

Study on phenology stages of cultivated Persian shallot (*Allium hirtifolium*) in Mashhad region

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ABSTRACT: *Allium hirtifolium* Boiss. known as Persian shallot, is a spice used as a traditional medicine in Iran and, Mediterranean region. In this study phenological stages of Persian shallot was detected based on growth degree days (GDD). The results showed that Persian shallot cultivated in growth period of about 150 days in Mashhad condition. Early stage of growth at 8 degrees day started in the leaves of vegetative and flowering stages of shoot growth to continue. Maximum frequency between 494 to 693 degrees in open flowers - day growth occurred between 10 and 20 April of the calendar and the third month of the shoot. Opened the scoring in the third month of shoot emergence was observed. The highest average frequency of seeding 1236.5 GDD to 1447, coinciding with the June 18 and 26, the temperature at this time was almost up.

Keywords: GDD, Persian shallot and phenology

INTRODUCTION

Persian shallot (*Allium hirtifolium*) is a native plant in Iran. *A. hirtifolium* or Persian shallot also known as (moosir) is a native plant growing in some parts of Iran (Ashrafi et al., 2004; Fritsch et al., 2006), used as a dietary ingredient or medicinal remedy. It grows as a wild plant in the Zagros Mountains in west, south and the central parts of Iran (Rechinger, 1984; Ebrahimi et al., 2009). It is a wild, perennial, herbaceous and aromatic plant. It consists of a naked and erect scape with 80 to 120 cm height. The green leaves are linear and lanceolate with 20 to 30 cm length (Ghahreman, 1984). Bulbs in Persian shallot is yellow and produce it by more seed. However, Shallots can be grown from seed, but usually small bulbs are planted in late fall or early spring. The "mother" bulbs divide to several bulbs. The use of genus *Allium* plants including shallot, garlic and onion as medicine and condiment predates written history (Harris et al., 2001). These plants can treat diabetes, arthritis, colds and flu, stress, fever, coughs, headache, hemorrhoids, asthma, arteriosclerosis and cancer (Jellin et al., 2000). The genus *Allium* L. includes more than 700 species, which widely grow in the temperate, semi arid and arid regions of the northern hemisphere and therefore, results in a remarkable polymorphism (Hanelt et al., 1992).

Phenology is one of the major factors in the reproductive biology of plant species (Rathcke and Lacey, 1985). Phenology studies provide data on annual cycles and seasonal rhythms of individual plants, availability of community resources, and interactions between plants and animals that depend on these resources such as herbivores, pollinators and seed dispersers (Talora and Morellato, 2000).

MATERIALS AND METHODS

This study was conducted in the Faculty of Agriculture, Ferdowsi University, Mashhad, Iran during the growing seasons 2011. Three Persian shallot (Aligoodarz lot) treatments (small bulb, medium bulb and huge bulb) were planted in

randomized complete design in three replication. Cold and dry weather in the region is determined based on Ambroje method. Plots of land as of 1.5 × 2 mm were prepared and selected bulbs in each of these plots were planted with a distance of 30 cm from each other. From May until harvest in late June bulbs were watered once a week. Practices including weed removal was performed three times by hand. In order to record the different stages of Persian shallot shoots emerge from the soil by the end of the study and were recorded as follows:

1. Plots of 2 times a week for new record phenological stages of emergence (emergence) of shoot production of secondary shoots, inflorescence emergence, flowering (flowering) and the appearance of the fruit. Was selected because of the steps that are commonly used to study the phenological stages (Alm et al., 1991).

2. Plots of once a week to count the number of leaves and open flowers of Iranian shallot.

3. Records as of phenological stages

For quantitative evaluation of the degree of each record - the day of the beginning of each phenological stage of the plant when it is recorded that 25% of that level are logged. It is recorded that his stages are 50 % plants into the end of each stage, when the plant was 75% of the time behind (Alm et al., 1991). Since the use of calendar time (days after planting) will be fully affected by environmental factors and thus reduce the accuracy of vary in calculations and interpretations. To calculate the degree heat index - the combination of day. Degrees - were grown according to standard formulas. Cumulative temperature measurement temperature or cumulative growing degree days (GDD) using weather data and daily maximum and minimum temperatures during the growing season according to the proposed method, Vienna (1997) was calculated using the following formula:

$$GDD1 = \sum [(T_{max} + T_{min})/2 - T_{base}]$$

GDD : Growth degree day

T_{max} and T_{min} : Daily minimum temperature and maximum temperature, respectively.

T_b (base temperature) (the temperature below which growth is not done) to 5 ° C was considered shallots. In other words, did not germinate at temperatures lower than the temperature of bulbs. This is called physiological zero temperature (Ghersa et al., 1995).

RESULTS AND DISCUSSION

Iranian shallot cultivated in growth period of about 150 days. Leaf growth is starting the second week of March, after a three-week initial growth of leaves, shallots along with the 86.5 degrees - was the culminating day. Started flowering around the first of May and the first week of May, reaches its peak. Seeding began in mid-May to late June and early July, continued loss of seeds normally begin. By studying the growth, development and flowering peak Iranian shallot leaves was found that with increasing temperature the growth we are experiencing. And recession periods of high temperature and drought is consistent with the overall plant.

Mashhad ,Growth of persian shallot in climatic conditions of Mashhad up until 1989 -the day the growth continues. Early stage of growth at 8 degrees - the day started in the leaves of vegetative and flowering stages of shoot growth to continue . The late stage of the inflorescence at 1187 degrees - days of growth , the plant seeding, the plant began in 1493 and the loss rate - start to 1989 growing degree days - days of continued growth . Maximum frequency between 494 to 693 degrees in open flowers - day growth occurred between 10 and 20 April of the calendar and the third month of the shoot . Opened the scoring in the third month of shoot emergence was observed . The highest average frequency of seeding 1236.5 GDD to 1447, coinciding with the June 18 and 26 , the temperature at this time was almost up.

Researchers in the phenology of a pile of shallots (*Allium altissimum*) Found that plant phenology has been divided into several stages , including: 1) the germination and emergence : a need for prolonged periods of cold (near zero) to germination begins . In the second half of March , leaving a 5 to 10 cm long tubular leaves of green plants . 2) onion phases : the emergence of a tubular leaves the first year, the beginning and the end of the season Drsvkh photosynthesis and storage time (early June) is the dried leaves of a bulb underground pipes smaller (the size of a pea) is created .will . This trend continued in the fourth or fifth year of the bulb is large enough and the

number of leaves, leaf area increases approximately 6 to 9 . Depending on lighting and shading other plants, leaf length and width between 30 and 80 cm 3 to 12 cm , in the reproductive stage of the plant is able to enter . 3) The stage of the reproductive and onion sister during. The inflorescence axis simultaneous production and consumption of onion bulbs years ago, a new generation and maturation size after the peak seeds in late September . The following year , producing a green onion inflorescence organs are consumed , and a sister bulb produces the sequence of persist in later years . Rarely been observed that the mother corm produces inflorescence number two sisters onion production. The effect of environmental factors on phenology , significant differences between populations grown in different regio (Roche et al., 1997).

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