Acta Agriculturae Scandinavica, Section B — Soil & Plant Science

ISSN: 0906-4710 (Print) 1651-1913 (Online) Journal homepage: http://www.tandfonline.com/loi/sagb20

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**To cite this article:** Cherian Mathews, John B. O. Ogola, Wilhem Botha, Michael Magongwa & Pooran Gaur (2015): First report of root rot caused by Pythium spp. on chickpea in South Africa, Acta Agriculturae Scandinavica, Section B — Soil & Plant Science, DOI: 10.1080/09064710.2015.1101484

**To link to this article:** http://dx.doi.org/10.1080/09064710.2015.1101484

Published online: 22 Oct 2015.

ACTA AGRICULTURAE SCANDINAVICA, SECTION B – SOIL & PLANT SCIENCE, 2015
http://dx.doi.org/10.1080/09064710.2015.1101484

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SHORT COMMUNICATION

# First report of root rot caused by *Pythium* spp. on chickpea in South Africa

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**ABSTRACT**

Chickpea is a relatively new crop in the NE South Africa. High incidences of plant death were observed in an experiment that was established in 2012 in Mziniti, South Africa to assess the agronomic performance of 66 elite chickpea lines from International Crop Research Institute for Semi-Arid Tropics. Infected plants showed signs of root rot. Therefore this study aimed at investigating the cause of the root rot. Roots of infected plants were sampled and incubated at 25°C until colonies of the pathogen were observed. Colonies were sub-cultured with sterile soil extract and sterile leaf blades. Isolates were stored in sterile distilled water with leaf blades in screw capped 15 ml McCarthy bottles at 18°C. The pathogen was identified as *Pythium irregulare* based on morphological structures and species description. The isolates were inoculated on healthy potted chickpea plants and these showed root rot symptoms similar to field observation. The pathogen was re-isolated from the inoculated plants and cultured; they showed similar characteristics to the ones observed during the first isolation. This is the first report of *P. irregulare* incidence on chickpea in South Africa.

**ARTICLE HISTORY**
Received 5 May 2015
Accepted 25 September 2015

**KEYWORDS**
Agronomic performance; chickpea; *desi*; isolates; *kabuli*; *Pythium* spp.; root rot



## Introduction

Chickpea (*Cicer arietinum*) is an edible legume grown widely for its nutritious seed, which is rich in high quality protein, minerals, vitamins and dietary fibre. Globally, chickpea is the second most important pulse crop after common beans (*Phaseolus vulgaris* L.). It is cultivated in over 50 countries throughout the tropical, subtropical and temperate regions in South, West and East Asia, Australia, East and North Africa, North and South America and southern Europe (FAOSTAT 2014). Asia accounts for 89.2% of total area under chickpea globally and 84.5% of global chickpea production (FAOSTAT 2014). Ethiopia is the leading chickpea producer in Africa but there is little commercial chickpea production in South Africa despite the high and increasing domestic demand.

Efforts were initiated by the Mpumalanga Provincial Department of Agriculture, Rural Development and Land Administration (DARDLA) and the University of Venda to introduce the crop in dry environments of NE South Africa. Preliminary findings from the studies show the huge potential of chickpea in these dry environments (Madzivhandila et al. 2012; Thangwana & Ogola 2012).

A subsequent trial was established in June 2012 in Mzinti (25°40'60S; 31°43'60E and 284 m asl), South Africa to assess the agronomic performance of 66 (40 *desi* and 26 *kabuli* types) elite chickpea lines from the International Crop Research Institute for Semi-Arid Tropics (ICRISAT). There was a high incidence of plant death in all the experimental plots at seedling to pre-flowering stage in the Mzinti trial and the dead plants showed signs of root rot. Therefore we set out to investigate the possible causes of root rot that led to the death of the chickpea plants. The objective of this paper is to report on the findings of this investigation.

## Materials and methods

Chickpea plants showing symptoms of root rot were randomly sampled from each experimental plot. Roots of the sampled plants were washed with distilled water, blotted dry on paper towel and dissected into small pieces of approximately 1 cm length. Root pieces were placed in petri-dishes filled with solidified pimaricin-ampicillin-rifampicin-pentachloronitrobenzene agar (PARP) selective medium (Masago et al. 1977) and incubated at 25°C until colonies of the pathogen were observed. For identification purposes, agar plugs (5 mm in diameter) from colonies on plates were floated on sterile soil extract with wheat leaf blades in

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petri-dishes and incubated at 25°C. Colonies were sub-cultured in 9 cm diameter petri-dishes with sterile soil extract and sterile leaf blades. Isolates were stored in sterile distilled water with leaf blades in screw capped 15 ml McCarthy bottles at 18°C. *Pythium* species were identified based on morphological structures and species descriptions (Van der Plaats-Niterink 1981).

## Results and discussion

The isolates were identified as *Pythium irregulare*, a common root rot pathogen with a wide host range that belongs to the *P. irregulare* complex (Garzon et al. 2007). The isolates were subsequently inoculated on healthy potted chickpea plants in an environment different from where the diseased plants were grown. The inoculated plants showed root rot symptoms similar to field observation. The pathogen was re-isolated from the inoculated plants and grown in the PARP medium and the isolates showed similar characteristics to the ones observed during the first isolation. The chickpea lines evaluated appeared to have little resistance to the disease since incidences of root rot was observed in plants from all the plots but the damage appeared to be more severe (80–100%) in the *kabuli* types in line with previous studies (Kaiser & Hannan 1983). Incidences of root rot caused by *Pythium* species have been reported elsewhere (Westerlund et al. 1974; Kaiser & Hannan 1983). However, this is the first report of *P. irregulare* incidence on chickpea in South Africa.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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