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(REVIEW ARTICLE)

A brief review on biodiversity of s

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Abstract

Nematodes enhance soil conditions in four primary manners, they consume organisms that cause disease, produce minerals that plants can use, and they feed on all kinds of other soil organisms. Nematodes indicate greater modifications to climate-induced distress than numerous additional species, its suggests that nematode distribution and populations increase and remain comparatively elevated as one goes toward the onto acute environments. As a result of the assimilation of many other species, soil nematodes, which are primarily considered as relatively multidisciplinary in nature, display small numbers as well as predominantly negligible abundance in tropical lowland rain forests. Engage of nematodes can tends to occur be heard in hushed, fearful tones. A glance of tiny, microscopic worms can cause grief to even more powerful humans. Regretfully, like countless things in the world, the entire bushel was tainted by a several of "negative". Although they being only less than one percent of the overall nematode population density, only a fraction of them have attracted a huge amount of attention due to its harmful effects on crops. A large portion of individuals has advantages from the well-being of the ecosystem, agricultural sector, and especially the soil.

Keyword: Nematode; Consume; Population; Soil; Tiny; Distribution; Assimilation

1. Introduction

Nematodes, an important component of soil ecosystems, form a major consumer group because of their larger biomass, higher metabolic rate and diverse nature. K. Hota et al (1988) Nematodes, a type of worms having diversity ranging from soil to water and beyond, are often classified of as roundworms. As members of the biological division Nematoda, organisms exhibit a diversity of behaviour. Soil species ranges of nematodes can often be high, both at beneficial and individual soil-core boundaries Christien H. Ettema (1998).

Nematodes, an assortment of worms varying in diversity from soil to water and beyond, are generally referred to as roundworms. They demonstrate various types of lifestyles and are constituents of the phylum Nematoda. Nematodes contribute to soil health in many ways. Some of them are decomposers, and that disintegrate biological compounds such as dead plants and animals, which helps to recycle nutrients back into the soil. Some nematodes act as predators, ingesting fungi, bacteria, or even other nematodes to maintain a healthy balance of microbial communities.

They increase soil aeration, promote better water infiltration, and aid in nutrient cycling when digging and tunnelling. The encounter with soil nematodes has a profound impact on agricultural production and environmental balance, making them invisible architects of healthy soils.

Plant-parasitic nematodes also constitute the major organisms causing considerable losses in used to be raised plants worldwide. As well as causing ulcers on plant roots with some microbial research ailments, plant-parasitic nematodes also cause brown spots on roots with enlargement or decay of tubers at higher components within the plant. Plant

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infecting nematodes are considered one of the most dangerous plant diseases for a range of crops, including potatoes, soybeans, corn, vegetables, and sugar beets. Root-knot (Meloidogyne species), root-lesion (Pratylenchus species), and cyst (Heterodera species)

Overall, the ecological equilibrium and fertility of soil are determined by soil nematodes, and understanding their roles can help in maintaining healthy soils and sustainable agricultural practices.

2. Review of literature

P. K. Hota et al (1988) In this research multiple genera had been distinguished via samples taken during the study period. The most abundant food groups at both sites were plant feeders and they were more diverse in the upland areas than in the lower areas. Hirschmaniella mucronata was the major plant feeder recorded from every sample throughout the year at both locations. Other plant host species were occasionally found. Microbivores were much less abundant, and most were Acrobelloides species. Of the three species identified with diverse feeders (fungivores including nematodes of unknown trophism), 2 were found in the lowlands. One of the 3 identified predator species, Mylonchulus havanensis, was found in the uplands in addition to 2 species in the lowlands.

Dennis L. C. Procter (1990) Under this presumption it was demonstrated that the altitudation of vegetation closely matches the zonation according to latitude from the equator towards the poles, especially in the northern hemisphere. The principle that increasing altitude has the same effect on soil nematode organisms as increasing latitude does is a key element of Proctor's plan. Like latitudinal zonation, altitudinal zonation is mostly replaced in the current paradigm by the type and intensity of environmental stress in nematode population definition. There are different environmental pressures at higher altitudes and higher latitudes.

