



First report of *Rhizoctonia solani* anastomosis group 5 (AG5) in wheat in the UK

J.W. Woodhall*, L. Laurenson and J.C. Peters

The Food and Environment Research Agency, Sand Hutton, York, YO41 1LZ

*E-mail: james.woodhall@fera.gsi.gov.uk

Received: 07 Jun 2012. Published: 15 Sep 2012. Keywords: *Triticum aestivum*, *Thanatephorus cucumeris*, real-time PCR

A sample of wheat (cv. Grafton) was taken from a field in Shropshire in May 2010. Brown lesions were present on two stems 5-15 mm from the stem base and also browning of the roots was observed. From the affected stems, pure *Rhizoctonia* cultures were obtained as previously described (Woodhall *et al.*, 2007) and these were identified as *Rhizoctonia solani* AG5 by the AG5 specific real-time PCR assay (Budge *et al.*, 2009). Isolate identity was confirmed by sequencing of the rDNA ITS region with primers ITS1 and ITS4. Sequencing was undertaken using an Applied Biosystems 3130xl Genetic Analyzer. The resulting sequence (GenBank Accession No. HE667746) was compared to other sequences and was 99% identical to other AG5 sequences in GenBank. Four 18-mm plugs of the isolate cultured on potato dextrose agar and were used to inoculate John Innes No. 3 compost into which wheat (cv. Einstein) was planted. After three weeks in a controlled environment room at 18°C and 50% relative humidity, brown lesions were observed on the stems. Re-isolation of the fungus from the wheat plant and confirmation of the resulting isolate as AG5 by real-time PCR satisfied Koch's postulates.

Soil samples (250 g) had been taken from the field in the previous year. DNA was extracted from soil using the method of Woodhall *et al.* (in press) and AG5 DNA was quantified using real-time PCR. In May 2009, no AG5 DNA was detected. At this time, a potato crop was being grown in the field. In October 2009, after wheat had been planted the month before, 456 pg DNA/g soil was detected. In May 2010, this had increased to 2084 pg DNA/g soil, indicating that levels of *R. solani* AG5 in the soil had increased with the presence of wheat and therefore suggesting some interaction between wheat and the fungus. Interestingly, in September 2011, *R. solani* AG5 was isolated from a decaying barley plant found in an adjacent field.

To the authors' knowledge, this is the first report of AG5 infecting wheat in the UK. AG5 has been reported on wheat previously. Demirci (1998) reported AG5 on wheat in Turkey and reported that it was pathogenic to wheat and barley. Gudmestad *et al.* (1989) reported that 56% of *R. solani* isolates from wheat in potato producing areas of North Dakota were AG5. *R. solani* is an important pathogen of many crops worldwide, including

cereals and potatoes. AG5 has been reported on potatoes in the UK previously (Woodhall *et al.*, 2007) and also on couch grass (Woodhall *et al.*, 2004). Further work is required to characterise the importance of *R. solani* AG5 in wheat. In this study, soil levels of AG5 appeared to increase when wheat was present. Therefore, planting potatoes after wheat may result in an increased risk of potato disease caused by *R. solani* AG5.

Acknowledgements

The authors acknowledge support from the AHDB (Potato Council), UK.

References

- Budge GE, Shaw MW, Colyer A, Pietravalle S, Boonham N, 2009. Molecular tools to investigate *Rhizoctonia solani* distribution in soil. *Plant Pathology* **58**, 1071–1080. [http://dx.doi.org/10.1111/j.1365-3059.2009.02139.x]
- Demirci E, 1998. *Rhizoctonia* species and anastomosis groups isolated from barley and wheat in Erzurum, Turkey. *Plant Pathology* **47**, 10–15. [http://dx.doi.org/10.1046/j.1365-3059.1998.00214.x]
- Gudmestad NC, Stack RW, Salas B, 1989. Colonization of potato by *Rhizoctonia solani* as affected by crop rotation. In: Vos J, van Loon CD, eds. *Effects of crop rotation on potato production in the temperate zones*. Dordrecht, Netherlands: Kluwer, 247-252.
- Woodhall JW, Lees AK, 2004. First report of *Rhizoctonia solani* anastomosis group 5 (AG5) on couch grass in Britain. *Plant Pathology* **53**, 538. [http://dx.doi.org/10.1111/j.1365-3059.2004.01041.x]
- Woodhall JW, Lees AK, Edwards SG, Jenkinson P, 2007. Characterization of *Rhizoctonia solani* from potato in Great Britain. *Plant Pathology* **56**, 286–295. [http://dx.doi.org/10.1111/j.1365-3059.2006.01545.x]
- Woodhall JW, Webb KM, Giltrap PM, Adams IP, Peters JC, Budge GE, Boonham N, 2012 (early view). A new large scale soil DNA extraction procedure and real-time PCR assay for the detection of *Sclerotium cepivorum* in soil. *European Journal of Plant Pathology*. [http://dx.doi.org/10.1007/s10658-012-0025-2]

To cite this report: Woodhall JW, Laurenson L, Peters JC, 2012. First report of *Rhizoctonia solani* anastomosis group 5 (AG5) in wheat in the UK. *New Disease Reports* **26**, 9. [http://dx.doi.org/10.5197/j.2044-0588.2012.026.009]

©2012 The Authors

This report was published on-line at www.ndrs.org.uk where high quality versions of the figures can be found.