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ABUNDANCE OF PARASITIC NEMATODES OF *O. GRATISSIMUM* L. (SCENT LEAF) IN IHITTE/UBOMA, SOUTH EAST NIGERIA.

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Abstract: *Ocimum gratissimum* (Labiatae) plant referred to as 'Nchu- anwu' (insect- repeller) or 'Scent leaf" in South Eastern Nigeria, was collected from Ihitte/Uboma and assessed for nematode infection. This was due to some level of deformation on the leaves and the formation of galls in the roots of the plants examined in different parts of the Local Government Area. *Ocimum gratissimum*. is a plant highly valued in Nigeria due to its combination of nutritional, medicinal and ornamental importance to the humans and animals. Root and soil samples were collected from *O. gratissimum* plants that exhibited symptoms of nematode infection. Standard methods of plant nematode sampling, extraction and identification were used. Seven nematode genera, six of which were plant parasitic, were identified from the study. These include *Helicotylenchus* sp., *Heterodera* sp., *Meloidogyne* sp., *Pratylenchus* sp., *Tylenchus* sp., *Tylenchulus* sp. and *Rhabaditis* sp. A total of 12,670 nematodes were obtained from 120g of the ocimum roots and 50g of soil around the roots. From the secondary roots 7,220 (54.9%) nematodes were extracted whereas 4,000 (31.0%) was got from the primary roots and 1,450(11.4%) from the soil. The difference was statistically significant ($p < 0.05$). *Meloidogyne* sp. was the most populous (28.20%) nematode encountered, with a total number of 3,700. The prevalence of nematode infected *O. gratissimum* was 58.2% in Uboma and 41.8% in Ihitte. The association of parasitic nematodes with *O. gratissimum* in Ihitte/Uboma was found to have a conspicuously detrimental effects especially on the leaves which are predominantly the medicinal part of the plant.

Keywords: *Ocimum gratissimum*, Parasitic nematodes, Infection, Roots

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INTRODUCTION

Plant parasitic nematodes constitute a major problem to a wide range of plants^[1] and majority of the host plants are of high economic importance^[2]. Studies have shown that nematode infestation of the host plant causes inefficiency in the utilization of available moisture and nutrients in the soil, as well as a decrease in the photosynthetic rates of the leaves^[3-4]. Being subtle and insidious parasites, nematode are known to cause considerable plant yield loss undetected^[5]. Some genera of plant parasitic nematodes act as biological vectors and intermediate hosts to some other plant pathogens including soil-borne viruses, wilt and rot bacteria, transmitting them to host plants^[1,6]. Studies had demonstrated that plant nematodes attack different parts of the host plants including, the roots, leaves, fruits, seed and flower bud using a feeding structure called stylet^[7-8]. The extent of the damage may depend on the type of nematodes involved. Common symptoms such as galls (knot), lesions, excessive root branching chlorosis, open root system and leaf-spot are often associated with plant parasitic nematodes^[9,6].

Ocimum gratissimum (plate1) is popularly known in Nigeria and in some other countries of the world. In Nigeria it is referred to as 'scent leaf' with local names such as "Nchuanwu" (insect repeller) (Ibo); Efirin ajase or Efirinpo (Yorubas) and Aai doya to gida (Hausa). It is highly valued all round the world due to its rare qualities^[10-17].

Research on the health benefits of *O.gratissimum* has shown that extracts from the leaves can be used to treat epilepsy, high fever, different forms of diarrhea, wounds and in the management of baby's cords^[18] (Igadula et al 1980). In parts of West Africa, *O. gratissimum* is reportedly used in folk medicine as a febrifuge, anti-malaria and anti-convulsant^[19]. Diabetic patients find the mature fresh leaves very useful especially when taken in right proportion. The leaves of *O. gratissimum* contain essential oil (mainly monoterpenes and sesquiterpenes) of which the constituents have repellency, insecticidal and larvicidal activities^[20].

The plant is widely consumed in Nigeria as vegetable and also used as seasoning for a variety of dishes because of its aroma^[21]. In addition to other nutrients, research has shown that the leaves of *O.gratissimum* have high contents of vitamin C and fluoride^[12].

There have been reported cases of pests such as fusarial wilt, caterpillar and cut worms in association with *Ocimum species*^[22], but non cause as much damage as plant parasitic nematodes in Ihitte/ Uboma.

