

Early diagnosis of parthenocarpic seedlings within one year after pollination with grapefruit (*Citrus paradisi* Macf.)

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Abstract	<p>Long juvenile phase is one of the major obstacles for breeding of seedless citrus with parthenocarpy. Five high to low parthenocarpic and monoembryonic Citrus cultivars used as seed parents were crossed with moderately parthenocarpic 'Foster Pink' grapefruit (FPGF; <i>Citrus paradisi</i> Macf.) generating precocious-flowering nucellar seedlings. Perfect flowers of precocious-flowering hybrid seedlings derived from the crosses were emasculated to prevent pollination and bagged. Those that showed ovary growth beyond 14 days after anthesis (DAA) were determined to be parthenocarpic. Segregation rates of the parthenocarpic to non-parthenocarpic hybrid seedlings were 8:41 for 'Akune No.6' pummelo x FPGF, 8:26 for 'Hirado Suntan' pummelo x FPGF, 9:22 for 'Iyokan' tangor x FPGF, 109:135 for 'Kawachi-bankan' x FPGF, and 13:10 for 'Kiyomi' tangor x FPGF. Considering that about 20.0% of precocious-flowering nucellar seedlings of grapefruit did not set parthenocarpic fruits, it is suggested that the parthenocarpy in these hybrid seedlings of grapefruit are controlled by three dominant complementary genes, P-1, P-2 and P-3. Eleven of 14 adult 'Hirado Suntan' S-1 seedlings and 6 of 13 adult 'Banpeiyu' S-1 seedlings showed parthenocarpic fruit set and growth, supporting that the three dominant complementary genes control autonomous parthenocarpy in Citrus. When a precocious-flowering seedling in which the parthenocarpic growth of the fruit had been observed for more than one month after anthesis were top-worked on the adult satsuma trees, the grafted seedling produced seedless fruits of the same size as seeded fruits on the same trees seven years after the grafting. Based on this result, we selected the high degree of parthenocarpic hybrid seedlings in which the growth of fruits is seen for more than one month after precocious flowering in each of the five crosses. It could be said that this method with precocious flowering is useful for the other crosses generating precocious-flowering seedlings to select high degree of parthenocarpic hybrid seedlings within one year after pollination in Citrus.</p>
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