

## **Integrated Control of the Date Palm Spider Mite**

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***Objective 3:** Develop postharvest treatments to mitigate evident mite damage caused to fruits by spider mites.*

During the period of the current report no work in compliance with Objective 3 was done.

***Objective 4B:** Relationship between fruit chemistry and mite phenology and population density.*

In the previous reports we have described our results on fruit mineral composition (including total nitrogen, phosphate, potassium, calcium, magnesium, sodium and chloride), chemical composition (including water content, juice total soluble solids' concentration, electrical conductivity, pH, titratable acidity and total soluble phenolics' content) and secondary metabolite profile (including polyphenolics, and initial data on chlorophylls and carotenoids).

Mineral and chemical parameters in fruit of the three CVs, 'Deglet Noor', 'Medjool' and 'Barhi', changed similarly during development; however, the absolute values as well as the degree and rate of change of each parameter were cultivar dependent, indicating that fruit chemistry may indeed relate to cultivar susceptibility to the mite. The variations in certain polyphenolics' content that paralleled seasonal changes in mite phenology and density in the three CVs suggest they may play a role as constitutive repellents.

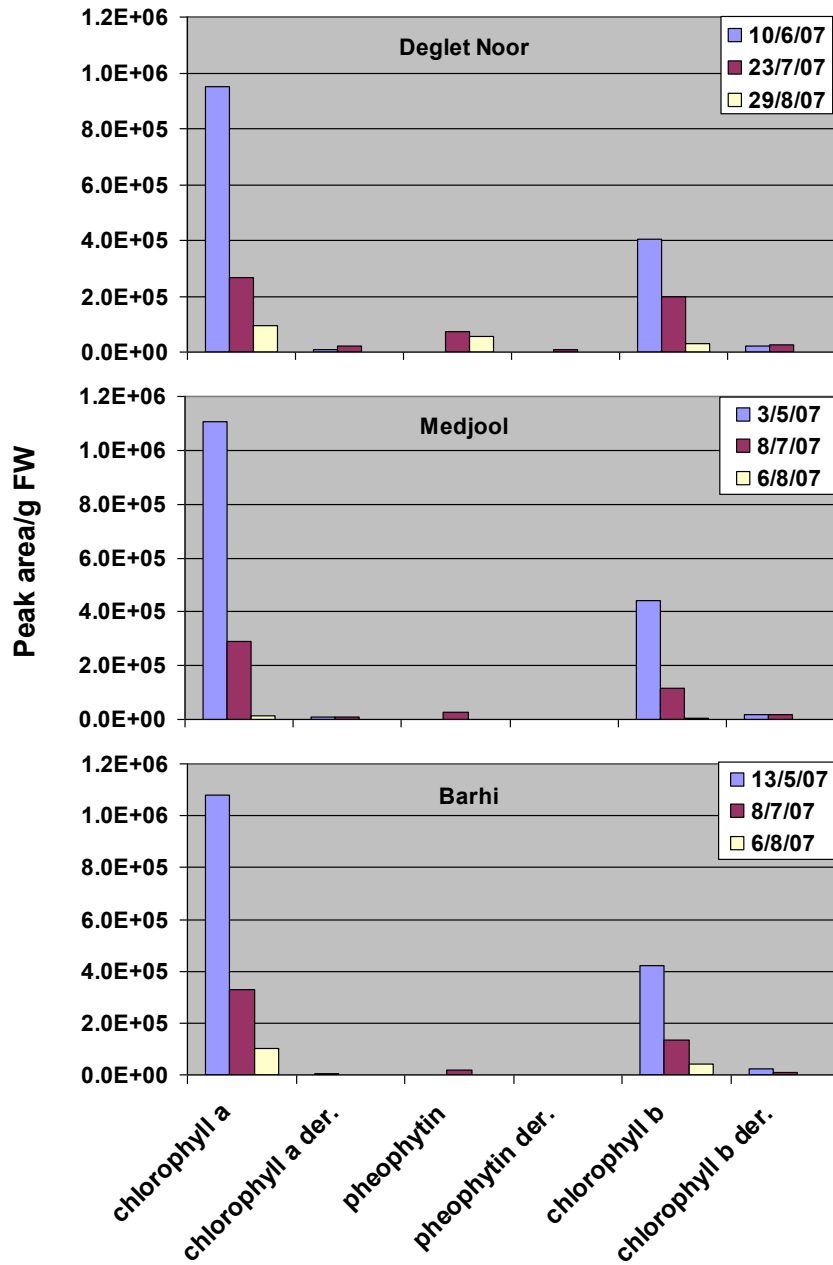
In the current report we present further analysis of chlorophyll and carotenoid compounds in the developing fruit of the three CVs on dates prior to mite ascent, during population buildup and at the beginning of descent.

Detailed account on the hydrophobic pigment extraction and HPLC analysis as well as and representative chromatograms for 'Deglet Noor' fruit extracts were presented in the previous report. The chromatograms obtained with fruits of the three CVs were similar in shape but peak area as well as the degree and rate of change during fruit development were cultivar dependent. The major peaks were of