2. MATERIALS AND METHODS

The study site was Ihitte/Uboma, an amalgamated Local Government Area of Imo State with Ihitte to the south and Uboma to the north. The area covers a land mass of about 209 square

kilometers with population of over 200,000 people (Ihite/Uboma Information Manual). Twelve communities were selected from the study site, six of which are from each section of the Local Government Area.

2.1 Sample Collection:

The roots of *Ocimum.gratissimum* plant that appeared diseased were collected for examination. These were separated into primary and secondary roots, covered in black polythene bags and taken to the laboratory for nematode extraction.

2.2 Nematode Extraction and Identification

O. gratissimum root tissues from each of the communities were homogenized and 10graj soaked in water over- night. Filtration was done using a sieve (Muslin Cloth), which permits nematode escape into a receiving beaker. The filtrate was examined using 10x objective lens of a binoculars microscope for the presence of nematodes. Morphological features considered were stylet types and length, position of the vulva, spicules, oesophagus and tail region.

3. RESULTS

Six parasitic nematode genera were extracted from *O. gratissimum* plant in the study area. These include *Helicotylenchus* sp; *Heterodera* sp; *Meloidogyne* sp; *Pratylenchus* sp; *Tylenchus* sp; *Tylenchulus* sp. Twelve thousand, six hundred and seventy (12,670) nematodes were obtained from 120g of *O. gratissimum* plant tissues and 50g of soil. A total of three thousand seven hundred, (3,700) *Meloidogyne* spp were obtained. *Pratylenchus* sp was two thousand, six hundred and fifty(2,650), while the other nematodes are comparatively less in number (Table 4.1).

In the root hairs (secondary roots) more nematodes (N=7225; 56.9%) were got than the primary roots (N=4000; 31%) and soil (N=1450; 11.44%) put together (Table 2). This difference in nematode population in the various samples was statistically significant ($p < 0.05$).

Meloidogyne and *Heterodera* spp were also extracted in their numbers from soil around the roots of *O. gratissimum* as well as the free living nematode *Rhabditis* sp. (Table 1). *Tylenchulus* sp. and *Heterodera* sp selectively inhabited the secondary roots and were not found in the primary roots. The rate of infection by *Helicotylenchus* sp., *Meloidogyne* sp., and *Pratylenchus* sp. was comparatively higher in the primary roots than in the secondary roots (Table 2).

The population of the isolated nematodes varied from one community to the other. Okata community in the northern part of the study site had more nematodes in both plants and soil, while the infection was lowest (4.88%) in Amainyi community in the southern part of the study-

site (Table 4.3). In general, the *Ocimum gratissimum* plants sampled from communities in Uboma showed more nematode infection than those from Ihitte. The overall prevalence of plant nematode infection in *O. gratissimum* in Uboma was 59.59% while it was 41.85% in Ihitte (Table 3.).

4. DISCUSSION

Several nematode genera were obtained from little quantity of *O. gratissimum* root tissue in Ihitte/Uboma area. This indicates that the plant is host to a wide variety of parasitic nematodes^[5]. From records of previous studies, it was evident that plants so infested with nematodes suffer great reduction in the level of productivity and are predisposed to complex diseases interactions^[23,6,3].

Extraction of more nematodes from the secondary roots than primary roots was attributed to the tender and succulent nature of the tiny root hairs which paved way for the nematodes to penetrate and cause tissue damage^[6]. Persistent root tissue disruption of host plants result in their inability to obtain food and moisture from the soil, leading to a decrease of the relative water content of the leaves and subsequent interferences with their photosynthetic rates^[6,4].

The dominance of *Meloidogyne* sp. (root-knot nematode) in *O. gratissimum* plant over *Pratylenchus* sp. and the other isolated nematodes relates to its high reproductive potentials and parasitic capabilities^[23]. From records *Meloidogyne* sp. is capable of parthenogenetic reproduction, producing large numbers of eggs and infective larvae^[24-25]. In addition, they feed preferentially near the root tips of the host plants, while *Pratylenchus spp.* prefer the root tissues further back, but distal to the maturation area^[23] (Norton, 1989). Moreover, the female species of *Meloidogyne* is a sedentary endo-parasitic nematode with great reproductive ease, while *Pratylenchus* sp. is a migratory endo-parasitic nematode with relatively lower reproductive potential than *Meloidogyne* sp.^[1,2].

