ONION (*Allium cepa* 'Tamara')
Onion stunting; *Rhizoctonia solani*,

Dipak Sharma-Poudyal, Oregon Department of Agriculture, Salem, OR, 97301; Jordan E. Eggers, Oregon State University HAREC, Hermiston, OR 97838; Timothy C. Paulitz, USDA ARS, Pullman, WA 99164; Philip B. Hamm, Oregon State University HAREC, Hermiston, OR 97838; and Lindsey J. du Toit, Washington State University Mount Vernon NWREC, Mount Vernon, WA 98273.

**Effect of deep vs. shallow tillage on onion stunting and onion bulb yield, 2012.**

A field experiment was conducted at a site inoculated with *R. solani* AG 8 at the Oregon State University Hermiston Agricultural Research and Extension Center in Hermiston, OR to determine the effect of plowing (deep tillage) vs. rototilling (shallow tillage) on onion stunting caused by *R. solani* AG 8 and onion yield. Winter oat seeds (140 kg/ha) were mixed with *R. solani* AG-8 inoculum grown on sterilized oat grain (95 kg/ha), and the oat seed-inoculum mix planted on 7 Oct 11 with a grain drill. The winter oat crop was killed with a 3% Roundup spray just prior to plowing the field on 5 Mar 12. A moldboard plow was used to till the plots (20 to 25 cm deep) one week before planting onion seed, and all the plots (both deep and shallow tillage plots) were rototilled about 15 cm deep just prior to planting onion seed. The two treatments were replicated five times in a randomized complete block design. Individual plots were 2 m x 30 m. The onion cv. Tamara was seeded on 12 Mar 12. Onion seedling height was measured from 40 seedlings sampled randomly in each plot, and chlorophyll content was estimated with a Minolta SPAD-502 chlorophyll meter (Konica Minolta Business Solutions, Inc., Ramsey, NJ) for the second youngest leaf of each of five plants/plot. Onion bulbs (n = 25) were harvested from each of four randomly selected sites within each plot on 28 Aug 12, and graded, counted, and weighed by size category: colossal (>10.2 cm diameter), jumbo (7.6 to 10.2 cm), medium (5.7 to 7.6 cm), and prepack (<5.7 cm) bulbs. Analyses of variance were calculated using PROC GLM, and treatment means were compared using Fisher's protected least significant difference (LSD) in SAS Version 9.2 (SAS Institute, Cary, NC).

Onion seedlings were, on average, 10% taller in plowed plots than in rototilled plots. Colossal bulbs only developed in the plowed plots. Although the number and weight of jumbo and medium bulbs did not differ significantly between plowed and rototilled plots, plowed plots had a greater proportion of jumbo and medium bulbs than rototilled plots. Therefore, total bulb weight averaged about 10% more in the plowed plots than the rototilled plots. The deep plowing treatment may have buried *R. solani* AG 8 inoculum that developed on the winter oat cover crop residues, below the onion seedling rooting zone, resulting in no stunting of onion seedlings and, consequently, greater total onion bulb yield in the plowed plots compared to the rototilled plots. However, the effects of plowing on the pathogen were confounded with the potential effects of plowing on decomposition and nutrient release from the cereal cover crop residues.

| | | | Number of onion bulbs[x] | | | | Weight of onion bulbs (kg) | | | | Total bulb weight (kg)[w] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Treat-ment | Plant height (cm)[z] | Chloro-phyll content[y] | Colo-ssal | Jumbo | Medium | Pre-pack | Colo-ssal | Jumbo | Medi-um | Pre-pack | |
| Plow | 33.5 a[v] | 29.2 | 0.5 a | 19.2 | 6.6 | 0.8 | 0.26 a | 6.5 | 1.16 | 0.04 | 7.66 a |
| Rototill | 30.6 b | 28.1 | 0.0 b | 17.6 | 4.8 | 0.6 | 0.00 b | 5.7 | 0.83 | 0.03 | 6.96 b |
| LSD | 1.2 | NS | 0.4 | NS | NS | NS | 0.19 | NS | NS | NS | 0.63 |

[z] Seedling height measured at the 5 true-leaf growth stage.
[y] Chlorophyll content estimated with a Minolta SPAD-502 chlorophyll meter for five plants/plot.
[x] Number and weight of onion bulbs in each size category based on 25 onion bulbs harvested/plot.
[w] Total bulb weight = weight of colossal, jumbo, medium, and prepack onion bulbs. There were no culled bulbs.
[v] Within each column, treatments with the same letter did not differ significantly based on Fisher's protected least significant difference (LSD) at $P = 0.05$. NS = no significant difference between the two tillage treatments.