Effect of Temperature on Phenology in Triple-Awned Grass (*Stipagrostis plumosa*)

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(*Stipagrostis plumosa*)

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Abstract

Phenology of triple-awned grass in different stages of vegetative growth, flowering and seed falling was investigated. Each phenological stage was related to minimum and maximum air and soil surface temperatures. Soil surface temperature was measured two times per day during different seasons. Climate data were obtained from the nearest weather station. The study was carried out in sand dunes of band-e-rig of Kashan in the central region of Iran. This species is important in terms of wind erosion control and livestock feeding in arid areas. The results showed that air temperatures ranged from –22 ^{o}C to 41.5 ^{o}C and soil temperature varied from –3 ^{o}C to 52 ^{o}C during the growth stages.

Keywords: Desert lands, growth, desertification, seed, soil conservation, vegetation, livestock

Introduction

Vast regions of Iran have been changed to salt lands and sand dunes due to climatic, geologic and soil conditions (Moghaddam,1988). Vast parts of Kashan (one of central cities of Iran) are under the mentioned conditions so that development of desert lands is visible

there (Azarnivand, 1999). Mismanagement and wrong utilization of natural resources cause abandonment of villages and changes of rangelands and farms to desert lands. Today, some of these regions are source areas of sand that threat adjacent regions and consequently land degradation. Malekpour *et al, (*1977) believed that triple-awned grass is an important native plant because of its tolerance to drought, and use in soil conservation and livestock nutrition. As temperature is an important factor to plant growth, this study aimed at the investigation of this relationship between temperature and different growth stages of triple-awned grass.

Material and Methods

The study area rig-boland in Kashan is located between 33 ^{o},45' to 34 ^{o},38' N latitiude and 51 ^{o},53' to 52 ^{o} E longitude with average annual rainfall of 114 mm (Azarnivand and Dastmalchi, 1999). Mean maximum temperature in the warmest month of year (June) and mean minimum temperature in the coldest month of year (December) during 1981-1990 has been 44.4 ^{o}C and 5.3 ^{o}C respectively. Soils of the region are immature and sandy.

According to Mobaien (1980), Triple-awned grass (*Stipagrostis plumosa*) belongs to Poaceae family with 15 to 30^{cm} height, scatter root and needle like leaves. It has a bunch growth habit and is known as a palatable and psammophyte and tolerant to drought. It can be found on sandy soils.

With beginning of plant growth, maximum and minimum soil temperatures were recorded in 1995 and 1996. For this purpose a thermometer was set on soil surface.These measurements were made during growth stages such as: early growth, vegetative growth, flowering, seed ripenning and seed falling. Daily atmospheric data were obtained from weather station. By data analysis, prevailing air and soil temperature at different growth stages were determined.

Results and Discussion

Maximum growth of triple-awned grass occurred at air temperature varying between 28.4 ^{o}C to 36.5 ^{o}C (Table 1) in March. During this stage soil temperature ranged between 2 to 40 ^{o}C. Flowers appeared in May with of minimum temperature of 17.4 ^{o}C and maximum of 41.5 ^{o}C. During flowering stage soil temperature ranged between 15 ^{o}C to 52 ^{o}C. Seeds matured in October with maximum and minimum air temperature of 39.2 ^{o}C and 17 ^{o}C, respectively. Soil surface temperature varied between 14 ^{o}C to 42 ^{o}C. Seed falling was observed by end of October until middle of November.

This species needs more temperature for flowering and ripenning duration. Suitable temperature for this species is between -3 ^{o}C to 42 ^{o}C when other ecological conditions are favourable. According to the results October is suitable time for seed harvesting. Triple-awned grass can be considered an adapted species to sand dune areas. In addition it is palatable to domestic and wild animals.

References:

Azarnivand, H. (1999). Eutecology of *Smirnovia iranica*, PhD seminar, Natural resources college of Tehran university.

Azarnivand, H. and Dastmalchi H. (1999). Phenology of four desert range species in Kashan region. Research report of Tehran university, in Persian.

Malekpour, B., Peimanifard B. and Faezipour M. (1979). Presentation of range important plants and guidance for Iranian different regions. Research Institute of Rangelands and Forests.

Mobayen, S. (1980), Flora of Iran Vascular plants. Vol. 2. Tehran University Publications.

Moghaddam, M.R. (1998). Range and range management . Tehran university publications.

Table 1 – Air and soil temperatures (^{o}C) prevailing during different phenological growth stages of triple-awned grass

Growth stages	Maximum air temperature	Minimum air temperature	Maximum soil temperature	Minimum soil temperature
Beginning of growth	28.4	3.6	30	5
Vegetative growth	28.4-36.5	3.6-9	30-40	2-6
Flowering	40.5-41.5	17.4-19.8	48-52	15-16.5
Seed ripenning	39.2	17	42	14
Seed falling	29.2-17.6	0.6-(-2.2)	15-30	0.5-(-3)