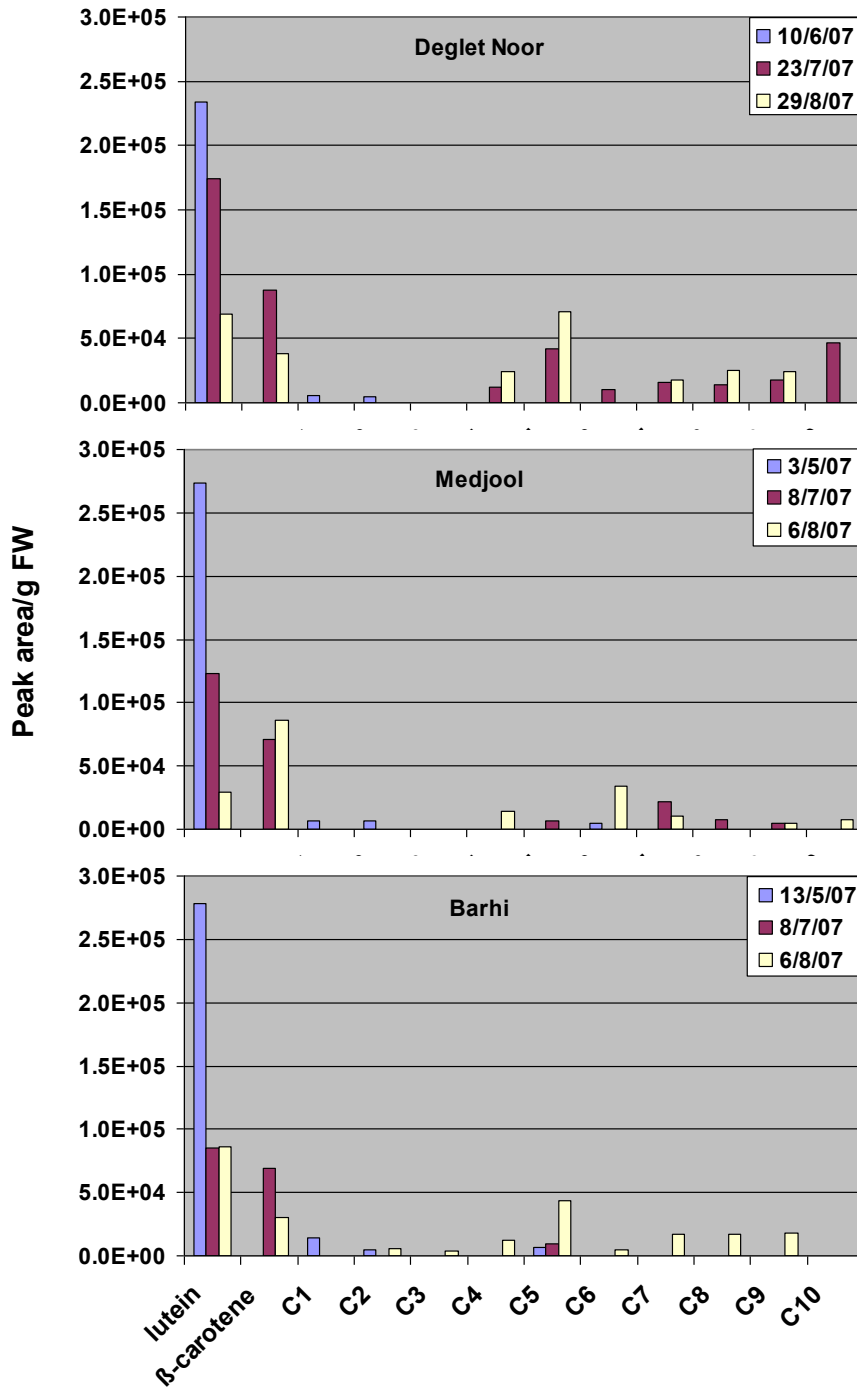
chlorophyll a and b and their degradation products (pheophytins), lutein,  $\beta$ -carotene and unidentified carotenoids (denoted as C1 to C10).

Figure 1 summarizes the levels of chlorophylls and pheophytins in fruit of the three CVs on dates (1) preceding mite ascent (10/6, 3/5 and 13/5 for 'Deglet Noor', 'Medjool' and 'Barhi', respectively) , (2) during population buildup (23/7, 8/7 and 8/7), and (3) at the beginning of mite descent (29/8, 6/8 and 6/8). The pattern of chemical change was highly similar in all three CVs. The content of both chlorophylls was the highest in fruit at developmental stage preceding mite ascent; a marked reduction in chlorophylls' content and a transient accumulation of pheophytins were measured as fruit development progressed. By the dates corresponding to mite descent, the levels of both chlorophylls and pheophytins were very low.

Figure 2 summarizes the levels of the various carotenoids in fruit of the tree CVs on the same dates specified in Figure 1. The pattern of carotenoid change in all three CVs bore significant similarity. The content of lutein was the highest in fruit of developmental stage preceding mite ascent, and decreased on later dates. On the other hand,  $\beta$ -carotene was not detected at the earlier stage of fruit development; its content in the fruit was significant on dates corresponding to mite population buildup. Several unidentified carotenoids have accumulated later in fruit development. The change in  $\beta$ -carotene content during fruit development is consistent with the possibility that it has a nutritional role in the mite diet.



**Figure 1:** Chlorophylls and pheophytins' composition in 'Deglet Noor', 'Medjool' and 'Barhi' fruit on several dates along fruit development.



**Figure 2:** Carotenoids' composition in 'Deglet Noor', 'Medjool' and 'Barhi' fruit on several dates along fruit development.

#### FUTURE WORK:

**Objective 3:** *Develop postharvest treatments to mitigate evident mite damage caused to fruits by spider mites.*

If the revised budget allocation approved, hydration protocol to alleviate mite-damaged 'Deglet Noor' fruit strands and quality preservation during storage and shelf

life will be further studied. Research will concentrate on the refinement of the hydration process with respect to temperature and humidity combinations as well as exposure period.

***Objective 4B: Relationship between fruit chemistry and mite phenology and population density.***

Analysis of fruit chlorophylls and carotenoids will be completed.

If the revised budget approved, fruit chemistry of the mite resistant date variety 'Zahidi' will be studied, analogously to our work on the three mite susceptible CVs. Comparison between mite susceptible and resistant date varieties will be very valuable in establishing the involvement of certain fruit components in mite attraction and repulsion.