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Effect bulb size and two specie mooseer to yield components bulb percent allicin in weather mashhad

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Abstract

One of the most important species of medicinal and industrial shallot Iran. Those in the as normal and in elevated areas with very cold climate to semi grow cold. Shallot (*Allium altissimum*) and Persian shallot (*Allium hirtifolium*), are represented important species in Iran. To investigate the possibility of domestication and cultivation of these two native cultivars, an experiment with three Bulb sizes (small, medium and large) and two species of mossir (Aligoodarz and Kalat) and inflorescence removing with three replications was conducted in horticulture department of Ferdowsi University of Mashhad. The results showed that the percentage of Bulblet, was affected by treatments. Bulb lowest percentage of Bulblet (24.7 percent) and most of the mass production of shallot Kalat Bulblet (40.4 percent) was related to the Aligoodarz mooseer specie. Largest Bulb size (80.2 gr) and highest Allicin content (4.24 µg/mg) was observed in large size Bulbs of Aligoodarz native species. Stem flower removal showed no significant difference within Bulb weight, but it affected Bulb size and Allicin content significantly.

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Introduction

Medicine plants are very important natural resources that traditionally have been considered as drug. Different species of the Allium have nutritional, pharmaceutical, and medicine value. Have been more than seven hundred species of the genus Allium (Kamntsky and Rabynvych, 2002). Over 139 species of Allium reported from Iran that about 30 of them are endemic (Mozaffarian, 1996). Persian shallot (*Allium hirtifolium Boiss*) called as "Mooseer" in Iran belongs to Alliaceae family and is one of the important edible alliums in Iran. It is endemic of Iran and grows as a wild plant in the Zagross Mountains (Rechinger, 1984). It is different from common shallot (*Allium ascalonicum L.*) for many characteristics. Bulbs of common shallot are pear-shaped, reddish- brown skinned and clustered at the base of the plant and its clusters may contain as many as 15 Bulbs (Rubatzky and Yamaguchi, 1997). In Persian shallot the storage tissue is Bulb like, yellow, oval, white skinned and usually consists of a single main Bulb or rarely of two Bulbs, the weight of each Bulb being 1– 3 times of garlic Bulb (Fig. 1). Persian shallot (Mooseer) is originated from cold them in the as normal and in elevated areas with very cold climate to semi grows cold of Khorasan, Lorestan, and other regions with an altitude over 1000 meters above sea level and the slope of their growth (Kamenetsky, 1996 and Randle, 2002). Mountains of Iran, but common shallot is originated from warm regions of west Asia (Salunkhe and Kadam, 1998). Allium altissimum Regel growth in Afghanistan and Iran and Tajikistan and Turkmenistan (Nayar *et al*, 1992). Bulb mooseer to treat rheumatism (Baril *et al*, 2005), wound surface (Amin, 2004), regulating blood pressure and reported have prevention of atherosclerosis and Antimigraine and diabetes (Moghadasi, 2010). Mooseer is a nutritive plant with special taste and its dried Bulb slices are used as an additive to yogurt and also pickling mixtures. Its powder is used as a tasty additive or spice for foods in Iran (Amin, 2004). In addition, it has crucial medicinal effects, aqueous extract of Mooseer has shown antibacterial effects (Ashrafi *et al*, 2004). Since Persian shallot (Mooseer) grows as a wild plant only in some mountains of Iran, very little information is available about different aspects of this species especially on its morphological traits and genetic diversity there is not enough information about this plant, in an attempt for cultivating this wild plant. Given that the global demand for many species of wild medicinal and aromatic due to increase the growing diversity of human needs is and the majority of medicinal and aromatic plant species are still collected from nature, the increasing demand for these species, the destruction and the uncontrolled exploitation of mach species in nature is due to uncontrolled and unsustainable harvesting of wild medicinal and extinction have been exposed to destruction (Gupta *et al*, 1998). Sepahvand *et al* (2005) evaluated two cultivation methods for species of Lorestan province. Present research was carried out to prepare a collection of germless of Mooseer from different provinces, to study the diversity among species by morphological and molecular markers, and to determine some of its nutrient compositions. Based on available information, this is the first study on genetic diversity of this species, considering that few Alliaceae have been evaluated for intraspecific molecular variation. Given the growing need for industrial and medicinal plants can be harvested from natural habitats and the increasing destruction it seems natural habitats to agricultural production in these species can serve as an important strategy in ensuring growing global market act (Uniyal, 2000). The aim of this study examined the role of maternal size and specie mooseer Bulb yield, components yield these two specie in Mashhad environmental conditions.

