before sowing (Basra et al., 2003)
Hydropriming: Seeds were soaked in aerated distilled water for 48 h and thereafter dried under shade before sowing in the field
Micropriming: Micro-priming is a technique which aims to cover the seeds with living organisms to act in biocontrol and/or growth promotion.
Weeding was by hand pulling and hoeing. The crop was harvested when the capsules are become brown in color. And the measurements are performed due to the common rules and using standard devices. Analysis of variance (ANOVA) was carried out using SAS software (SAS Institute, 2001). Excel software was used to draw figures, while means were compared by applying Least Significant Difference (LSD) at 5% probability.

3. Results and Discussion

The results are presented in table 1. These results were presented in figures, and a comparison has been done among the treatments.
The effect of priming on the number of capsules was significant (fig. 1). As Fig.1 shows, micro-priming improves the number of capsules significantly. These results were in consistence with results of Afzal et.al (2004).

Table 1: Results of the priming treatments on different traits of Nigella Savita

	number of capsules	number of branches	total seed weight	oil Content	oil yield	seed yield
control	4.4	3.73	99.8	35.07	614	1734
Hydropriming	4.63	3.9	119.3	37.75	691	1830
Hardening	4.72	4.06	139.5	39.73	864	2190
Micropriming	5.06	4.71	203.6	36.23	828	2266

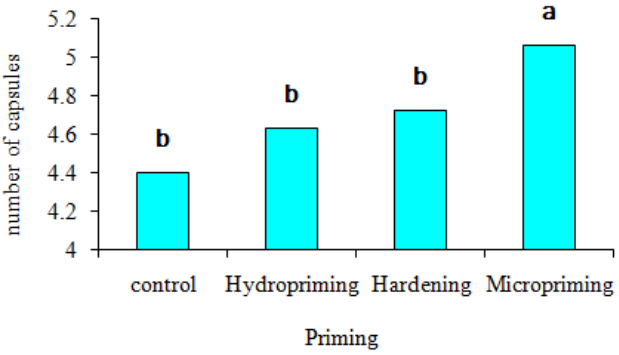

Fig. 1 the effect of priming on the number of capsules.

The effect of seed priming on the number of branches in Black Cumin, is presented in figure 2. As it was shown, Micro-priming improves the number of branches, and the difference was significant. Several reports demonstrate that seed priming can improve the number of branches in primed seeds in comparison with non-primed plants (Kaur et.al, 2005).

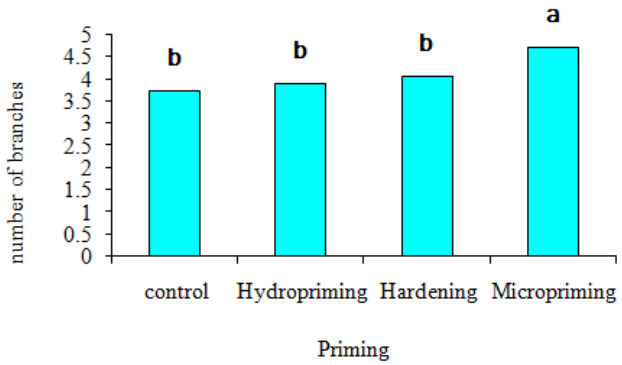

Fig. 1 the effect of priming on the number of branches

Figure 3 shows the effect of priming on the total weight of black cumin. The results shows that, priming improved this

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characteristic significantly in comparison with non primed seeds (control). The significant differences between the results of the treatments indicate that micro-priming improved the total seed weight. Increased grain weight and grain yield, as a result of priming was reported in literature (Kaur et.al, 2005; Moradi et.al, 2009).