William M. Hominick et al (1996) Three major problems are covered in this paper. Molecular taxonomy is the first consideration to understand the biodiversity and biogeography of entomopathogenic nematodes. Second, an overview of information on their biogeography and habitat characteristics is provided, along with an assessment of the limitations of currently published data. Third, this study briefly discusses the Convention on Biological Diversity recognizing how it will affect regarding the future research on entomopathogenic nematodes and biological control

Brian Boag et al (1998) The results concluded that tropical rainforest, grassland, cultivated soil, temperate coniferous forest, polar vegetation and temperate broadleaf forest had the highest percentage of species richness (61.7 species per sample). The overall average species richness at the equatorial edge (i.e., 0±10°) was 80.6 species for each sample; Species richness was modest above 70° and most substantialbetween 30±40° latitudes (93.9 species per sample).

Liliane Ruess et al (1999) The biomass of microbial species C at the health site varied from 9.2 to 12.7 mg/gdw after six growing seasons of environmental disturbance; This was increased through temperature + fertilizer administration along with fertilization. Additionally, their significant main effect of fertilization (F=7.80, P= 0.014) Microbial C in the fellfield averaged 5.8 mg/g DW, it was almost 50% of that found in the heath. At this site, no therapeutic effect was observed. Antioxidant Ergo concentrations in the soil were found to range between 1.5 and 2.1 g/g DW in the fall field and between 11.9 and 38.9 g/g DW in the heath.

G.W. Yeates et al (1999) According to recent research, the relative abundance of nematodes that feed on fungi versus bacteria may be a sensitive predictor of changes in management. Environmental variations often reflect changes in nematode diversity as shown by Shannon–Wiener index (H0) values. The "maturity index" of nematodes can yield practical information about the trajectory of amendments in a given soil, and the probability that a certain amount or percentage of C-P will be present in groups 1 and 2 as a variable index. Benefits may exist. Triangles containing C-P can be used to show trends that follow perturbation encounters. Although they do not provide a universal designation, aesthetically indistinguishable groups (such as Criconematidae, Longidoridae, and Mononchoidea) may be helpful across regions or soil types.

Y. Guo et al (2001) The overall number and assortment of small animals over wide areas is the subject of this study, which determined a spectacular result: 168 possible species of nematodes corresponding to 79–95% of the range of meiofauna at different sampling sites. Two key elements of this data should be established so as reliability of interpretations made using could be assured first, it must be established to assure that the distribution patterns determined are consistent and not just sampling. is the product of bias; Second, it is necessary to establish that the observed patterns persist over time, i.e., temporal stability.

J.W. Potter et al (2002) Much of Canada's soil nematode biodiversity remains unexplored territory. In contrast, a dazzling array of more than 15,000 microscope slides has been installed, befitting the country's largest nematode taxonomy and systematics effort. The vast number of nematode specimens includes unusual types that originally appeared in Canada, as well as moderate and dangerous species. This collection does an admirable job of capturing the essential characteristics of horticultural hotspots, but is inadequate to effectively convey the diversity of regional crop areas such as the Prairies, reinforcing the need for more study.

Maria A. Tsiafou et al (2006) This study identifies and compares the diversity of trophic and generalist configurations, life strategies, and nematode demography in soils used for commercial and organic artichoke cultivation. 80% of the total nematode frequency under organic farming methods falls under the bacterivorous/fungivorous category. A whole collection of 58 genera (30 families) have been determined, of which 28 were plant-eaters, 8 fungivores, 8 predator, 2 omnivores and 12 bacterivores. Regarding all of the remaining species 24 were frequent in each case while the majority had an exceptionally small contribution to this purpose, making them uncommon. In most circumstances, nematodes with CP 2 coefficients were feeders of bacteria and fungi, although in most cases, nematodes with CP values 3 were consumers of plants.

Sara Sanchez-Moreno et al (2007) In 2005, 33 species were found and 35species, in 2006. The riparian corridor was the only environment in which a nematode taxon, a species of the Hoplolamidae family, became evident in 2005. The prevalence of 4 different nematode species fluctuated greatly according to environment. In 2006, nine species were identified within the same geographic range, while five nematodes displayed significant variations in occurrence between ecosystems.

