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DIETARY COMPONENTS AFFECTING MORPHOMETRICS OF *TERATORHABDITIS ANDRASSYI* (NEMATODA: RHABDITIDA)

by
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Summary. *Teratorhabditis andrassyi* was reared on plain agar and on agar separately supplemented with maltose, vitamin E and cholesterol. The morphometrics of the nematodes from the four cultures were compared with those obtained from soil. Lip height and width, stoma length, corpus length, nerve ring position and basal bulb length remained more or less constant. However, significant variations in gonad length and width and the allometric ratio 'a' were observed in the nematodes reared on supplemented media.

Nematodes require certain compounds viz., amino acids, carbohydrates, vitamins and sterols in their diet to maintain them in culture in the laboratory (Vanfleteren, 1980). It has been shown that these compounds stimulate growth and reproduction in nematodes (Hansen *et al.*, 1971) and the omission of any of these results in significantly reduced growth and reproduction rates (Balasubramanian and Myers, 1971). Furthermore, Vanfleteren (1980) emphasized that malnutrition eventually induces morphological variations in the individuals. This paper describes the effect of maltose, vitamin E and cholesterol on the growth and morphometrics of *Teratorhabditis andrassyi* Tahseen *et* Jairajpuri, 1988.

Materials and methods

Adult nematodes extracted from soil were fixed and processed to glycerine for making permanent mounts. For experimentation a stock axenic culture of *T. andrassyi* was maintained in soypeptone agar. Fourth stage male and female juveniles were isolated from culture, washed in sterile water and inoculated into Petri dishes containing plant water agar (1.5%), agar + maltose (50 µg/ml), agar + vitamin E (5 æg/ml) or agar + cholesterol (50 µg/ml). The cultures were incubated for seven days at 25 ± 2 °C after which the nematodes were extracted in a Baermann funnel, fixed in formalin, dehydrated and mounted in anhydrous glycerine.

Results

Nematodes reared in water agar showed no variation in morphometric and allometric characters when compared to those from soil (Table I). Those cultured in supplemented media also showed no variation ($P > 0.05$) in lip width and height, stoma length, corpus length, basal bulb length, position of nerve ring and 'c' value as compared to those from soil.

Variation occured in other characteristics in the nematodes cultured on supplemented media (Ta-

TABLE I - *Effect of culture media on the morphometric and allometric characters of* Teratorhabditis andrassyi.

		Soil	Agar alone	Agar + maltose	Agar + vitamin E	Agar + Cholesterol
Lip width µm	♂	10.1 ± 0.6	10.1 ± 0.6	10.6 ± 0.8	11.6 ± 0.5	12 ± 0.3
	♀	10.9 ± 0.8	10.8 ± 0.9	10.8 ± 0.5	10.4 ± 0.4	12.6 ± 0.7
Lip height µm	♂	4.5 ± 0	4.5 ± 0	4.5 ± 0.01	4.5 ± 0.01	4.5 ± 0.01
	♀	4.5 ± 0.1	4.5 ± 0.1	4.5 ± 0.3	4.6 ± 0.1	4.5 ± 0.2
Stoma length µm	♂	25 ± 1.2	24.6 ± 0.7	25.2 ± 0.6	25.5 ± 1.1	25.5 ± 1.2
	♀	25.5 ± 0.7	25.6 ± 1.3	25.8 ± 0.9	27.3 ± 0.9	27.9 ± 1.3
Oesophagus length µm	♂	200 ± 9.8	199 ± 10.6	205.8 ± 13.9	217.8 ± 8*	205.5 ± 17.2
	♀	236 ± 13.9	234 ± 15.2	238 ± 10.6	239.6 ± 15.9	234.6 ± 18.4
Nerve ring position µm	♂	145 ± 6.1	144 ± 5.6	146.6 ± 9.3	144.4 ± 9.2	140 ± 8.9
	♀	170.4 ± 7.1	168 ± 8.5	164.4 ± 5.2	165.3 ± 7.2	167.2 ± 8.7
Body length (L) µm	♂	740 ± 40.6	735.6 ± 60	807.1 ± 52	898.1 ± 64.6*	851.3 ± 28*
	♀	910.4 ± 80	900 ± 60.9	948 ± 64.2	985.8 ± 49.3*	958.2 ± 98.9
Body width µm	♂	35.5 ± 2.4	40.8 ± 1.8	46.3 ± 3.1*	48.3 ± 3.0*	43.8 ± 1.0*
	♀	44.3 ± 1.6	43.8 ± 1.04	50.6 ± 4.3*	52.2 ± 2.6*	55.8 ± 12.4*
a	♂	23.5 ± 0.9	23.6 ± 0.6	22.4 ± 1.4	19.9 ± 0.4*	20.9 ± 0.4*
	♀	22.8 ± 2.9	23.1 ± 2.5	19.9 ± 0.9*	19.8 ± 1.0*	18.1 ± 2.2*
b	♂	3.6 ± 0.12	3.5 ± 0.2	4.3 ± 0.2	4.2 ± 0.2	4.3 ± 0.1
	♀	3.8 ± 0.3	3.7 ± 0.6	4.0 ± 0.2	4.1 ± 0.2	4.2 ± 0.4
c	♂	24.6 ± 1.2	24.5 ± 1.7	25.7 ± 1.2	24.3 ± 2.6	23.3 ± 0.8
	♀	35.6 ± 6.2	33.5 ± 3.2	34.3 ± 0.9	35.3 ± 2.0	34.1 ± 7.6
c'	♂	1.3 ± 0.1	1.3 ± 0.4	1.6 ± 0.3	1.3 ± 0.1	1.3 ± 0.2
	♀	1.7 ± 0.4	1.6 ± 0.5	1.5 ± 0.1	1.4 ± 0.2	1.4 ± 0.1
V or T %	♂	57.5 ± 3.3	60.5 ± 3.6	66.2 ± 3.5*	66.8 ± 2.2	67 ± 3.1*
	♀	94.3 ± 1.5	94.2 ± 0.5	93.5 ± 0.2	93.6 ± 1.1	93.6 ± 0.6
Tail length µm	♂	29 ± 2.3	30.5 ± 1.8	34.5 ± 1.1	37.2 ± 1.2*	36.5 ± 0.7*
	♀	26 ± 2.9	25.2 ± 3.1	24.6 ± 3.3	27.8 ± 1.2	26.3 ± 3.3
Anal body width µm	♂	19.1 ± 0.7	19.2 ± 1.2	20 ± 1.5	24.5 ± 1.1	25.9 ± 0.7
	♀	15.9 ± 1.3	14.6 ± 2.2	19.7 ± 1.4	19.8 ± 1.6	19.7 ± 2.0
Gonad width (germinal part) µm	♂	15.2 ± 2.3	15.6 ± 1.8	20 ± 3.6	23.9 ± 4.5*	22.4 ± 2.8
	♀	20.6 ± 1.2	20.3 ± 1.6	23.2 ± 2.4	29.3 ± 1.5*	28.6 ± 0.7*
Vagina depth µm	♂	22.3 ± 1.5	21.8 ± 2	28.1 ± 1.8*	28.3 ± 1.9*	27.9 ± 1.6*
G_1 length µm	♀	66.7 ± 5.1	66.9 ± 8.7	67.3 ± 10.4	78.6 ± 3.4*	75.5 ± 5.6
Spicules µm	♂	62.6 ± 2.0	62.7 ± 1.5	62.3 ± 2.5	62.4 ± 2.9	64 ± 6.0
Gubernaculum µm	♀	28.2 ± 2.2	28.9 ± 3.4	29.3 ± 3.1	30.2 ± 1.6	27.5 ± 3.5

