

Abstract:

Regulation of tuber size in the seed and processing potato systems (where either a high number of small tubers or a small number of large/uniform tubers per plant is desirable) has been undertaken by a combination of modification of the seed tuber storage atmosphere and various planting densities in the field. Seed tubers of the two processing cultivars, 'Russet Burbank' and 'Shepody', were stored at 4 °C, 80-85% humidity, 4 L per minute air exchange rate, either under ethylene supplement ($4 \text{ ml}\cdot\text{L}^{-1}$ applied continuously, beginning in either November or February) or 1-methylcyclopropene (AgroFresh™ - MCP, applied as a gas, for 48 h, only once in early December). In-row spacing for 'Russet Burbank' was 40 cm (processing) and 30 cm (seed); for 'Shepody' 30 and 20 cm, respectively. Compared to the untreated controls, ethylene treatments released apical dominance. More and longer stems and stolons were produced in growth room and field trials in both cultivars. In the growth room trials, 'Russet Burbank' had a mean of 4 stems per plant, with 9.3 stolons, each approx. 5 cm long in ethylene treatments, vs 1.3 stems with 3.6 (3.3 cm long) stolons in controls. A significantly higher number of stems and better yield of uniform tubers was also obtained from the ethylene-treated seed tubers. Average Time to Emergence (ATE) in both cultivars was 2-3 days shorter in plants from the ethylene treatments than from the control, irrespective of in-row spacing. Compared to the untreated control, the MCP treatment reduced number and length of stolons in 'Shepody' but not in 'Russet Burbank'. Total yield in both cultivars was the highest from the seed stored in ethylene treatments. Independent of cultivar, seed tubers exposed to MCP or Ethylene + MCP during storage tended to produce larger and more uniform tubers in the field.