Barbara Manachini (2008) 45 different taxa and 22 families of nematodes were found in samples obtained from rice fields. The commonly found and often dominating trophic group was Rhabditis (46.6%), which included the majority of bacteriovores (60.0%). The genera Rhabditis, Protorhabditis, Cephalobus, Pratylenchus, Helicotylenchus and Acrobelloides accounted at approximately 80% of entire nematodes collected. Phytophagous represented more than 20% of total nematodes in almost all regions, and Ditylenchus sp. was recorded. The predominant number of genera (23) was found in Novara, which also presented the highest number of phytophagous genera (8). The most abundant fungus eater (8%) was Aphelanchus.

Rishi Pal et al (2008) Entomopathogenic nematodes were found in nine of the 123 soil samples evaluated (7.3% of the total). Three samples (2.4%) at Dulhera, University Old Campus and Pullavapuram were positive for Heterorhabditids, and five samples (4.1%) at Horticulture Nursery and University Old Campus tested positive for Steinernematids. At the Crop Research Centre, a rhabditid nematode, Oschius sp. (Rhabditida: Rhabditidae), was identified in the samples (0.8%). No nematodes were found at two sampling locations, Lawar and Siwaya. Morphological characteristics of Heterorhabditis sp. PAL02 isolated from Pallavapuram can be compared with Heterorhabditis cf. Indica There are still delays in confirming the status assessment of this species.

V. V. S. Tomar et al (2009) A total of fifty-two nematode genera in eight orders and twenty-four families have been determined. The order Doryllamida was the most frequently found genera, while Rhabditida was the most common individuals. Abundance the entire nematode group fluctuated between 23 and 57%, with varying availability of Dorylames and Tylenchids per sample (20–53.8% and 0–46.7%, respectively). The genus Acrobales dominated the bacteriovore kingdom, while the herbivorous, omnivorous, fungivorous and predatory domains were monopolized by the Boladorus, Mesodoralemus, Ephelenchus and Aporcellamelus genera in that proportion. Among omnivores, fungivores, bacterivores, herbivores and predators, the least common species were Thornema, Exonchium, Lamaidorus, Hemicriconemoides and Pteratorhabditis, in that order.

Gen Chen et al (2009) In the Lanz-Hou region of China, the Yellow River is the cornerstone of soil nematode populations. The present investigation explored the response of the nematode community to various heavy metals (Cd, Pb, Cr, Cu, and Zn) and polycyclic aromatic hydrocarbons (PAHs) 5 sites from where the soil samples were taken (A–E), soil level of water content, biological matter content, total nitrogen content, C/N ratio, and pH varied dramatically ($p < 0.01$) across all sampling sites. Went. The total moisture content of the soil fluctuated from 10.33% to 19.30% on an average basis. In contrast to the other sites, soils from sites B and D had higher nitrogen content and higher organic matter content; Nevertheless, the C/N ratio was low. With a pH range of 7.70 to 7.96, the soil appears only barely alkaline.

M. Baniyamuddin et al (2010) A total of 85 species were identified, predators formed the largest group (32%). According to taxonomic grouping, 54% of the 85 genera found belonged to Dorylamidae. Twenty to thirty genera were found in most samples, with a minimum of eleven and a maximum of 26 genera reported per samples. The highest individual abundances were 600–1040 specimens per 100 cm3 of soil, with 600–800 specimens found in most cases.

Lori A. Biederman et al (2010) Among the 123 soil samples evaluated, nine (7.3% of the total) contained entomopathogenic nematodes. Heterorhabditids were found in three (2.4%) samples from Dulahera, University Old Campus and Pulavapuram, while Steinernematids were found in five (4.1%) samples from Horticulture Nursery and University Old Campus. One rhabditid nematode identified in samples (0.8%) being studied in the Crop Research Laboratory was Ossius sp. (Rhabditida: Rhabditidae). Although there were no nematode observed in the two locations chosen for sampling, Lawar and Siwaya. Comparable morphological characters appear between Heterorhabditis sp. PAL02, isolated from Pallavapuram, and Heterorhabditis cf. Indica. (2016) determining a status assessment for this species is still a process of waiting.

