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

Dipak Sharma-Poudyal, Oregon Department of Agriculture, Salem, OR 97301; Timothy C. Paulitz, USDA ARS, Pullman, WA 99164; Robert G. Linderman, Plant Health LLC, Corvallis, OR 97330; and Lindsey J. du Toit; Washington State University Mount Vernon NWREC, Mount Vernon, WA 98273.

Effect of arbuscular mycorrhizal fungi on onion growth and onion stunting caused by *Rhizoctonia solani*, 2013.

A preliminary study was conducted in a greenhouse (15 ± 1ºC, with supplemental lights for 12 h/day) to determine the role of AMF on onion growth and for reducing the severity of onion stunting, using a commercial AMF inoculant, BioTerra Plus, that contains 104 propagules/g (ppg) of *Glomus intraradices* and 9 ppg of each of *G. mosseae, G. aggregatum, G. clarum, G. etunicatum, G. claroidium,* and *Gigaspora albida* (Plant Health LLC, Corvallis, OR). Four soil treatments were compared: BioTerraPlus, *R. solani* AG 8, BioTerraPlus + *R. solani* AG 8, and non-inoculated control soil. Pasteurized soil with a low P concentration (29 ppm) was used in plastic cone-tainers (4 cm x 21 cm, Steuwe & Sons, Corvallis, OR). A two cm thick layer (16 g) of BioTerra Plus was placed on top of 110 g of soil (13 cm deep) in each replicate cone-tainer for the AMF treatment. Sterilized oat grains colonized with *R. solani* AG 8 were ground just prior to inoculation, and mixed into pasteurized soil (1% w/w for a total soil weight of 130 g = 15 cm deep in the cone-tainer) for the *R. solani* AG 8 treatment. For co-inoculation of AMF and *R. solani* AG 8, the same amount of BioTerraPlus as in the first treatment was top-dressed above 110 g soil (13 cm deep) inoculated with *R. solani* AG 8 (1% w/w). The non-inoculated control soil consisted of 130 g pasteurized soil in each cone-tainer. The soil in each cone-tainer was moistened with 50 ml water just prior to seeding. Four seeds of the onion cv. Talon were planted in each cone-tainer, and covered with 0.5 cm of soil. Treatments were replicated five times and arranged in a completely randomized block design. Onion seedling height, root length, and root and shoot dry weights were measured 60 days after seeding. Analysis of variance and means comparisons were computed with JMP Version 11 Pro (SAS Institute Inc., Cary, NC).

Inoculation of soil with *R. solani* AG 8 reduced onion plant height by 56%, and onion shoot, root, and total dry weights by 73, 70, and 72%, respectively, compared to plants growing in non-inoculated control soil. Soil treated with BioTerra Plus had significantly taller onion plants (average 20.0 cm) compared to plants in non-inoculated soil (15.8 cm) and plants in soil inoculated with *R. solani* AG 8 (7.0 cm). However, BioTerra Plus alone did not affect onion root length or shoot, root, or total dry weights significantly compared to the control soil, and neither did co-inoculation of the soil with BioTerra Plus + *R. solani* AG 8. However, onion seedlings were 2.9 and 2.6 times taller in soil amended with BioTerraPlus alone and BioTerraPlus + *R. solani* AG 8, respectively, compared with plants growing in soil amended with *R. solani* AG 8 alone. Similarly, soil treated with BioTerraPlus only and BioTerraPlus + *R. solani* AG 8 produced seedlings 1.3 and 1.2 times taller, respectively, than plants in the control soil. Therefore, inoculation of soil with AMF increased onion height not only in the absence of the onion stunting pathogen, but also in the presence of this pathogen. Research is needed to assess the potential use of AMF for enhancing onion yield in growers' fields in the Columbia Basin of central Washington and north-central Oregon, particularly in fields with a high risk of onion stunting caused by *R. solani*.

Soil treatment	Plant height (cm)	Root length (cm)	Dry weight (g)		
			Shoot	Root	Total
BioTerra Plus	20.0 a*	21.6 a	0.086 a	0.0172 bc	0.1029 a
BioTerra Plus + *R. solani* AG 8	18.2 a	15.4 ab	0.105 a	0.0313 a	0.1361 a
R. solani AG 8	7.0 c	9.8 b	0.017 b	0.0086 c	0.0258 b
Non-inoculated control	15.8 b	14.8 ab	0.065 a	0.0283 ab	0.0930 a
LSD (P = 0.05)	2.0	7.1	0.043	0.0138	0.0555

* Numbers in a column with the same letter are not significantly different based on Fisher's protected least significant difference (LSD) at P = 0.05.