Determining Planting Dates for Spring Safflower by Temperature and Digital Elevation Model in Esfahan Province

Talat Yasari*
Assistant Prof., Department of Physics, Zabol University, Iran

Received: 27/04/2014 Accepted: 31/08/2014

Extended Abstract

Introduction

Planting date plays main role in crop performance. Planting date through correspondence with the climatic elements affect vegetative and reproductive growth and ultimately affect the quality and quantity of crops. Among the climatic elements, temperature and day length are more important under irrigated condition. It is necessary to mention that the majority of crops cultivated in Iran are indifferent to day length. The temperature is the most important element in controlling their growth period. By using long-term weather data and related software such as Arc map we can determine the suitable planting dates for a wide area. Therefore, by eliminating field experiment and avoiding large amount of time and cost, much can be saved. The purpose of this study is to determine the best planting dates for spring safflower in different parts of Esfahan province in order to gain the maximum performance in any climatic zone.

Methodology

The minimum, maximum and mean temperature of 51 synoptic and climatic stations of Esfahan province and other neighbouring provinces from 1961 to 2011 have been used to determine the appropriate planting dates of spring safflower in Esfahan province. Using the mean temperature and Kriging method, Esfahan province is divided into three zones including zone 1 (warm), zone 2 (moderate) and zone 3 (cold). For determining the planting dates of spring safflower in different part of Esfahan province daily mean and minimum temperature from January to October as average of 15 days have been calculated and related maps were plotted in GIS environment. Interpolation of temperature was done by Digital Elevation Model (DEM) and

*E-mail: yasari85@yahoo.com Tel: +98 9133278087

regression analysis between temperature and height in the GIS environment. Beginning of planting dates in warm, moderate and cold regions were considered to reach mean of temperature to 7, 9 and 12°C, respectively. For determining the growth inhibitory of high temperatures, average of the 15-days mean and maximum temperature calculated from June to September and related maps were plotted in GIS environment. The daily mean temperature of 30°C and the maximum temperature of 37°C are considered as high-temperature inhibition.

Results and Discussion

Delay in spring planting of safflower accelerates the development stages, decrease vegetative growth and yield components, and ultimately cause safflower yield reduction. Early planting dates due to production of higher seed yield are recommended. Thus, if the thermal requirements of safflower provide the safflower cultivation, earlier and higher yield will be achieved.

In the first thermal zone, information layers of the regions were combined that in them mean temperature is reached to 7°C and the minimum temperature to above 0°C. Therefore, in mid-January the eastern and northern half of the province is appropriate for safflower cultivation. In this zone, in east and north parts of the province the planting dates start at January 19 and end in March 6. Khorobiabanak and Biazehbiabanak are stations that located in this region. In the second thermal zone, information layers of the regions were combined that in them mean temperature reached to 9°C and the minimum temperature reached above 0°C. Therefore, in mid-March the areas of south-eastern and central provinces were added to the previous range. In this zone, on some parts in south of the province the planting dates start at March 7 and end at April 4. Esfahan, Kabootarabad, Palayeshgahe Esfahan, Najafabad, and Balan stations are located in this region. In the third thermal zone, information layers of the regions were combined that in them mean temperature reached to 12°C and minimum temperature reached above 0°C. Therefore, in mid-April, additional narrow strip of the north-west to the south of the province was added to the previous range. In this zone, in the other parts of the province the planting dates start at April 5 and end at May 21. Golpaygan, Meymeh, Abyaneh, Daran, Singerd, Chadegan, Emam Gheys, Mehrgerd and Hamgin, Damaneh Freydan, Freydoon Shahr, Badijan, Hana and Khonsar stations are located in this zone. It is noteworthy that in the west and north western part of the province some regions with 2338 to 4405 m height are not suitable for safflower planting due to low temperature.

Conclusion

Based on the results in the first, second and third thermal zones, planting dates in the province is generally started from January and continue to May.. By considering temperature requirements of safflower the suitable planting date must be considered. Cultivation and planting shall not face to limited temperature and in every zone the first planting date is the best time for planting.

Keywords: Digital Elevation Model, Kriging, Planting Date, Spring Safflower, Temperature.