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# Determination of the best time of harvest in different commercial Iranian pistachio nuts

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**SUMMARY** – One of the most important factors affecting quality of pistachio nuts is the time of harvest. Occurrence of early hull splitting in pistachio fruits is one of the most considerable problems in orchards. These split fruits cause contamination with the *Aspergillus sp.* fungus. The kind of cultivar and time of harvest are important factors determining early hull splitting and quality of yield. This study was carried out on four commercial Iranian pistachio cultivars. A factorial design was laid out at Rafsanjan area. Percentage of hulling, blank and immature fruits, early hull splitting, splitting, non-splitting, hull cracking, number of nuts per 100 g dried nuts, kernel/nut ratio, kernel humidity, sucrose, oil and finally content of aflatoxin B1 and B2 were measured. Almost all the quality differences between cultivars were associated with time of harvest and their differences were significant. 'Ahmad-Aghaei' was shown to be of substantially better quality than the other cultivars. The middle to end of September was determined as the best time of harvest.

**Key words:** Pistachio, harvest, fruits, nuts, early splitting.

**RESUME** – "Détermination de la meilleure période pour la récolte chez différentes variétés commerciales iraniennes de pistaches". Un des plus importants facteurs affectant la qualité de la pistache est le temps de récolte. La survenue du fractionnement précoce des pistaches est un des grands problèmes des vergers. Le fractionnement de ces fruits est la cause de la contamination fongique de la récolte par *Aspergillus sp.* Le type de cultivar et le temps de récolte sont des facteurs importants qui déterminent le fractionnement précoce et la qualité de la récolte. Cette étude est faite sur quatre cultivars commerciaux iraniens de pistaches. Un modèle factoriel a été appliqué dans la région de Rafsanjan. On a ainsi mesuré le pourcentage d'écalage, de coquilles vides, de fruits non mûrs, le fractionnement précoce, le fractionnement et non fractionnement, la brisure de la coquille et le nombre de fruits pour 100 g de fruits secs, le rapport entre l'amandon et le fruit, l'humidité de l'amandon, le sucre, l'huile et finalement la teneur en aflatoxine B1 et B2. Presque toutes les différences de qualité entre les cultivars sont liées au temps de récolte et elles étaient significatives. En effet, le cultivar 'Ahmad-Aghaei' a montré une meilleure qualité par rapport aux autres. La deuxième moitié de septembre est la meilleure période pour la récolte.

**Mots-clés :** Pistache, récolte, fruits, fractionnement précoce.

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## Introduction

Experienced growers recognize the signs of maturing pistachio fruits and best time of harvest in different pistachio cultivars. Maturity of pistachio fruits is obvious by a softening and loosening of the hull from the shell, increase in percentage of hulling, change in the color of hull, change in size of kernel, etc. The nuts do not abscise from trees at maturity time, but gradual drying and shriveling of the hulls occurs for several weeks. The objective of the study was to determine the accurate time at which pistachios should be harvested to achieve a yield with highest quality.

## Materials and methods

This study was carried out on four commercial Iranian pistachio nut cultivars 'Ahmad-Aghaei', 'Kaleh-Ghouchi', 'Ohadi' and 'Badami' in Rafsanjan (Iran) in 2001-2002. Ten fifteen-year-old trees from each cultivar were selected. A factorial design with three replicates was laid out at in 2001 and the results for a period of 2 years from 2001 to 2002 are presented. Percentage of hulling, blank and immature fruits, early hull splitting, splitting, non-splitting, hull cracking, number of nuts per 100 g dried

nuts, kernel/nut ratio, kernel humidity, sucrose, oil and finally content of aflatoxin B1 and B2 were measured. Harvest of experimental samples was done, weekly, from 23rd August to 22nd October of each year. Statistical analyses were performed using procedures of a statistical software package (SAS Institute, Cary, N. C.) Summary statistics and analyses of variance based on a factorial design were obtained. The mean of results of 2-year-experiment is produced in results and discussion section.

## Results and discussion

The percentage of hulling showed increase from the 3rd week of harvest and continues to be constant. No significant changes were observed from 4th to 8th week of harvest. 'Ahmad-Aghaei' showed the highest percentage of hulling in compare to other cultivars and differences were significant (Fig. 1).

