Proceedings of The World Avocado Congress III, 1995 pp. 366 - 369

RIPENING AND FATTY ACID COMPOSITION OF AVOCADO FRUIT IN JAPAN

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Abstract

In order to determine the mature harvesting stage of avocado fruit in Japan, respiration rate, ethylene production and fatty acid composition were measured. Harvested fruits stored at low temperature to elucidate the relationship between harvesting stage and ripening after storage.

Additional index words

harvest time, respiration, ethylene

1. Introduction

It is difficult to decide the optimum harvest time of avocado fruit that does not change in the color of fruit peel or fruit hardness when the fruit matured. The decision of harvest time based on fruit oil content is usually used, in California fruit harvest begins when the oil content reaches 8%. It is October that the oil content reached 8% in Japan (Inoue and Takahashi, 1991). On the other hand, the harvest time judged by ethylene production of the fruit which is a typical climacteric fruit is early December in Japan (Inoue and Takahashi, 1991).

It is important that the determination of harvest time. The fruit maturity is connected with fruit quality result of ripening or storage after harvest. In the present study, it reports that the mature harvest time of avocado fruit in Japan determined by the changes in fatty acid composition in the fruit and the effect of harvest time on the fruit storage or ripening of avocado fruit.

2. Material & Methods

Avocado fruits (cv. Fuerte) were picked one month each September 1992 to March 1993 in Yamada orchard, Numazu, Shizuoka prefecture. The harvested fruits were stored at 5, 10 and 25°C, and the fruits stored at 5 and 10°C were transferred to 25°C at 20 days after harvest. Respiration rate and ethylene production were measured by gas chromatography.

Total lipid was extracted from avocado fruit mesocarp (not ripened) by the method of Folch et al. (1957) and fatty acid composition was determined by gas chromatography.

3. Results & discussion

3.1 Respiration and ethylene production (figure 1)

Typical climacteric pattern was observed when the fruits, which harvested on and after October, stored at 25°C, although the peak of ethylene production became earlier with fruit maturation. It was also reported that the days to the climacteric peak decreased as the season progressed (Eaks, 1980). It suggests that harvest time judged by ethylene production begins October. It agrees with the previous report (Inoue and Takahashi, 1991). Slightly ethylene was detected in the fruit stored at 10°C and their ethylene production became more and more marked with fruit maturation. No ethylene production was detected in the fruits stored at 5°C. When the fruits stored at 10°C were transferred to 25°C, obvious peak of ethylene production was not detected, although it was detected in the fruit had stored at 5°C were stored again at 25°C. These results indicate that the fruits stored at 10°C are slowly proceeding with the ripening, therefore the fruit had better store at 5°C for long term storage.

3.2 Changes in fatty acid composition (figure 2)

Major fatty acids in the fruit mesocarp consisted of oleic acid, followed by palmitic acid, linoleic acid, palmitoleic acid and linolenic acid. The percentage of oleic acid increased until December and the percentage of linoleic acid decreased until the same time. These changes are the same as that of the avocados grown in California (Kikuta and Erickson, 1968) or in South Affica (Kaiser and Wolstenholme, 1994). Little change was observed in the fatty acid composition on and after December. Although the fruit reaches 8% of oil content in October, its composition changed until December in Japan. It suggests that harvest stage judged by the fatty acid composition is December when the fruit has reached 12% oil content (Inoue and Takahashi, 1991).

These results indicate that the beginning of harvest time is October and optimum harvest stage is December to March in Japan.

