Atlantic, Superior and Russet Burbank potatoes were planted April 17 at the Hancock Agricultural Research Station to evaluate the effect of chemical and cultural treatments on seedpiece decay, emergence, stand, and yield. All seedpieces were cut mechanically with most treatments cut the day of planting. Russet Burbank and Russet Norkotah treatments which had been cut before being placed in storage in the fall of 1995 were planted on May 1. To apply chemical seedpiece treatments, seedpieces (40 lb - Dark Red Norland and Russet Burbank, 45 lb - Atlantic, and 44 lb - Superior) were placed in plastic bags with the chemical and shaken until seedpieces were uniformly coated. For some treatments, to simulate rough treatment at various stages in the seed handling process, the bag containing seedpieces was dropped 10 times from a height of 3 feet onto a concrete floor. Bruised seedpieces were planted immediately after bruising. To inoculate seedpieces, cut seed was placed in a large plastic bag and inoculum was sprayed over the seedpieces (10⁷ colony forming units per ml of Erwinia carotovora pvar. atroseptica applied at 70 ml/10 lb of seedpieces). The bags were rolled back and forth during the spray application to assure uniform coverage. The Trichoderma in-furrow treatment was applied by sprinkling a measured amount of the treatment into the furrow as those treatment rows were planted. Seedpieces were planted with an assist-feed planter approximately 3 inches deep. Conditions on April 17 were: Air temperature 64°F, soil temperature 45°F at the depth of seedpiece placement, seedpiece temperature 62°F and relative humidity 62%. Skies were clear throughout the time of planting and the soil was wet. Conditions on May 2 were: Air temperature 52°F, soil temperature 51°F at the depth of seedpiece placement, seedpiece temperature 45°F and relative humidity 70%. Cloud cover was about 20% with high clouds and the soil was moderately moist.

The experiment was designed as a randomized complete block with four replications. Each plot consisted of 50 feet of row (one 50-foot row for treatments planted April 17; 2 25-foot rows for those planted May 2) with seedpieces planted 12 inches apart in the row and treatment rows were spaced three feet apart. Soil type was a Plainfield sand with pH 6.3. Fertilizer consisted of 200 lb/A of 0-0-60 (broadcast as a preplant application), 600 lb/A of 5-10-30 (applied in the row at planting), and sidedress applications of 33.5-0-0 on May 30 (225 lb/A) and June 13 (375 lb/A). Insects were controlled with Admire (16 oz/A) incorporated in the fertilizer at planting and with foliar sprays of Azinphos-M50 WSB (1.5 lb/A, July 5) and Asana XL (7.7 fl. oz/A) + Pyronyl (4 fl. oz/A), July 19). Lorox DF (1.0 lb/A, May 20) was applied for weed control. Fungicides were applied on a standard schedule for early and late blight control (Bravo Zn, 1.5 pt/A - July 12, July 19; 2.13 pt/A - August 2, 9, 16, 23, 28 and September 4; Tattoo C, 2.3 pt/A, July 26). Vines were killed with applications of Diquat, 1 pt/A, plus Peptoil, 1.0 pt/A (Atlantic, Dark Red Norland and Superior on August 12 and August 19; Russet Burbank and Russet Norkotah on August 30).

Rainfall measured during the growing season (inches) was 1.1 (April 25-30); 1.5 - May; 6.0 - June; 3.9 - July; 1.5 - August; and 0.1 (September 1-16). An additional 11.6 inches of water was applied as overhead sprinkler irrigation in 23 applications (May 24 - August 31).

A sample of seedpieces from each treatment was evaluated for seedpiece decay in the laboratory in Madison, WI. Forty seedpieces (4 replicates consisting of 10 seedpieces each) from each treatment were placed in a chamber with continuous mist at 70°F and 100% RH. The mist kept seedpiece surfaces wet throughout the incubation period. Plastic canopies protected the seedpieces from dripping water and contamination from other samples. Severity of decay was rated after 96 hours.

