Pakistan Journal of Nematology (2020) 38(1): 107-109 ISSN 0255-7576 (Print)
ISSN 2313-1942 (Online)
www.pjn.com.pk
http://dx.doi.org/10.18681/pjn.v38.i01.p107-109

Effect of some temperature changes on the population density of some plant parasitic nematode species

M. M. A Youssef and W. M. A. El-Nagdi†

Plant Pathology Department,
Nematology Laboratory, National Research Centre, Dokki, Cairo, Egypt

†Corresponding author: wafaaelnagdi@yahoo.com

Plant parasitic nematode are known to be sensitive to some climatic changes such as temperature, and most stages of nematodes may be killed when exposed to temperatures above 40°C (Santmayer,1955). Hence, during the study, the effect of temperature changes during a year representing the all four seasons (autumn, spring, summer and winter) on the numerical fluctuations in the population density of some parasitic nematodes on plants viz., date palm and olive in both soil and roots was investigated. These nematodes were negatively correlated with the prevailing average soil temperature during four seasons (autumn= 20°C; spring= 22°C; summer= 27°C and winter= 14°C).

The numerical fluctuations in plant parasitic nematode population densities naturally found in clay loam soil and roots at a depth of 60-cm from the soil surface and at a distance of 1m from trunk of date palm of Zaghloul cultivar (Youssef & Eissa, 1994) were studied. Seasonal fluctuation in population density of the reniform nematode, *Rotylenchulus reniformis* in soil and roots were negatively correlated with the prevailing soil temperature and were positively correlated with percentage soil moisture at different sampling months and seasons. Spiral nematode, *Helicotylenchus* population was found in soil because its most species act as ectoparasites in soil, feeding on the outer layers of roots. Its numbers reached the peak in July and September which directly and positively correlated with the medium soil temperatures (28 and 24°C, respectively) and the lowest numbers were observed in March as the soil temperature was relatively moderate (20°C). This degree seemed to be relatively moderate at this period on the basis that soil temperature is higher than air temperature. The population of root-knot nematode, *Meloidogyne incognita*, fluctuated without a significant increase throughout the study year. This may be due to difficulty for nematode penetration into the roots of older trees (30years-old) and could not reach most feeder roots of date palm which were far from the region of existing nematodes. Also, *Meloidogyne* spp. can survive well in sandy or loamy soil as compared in clay soil (Youssef & Lashein, 2013). The other nematode genera associated with date palm viz., *Criconemoides*, *Hoplolaimus*, *Rotylenchulus*, *Pratylenchus*, *Trichodorus* and *Tylenchorhynchus*, varied in population densities during the study and there was no clear correlation with soil temperature. This may be due to their small numbers, as date palm may be considered a poor host for these nematodes. Similar observations were also reported by earlier researchers (Montesser *et al*., 2015; Youssef & Eissa, 1994).

Generally, number of nematodes in the soil in this study was correlated in an inverse relationship with the degree of prevailing soil

Published by Pakistan Society of Nematologists
Received:22 Jan, 2020
Accepted:16May, 2020

temperature in date palm cvs. Barhi and Hayani as shown in Table 1. On date palm cv. Barhi, there were negative correlations (r= -0.43) between the number of reniform nematode, *R .reniformis* and prevailing soil temperature during different months and (r = -0.30) during seasons. As for *Helicotylenchus* sp., this nematode recorded higher negative correlations (-0.63) and -0.27 during different months and seasons, respectively. However, on the cultivar Hayani, *R. reniformis* recorded a low negative correlation (r =-0.10) between its population and prevailing soil temperature among different months and the correlation coefficient was (r = -0.20) among different seasons. Also, number of *Helicotylenchus* recorded a low negative correlation (0.10 and 0.11) between its population and prevailing soil temperature among different months and different seasons, respectively (Table 1) as earlier reported by Lashein & Youssef (2013a).

On olive cv. Toffahi, the reniform nematode, *R. reniformis* and *Helicotylenchus* increased in summer and spring and in winter, and declined in autumn where *R. reniformis* inversely correlated with the prevailing temperature (r= -0.29) among different months. But correlation coefficient was higher (-0.40) for different seasons. As for *Helicotylenchus* reflected lower correlation coefficient (-0.01) among different months but recorded a positive correlation (0.53) for different seasons (Table 2) as earlier reported by Lashein &Youssef (2013b).

Table 1. Correlation coefficient (r) between two associated nematodes with date palm cvs. Barhi and Hayani during different months and seasons along a year and prevailing soil temperature (14-27°C).

Period	*Rotylenchulus reniformis*	*Helicotylenchus* sp.
	Correlation coefficient (r)	Correlation coefficient (r)
Barhi		
Months	-0.43	-0.63
Seasons	-0.30	-0.27
Hayani		
Months	-0.10	-0.10
Seasons	-0.20	-0.11

Table 2. Correlation coefficient (r) between the two associated nematodes with olive cv. Toffahi among different months and seasons in relation to soil temperature (14-27°C).

Period	*Rotylenchulus reniformis*	*Helicotylenchus* sp.
	Correlation coefficient	Correlation coefficient
Months	-0.29	-0.01
Seasons	-0.40	-0.53

References

Lashein, A. M. S. & Youssef, M. M. A. (2013a). Seasonal dynamics of phytonematodes associated with date palm cvs. Barhi and Hyani as affected by soil temperature and moisture. *Archives of Phytopathology and Plant Protection*, 46, 937-941.https://doi.org/10.1080/03235408.2012.755358

Lashein, A. M. S. & Youssef, M. M. A. (2013b). Seasonal dynamics of phytonematodes associated with olive cv. Toffahi as affected by soil temperature and moisture. *Pakistan Journal of Nematology*, 31, 85-88.

Montasser, S. A., Korayem, A. M., Youssef, M. M. A. & Mohamed, M. M. M. (2015). Vertical distribution of the root lesion nematode, *Pratylenchus zeae* infesting sugarcane in relation to soil type and growing season. *Scientia Agriculturae*, 10, 95-97.

Santmeyer, P. H. (1955). A comparison of the thermal death time of dissimilar species of nematodes, *Panagrellus redivivus* (Lin, 1967), Goodey, 1945 and *Meloidogyne incognita* var. acrita Citwood, 1949. *Proceedings of Helminthological Society of Washington*, 22, 22-25.

Youssef, M. M. A. & Eissa, M. F. M. (1994). Population dynamics of certain nematodes associated with date-palm in Egypt. *Afro-Asian Journal of Nematology*, 4, 68-72.

Youssef, M. M. A. & Lashein, A. M. S. (2013). Nematodes associated with some date palm cultivars in relation to soil type. *Archives of Phytopathology and Plant Protection*, 46, 273-277. https://doi.org/10.1080/03235408.2012.739018