4. References

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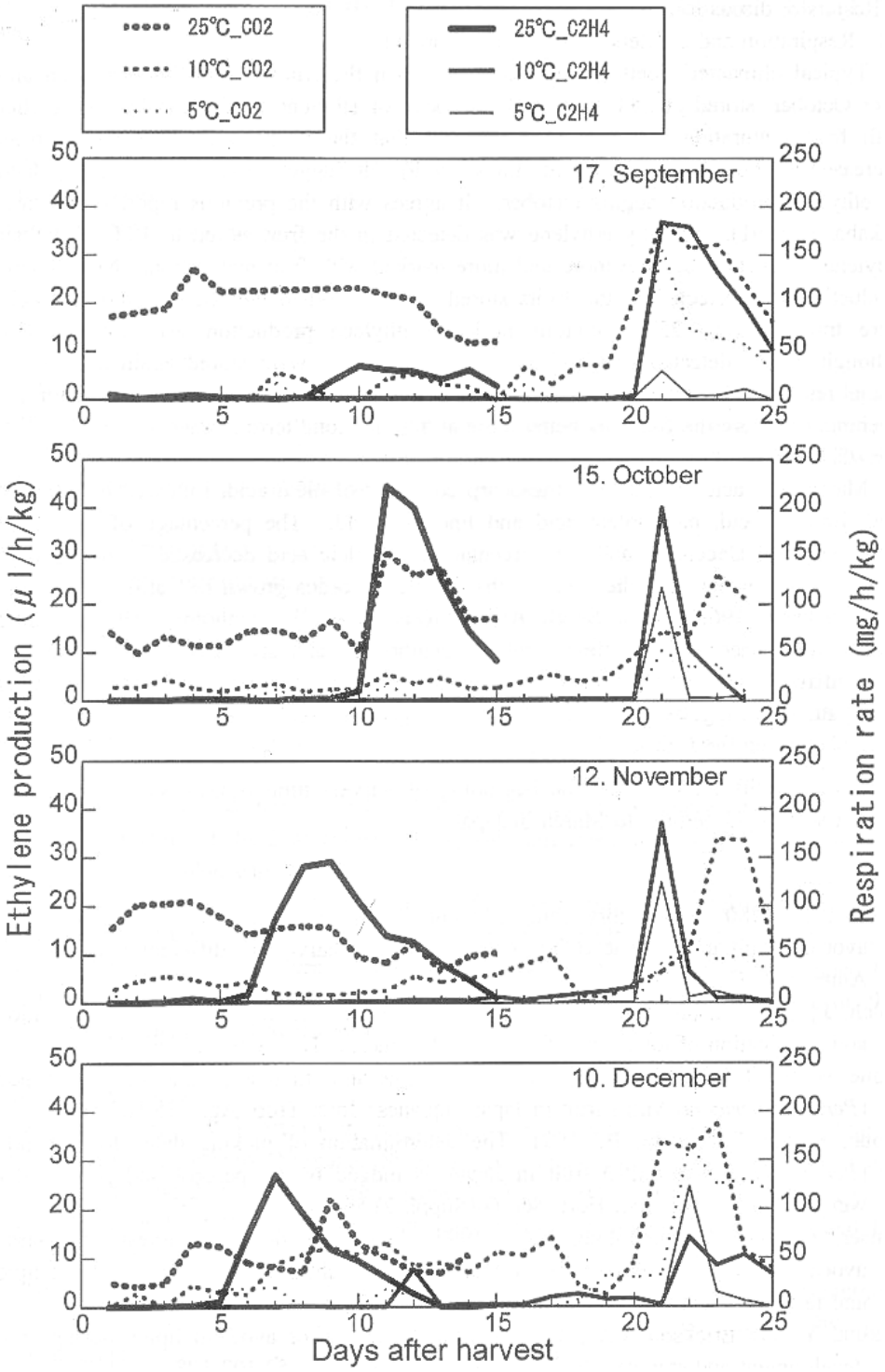
25℃_CO2
10℃_CO2
5℃_CO2
25℃_C2H4
10℃_C2H4
5℃_C2H4
17. September
15. October
12. November
10. December
Ethylene production (μl/h/kg)
Respiration rate (mg/h/kg)
Days after harvest

