Rotylenchulus reniformis (Linford & Oliveira, 1940)

Fig. 1 *Rotylenchulus reniformis* (a) Immature female (second-stage juvenile), (b) Male, (c) Young female with swelling body five days after infection, and (d) Mature female in kidney shape with eggs. The anterior portion of the body is imbedded in the root whereas the posterior portion is protruding from the root surface. Photos are not to scale. Photo credits: W. O' Neill (a & b), J. Cobon (c & d).

Common Name: Reniform nematode
Classification: K: Animalia, P: Nematoda, C: Secernentea, O:Tylenchida, SO:Tylenchoidea, F: Hoplolaimidae

The reniform nematode, *Rotylenchulus reniformis*, is a sedentary semi-endoparasitic nematode of plants with a worldwide distribution in the tropical and subtropical regions. Reniform nematodes are one of the most damaging nematode pests, capable of attacking a wide range of crop plants as well as many weed species. The effects of reniform infestation include stunting, chlorosis and yield reduction. In addition to direct damage, *R. reniformis* can increase seedling diseases and Fusarium wilt.

Symptoms: The lack of obvious root symptoms in plants infected with *R. reniformis* makes the identification of this parasite more difficult than that of some other parasitic nematodes e.g. root-knot nematode. Observation of the female on infected roots is the best diagnostic evidence of reniform nematode infection. Reniform nematodes tend to be more uniformly distributed over a field than most nematode species, hence a field may lack irregular or discrete areas of symptomatic plants. The first symptom of damage may be a suppression of yield, followed by slight to severe stunting and chlorosis.

Lifecycle: Eggs hatch one to two weeks after being laid. The first-juvenile stage molts within the egg, producing the second-stage juvenile (J2) that emerges from the egg (Fig. 1a). The life cycle of reniform nematodes is unique in that the nematode proceeds from the freshly hatched J2 stage through four molts to the immature female in the soil without feeding. The infective stage is reached one to two weeks after hatching. Once root penetration occurs, a further 7 to 9 days are required for females to reach maturity. The male, which remains outside of the root, can inseminate immature females. Sperms are stored and soon after female gonad maturation the eggs are fertilised. About 50 to 100 eggs are deposited into a gelatinous matrix which surrounds the female's body. Typically there is an equal number of females and males in a population although some populations of reniform nematode reproduce parthenogenetically. The life cycle is usually shorter than three weeks in cotton, but this is dependent on soil temperature. Reniform nematodes can survive at least two years in the absence of a host in dry soil through anhydrobiosis.

Host range: At least 314 plant species are host to *R. reniformis*. In Queensland, this nematode is widely distributed on a broad range of crops including tomato, bananas, sweet potato, pawpaw, pineapple, pigeon pea, mango, melon, pumpkin, zucchini and cotton. There have also been detections in the Northern Territory and Western Australia. Most species of broadleaf weeds are hosts of *R. reniformis*, while monocot weeds are non-hosts.

Key Diagnostic Features: *Rotylenchulus* species identification requires microscopic examination of adult females, males and juveniles. Immature females of *R. reniformis* have a vulva at 68-73% and a tail tapering to a narrow rounded terminus. Males are abundant, but with a weaker stylet than the immature female.

R. parvus is also widespread in Queensland on grasses and crops such as sugarcane, sorghum and corn. Immature females have a vulva at 60-66% with a conoid tail, ventrally arcuate, the terminus often with a short ventral projection. Males are extremely rare.

Management and control: A range of management strategies are available for controlling reniform nematodes, such as rotations using resistant crops, cultural practices, host resistance and nematicides. Crop rotation with a non-host plant is a cost effective means of managing nematodes if the alternative crops fit your farming system. Any cultural practice which reduces nematode densities is beneficial. Conventional tillage systems that bury nematodes deep in the soil enable the tap root to grow longer before nematodes can reach and infect the root tips. A bare fallow for the entire growing season is an effective strategy for reducing nematode population density. Host plant resistance (if available) is one of the most effective ways to limit yield losses due to nematodes and can provide control across an entire field. Use of nematicides is costly and may be feasible only for high value crops**.** Weeds can act as reservoir hosts of reniform, hence keeping farms clean helps in keeping the nematode population levels low.

Further Reading:

Siddiqi, M. R. (1972) *Rotylenchulus reniformis. CIH Descriptions of Plant-parasitic Nematodes Set 1, No. 5.*
Robinson et al (1997), Rotylenchulus species: Identification, distribution, host ranges, and crop plant resistance. Nematropica 27, 127-180,
Koon-Hui Wang University of Florida Featured Creatures, Reniform Nematode http://entnemdept.ufl.edu/creatures/nematode/r_reniformis.htm

Acknowledgement:
The authors would like to acknowledge the support of the Cotton Research and Development Corporation and Horticulture Australia Limited.

Key contacts:
Linda Smith, Queensland Department of Agriculture, Fisheries and Forestry, Ph: 07 32554356 linda.smith@daff.qld.gov.au;
Jennifer Cobon, Queensland Department of Agriculture, Fisheries and Forestry, Ph: 07 3255 4342 jennifer.cobon@daff.qld.gov.au;
Wayne O'Neill, Queensland Department of Agriculture, Fisheries and Forestry, Ph: 07 3255 4351 wayne.o'neill@daff.qld.gov.au