Material and Methods

Plant material

Two specie of *A. hirtifolium* and *A. altissimisum* collected from their main local growth areas of Lorestan province (Aligoodarz) and Khorasan province (Kalat) in Iran, were used in this study. This two specie were grown at the Research Station medicinal plant of Ferdowsi University in Mashhad

Iran. To longitude 59.37 and latitude 36.16 degrees, with annual rainfall of 250 mm and 979 meters above sea. Cold and dry Mashhad environmental conditions in the region based on Amberge has been determined (Aghajani Mazandarani, 2001). Bulb used in this experiment in July May 2010 of two regions located in the northern city of Mashhad and Kalat Aligoodarz region located in the East province were collected. Level were divided into three groups, small, medium and large, with weight of 10- 20 gr, 20-30 gr and 30-50 gr, respectively. Then, the Bulbs of each group were planted in the field and grown routinely with the purpose of producing Bulb. The Bulbs were planted in field with 30×30 cm spacing in a randomized complete block design (RCBD) with three replications. The soil was soft, well drained, with a pH 7.2, the cultural operations consisted of manual weeding and regular irrigation to maintain adequate soil moisture for growth of the plants. Plants were harvested individually at the end of flowering stage. Morphological traits including leaf length, width (cm), thickness and number, inflorescence stem length (cm) and diameter, Bulb weight and diameter, florets number per inflorescence, Bulblet number, Bulb clustering percentage and Bulb dry matter, days to emergence and days to flowering were evaluated. To determine the weight Bulb, it first harvest then weight by scales with accurately 0.01 gr. To evaluate the performance of each plot for a square meter of the eight components of the plant Random from each plot after removing the effect was marginal and the Bulb.

Allicin determination

Allicin (standard) was obtain from Nopex Company as Allisure™ (Nopx, England).

The plant assay: the mixture is chopped Bulb for measure Allicin and Solvent (2:10 W/V) and stirred (in electric mixer) and were kept in the refrigerator for 24 hours. It was filtered through cotton cloth. Then to remove the solvent, it was dried in vacuum pressure and 25° C and the final extract for next steps was preserved at- 20° C. The presence of Allicin was evaluated in Bulbs by TLC. It was filtered through micro filter 0.2 mm after that 20 µl of each sample was injected into the HPLC system. Reversed – phase HPLC was a method of choice for detection and quantitation of Allicin in A. hirtifolium extract. The HPLC Reversed - phase HPLC/UV (methanol/water 80: 20), **λ** :240 nm, flow rate: 1ml/ min., column (C18 (3.9 x 150 mm,4. 5 µm)), injection volume 20 µL, column temperature 28 ° C, Run Time 15 minutes was used. After calculating the area and using the following formula Allicin concentrations were determined (µg /gr) for each sample:

$$\%W/W\ \text{Allicin} = \frac{C \times FV \times D \times 100\%}{W(10=0\mu\ g/mg)}$$

C is the sample's Allicin concentration (µg/ mL), extrapolated from the calibration curve's linear regression.

FV is the final volume of the sample (mL).

D is the dilution factor of the sample preparation (if needed).

W is the sample weight (mg).

Data analysis

Quantitative analysis of morphological traits was carried out using SAS software and MSTATC software. Analysis of variance (ANOVA) was performed and the means were compared by LSD test (LSDT).

Fig. 1

Results and discussion

Given the natural distribution areas, mainly Iranian highlands and mountainous regions and shallot is

cold, it is natural that cultivation of the plants originate in areas with different climates, changes in growth and other characteristics of the vegetative and reproductive development be (Fig. 1) a number Bulblet produced in species of specie Aligoodarz is seen. The function of the specie m Bulb shallot Aligoodarz of Kalat was the highest and lowest Bulbs performance in small of the shallot Kalat, (243.1 gr/m²) and (194.4 gr/m²) (Fig. 2). The highest and lowest performance among in Bulb specie medium shallot Kalat, respectively (375.2 gr/m²) And Aligoodarz (326.8 gr/m²) respectively. If this is the highest performance of the large Bulb Aligoodarz (697.2 gr/m²) and lowest performance of the large shallot Bulb Kalat (585.9 gr/m²) is.