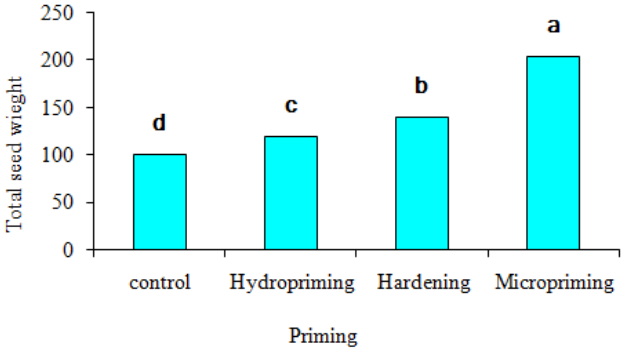

Fig. 3 the effect of priming on the total seed weight

Figure 4 presents the results of priming on the oil content of Nigella Sativa. The results revealed that priming improved the oil content of Black cumin. The differences between the primed and non-primed plants are significant. And, hardenign has a significant improvement on the oil content. Ahmadi and Omidi (2000) reported that Micro- and Hardening priming improved the oil content of safflower significantly.

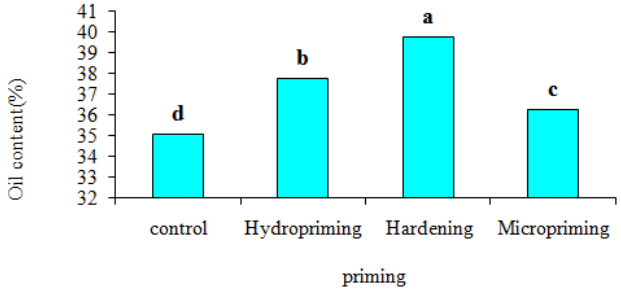

Fig. 4 the effect of priming on the oil content

Figure 5 presents the results of priming on the oil yield of Nigella Sativa. The results revealed that priming improved the oil yield of Black cumin. The differences between the primed and non-primed plants are significant. And, hardening has a significant improvement on the oil content. These results are in accordance with the reported results in this field (Ahmadi and Omidi, 2000).

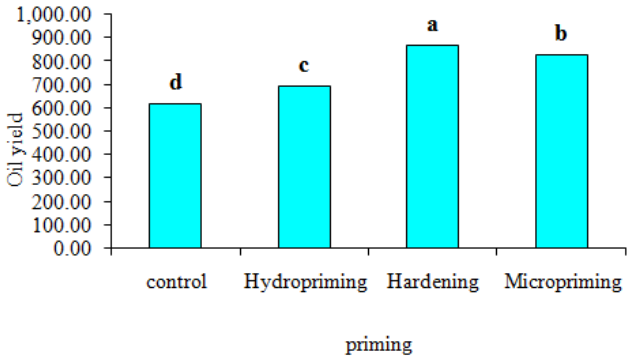

Fig. 5 the effect of priming on the oil yield

The results of priming effect on seed yield are presented in figure 6. The results show that priming can improve the overall seed yield. Micro-priming can improve seed yield significantly in comparison with other priming methods. These results are in consistence with the reported results. Increased seed yield form seed priming may be the result of desirable seed germination((Hariss et.al, 2001,2004; Ghasemi et.al,2010;).

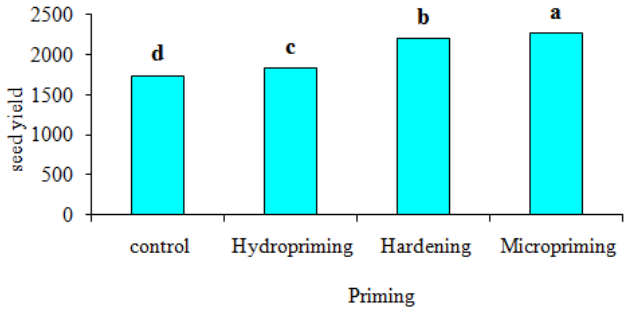

Fig 6 the effect of priming on the seed yield

4. Conclusions

Review the results of the study on the effect of priming suggest that priming characteristics linseed plants generally improves the performance of the Nigela Savita plant. The results show that the number of capsules, number of branches, total seed weight, seed yield of treated plants and micro elements have achieved better results. Oil content, oil yield and hardening treatment will achieve a better performance. Based on these results, we can conclude that, in general, are Nigela Savita seed priming to improve crop yield, among these three elements can be treated as an application for micro and hardening suggested linseed plant.