Parasitic nematodes are obviously detrimental to the productivity and well-being of host plants. The affected ones are less desirable, unfit for consumption and oftentimes die before maturity. Being an economically valuable plant, *O. gratissimum* should be protected from parasitic nematodes and other pests to maintain its nutrients.

Table 1. Number and type of nematodes obtained from *O.gratissimum* roots and surrounding soil

Communities.	Root and soil samples	<i>Helicotyl-enchus sp.</i>	<i>Heterodera sp.</i>	<i>Meliodo-gyne sp.</i>	<i>Praty-lenchus sp.</i>	<i>Rhadtis-sp.</i>	<i>Tylench-us sp.</i>	<i>Tylen-chulus sp.</i>	Total
Amainyi	Soil	5	-	5	10	50	-	-	70
	1 ^o root	30	20	70	50	-	-	5	175
	2 ^o root	90	40	100	100	-	30	10	370
Atonerim	Soil	5	-	10	5	100	-	-	120
	1 ^o root	80	20	100	70	-	-	10	510
	2 ^o root	100	50	150	110	-	80	20	410
Ekwereocha	Soil	3	-	30	10	70	-	-	113
	1 ^o root	30	35	90	90	-	-	5	250
	2 ^o root	90	80	140	140	-	70	20	540
Umuezegwu	Soil	4	-	20	5	100	-	-	129
	1 ^o root	90	25	100	80	-	-	10	305
	2 ^o root	80	60	110	150	-	90	30	520
Umuihi	Soil	4	-	20	10	100	-	-	134
	1 ^o root	25	30	110	50	-	-	20	235
	2 ^o root	100	65	100	140	-	150	10	365
Umunohu	Soil	2	-	15	10	900	-	-	117
	1 ^o root	50	25	90	100	-	-	5	270
	2 ^o root	100	79	180	130	-	80	40	600
Abueke	Soil	5	-	20	5	120	-	-	150
	1 ^o root	65	30	100	90	-	-	5	300
	2 ^o root	80	80	220	150	-	160	40	715
Awuchinumo	Soil	5	-	20	10	50	-	-	85
	1 ^o root	100	65	190	140	-	-	15	315
	2 ^o root	140	95	80	100	-	150	25	580
Ikerejere	Soil	4	-	50	10	80	-	-	144

Okata	1 ^o root	90	50	180	110	-	-	20	435
	2 ^o root	150	80	200	90	-	90	15	670
	Soil	6	-	30	10	110	-	-	156
Onichauboma	1 ^o root	80	70	170	120	-	-	5	450
	2 ^o root	90	100	180	140	-	150	60	730
	Soil	5	-	40	10	80	-	-	135
Uzinomi	1 ^o root	70	7	150	100	-	-	10	410
	2 ^o root	100	120	240	150	-	100	100	760
	Soil	2	-	40	5	50	-	-	97
Total	1 ^o root	90	60	150	5	-	-	20	375
	2 ^o root	100	50	200	100	-	150	50	660
	Soil	2070	1400	3700	2650	1000	1300	550	12,670

Key: 1^o root- primary root

2^o root- secondary root

Table 2. Distribution of the nematodes according to communities studied.

Ihite Section	<i>Helicotyl- enchus</i> sp. (%)	<i>Heterodera</i> sp.(%)	<i>Meloidogyne</i> sp. (%)	<i>Pratylenchus-</i> sp. (%)	<i>Rhabditis</i> sp. (%)	<i>Tylench- us</i> sp.(%)	<i>Tylenchu- lus</i> sp.	Total
Amainyi	125 (20.33)	60 (9.76)	175(28.46)	160(26.02)	50(8.13)	30(4.88)	15(2.44)	615
Atomerim	185 (20.33)	70 (7.69)	260 (28.57)	185 (20.33)	100 (10.99)	80 (10.99)	30 (3.30)	910
Ekwereocha	123 (13.62)	115 (12.74)	260(28.79)	240 (26.0)	70 (7.75)	70 (7.75)	25(2.77)	903
Umuezegwu	174 (18.25)	85 (8,91)	230 (24.11)	235 (24.63)	100 (10.48)	90 (9.43)	40(4.19)	954
Umuihi	129 (13.81)	95 (13.81)	230 (24.63)	200 (21.41)	100 (10.71)	150 (16.60)	30 (3.21)	934
Umunohu	152 (15.40)	95 (6.63)	28 (28.88)	240 (24.32)	90 (9.12)	80 (8.11)	45 (4.56)	987
Total	888	520	1,440	1,260	510	500	185	5,303
Uboma Section	<i>Helicotyl- enchus</i>	<i>Heterodera</i>	<i>Meloido-</i>	<i>Pratylenchus-</i>	<i>Rhabditis-</i>	<i>Tylench-</i>	<i>Tylenchu-</i>	Total

