

Abstract

In a three-year (1991-1993) study using mature "Empire"/M.26 apple trees (*Malus domestica* Borkh.), application of 100 or 200 mg/litre benzyladenine ((BA) RBG-3062: 21 g a.i./litre) as dilute sprays 16, 22 or 25 days after full bloom (DAFB) consistently and reliably reduced fruit set, and there was no difference between 100 and 200 mg/litre BA in their thinning capability. In a two-year trial (1993-1994) on the timing of application and concentration, 100 or 200 mg/litre BA (ABG-3062) applied at 2, 4, 9, 11, 13, 15, 17, 20, 25, 27, 29 or 31 DAFB (1993) reduced fruit set between 15-25 DAFB, but overthinned between 25-29 DAFB (king fruitlet diameter ≤ 9 mm) and did not thin between 2-13 DAFB. In 1994, 50 or 100 mg/litre BA as ABG-3062 or Accel (20 g BA a.i./litre; 2 g GA₃ a.i./litre) was applied at 2, 7, 15, 18 or 30 DAFB. BA either as ABG-3062 or Accel at 100 mg/litre reduced fruit set between 15-30 DAFB (king fruitlet diameter 6-20 mm), but neither 50 mg/litre of BA as ABG-3062 nor Accel thinned adequately. BA-treated fruitlets exhibited higher ethylene production, 24 hours and 7 days after spraying compared to untreated controls. The response of apple fruitlets to BA applied as a thinner suggests that thinning is mediated by ethylene. Associated with BA-induced crop load reduction was an increase in trunk cross-sectional area growth, return bloom, and total shoot growth and shoot number. However, BA reduced significantly greater in weight, diameter, length, and firmness but fruit L/D ratio, seed number, colour, soluble solids content ethylene production, respiration, and time of onset and magnitude of the respiratory climacteric were unaffected. Despite the larger size of BA-treated fruit than the control, they had no negative postharvest fruit quality attributes and had reduced physiological disorders after long-term storage in air, low oxygen and controlled atmosphere at 0°C and 90-95% RH. These results suggest that BA has the potential to substitute for the use of carbaryl, naphthaleneacetic acid, and naphthalene-acetamide as a thinner of apples in Ontario orchards.