

## Study the Climatical Factors Effects on Bunch Fading Disorder of Date Palm in Southern Iran and the Methods of its Control

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**Abstract:** Fading disorder is one of the most important factors that have decreased date's production in Iran in recent years. This disorder occurs very suddenly and rapidly from Khallal to rotab stage conversion, causing fade and eventually drought of date fruits. A study was carried out to determine the effects of climatical factors on dates fading disorder in different parts of Bushehr province in southern Iran. The daily data of three meteorological stations and twelve date gardens near these stations were used in this study. Observations were carried out to determine the time and damage percent through disorder occurrence in the gardens. The diagrams for every weather parameter and fading development were drawn. Results showed that climatical factors affected dates fading disorder by the following effectiveness sequence: weather relative humidity > wind speed and streamline > weather temperature. Also, estimation of fading disorder time occurrence can be done by wind streamline forecasting maps through five former days. As it was concluded that climatic parameters could be the most important factor of fading disorder, three cultural control methods (Intercropping, Bunch covering, Fruit thinning) were used in three different studies. It was observed that applying these methods together could decrease fading up to 70 percent.

**Key words:** Date palm . Fading disorder . Climatical factors . Southern Iran

### INTRODUCTION

Fading disorder is one of the most important factors that have decreased date's production in Iran in recent years. This disorder occurs very suddenly and rapidly Khallal to rotab stage conversion, causing fade and eventually drought of date fruits [1]. Many factors have been thought to have effects on this disorder such as fungi spores, bacteria, overloaded fruit, no tinning and climatical changes [2, 3]. None of these factors was proved to be the main one [4]. Some field reports showed that weather fluctuation especially high temperature and blowing hot winds could have influence on development of this disorder [5]. Therefore, a study was done to determine the effects of climatical factors on dates fading disorder in different parts of Bushehr province in southern Iran (Fig. 1).

### MATERIALS AND METHODS

The daily data of three meteorological stations were used in this study. Also, twelve date gardens near these stations were selected and the chemical and physical properties of their soils and irrigation water were analyzed. The date palms were located in different physiographic such as plain, downhill, marginal and surrounded gardens. Precise repetitive observations

were carried out to determine the time and damage volume of disorder occurrence in the selected gardens. The percent of affected fruits was calculated by picking up 50 date fruits randomly from each palm and then multiplying the number of faded fruits by two. Any changes in the damage percent were notified for a specified bunch and its fruits in a tree.

### RESULTS AND DISCUSSION

The diagram of fading damage percent related to time progress was drawn which had two increasing stages-emergence of disorder-and a decreasing stage-hide ness of fading appearance-after each one. Also, a silent period between stages was observed (Fig. 2). It means that the disorder could be seen on many fruits while disappeared in some of them after it. Then, this cycle happened again.

The diagram of fading development with each weather parameter was drawn, too. Results showed that rapid changing in climatical parameters could be seen during the occurrence of fading disorder. Characters of diagrams are explained as follows:

**Temperature:** It was observed that before every fading disorder emergence, certainly air temperature enhancement happened (31<sup>st</sup> July and 12<sup>th</sup> August



