Elephant hide and growth cracking on potato tubers caused by *Rhizoctonia solani* AG3-PT in South Africa

N. Muzhinji, Department of Microbiology and Plant Pathology, University of Pretoria, Pretoria 0002, South Africa and Tobacco Research Board, Zimbabwe; J.W. Woodhall, The Food and Environment Research Agency, Sand Hutton, York, Y041 1LZ, UK; M. Truter, Plant Protection Research Institute, Agricultural Research Council, Private Bag X134, Queenswood, 0121, South Africa; and J. E. van der Waals, Department of Microbiology and Plant Pathology, University of Pretoria, Pretoria 0002, South Africa

Rhizoctonia solani consists of 13 anastomosis groups (AGs) designated AG1 to 13. AG3-PT is considered the predominant AG in potatoes (4) and is associated with quantitative and qualitative yield losses. Qualitative losses are typically associated with the tuber blemish disease, black scurf. However, atypical tuber blemishes such as elephant hide consisting of corky lesions on the tuber surface (2) have also been attributed to *Rhizoctonia*. Such atypical blemishes are not considered specific to *Rhizoctonia* making direct-cause effect estimates difficult (1). Koch's postulates for the elephant hide symptom and *R. solani* AG3-PT have not been completed. Recently growth cracking and scab lesions referred to as fissure scab were observed on potato tubers in South Africa and attributed to a new *Streptomyces* species (3). The appearance of these lesions and cracking were similar to elephant hide symptoms attributed to *R. solani* AG3-PT. Therefore the cause of the elephant hide symptom in South Africa was investigated further.

Symptoms of elephant hide and cracking have been observed on tubers from the Eastern Free State, KwaZulu-Natal, Limpopo, Mpumalanga, North-Eastern Cape, Northern Cape, North

West, Sandveld and Western Free State growing regions. In 2012, three samples of potato tubers (cv. BP1) displaying elephant hide and cracking were selected for analysis. These samples were collected from Clanwilliam in the Sandveld potato growing region in the Western Cape. Tubers were surface-sterilised with 1% NaOCl and sections of affected tissue were excised and plated onto potato dextrose agar (PDA). *Rhizoctonia*-like colonies were identified and after further sub-culturing on PDA, three representative isolates (Rh3, Rh4 and Rh6) of *R. solani* from each sample were obtained. For each isolate genomic DNA was extracted and the rDNA ITS region was sequenced using ITS1-F and ITS4 (2). The resulting sequences (KF234142, KF234143 and KF234144) were at least 98% identical to other AG3-PT sequences on GenBank (JX27814, KC157664).

To confirm Koch's postulates, pathogenicity tests were conducted with the three isolates. PDA plugs of each isolate were added to 10 g of barley grains which were incubated for 14 days until fully colonised. The barley grains were then used to inoculate disease-free mini-tubers (cv. BP1) in 5 l pots containing sand: clay: pine bark mixture (1:1:1). Potato plants inoculated with sterile barley grains served as controls. Plants were held for 120 days in a greenhouse at 22°C with light for 12 h a day. Incidence of the elephant hide symptom for isolates Rh3, Rh4 and Rh6 was 58%, 33% and 37.5% respectively. Growth cracking and black scurf were also observed with each isolate. *R. solani* AG3-PT was successfully re-isolated from symptomatic tubers thereby confirming Koch's postulates.

This is the first report of *R. solani* AG3-PT causing elephant hide in potato tubers in South Africa. Elephant hide caused by *R. solani* AG3-PT has been reported in tubers from France (2) and the UK (3) but Koch's postulates were not proven. In this study, Koch's postulates were proven for *R. solani* AG3-PT causing scab or elephant hide symptom and cracking in potato tubers. *R. solani* AG3-PT should thus be considered in addition to *Streptomyces* as a

cause of this symptom and control strategies aimed at decreasing tuber blemishes should consider *R. solani* AG3-PT.

References: (1) Banville, G. J.,et al. Rhizoctonia disease on potato. In B. Sneh et al, *Rhizoctonia* species. Taxonomy, molecular biology, ecology, pathology and disease control, pp. 321–330, 1996. (2) M. Fiers et al. Eur. J. Plant. Pathol. 128:353–371, 2010. (3) R. Gouws and A. McLeod. Plant Dis. 96: 1223, 2012. (4) J.W. Woodhall et al., Eur. J. Plant. Pathol. 136:273–280, 2013.