Emergence was counted for each plot six times between May 28 and June 20. On June 20-21, the height of each plant in every plot was measured. Then, 10 plants from each plot were hand harvested and number of stems per plant, Rhizoctonia severity, incidence of black leg symptoms and extent of seedpiece decay were recorded. Seedpieces from plants which were dug and evaluated were removed and discarded. Total fresh weight of all leaves and stems, and weight of daughter tubers was recorded for the sample of plants dug from each plot. Plant height was expressed in two different ways: height per plant is the sum of all plant heights measured, divided by the actual number of plants which emerged; height per hill is the sum of heights measured, divided by 50, the number of hills planted. Height per hill thus represents a measure of general vigor of all plants in a plot, since this value would be very low if few plants emerged. A forty-foot section of row in each plot was mechanically
harvested (Atlantic, Dark Red Norland and Superior on August 27; Russet Norkotah on September 16; Russet Burbank on September 30) and graded into US#1, undersize, and cull categories. Specific gravity was measured on a sample of tubers from each plot. US#1 tubers from all plots were sorted using an optical size grader into six categories: <4 oz., 4-6 oz., 6-10 oz., 10-13 oz., 13-16 oz., and >16 oz.

Soil was moderately moist at planting. Rainfall on the three days after planting (totaling 1.5 inches) and several extended wet periods in May and June contributed to relatively high levels of seedpiece decay observed.

Inoculation of freshly cut Atlantic seedpieces with *Erwinia carotovora* pvar. *atroseptica* significantly reduced emergence, stems per hill, fresh weight of leaves and stems, plant height and yield, and increased seedpiece decay in the field. Plots planted with seedpieces receiving no treatment or treatment with Captan fungicide had the greatest percent emergence. None of the treatments had a significant effect on the amount of seedpiece decay in the mist chamber, the percentage of plants with black leg, black leg severity or infection by Rhizoctonia. Yields were similar in plots treated with Captan, Mancozeb/Trichoderma or receiving no chemical treatment.

Inoculation of freshly cut Dark Red Norland potatoes with *Erwinia carotovora* pvar. *atroseptica* severely reduced plant emergence, fresh weight of leaves and stems, weight of daughter tubers, height per hill and yield. Inoculation also significantly increased the severity of seedpiece decay in the mist chamber, but had no effect in the field where all seedpieces of all treatments were severely decayed at the time of evaluation. Emergence and yields were similar in plots where seedpieces were treated with Captan fungicide and where seedpieces received no treatment. Significant effects of treatment were not observed on specific gravity and only minimal effects were observed on the size grades of tubers.

Inoculation of freshly cut Superior potatoes with *Erwinia carotovora* pvar. *atroseptica* reduced final emergence, but emergence was similar in plots planted with untreated seedpieces or seedpieces treated with Captan. Yields were highest in plots with untreated seedpieces and seedpiece treatment had no effect on specific gravity and minimal effect on size grades of the US#1 tubers.

Inoculation of freshly cut Superior potatoes with *Erwinia carotovora* pvar. *atroseptica* reduced final emergence, but emergence was similar in plots planted with untreated seedpieces or seedpieces treated with Captan. Yields were highest in plots with untreated seedpieces and seedpiece treatment had no effect on specific gravity and minimal effect on size grades of the US#1 tubers.

Emergence was similar in plots planted with seedpieces treated with a wide range of chemical protectants or left untreated. Emergence, fresh weight of leaves and stems, weight of daughter tubers and average height per hill were all reduced by inoculation with *Erwinia carotovora* pvar. *atroseptica*. Seedpiece decay in the mist chamber and in the field was lowest in plots where the freshly cut seedpieces received no treatment and highest on the inoculated seedpieces. Treatments did not affect the severity or incidence of blackleg, but the incidence of Rhizoctonia stem canker was highest in plots receiving treatment with Trichoderma. Total yields in most plots exceeded 500 cwt/acre. Inoculation with *Erwinia* only slightly reduce total yield but yields of US#1 tubers were lowest and yields of cull potatoes were highest in these plots. Treatment did not affect the specific gravity.

Fall cutting appeared to reduce the amount of decay in the field and the number of stems per plant, although since the fall-cut and spring cut treatments were derived from two distinct seed lots it is difficult to make comparisons. Average height per plant, yields and specific gravity were significantly lower when either fall-cut treatment was compared with the untreated fresh cut plots (or most of the other fresh cut treatments). Storage temperature of fall-cut Russet Norkotah seedpieces had no significant effect on emergence, decay, blackleg, Rhizoctonia, number of stems, fresh weight of leaves and stems, plant height or yield. The effect of fall cutting cannot be evaluated as there was no fresh cut Russet Norkotah material in this trial.
1996 Soil Temperature and Rainfall - Hancock, WI

Shaded gray band represents minimum-maximum range each day