Fig. 1: Showing the damage of a faded bunch and its fruit

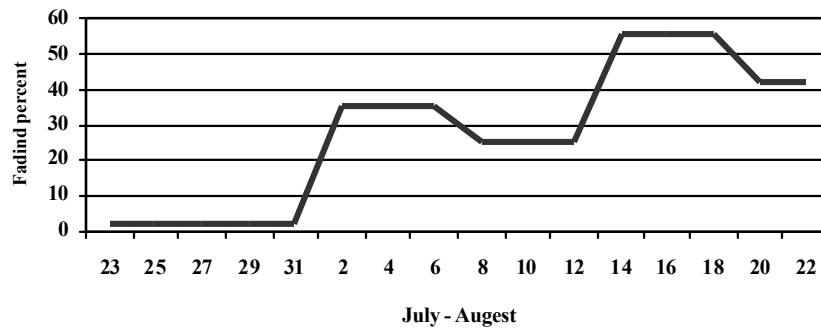


Fig. 2: Fading disorder damage development during time

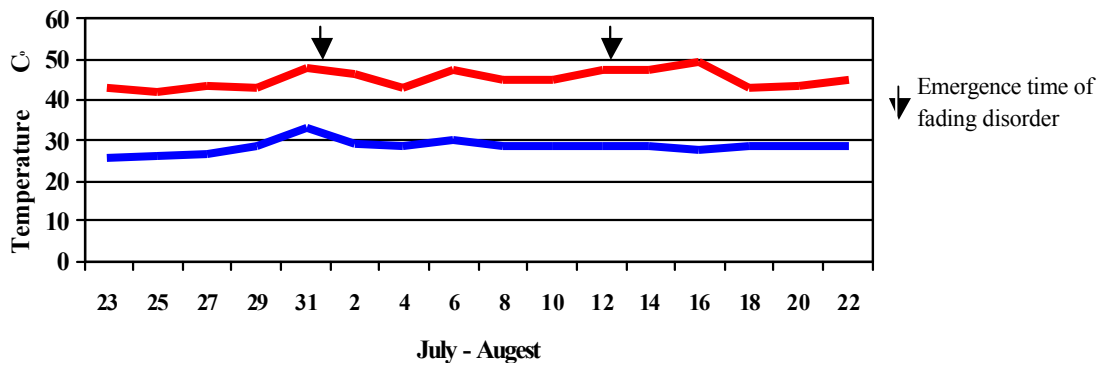


Fig. 3: Air temperature diagram in Busher during July-August

caused fading). But this doesn't mean that fading disorder would be followed any increase in temperature (16<sup>th</sup> August didn't cause fading disorder). Also, more damage of fading disorder was obtained in gardens locations with higher temperature (Fig. 3).

**Wind:** Nearly, five days before the fading emergence, wind streamlines changed sensitively. Wind streamline shows the direction of wind

blowing in the area (Fig. 4). In this diagram, the directions of wind are showed by degree. This period of time (5 days and more) seems to be essential for wind to affect fruit appearance and quality (26<sup>th</sup>-31<sup>st</sup> July). It should also be mentioned that winds blown from dry mountains located in eastern and north eastern part of the region were more effective than the others according to their higher temperatures.