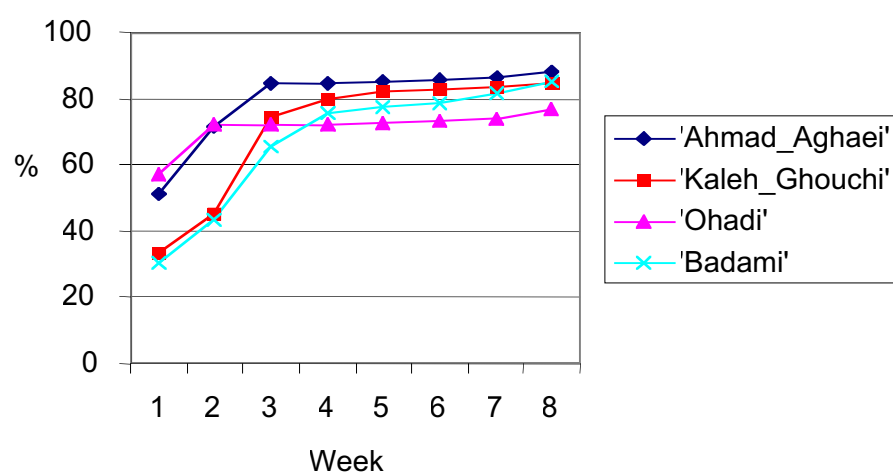


Fig. 1. Percentage of hulling in fruits of four commercial cultivars (from week 1 to 8).

The percentage of blank and immature fruits decreased week by week. No significant differences were observed between cultivars from week 4. The lowest percentage of blank and immature fruits is belonged to 'Ahmad-Aghaei' (Fig. 2).

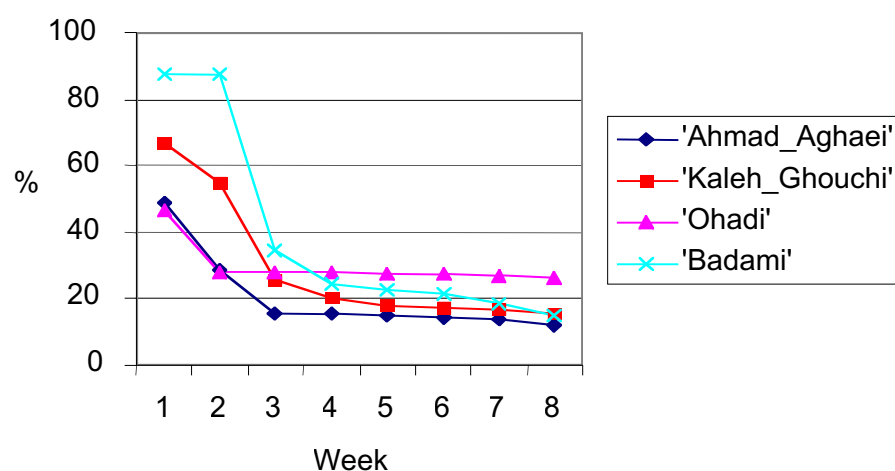


Fig. 2. Percentage of blank and immature fruits of four commercial cultivars (from week 1 to 8).

The percentage of early hull splitting showed gradual increase and the highest percentage among experimental cultivars was observed in 'Ahmad-Aghaei'. Delay in harvest increased percentage of early hull splitting and 'Badami' showed the lowest percentage of early hull splitting (Fig. 3).

