



The effect of different treatments on germination of *Alyssum* and *Althaea* seeds

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Abstract

Alyssum genus has about 100-170 species of flowering plants that are native to Egypt, Arabia, Iraq, Iran and Pakistan. *Alyssum* L. belongs to the Cruciferae family and has 27 species of annual and perennial plants in Iran (Mozaffarian, 2015). *Althaea* L., belongs to the Malvaceae family and has five species of annual and perennial herbaceous plants in Iran. This experiment was carried out in the seed laboratory of Natural Resources Gene Bank of Research Institute of Forests and Rangelands in 2024. The experimental design was a completely randomized design. The seeds were obtained from the gene bank of the Research Institute of Forests and Rangelands of Iran. 25 seeds were prepared in three replicates of each accession and after disinfection, the seeds were planted in petri dishes. The control and three and five treatments were used for *Alyssum* and *Althaea* seeds, respectively. In *Alyssum* accessions, the difference between accessions was not significant, but the difference between the treatments and the effects of accession* treatment were significant. In *Althaea* accessions, all of the effects of accessions and treatments were significant. In the accessions of *Alyssum* sp., the most effective treatment on germination was treatment number 3 (Cultivation in germinator watered with 0.2% potassium nitrate),). In *Althaea* accessions, treatment number 5 (removing the shell + scraping + transfer to the germinator), In *Alyssum*, the dormancy of seed is internal or physiological (related to embryo), but in *Altheae*, it is related to seed coat (external).

Key words: Chilling, Germination, Hot water, Potassium nitrate, Treatment, Seed

Introduction: *Alyssum* genus has about 100-170 species of flowering plants that are native to Egypt, Arabia, Iraq, Iran and Pakistan. *Alyssum* L. belongs to the Cruciferae family and has 27 species of annual and perennial plants in Iran (Mozaffarian, 2015). In traditional medicine, *Alyssum* is used as an expectorant, anti-inflammatory, laxative and repellent for urinary tract stones, digestive discomfort and throat and throat mucosa infections (Hesarinejad et al., 2015). Europe, Southeast Asia, North Africa, Central, Siberia and North America are the habitats of this genus. 36 species of this genus have been reported in Iran, which is one of the richest plant genera in Iran (Rechinger, 1968). *Althaea* L., belongs to the Malvaceae family and has five species of annual and perennial herbaceous plants in Iran (Mozaffarian, 2015). This plant is one of the valuable medicinal species of dark cheese, which is also planted as an ornamental species due to its beautiful flowers. Its origin is considered to be in different parts of Asia and Europe (Mosihuzzaman & Choudhary, 2008; Šutovská et al., 2009).

Materials and methods: This experiment was carried out in the seed laboratory of Natural Resources Gene Bank of Research Institute of Forests and Rangelands in 2024. The experimental design was a completely randomized design. Table 1 shows the characteristics of the collection site of the accessions seeds. There are two species of *Alyssum* and *Althaea* genus with two accession for each, according to Table 1.

The seeds were obtained from the gene bank of the Research Institute of Forests and Rangelands of Iran. 25 seeds were prepared in three replicates of each accession and after disinfection, the seeds were planted in petri dishes.

The control and three and five treatments were used for *Alyssum* and *Althaea* seeds, respectively.

The treatments were used for *Alyssum* seeds are:

No treatment or control: 15 days of cooling

Treatment 1: 2 days of seed treatment with 0.2% potassium nitrate + 15 days of chilling

Treatment 2: 15 days of pre-chilling + watering the seeds with 0.2% potassium nitrate

Treatment 3: Cultivation in germinator and watered with 0.2% potassium nitrate

The treatments were used for *Althaea* seeds are:

No treatment or control: 15 days of cooling

Treatment 1: removing the skin + 15 days of cooling + watering with potassium nitrate 0.2% transfer to the germinator

Treatment 2: removal of the shell + 15 days of cooling + transfer to the germinator

Treatment 3: hot water 70 degrees for 15 minutes + watering with potassium nitrate 0.2% transfer to the germinator + 15 days of cooling

Treatment 4: removal of the skin + scratching + 15 days of cooling + transfer to the germinator

Treatment 5: removing the shell + scraping + transfer to the germinator

After the end of the germination period (21 days), the germination percentage was calculated for each.

Results and Discussion: Table 2 shows the results of analysis of variance in accessions of *Alyssum* sp. and *Althaea* sp. In *Alyssum* accessions, the difference between accessions was not significant, but the difference between the treatments and the effects of accession* treatment were significant. In *Althaea* accessions, all of the effects of accessions and treatments were significant. In the accessions of *Alyssum* sp., the most effective treatment on germination was treatment number 3 (Cultivation in germinator watered with 0.2% potassium nitrate), with 95.33 percent germination, and accession 37247 and 30218 of *A. hirsutum* had the most and lowest value of germination percent (90 and 84.67). In *Althaea* accessions, treatment number 5 (removing the shell + scraping + transfer to the germinator), with 91.67% had the greatest effect on seeds, and 15 days of cold treatment had no effect on seed germination. Accession 38954 of *A. officinalis* and 30411 of *A. rosea* with 58.61 and 41.67 had the most and lowest value of germination percentage. Therefore, the best treatment for breaking of dormancy in *Alyssum* and *Althaea* seeds are the treatment No. 3 (Cultivation in germinator watered with 0.2% potassium nitrate) and No. 5 (removing the shell + scraping + transfer to the germinator), respectively.

Conclusion: In *Alyssum*, the dormancy of seed is internal or physiological (related to embryo), but in *Altheae*, it is related to seed coat (external).

Table 1: The list of studied *Alyssum* and *Althaea* accessions studied, collected from different regions of Iran

Accession	Species	Original
37247	<i>Alyssum hirsutum</i>	Taft, Yazd, Iran
30546	<i>Alyssum stapfii</i>	Khalkhal, Ardabil, Iran
23372	<i>Alyssum stapfii</i>	Taft, Yazd, Iran
30218	<i>Alyssum hirsutum</i>	Ardabil, Iran
40261	<i>Althaea rosea</i>	Iran
30411	<i>Althaea rosea</i>	Alashter, Lorestan, Iran
30410	<i>Althaea rosea</i>	Khoramabad, Lorestan, Iran
38954	<i>Althaea officinalis</i>	Beshroyeh, South Khorasan, Iran

Table 3: The mean of germination percent and treatments in different accessions of *Alyssum*

Accession	40261	30411	30410	38954		
Mean Germination	57.22 a	41.67 b	47.22 b	58.61 a		
Treatment	Non-T	T1	T2	T3	T4	T5
Mean	2.92 E	53.33 b	44.17 c	28.33 da	86.67 a	91.67 a

Table 2: Analysis of variance between species and genotypes

Accession	37247	30546	23372	30218
Mean Germination	90 a	89 ab	88 ab	84.67 b
Treatment	Non-T	T1	T2	T3
Mean	73 c	89.67 b	93.67 ab	95.33 a

Table 4: The mean of germination percent and treatments in different accessions of *Althaea*

Sources	DF	Germination percent in Alyssum	DF	Germination percent in Althaea
		Mean		Mean
Accession	3	64.33 ^{ns}	3	1187.38**
Treatment	3	1254.55**	5	13928.68**
Accession*Treatment	9	225.82**	15	343.49**
Error	32	34.33	48	123.26
CV%		6.66		21.69

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