* indicates values significantly different from those of a soil population.

ble I). Body length of both sexes was significantly increased ($P < 0.05$) in vitamin E supplemented media and males also increased in length ($P < 0.05$) in a cholesterol supplemented diet. Oesophageal length of females was unaltered in all the three growth supplemented media but that of males increased significantly when vitamin E was present. There was a substantial increase ($P < 0.05$) in vaginal depth in nematodes cultured on supplemented diet but the position of the vulva was more or less constant. A significant increase in the length of the germinal part of the ovary occurred only in females reared with vitamin E while males showed a significant increase in the germinal part of the testis in all the three supplemented media. The length of the tail significantly increased in males reared on media with vitamin E and cholesterol supplements. The body width of both males and females increased significantly in all supplemented media. Vitamin E and cholesterol significantly enhanced the anal body width of both the sexes while width of the germinal part of the gonad in both sexes was significantly increased in vitamin E supplemented medium; the cholesterol supplemented medium, however, only increased the width of ovaries ($P < 0.05$). The number of germ cells remained more or less constant in nematodes cultured in the supplemented media or in plain agar. The value 'a' declined significantly in nematodes reared on supplemented media. Males cultured in supplemented media showed a significant increase in 'T' value whereas females showed an increased 'G' value only in vitamin E supplemented media.

Discussion

The results show that maltose, vitamin E and cholesterol affected the growth of *T. andrassyi* to a significant extent. Hence considerable variability in morphometrics may be expected in different naturally occurring populations of the same species. Therefore, care should be taken in the diagnosis even if the populations of a species are obtained from different localities.

The morphometrics of *T. andrassyi* was least affected by maltose. The other two supplements, vitamin E and cholesterol, appeared specific in their effect. Vitamin E seemed to be associated with the growth of the reproductive tract, particularly the germinal zone. Zuckerman and Geist (1983) observed that vitamin E increased the life span of *Caenorhabditis elegans* but did not extend the length of the reproductive period, whereas in our experiments a significant increase in 'G' and 'T' values in females and males, respectively, indicates a positive role for vitamin E in relation to growth of the reproductive system. The fecundity of *C. elegans* was unaffected in nematodes cultured in vitamin E at the prereproductive period (Zuckerman and Geist, 1983). Also in our study the significant development of ovary/testis appears to be due to the enlargement of germinal cells and not to their proliferation. This contrasts with Mamiya's (1986) observations on *Bursaphelenchus xylophilus* where unsaturated fatty acids enhanced proliferation of germ cells. In *T. andrassyi* there was an increase in the size of oocytes and not in their numbers.

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