Effect of foliar application of potassium sulfate and calcium chloride on date bunch fading disorder in Iran

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Abstract
In a field experiment, the effects of foliar application of potassium sulfate and calcium chloride with and without using micronutrients on date bunch fading and yield of date palm (*Mozafati* cultivar) in Jiroft, located in southeast of Iran, were evaluated. The experimental design was RCBD with four replicates. The results showed that, treatments containing potassium compared with other treatments, had better effects in controlling the bunch fading disorder and increasng the yield. For the first time, these results reveal the useful effects of potassium sulfate application (with or without micronutrients) on decreasing the date bunch fading disorder in Iran.

Key Words
Date palm, bunch fading, potassium, Iran.

Introduction
Recently, bunch fading disorder of date palm has extended in important date producing regions of Iran (e.g. Jiroft and Bam in Kerman provice). The disorder has only reported from Iran. It has highly damaged date growers. Several investigations have been conducted to identifying the responsible agent(s), but so far these works have had no success. However, all of the researchers believe that unsuitable climatic conditions such as high temperature and low humidity influence the incidence of this disorder. On the other hand, it is confirmed that the calcium plays a specific role in cell wall stability and potassium has important roles in the resistance of plants to environmental stresses, pests and pathogens(Marschner 1993). It is accepted that the needs of palm for potassium is high(Klein and Zaid 2000) and this element affects the quentity and quality of dates(El- Deeb *et al.* 2000). Also, balanced nutrition positively affects plant health. In this study, the effects of K, Ca, Fe, Zn, Cu and Mn applications on the control of date bunch fading disorder were investigated.

Methods
In order to evaluate the effects of foliar application of potassium sulfate and calcium chloride with or without using micronutrients (together with manure to soil) on date bunch fading, an experiment was carried out in Randomized Complete Block Design (RCBD) with 6 treatments and four replicates in 2002-2003 at Jiroft. The treatments were:

- Control (only nitrogen fertilizer application, one Kg per each palm as Urea + 20 Kg manure) (T1);
- Application of fertilizers containing the micronutrients(e.i. $FeSO_4$, $ZnSO_4$, $CuSO_4$ and $MnSO_4$,200g of each fertilizer per palm with 20 Kg manure + 2 Kg Urea) (T2);
- Foliar application of pure calcium chloride (conc. 5kg/1000L, 20L per palm) (T3);
- T2 + T3 (T4);
- Foliar application of pure potassium sulfate (conc. 5kg/1000L, 20L per palm) (T5);
- T2 + T5 (T6).

The irrigation method was basin(pan) and the trees were irrigated in frequency of 5-7 days. Foliar applications were carried out at 2,4,10 and 15 weeks after pollination. One half of N-fertilizer was used in Jan with micronutrients and the next half was used in May.

Results
The results showed that, foliar application of potassium sulfate and calcium chloride with or without micronutrients addition, were more effective in decreasing damage due to the disorder. Treatments containing potassium decreased the percent of faded fruits and bunches subsequently increasing the yield, significantly.

Foliar application of potassium sulfate with or without using micronutrients decreased the percent of faded bunches from 69% in control to 19.7% and 21.2% (Figure 1) and faded fruits from 66.5% in control to 7.5% and 10.4% (Figure 2) and increased the yield by 46% and 65%, respectively (Figure 3).

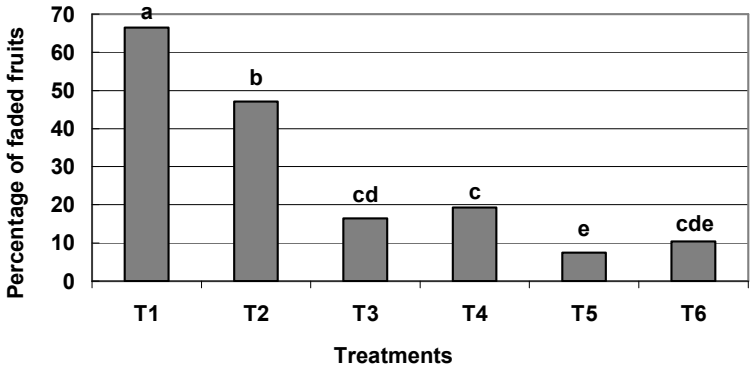

Figure 1. Effects of different treatments on faded bunches.

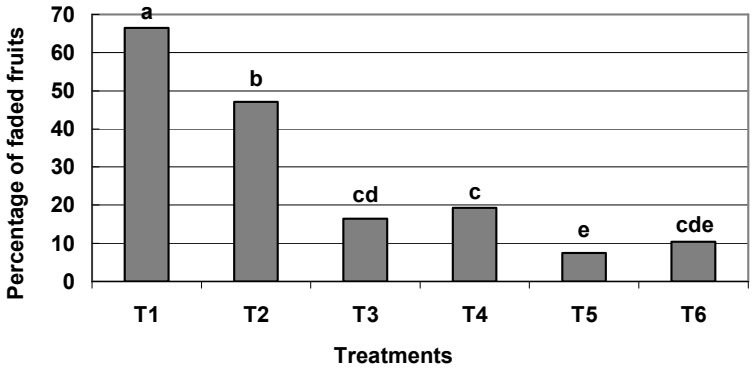

Figure 2. Effects of different treatments on faded fruits.

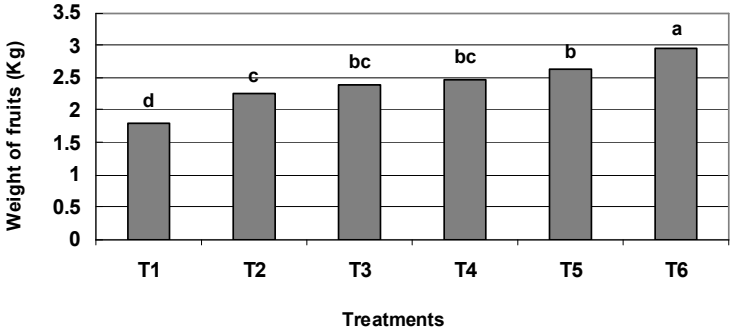

Figure 3. Effects of different treatments on fresh weight of 200 fruits.

Conclusion

To overcome the undesirable effects of drought stress and control of date bunch disorder in affected regions of Iran, the application of potassium fertilizers preferably with fertilizer containing micronutrients in date orchards is highly recommended.

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