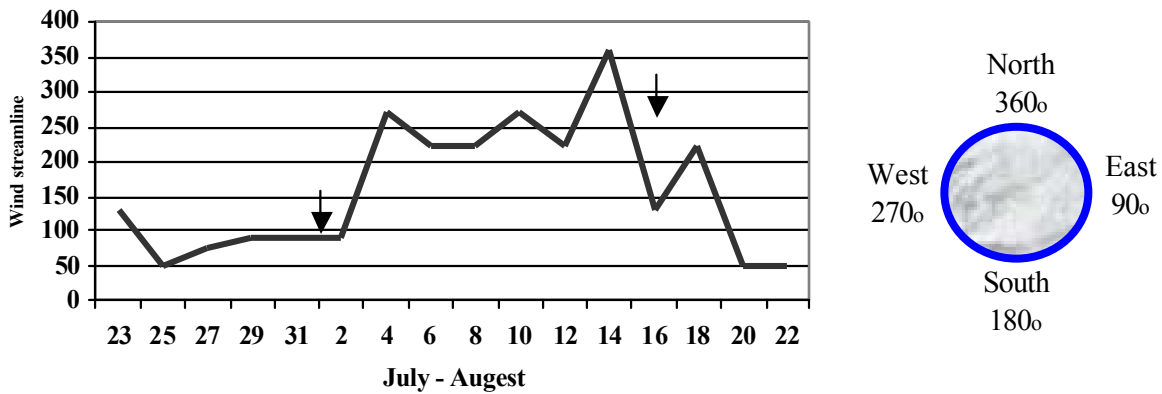


Fig. 4: Wind streamline diagram in Buser during July-August

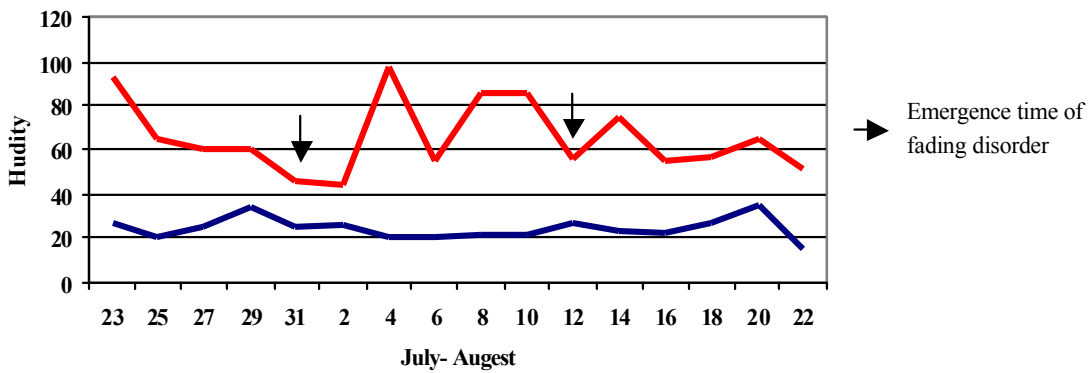


Fig. 5: Air humidity diagram in Buser during July-August

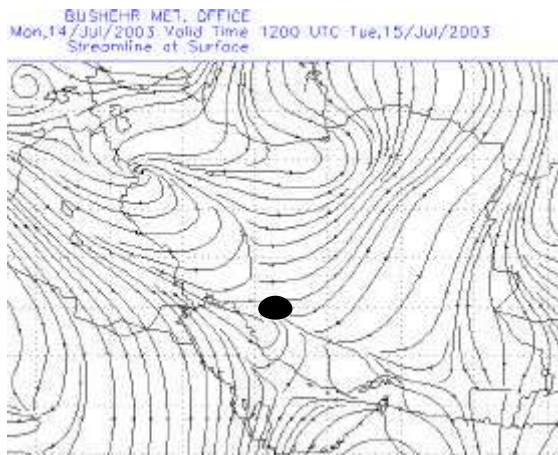


Fig. 6

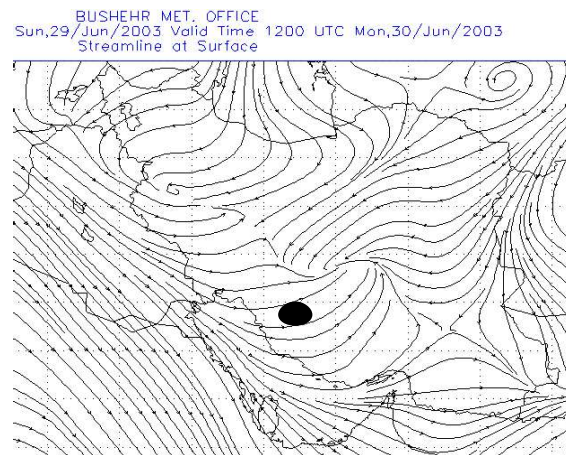


Fig. 7

Fig. 6, 7: Decrease and increase in air humidity by the effect of wind streamline  
● Studying area

**Air humidity:** Like wind, if a distinct change in five days or more were observed in air humidity, fading disorder happened clearly (Fig. 5). Also, every small change in air moisture after this time were followed by a change in damage percent which could explain different stages of fading development (increasing, decreasing and silent stages) in fruits as shown in

Fig. 2. Among climatical factors only air humidity showed such an effective function.

So, it was concluded that the climatical factors can have the strongest effect on dates fading disorder by different effectiveness with the following sequence: weather moisture > wind streamline > temperature.



Fig. 8: Fading disorder control by intercropping

Regression between climatical data and disorder percent could not be established according to the sudden emergence character of the disorder. It was also observed that the critical time for fading disorder happening would be in the early of August in Bushehr province. Further investigations by satellite weather prediction in the region were carried out. It proved that the estimation of fading disorder time occurrence could be done by wind streamline forecasting maps through five former days.

These maps show the direction of continental and regional winds in a large scale. It was proved that winds blowing from hot deserts in the center of Iran would decrease air humidity severely and cause fading disorder (Fig. 6). In contrast, blown winds from sea (Persian Gulf) have reverse action and increase air humidity and decrease the disorder (Fig. 7).

**Fading disorder control methods:** As it was concluded that climatic parameters could be the most important factors affecting fading disorder, three cultural control methods were used in three different studies as follows:

**Intercropping:** Intercropping of date plantations with Alfa Alfa (*Medicago sativa*) and sorghum (*Sorghum vulgare*). These cultivations increased relative humidity in the garden and decreased the disease. Results showed that Alfa Alfa was more effective than sorghum Fig. 8.

**Date bunch covering:** Bunches were covered by mat baskets, plastic bags, hemp bags and cloth net bags. These covers were used from Khalal stage until the time that weather condition became suitable. Mat



Fig. 9: Mat basket



Fig.10: Cloth net bag



Fig. 11: Fruit thinning from the bunch tip

baskets showed to be more effective than the other materials Fig. 8 and 9.

**Fruit thinning:** In this study, 30 percent of bunch tips were cut at pollination stage. This action decreased fruit competence for water and nutrients in bunches. Results showed that this method can decrease fading disorder significantly Fig. 11.

It was observed that applying these methods together was more effective than using them lonely. In an experiment it was proved that 70 percent decrease in fading happened by using the control methods simultaneously.

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