SHOUSE, DONALD L.[1], DON W. MORISHITA[1]*, J. DANIEL HENNINGSEN[1], ROBYN C. WALTON[2] and MICHAEL P. QUINN[3], [1]University of Idaho, Twin Falls R&E Center, P.O. Box 1827, Twin Falls, ID 83303, [2]Seminis Seed Company, 21120 Hwy 30, Filer, ID 83328 and [3]Oregon State University, Crop and Soil Science, 109 Crop Science Building, Corvallis, OR 97331. **Volunteer potato density interference in sugar beet**.

ABSTRACT

Sugar beet often follows potato in southern Idaho and eastern Oregon crop rotations. Depending on post-harvest environmental conditions and management practices, volunteer potato can be a serious problem in sugar beet production. Volunteer potato can serve as potential initial inoculum sources for late blight, potato virus yellows, and potato leaf roll virus diseases and can host aphids, nematodes, and Colorado potato beetle. Volunteer potato can be competitive, difficult to control, and can reduce rotational crop value and yield. In a survey conducted by George Newberry and Robert Thornton, at Washington State University, they found that volunteer potato tuber survival in spring to range from 320 to 41,283 tubers/A, with an average of nearly 10,000 tubers/A. They also found that 62% of the surviving tubers were found from the soil surface to six inches deep. In the same studies, they found that soil temperatures must drop to 28 F (-2.2 C) in order to kill potato tubers. A study was conducted to determine the competitive effect of volunteer potato in sugar beet.

Field experiments were conducted in 2005 and 2006 at the University of Idaho Research and Extension Center near Kimberly. The experimental design was an addition series density study with treatments arranged in a randomized complete block design with four replications. Individual plots were four rows wide by 30 ft. Row spacing was 22 inches. Sugar beet was planted May 2, 2005, and May 1, 2006 at 57,000 seed/A. Whole potato tubers averaging 3 ounces in size were planted within each row on May 5 and 7, 2005 and 2006, respectively. The tubers were planted at seven densities: 2,723, 4,084, 5,445, 6,806, 8,168, 10,890, and 16,335 tubers/A in addition to a potato-free control. Weed control was maintained with three applications of ethofumesate & phenmedipham & desmedipham plus triflusulfuron at 0.25 + 0.0156 lb ai/A. The applications were made at the sugar beet cotyledon, 2 leaf and 4 leaf growth stages. Herbicides were applied in a broadcast spray using a CO_2-pressurized bicycle-wheel plot sprayer equipped with 8001 flat fan nozzles at 15 gpa. Hand weeding was used to control other weeds not controlled by the herbicides. Potato tubers were harvested from 8 representative plants in the two center rows of each plot on September 28 and 23, 2005 and 2006, respectively. Harvested tubers were sorted by weight and counted. Sugar beet was harvested from the two center rows in each plot on October 5 and 10, 2005 and 2006, respectively. Sugar beet quality was determined by collecting representative root samples from each plot and submitting them to the Amalgamated Sugar Company's tare laboratory.

Sugar beet root yield response fit a linear model with an $R^2 = 0.72$. With no volunteer potato interference, sugar beet root and extractable sucrose yield averaged 33 and 4.3 ton/A, respectively. At the lowest potato density, sugar beet root yield was reduced 25% in 2005 and 21% in 2006 and at the highest density; root yield was reduced 61% in 2005 and 58% in 2006. Similar to root yield extractable recoverable sucrose yield also fit a linear model with an $R^2 = 0.74$. Volunteer potato tuber production also fit a linear model with an $R^2 = 0.79$. At the highest potato density, tuber production was greater than 100,000 tubers/A. This study clearly shows the competitiveness of volunteer potato in sugar beet.