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1. Afzal, I., Aslam, N., Mabood, F., Hussain, A. & Irfan, S. (2004). Enhancement of canola seed by different priming techniques. Caderno de Pesquisa Ser. Bio., Santa Cruz do Sul, 16, 19-34.
2. Ali, B.H. and G, Blunden. (2003). Pharmacholgical and Toxicologyical Properties of Nigella Sativa, Physiotherapy research., 17: 299-305.
3. Arif M (2005). Effect of seed priming on emergence, yield and storability of soybean. PhD thesis, NWFP Agricultural University of Peshawar 192.
4. Ashraf M and Foolad MR (2007), Roles of glycine betaine and proline in improving plant abiotic stress resistance. Environmental and Experimental Botany 59 206-216.
5. Basra, S.M.A., M. Farooq, R. Tabassam and N. Ahmad, (2005). Physiological and biochemical aspects of pre-sowing seed treatments in fine rice (Oryza sativa L.). Seed Sci. Technol., 33: 623-628.
6. Bradford, K. J. (2002). Water relations in seed germination. In: J. Kigel and G. Galili (eds.). Seed Development and Germination, pp. 351- 396. Marcel Dekker Inc. New York.
7. Dharmalingam,C. and R.N. Basu,(1990), Maintance of viability and vigour in sunflower. Seed Res. 18, 15–24, 1990.
8. Ellis, R. H. and E. H. Roberts. (1981). The quantification of ageing and survival in orthodox seeds. Seed Sci. Tech. 9:377-409.
9. Khajeh-Hosseini,M. A.A. Powell, and I.J. Bingham,(2003) The interaction between salinity stress and seed vigour during germination of soybean seeds. Seed Sci. Technol. 31, 715–725, 2003.
10. Kaur, S., Gupta, A.K., and Kaur, N. (2005). Seed priming increase crop yield possibly by modulating enzymes of sucrose metabolism in chickpea. J. Agron.Crop Science. 191: 81-87.
11. Harris, D. (2006). Development and testing of on-farm seed priming. Advances in Agronomy, 90:129-178.
12. Halmer P (2000). Commercial Seed Treatment Technology. In: Seed Technology and its Biological Basis edited by Black M and Bewley JD (Sheffield Academic Press, London) 257–272.
13. Parera, C.A. and D.J. Cantliffe, (1994) Presowing seed priming. Hort. Rev. 16, 109–141, 1994.
14. Ramadan, M.F. and j.T, Morsel. (2003) .Analysis of ylcolipiols from black cumin (Nigella sativa), coriander (Coriandrumsativam 1.) andniger (Guizotiaabyssinicacass.) oil seeds. food chemistry, vol.80, ISS.2:197-204
15. Rao, C.A, S.W. Aker, and R.M. Ahring, (1987)Priming Brassica seed to improve emergence under different temperatures and soil moisture conditions. Crop Sci. 27, 1050–1053, 1987.
16. Roa, S. and W. Philipse. (1993). Effect of seed priming and soil residue on seeding emergence and forage production of Brassicas. J. Sust. Agric. 3:89-98.
17. Singh, B.G. and G. Rao, (1993) Effect of chemical soaking of sunflower (Helianthus annuus L.) seed on vigour index. Indian J. Agric. Sci. 63, 232–233, 1993.
18. Taylor AG, Allen PS, Bennett MA, Bradford KJ, Burris JS and Misra MK (1998). Seed enhancements. Seed Science Research 8 245-256.

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