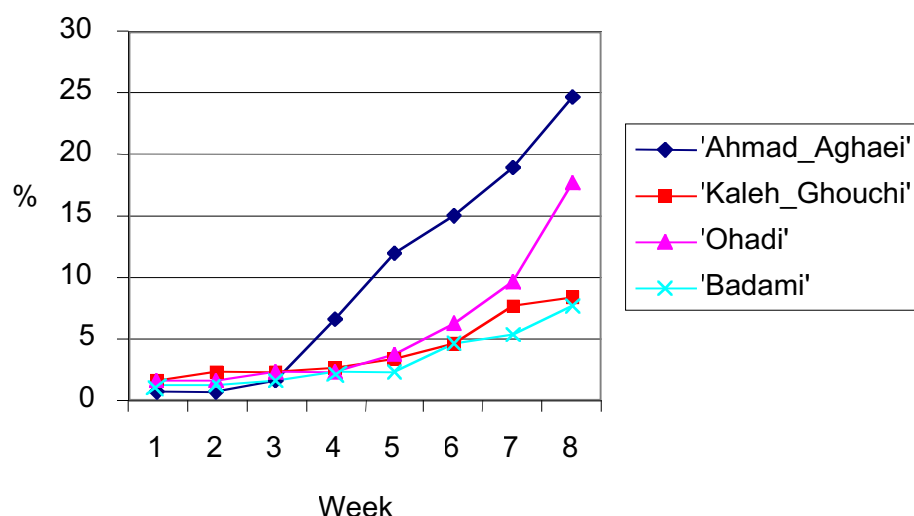


Fig. 3. Percentage of early hull splitting of four commercial cultivars (from week 1 to 8).

The percentage of shell splitting increased week by week and at the 8th week of harvest showed the highest percentage in all cultivars. Among the different cultivars, 'Ahmad-Aghaei' showed the highest value of shell splitting (Fig. 4). The percentages of non-splitting in shells showed decline, but 'Ahmad-Aghaei' showed a constant trend and was close to zero (Fig. 5).

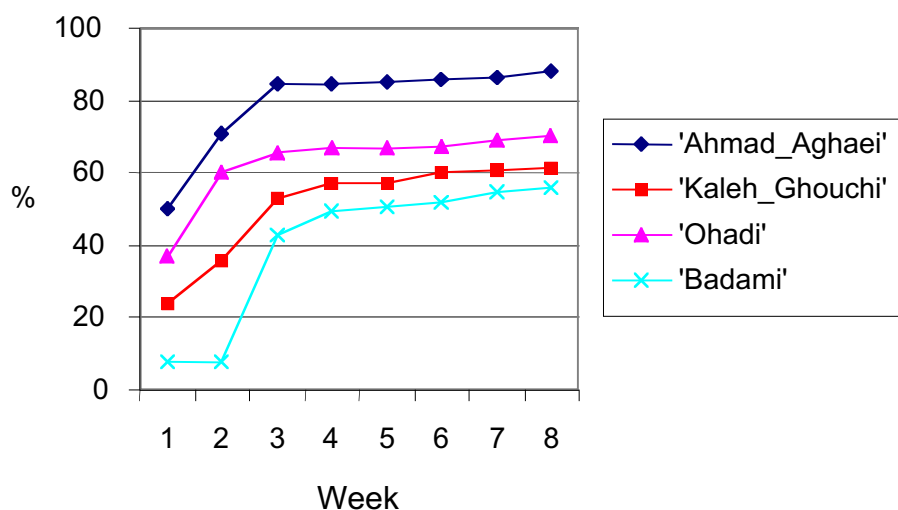


Fig. 4. Percentage of shell splitting of four commercial cultivars (from week 1 to 8).

The results indicated that the percentages of hull cracking in 'Ahmad-Aghaei' and 'Kaleh-Ghouchi' are higher than in other experimental cultivars (Fig. 6).

The number of nuts per 100 g indicated that 'Kaleh-Ghouchi', with 84.2 nuts per 100 g, could be recognized as a big nut, but 'Badami' with 126.6 nuts per 100 g is a small nut and their number reduced by increase in time (Table 1). 'Ohadi' showed the highest ratio of kernel/nut. Percentage of fruit humidity decreased gradually by increase in fruit maturity and 'Badami' showed the lowest percentage of humidity of fruit in comparison with other cultivars (Table 1). The percentage of sucrose

declined by the end of season, but the percentage of oil in kernel showed increase. 'Ahmad-Aghaei' contains the lowest percentage of sucrose and highest percentages of oil (Table 1). Also the content of aflatoxin B1 and B2 were not detectable by HPLC method.

