Rhizoctonia Seedling Blight of Onion Crops in the Columbia Basin

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Problem: Severely stunted patches of plants can develop in onion crops on sandy soils in the Columbia Basin after incorporating cover crops (**Fig. 1**). Patches occur primarily when planting soon after incorporating a cover crop. Patches can range from 2 feet to >30 feet in diameter (**Fig. 2**). Stunted onion plants have sparse, short roots with a 'spear-tipping' effect (**Fig. 3A**). Roots may be lightly discolored with more branching than normal. Symptoms have been associated with *Rhizoctonia*, particularly *R. solani* isolates of AG8 and AG4. Affected roots may have dark fungal visible microscopically (**Fig. 3B** and **3C**).

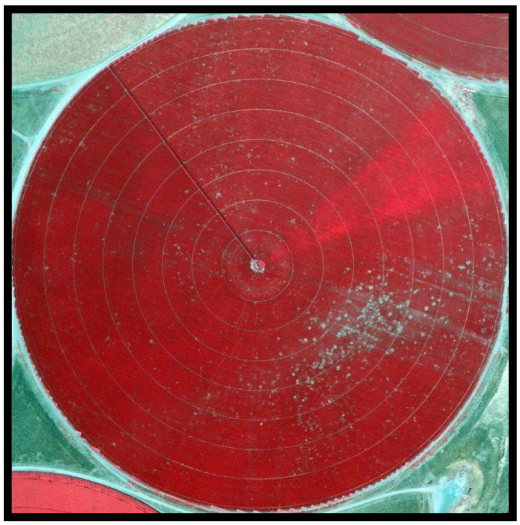

Fig. 1. Aerial, infra-red photo of an onion bulb crop with numerous patches of severely stunted plants.

Fig. 2. A patch of stunted plants in an onion bulb crop.

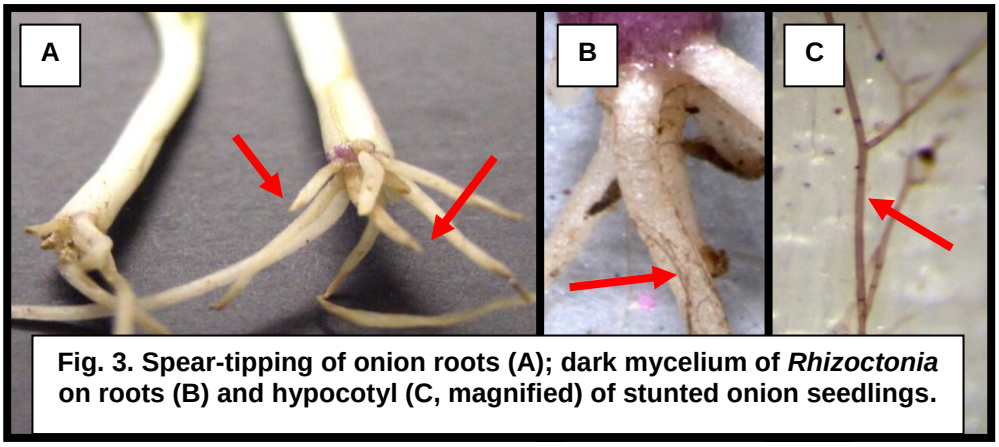

Fig. 3. Spear-tipping of onion roots (A); dark mycelium of *Rhizoctonia* on roots (B) and hypocotyl (C, magnified) of stunted onion seedlings.

The presence of significant **decomposing plant material from the previous crop is the main factor driving the disease**. Cover crops on sandy soils help reduce wind- and sand-blasting but favor *Rhizoctonia*, which rapidly colonizes dying roots of plants killed by herbicides or other means. This leads to a rapid increase in inoculum in soil, and the fungus then feeds on onion seedling roots. Research is in progress to assess fungicide treatments (seed and soil), fumigation, timing cover crop incorporation prior to planting onion crops (green bridge), tillage practices, and other practices for reducing losses to this

disease and improving our understanding of the pathogen. Select results from 2012 field trials are shown below.