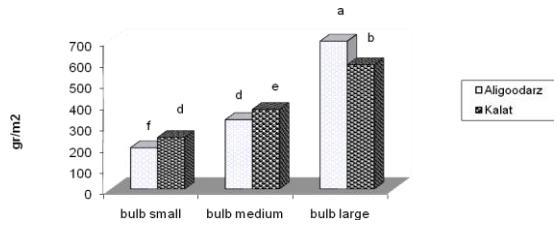

Fig. 1. Comparison between the number per plant Bulblet shallot Aligoodarz and Kalat.

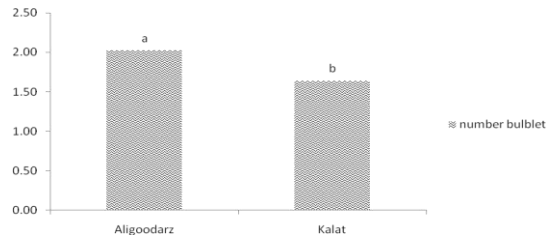

Fig. 2. Comparison of performance Bulb between shallot Aligoodarz and Kalat.

Morphological traits

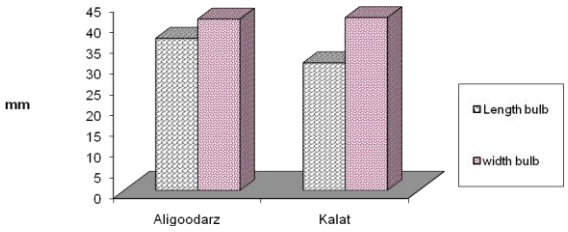

Fig. 3. Comparison between the length and width Bulb plant shallot landraces and Kalat Aligoodarz.

As (Fig. 3) is determined by the specie of the shallot Bulb Aligoodarz is greater in diameter specie Kalat (a. alttissimum), but they Bulb there was no significant difference in diameter and shallot Bulb Aligoodarz specie of Kalat case had drawn much more.

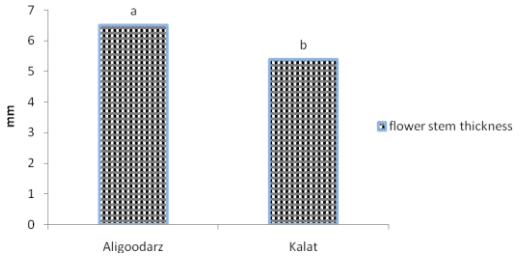

Fig. 4. Comparison of flower stem thickness between two species *Allium hirtifolium* (Aligoodarz) and *Allium alttissimum* (Kalat).

The results in shows that the highest average of flower stem thickness in the *Allium hirtifolium* (Aligoodarz), 6.5 cm and the lowest in *Allium alttissimum* (Kalat) 5.40 cm. Also, the inflorescence diameter in *Allium hirtifolium* (Aligoodarz) is highest (6.78cm) and lowest (5.1cm) in *Allium alttissimum* (Kalat) (Fig. 4).

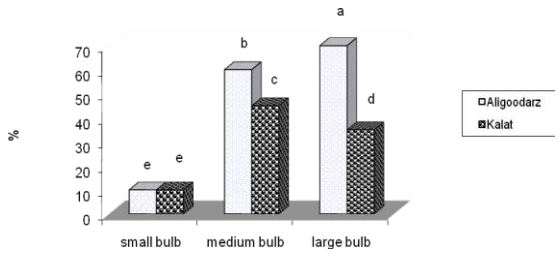

Fig. 5. Comparison of Bulblet production percentage per m² with three different size in between two species *Allium hirtifolium* (Aligoodarz) and *Allium alttissimum* (Kalat).

The above results show that the highest percentage of Bulblet in large Bulb (63.27 %) and in medium Bulb (52.63 %) was related to the specie Aligoodarz (Fig. 5). The production percentage of Bulblets in asexual reproduction of shallot are important, because the production of two or more Bulblets in mother Bulbs

which have inflorescence are seen rarely (Kheirkhah and Dadkhah, 2006). According to the results, it seems that beside the genetic factors, environmental factors are also determinants in Bulblet productions.