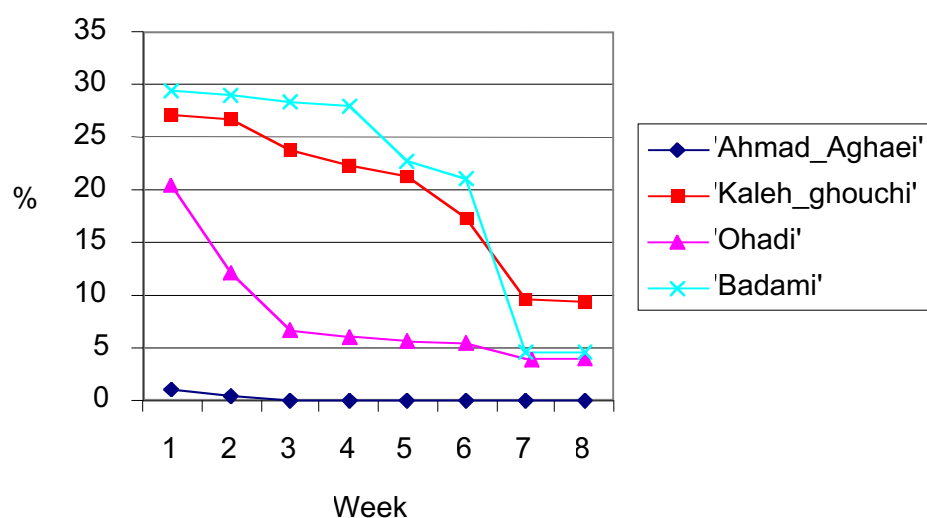


Fig. 5. Percentage of shell non-splitting of four commercial cultivars (from week 1 to 8).

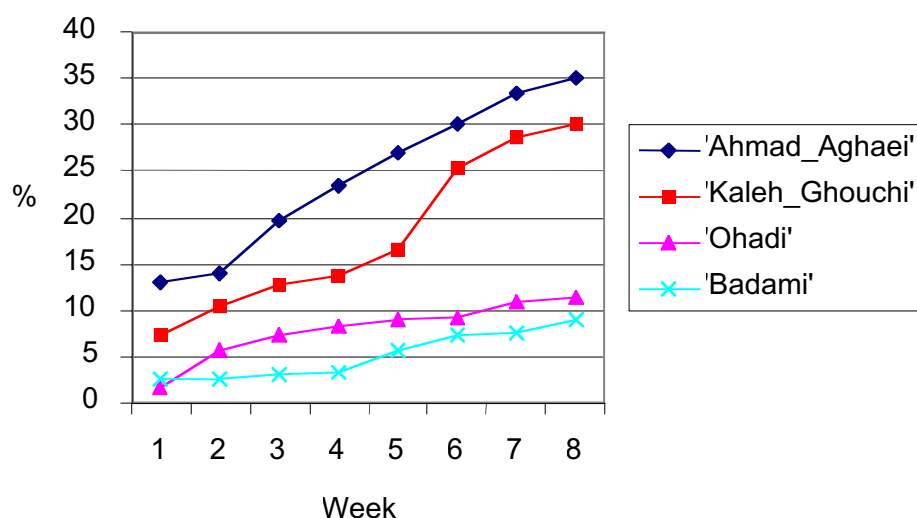


Fig. 6. Percentage of hull cracking of four commercial cultivars (from week 1 to 8).

Table 1. Comparison between fruit characteristics in 4 commercial Iranian pistachio nuts

Cultivar	Number of nuts per 100 g dried nuts	Kernel/nut ratio	Fruit humidity (%)	Kernel sucrose (%)	Kernel oil (%)
'Ahmad-Aghaei'	101.7 c	0.566 c	32.2 c	16.05 a	59.17 a
'Kaleh-Ghouchi'	84.2 d	0.560 d	36.2 a	15.25 b	54.88 c
'Ohadi'	106.5 b	0.582 a	35.4 b	16.55 a	54.75 c
'Badami'	126.6 a	0.576 b	30.3 d	13.90 c	57.35 b

a, b, c, d: Values with the same letter do not differ significantly.

## Conclusions

The data showed that almost all qualitative differences among cultivars were associated with time of harvest. 'Ahmad-Aghaei' was shown to be of substantially better quality than the other cultivars. The middle to end of September was determined as the best time of harvest.

## Recommended references

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