Table 1. 2012 Green bridge trial: Incidence/severity of stunted onion plants when a winter wheat cover crop was sprayed with herbicide 3, 17, or 27 days prior to planting an onion bulb crop.

Timing of herbicide application (days prior to planting onion seed)[a]	No. of patches/ acre	Cumulative patch area (ft^2)	Stunted patch area (% of plot)	Severity of stunting (1 to 3 scale)	Severity index[b]
3 days	56.1 a[c]	885 a	2.1 a	1.6 a	1,572 a
17 days	38.2 b	476 b	1.2 b	1.4 b	733 b
27 days	25.1 c	406 b	1.0 b	1.3 b	650 b

[a] RCB design with 6 replications. Each plot: 12 beds x the diameter of a 125 acre, center-pivot irrigated field.
[b] Severity index = (severity rating) x (area of patch), summed for all patches in a plot.
[c] Numbers in a column with the same letter are not significantly different ($P = 0.05$).

Spraying herbicide 17 to 27 days vs. 3 days prior to planting onion seed significantly reduced the number of stunted patches (46 to 54%), area of stunted plants (43 to 50%), severity of stunting (13 to 19%), and severity index of stunting (53 to 59%) on 18 June 2012. Two weeks later, when the canopy was closing, these effects were still evident. The least stunting was observed in plots sprayed 27 days before planting.

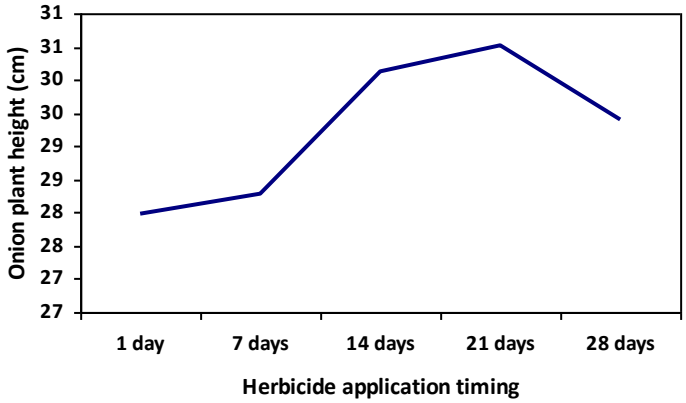

Fig. 2. Small-scale green bridge trial. Effect of timing spring herbicide application to a winter wheat cover crop on height of onion plants in a research trial at the Oregon State University HAREC. Herbicide was applied to the cover crop 1, 7, 14, 21, and 28 days before planting onion seed (cv. Tamara). Plant height was measured at the 6 to 7 true-leaf stage. Results corroborated those of the large-scale field trial (Table 1).

Table 2. Evaluation of a banded, pre-plant incorporated application of Quadris and Fontelis one day prior to planting onion seed, for management of stunting caused by *Rhizoctonia* spp.

Fungicide (banded, pre-plant incorporated)[a]	No. of patches/acre	Cumulative patch area (ft^2)	Stunted patch area (% of plot)	Severity of stunting (1 - 3 scale)	Severity index[b]
Non-treated control	73.1 a	1,205 a	2.3 a	1.7 a	2,193 a
Fontelis (24 oz/acre)	73.6 a	1,193 ab	2.3 a	1.6 ab	1,981 a
Quadris (19 oz/acre)	55.3 b[(P=0.078)]	809 b	1.6 b	1.4 b	1,219 b

[d] Numbers within a column followed by the same letter are not significantly different at $P = 0.05$ or the probability level indicated in superscript parentheses. Disease ratings were done on 5 June 2012 (later ratings not shown).

The Quadris treatment resulted in significantly fewer stunted patches (24% less), less area of stunting (33%), less severe stunting (18%), and a reduced stunting index (44%). In contrast, the Fontelis treatment did not reduce incidence or severity ratings significantly (with similar results 2 weeks later). Similar efficacy of Quadris against this disease was observed in a large-scale, 2011 field trial.

Support: Funding - WA State Commission on Pesticide Registration (2010), Pacific Northwest Vegetable Assoc. (2010-11), and WSDA Specialty Crop Block Grant (2011-2013). In-kind support: Grower-cooperators, and seed and chemical companies.

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