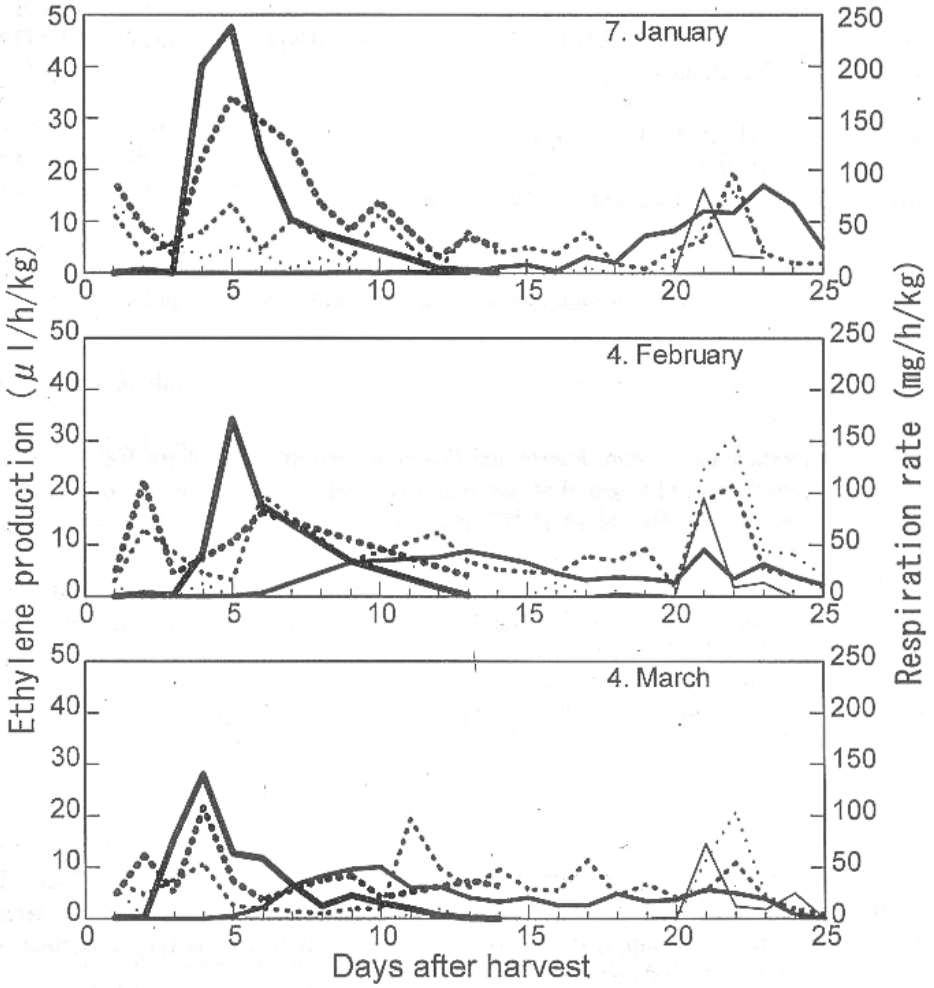

Fig. 1 Changes in respiration and ethylene production of fruits stored at 5, 10 and 25℃.

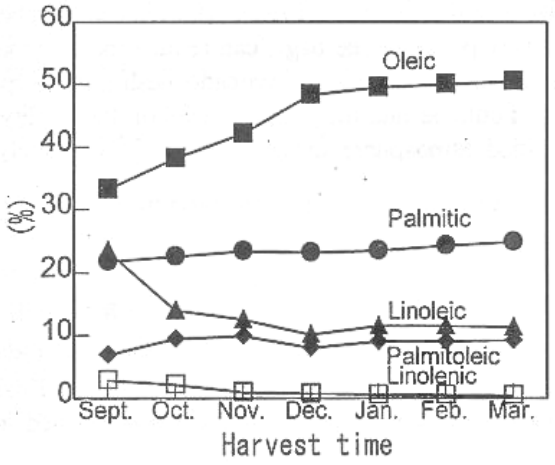

Fig. 2 Seasonal changes in fatty acids composition in Japan.