	sp(%)	Sp (%)	gyne sp	sp (%)	sp(%)	us sp	lus sp.	
Abueke	150 (12.88)	110 (9.44)	340 (29.18)	245 (21.03)	120 (10.30)	160 (13.73)	40(3.43)	1,165
Awuchinumo	245 (20.76)	160 (13.56)	290 (21.19)	250 (21.19)	50 (4.24)	150 (12.71)	35 (2.97)	1,180
Ikperejere	244 (19.54)	130 (10.41)	340 (34.45)	210 (16.81)	80 (6.41)	90 (7.21)	65 (5.21)	1,249
Okata	176 (13.17)	170 (127.2)	380 (28.44)	270 (20.21)	110 (8.23)	150 (11.23)	80(5.99)	1,336
Onichauboma	175 (13.41)	190 (14.56)	430 (32.95)	260(19.92)	80 (6.13)	100 (7.66)	70 (5.36)	1,305
Uzinomi	192 (16.96)	120 (10.60)	390 (34.45)	155 (13.69)	50 (4.42)	150 (13.25)	75 (6.63)	1,132
Total	1,182	880	2,260	1,390	490	880	365	7,367
Grand total	2,070 (16.34)	1,400 (11.05)	3,700 (29.20)	2,650 (29.91)	1,000 (7.89)	1,300 (10.29)	550 (4.34)	12,670

Table 3: Prevalence of plant parasitic nematodes of *O.gratissimum* in the different samples and communities.

Community	Primary root 1 ⁰ (%)	Secondary 2 ⁰ (%)	Soil sample (%)	Total (%)
Amainyi	175 (28.46)	370(60.16)	70 (11.38)	615 (4.85)
Atonerim	280 (30.77)	510 (56.04)	120 (13.19)	910 (7.18)
Ekwereocha	250 (27.69)	540 (59.80)	113 (12.5)	903 (7.13)
Umuezegwu	305 (31.97)	520 (54.51)	129 (13.52)	954 (7.51)
Umuihi	235 (25.16)	565 (69.49)	134 (13.52)	934 (7.37)
Umunohu	270 (27.36)	600 (60.79)	117 (11.85)	987 (7.79)
Abueke	300 (25.75)	715 (61.37)	150 (12.88)	1165 (9.19)
Awuchinumo	515 (43.64)	580 (49.15)	85 (7.20)	1180 (9.31)
Ikperejere	435 (34.83)	670 (53.64)	144 (11.53)	1249 (9.86)

Okata	450 (33.68)	730 (54.64)	156 (11.68)	1336 (10.54)
Onichauboma	410 (31.42)	760 (58.24)	135 (10.34)	1305 (10.30)
Uzinomi	375 (33.13)	660 (58.30)	97 (8.57)	1132 (8.93)
Total	4000 (31.0)	7220 (56.9)	1450 (12.10)	

CONCLUSION

Ocimum gratissimum is a plant to cherish, owing to its all-round economic values. The flowers are used for decorations in homes and offices. Oil from its leaves have properties which repel pests as well as kill disease agents such as bacteria, fungi and parasites^[20,26]. Communications from some long term consumers of the plant, as well as results of some experimental studies using various parts of the plant in different parts of the world, (where the plant is known) had confirmed its medicinal, nutritional and aesthetic benefits^[27,12,28,14]

The negative-effects of plant pests, especially parasitic nematodes in parts of Nigeria especially, in Ihitte/Uboma Local Government Area are alarming. This obviously requires the speedy implementation of effective preventive measures

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