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SCIENTIFIC NOTE

First report of matricidal hatching in *Meloidogyne hapla*

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HIGHLIGHTS

- The phenomenon of matricidal hatching was observed in *Meloidogyne hapla*.
- Out of 974 females examined, only 14 showed this phenomenon.
- Eggs at different stages of development, including first-stage juveniles within the egg and second-stage juveniles (J2) were observed inside of the female body cavity.

ABSTRACT: Matricidal hatching occur when embryogenesis and egg hatching take place within the nematode uterus. This phenomenon is known to occur within entomopathogenic and free-living nematodes, but it is very uncommon among plant-parasitic nematodes. Matricidal hatching was observed in a population of *Meloidogyne hapla*, originally collected in Connecticut, USA and reared on tomato 'Rutgers' maintained at 24 °C for 60 days in a growth room. Out of 974 females examined, only 14 (1.4%) showed this phenomenon. Second-stage juveniles (J2) were clearly observed inside of the female body cavity. The highest numbers of J2 and eggs observed per female were 57 and 350, respectively. However, the average number of J2 per female was 13, whereas the average number of eggs per female was 90. These findings suggest that this phenomenon is not common in the population of *M. hapla* used in this study. To the best of our knowledge this is the first report of matricidal hatching in *M. hapla*.

Keywords: endotokia matricida, intrauterine development, root-knot nematode.

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INTRODUCTION

Matricidal hatching occur when embryogenesis and egg hatching take place within the nematode uterus. The term was proposed by Seurat in 1914^[1] to define intra-uterine hatching that cause destruction of the female by juveniles. However, reports of this phenomenon are scarce for plant-parasitic nematodes. The first descriptions of matricidal hatching in the genus *Meloidogyne* were reported in two unknown species by Atkinson, 1889 and Nagakura, 1930^[1], and later in *M. javanica*^[2] and *M. incognita*^[3]. Here, we present the first report of this phenomenon in *M. hapla*.

MATERIAL AND METHODS

Tomato plants, 'Rutgers' were inoculated (5,000 eggs/plant) with an isolate of *Meloidogyne hapla*, originally isolated from strawberry roots from Fairfield County CT and maintained in greenhouse culture and field plots at the Connecticut Agri. Exp. Sta., Windsor, Connecticut, USA. The isolate was shipped to the University of Florida and grown on tomatoes that were maintained at 24 °C for 60 days



in a growth room. At harvest, root systems were washed, cut into 2-5 cm long pieces and subjected to digestion in 100 mL of Crystalzyme (Valley Research, South Bend, IN) enzyme solution diluted 1:5 with tap water for 4 h at room temperature or overnight at 4 °C^[4]. Softened roots were placed in a sieve (600 µm-pore-opening) nested in a sieve with 150 µm openings and sprayed with a heavy stream of tap water^[5]. Nematodes and root debris were collected in a beaker. Nematode females were hand-picked with the use of a dissecting microscope, crushed individually under a cover glass on a glass slide, and examined with a light microscope (Olympus, BH2). The number of females showing the phenomenon of matricidal hatching, the number of second-stage juvenile and eggs per female was recorded.

RESULTS AND DISCUSSION

Out of 974 females examined, only 14 showed the phenomenon of matricidal hatching (1.4%). Eggs at different stages of development were observed in the female reproductive system. First-stage juveniles were visible within eggs in the uterus and second-stage juveniles (J2) were observed inside of the pseudocoelomic cavity (Figure 1). The highest number of J2 and eggs observed per female showing matricidal hatching was 57 and 350, respectively. However, among all the females showing matricidal hatching, the average number of J2 per female was 13, whereas the average number of eggs per female was 90. These findings suggest that this phenomenon is not common in the population of *M. hapla* used in this study. It was also reported as hardly occurring in a populations of *M. javanica* in Brazil by Lordello, 1962^[2], who observed endotokia matricida (syn: matricidal hatching) only in one single female nematode. Similarly, four females of *M. incognita* collected in Costa Rica showed this phenomenon, each with 68, 27, 41, 39 second-stage juveniles per female and 9, 35, 23, and 29 eggs per female, second stage juveniles, and eggs, respectively^[3].



Figure 1. Female of *Meloidogyne hapla* showing several second-stage juveniles inside and outside of its body cavity.

CONCLUSIONS

Matricidal hatching is a rare phenomenon observed in plant-parasitic nematodes. Therefore, the registration of abnormalities is very important to expand knowledge about the biology of the nematodes and also to stimulate researchers to carry out in-depth studies for an understanding of the factors that lead to an occurrence of this phenomenon in root-knot nematodes.

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