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学 位 論 文 要 旨
Dissertation Abstract

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学位論文題目：
Title of Dissertation

Studies on cultural practices to improve fruit quality of low-chill, early ripening peach
（少低温要求性早生モモの果実品質向上のための栽培技術に関する研究）

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The low-chill peach cultivars, ‘KU-PP1’ and ‘KU-PP2’ which were developed by Kagawa University in 2016, were used. They require about 500 chilling hours to break bud dormancy and these cultivars have short fruit development Period, therefore they can be carried to the peach market earlier. However, ‘KU-PP1’ peach bears smaller fruit. Furthermore, these cultivars have poor fruit quality compared to the standard quality of Japanese high-chill cultivars. Smaller fruits with poor fruit quality has less demand in peach market. Therefore, different cultural practices were applied and researched to improve fruit quality from 2018 to 2023 year:

1. Effect of the timing of fruit thinning on fruit quality of the low-chill early ripening peach cultivar ‘KU-PP2’

The objective of this study was to determine the effects of the timing of fruit thinning on fruit quality of peach cultivar ‘KU-PP2’. In the present study, 12-years-old ‘KU-PP2’ peach trees trained to an open center system at the Kagawa University Research Farm, Japan were used in 2020. Fruits on four branches per tree with a total of 16 branches were thinned at intervals of 7,14, 21 and 28 days after full bloom (DAFB) to determine the best fruit thinning time for high fruit quality with better fruit size. At each thinning time, the branches were hand-thinned maintaining a distance of 10 cm between the fruits. By the fruit thinning treatments, fruit maturity was hastened. The fruits thinned at 7 and 28 DAFB enhanced the fruit weight and size. In addition, the highest TSS was recorded in fruit thinned at 7,14 and 28 DAFB, followed by 21 DAFB, which was higher than that of the control. Regarding the fruit firmness, all the thinning treatments reduced skin firmness; however, flesh firmness was not affected by the treatments. The fruit color value L* was recorded highest in the control. However, the

fruit color value a* was the highest at 7 and 28 DAFB. Moreover, b* was not significantly different among the treatments including the control. Based on our findings, we concluded that fruit thinning at 7 DAFB exhibited the best results compared to other treatments.

2. Effects of foliar spray of potassium sulfate at different growth stages on fruit growth and quality of the low-chill early ripening peach ‘KU-PP1’.

The purpose of this study was to evaluate the effect of foliar spraying of potassium sulfate (K_2SO_4) on the fruit growth and quality of the low-chill early ripening peach 'KU-PP1'. K_2SO_4 concentrations of 5, 10, and 15 $g \cdot L^{-1}$ were sprayed at intervals of 30, 45, and 60 days after full bloom on the leaves of 'KU-PP1' peach; four branches per tree during the 2020 and 2021 seasons. Fruit maturity was accelerated by K_2SO_4 in both seasons, and fruit weight and size increased in all treatments compared to the control. The largest fruit size and diameter were observed in the 15 $g \cdot L^{-1}$ K_2SO_4 treatment. Furthermore, the TSS were observed in the 15 and 10 $g \cdot L^{-1}$ K_2SO_4 treatments, followed by the 5 $g \cdot L^{-1}$ K_2SO_4 treatment, which was higher than the control during both years. K_2SO_4 treatment increased the photosynthesis rate, transpiration rate, and stomatal conductance of ‘KU-PP1’ peach leaves compared to the control. The results also showed that the fruit color (L*, a*, and b*) was more enhanced in the 10 and 15 $g \cdot L^{-1}$ K_2SO_4 treatments during both years. Based on our findings of positive correlations between K_2SO_4 concentrations and fruit quality, we concluded that the 15 $g \cdot L^{-1}$ K_2SO_4 treatment produced the superior results.

3. Effect of girdling time on growth and fruit quality of low-chill early ripening peach ‘KU-PP2’

Low-chill peach production has increased in recent years. However, the fruit is less acceptable to consumers than that of high-chill peaches because of its low fruit quality. Hence, the production of high-quality fruit is essential for low-chill peaches. In the present study, effect of girdling on fruit quality of low-chill, early ripening peach ‘KU-PP2’, bred at Kagawa University was evaluated. The girdling treatment was applied at two, four, and six weeks (G1, G2, and G3, respectively) after full bloom on March 11, 2021. Girdling was conducted with a width of 2 cm in each treatment, except for the control. We compared the effects of girdling on fruit growth, shoot growth, and fruit quality during 2021 ripening season. All girdling treatments improved fruit quality parameters, such as fruit weight, size, total soluble solids (TSS) and red coloration. Among all treatments, the G2 treatment improved fruit size and TSS the most. The skin color, L*, a* and b*, was the highest in the control, G1 and G3 treatments, respectively. In conclusion, we found that girdling treatments improved the quality of harvested fruits and that 4 weeks after full bloom was the optimal girdling time for low-chill early ripening peach ‘KU-PP2’.