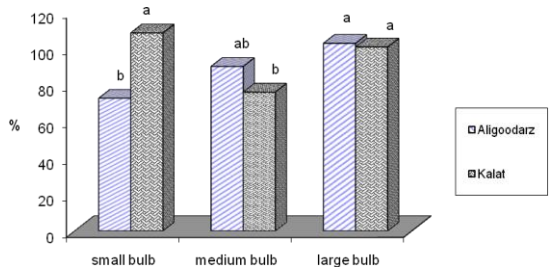

Fig. 6. Comparison of percentage increase weight with three Different size in between two species *Allium hirtifolium* (Aligoodarz) and *Allium alttissimum* (Kalat).

The results (Fig. 6) that the highest percentage increase weight in small Bulb of *Allium alttissimum* (108.4 %). But no significant difference between the large Bulb of percentage increase weight. However, the highest production in large Bulb specie Aligoodarz Bulblet (63.27%).

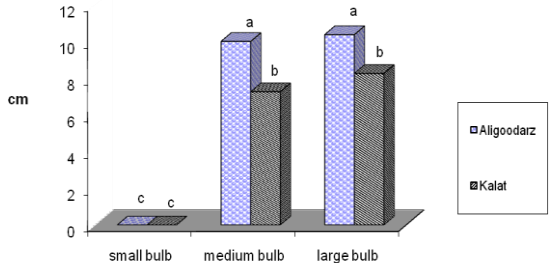

Fig. 7. Comparison diameter of the flower with three different size in between two species *Allium hirtifolium* (Aligoodarz) and *Allium alttissimum* (Kalat).

Researchers between the yield of Bulb with the number Bulb and diameter was a significant positive relationship. The increasing diameter Bulb and number, Bulb yield increases. The phenotypic correlation coefficients indicated a significant positive relationship that the Bulb number with stem height and leaf length and there. With increasing stem height and leaf length and Bulb number, Bulb yield increases. The correlation coefficients was positively and significantly between height stem and length, leaf width and increasing the length and width leaves, stem height can be increased (Sepahvand *et al*, 2005).

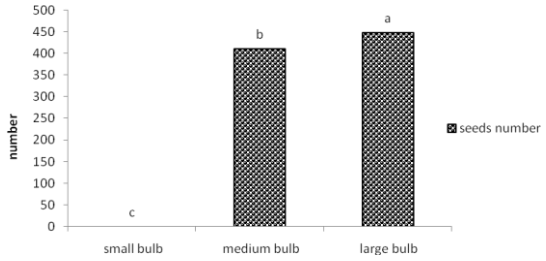

Fig. 8. Comparison of seeds number per flower with three different size in between two species *Allium hirtifolium* (Aligoodarz) and *Allium alttissimum* (Kalat).

The results (Fig. 8) that the unlike the medium and large Bulb, small Bulb seed production is not in two species shallot. The results show that increasing the seeds number per plant was increased Bulb size (Fig. 8). In the experiment in Esfahan with subject effects of density and size Bulb mother seeds onion 502 Granule Early Texas yield, observed that the increase in grain size mother Bulb cause increased grain yield and umbrellas number in the m² (Amin- Por, 2001). By increasing the diameter of the mother Bulb, seed yield, number umbrella per unit area and seeds yield significantly increased, but seeds number in capsule and seeds thousand weight for different size mothers Bulb at a statistical level was (Amin- Por, 2001). And the desired traits, onion with a diameter larger than 6.5 cm at the highest rank has been that Research (Arsagova and Zakaidez, 1974), (Nehra *et al*, 1988), (Orloweski, 1974) and (Pall and Padda, 1972) have also confirmed this result. The researchers examined three sizes onion (30, 60 and 90 gr) and plant density on seed yield onion, reported Bulbs 90 gr with intervals of 30 × 30 cm, the maximum number of umbrellas in the plant and the performance is (Lial *et al*, 1987).

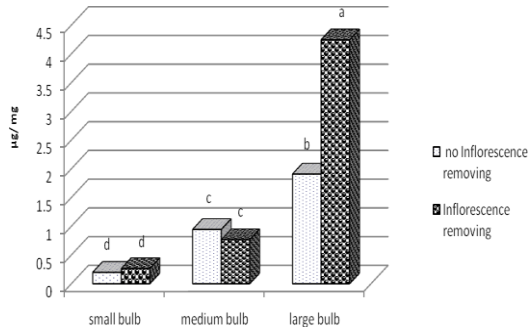

Fig. 9. Comparison Allicin (µg/mg) with inflorescence removing and three different size in between two species *Allium hirtifolium* (Aligoodarz) and *Allium alttissimum* (Kalat).

Conclusion

We found significant genetic variability among two specie for morphological and phytochemical traits.

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