NUCLEAR SEED POTATO PRODUCTION IN WISCONSIN

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Certified seed production begins with the production of minitubers from disease-free tissue-culture stocks in greenhouses. Production of tissue culture propagules like plantlets and microtubers is labor intensive, so efficient utilization of this material in the greenhouse is an important goal in the greenhouse. The research I will be reporting on is part of an ongoing set of studies I have pursued to define the best combination of cultural practices for efficient minituber production at the State Farm.

Back in 1992, I initiated some experiments measuring the responses of potato plants to applications of hormones, as well as daylength and fertilizer manipulations. During the first two years of these experiments, I noticed that Snowden plants in my experiments out yielded nearby non-experimental plants of the same variety to a significant degree. The theory that I developed was that productivity per unit of greenhouse floor space might be improved by the staking or trellising plants and perhaps spacing them further apart to improve individual plant productivity. Results in 1994 confirmed that pot spacing and size could be manipulated to produce nearly as much nuclear planting stock from 8 plants as we typically are producing with 18 plants in our standard configuration. I sought to broaden the application of this "fewer-plant" approach in 1995 by repeating the previous year’s work with Snowden and initiating studies with Atlantic.

In 1995 plantlets of both Snowden and Atlantic were grown in 2-gallon pots (standard pot size in WSPCP program) and in larger (approx. 5 gallon) "squat pots" (same depth as the 2-gallon pots) with and without plant support. Horticultural trellis netting was used to support plants as they grew. Within each trellised or non-trellised block, pot size and spacing was varied to provide combinations of plant densities from low (2 plants/10 ft²) to high (18 plants/10 ft²). Again with Snowden, it was possible to produce more yield and nearly as many planting units of minitubers with 6 to 8 5-gallon pots set out shoulder-to-shoulder as it was with 18 2-gallon pots growing shoulder-to-shoulder (our standard practice). Results with Atlantic were even more pronounced. Slightly more greenhouse space may be required to produce equivalent planting units of these two varieties in trellised large pots, but significant cost savings with the big-pot approach are obvious since you are able to plant the greenhouses with many fewer plants in many fewer pots.

In 1996, the first russet variety, Goldrush, was entered into my trellising and pot size studies. In addition to these variables, half of the 4 blocks in the experiment were planted from plantlets whereas the other half were planted with microtubers. Results from this experiment appear to indicate that this variety will respond to these variables quite comparably to Snowden and Atlantic. Pots planted with microtubers consistently yielded lower than pots planted with plantlets.

We are optimistic that the use of singly planted 5-gallon pots in our nuclear plot will significantly reduce the labor and tissue-culture lab requirements. In essence, we probably will be able to produce the same amount of minituber planting material in the future with half as many plants as we have used in the past. If a simple and practical method of trellising can be devised, we may be able to simultaneously boost productivity per plant and per pot an additional 30 to 50 percent.