Q. Tahseen et al (2011) In Ramsar wetlands, Keoladeo National Park (KNP), India, and Yuan Ming Yuan Park (YMP), China – also considered an imperial park – nectapod assemblages and food web assessments were examined. A total of 82 and 79 nematode specific taxa had been identified in KNP and YMP, respectively. With the possible exception of a few representative sites in the KNP, which have been determined to be disrupted, the maturity index (MI) primarily reflects the stability of the ecosystem. According to the Structure Index (SI) and Enrichment Index (EI) indicator values, the substrate in the YMP displayed stability and was rich in minerals, in contrast to the substrate in the KNP that was predictable, orderly, and often depleted of resources.

V. V. Gantait et al (2011) The widespread presence of soil and the association of plant parasite nematode with banana (Musa paradisiaca L. cv. Kanthali) plantations during an animal research investigation conducted in 29 divisions of Paschim Medinipur district of West Bengal, India, between March 2004 and February 2006. 46 species were determined. Of the 46 species, 17 are in the order Tylenchida and 29 are in the order Dorylamida. They contained up to seventeen species of plant feeders, eight species of predators, three species of bacteria feeders and two species of hyphal feeders. Among banana growers in the Paschim Medinipur region of West Bengal, the current study shows that phytophagous nematodes dominate throughout other trophic range nematodes.

B. Kavitha et al (2012) The identification of nematode species included Rotylenchulus, Helicotylenchus, Pratylenchus and Hopolimus provided statistical information on their prevalence and population density. Destruction and validation of taxonomy of phytonematodes, which present in samples of soils from tomato crop in 2011-2012. The average values for Rotyllenchus, Pratylenchus, Helicotilenchus, and Hoplolaimus were 36.50±2.646, 31.75±1.708, and 20.2 5±.957, respectively. The total number of Helicotylenchus significantly exceeds the numbers associated with other nematodes, while the total amount of Hoplolymus has decreased.

M. Schratzberger et al (2013) The south-western North Sea contains 169 species of nematodes, among which 33 species revealed the two most prevalent combinations of biological traits. One reason for this inclination was the assignment of nematodes to only 19 partially associated functional groups. The differences in the two most species-rich trait assemblages – shared by 18 and 15 species, respectively – included low-abundance and dominant species with different taxonomic associations, and those distinctions reflected spatial structures in the organizational structure of the assemblage. Caused.

Daya Ram Bhusal et al (2014) The confines of these samples, it was detected 63 different nematode taxa in 30 families. The most common found families were Phyllenchus, Monhystera, Plectus and Aphelenchoides. In soil (SL), nematode assemblage abundance and genus abundance were highest, whereas in upper trunk moss (TU), their levels were fewest. The overall median level of biodiversity for each sample was 4.86 hierarchical groups (range 1–6), 9.96 taxa (range 2–18), 6.76 functional combinations (range 2–12), and 14.02 genus (range 2–28).

E. Tarasco et al (2014) Incidence and diversification of entomopathogenic nematodes (EPNs), including steinernematid and heterorhabdtid species, in nine Italian regions in 1990–2010. Around 2000 data points had been extracted from 580 localities, 133 developed EPN samples. Soon after the EPN distribution map was developed, 133 original EPN impacts of 12 species were discovered in Italy. The strains identified included 43 isolates of Heterorhabditis bacteriophora, 1 each of H. downesii and H. megidis, 51 Steinernema feltiae, 12 S. Affin, S. Four different strains of Crucaceae, S. 8 of Apulia, S. Contains 5 different strains each from Apulia, 'Intermedium group,' 3 isolates of Steinernema 'Isolate S.sp.MY7' of S. intermedium group,' and 1 compared to S. arenarium.

Marina Carrascosa et al (2014) A total of thirty-two nematode taxa had been identified, of which 23 were found in agricultural soils and 30 in pine forest soils. Most species are members of five important trophic groups. Among 32 nematode species, 6 are plant parasites or herbivores, 2 were omnivorous, 4 were fungivorous, and 15 were bacterivorous. 13 taxa (Mesorhabditis, Panagrolaimus, Acrobales, Acrobelloides, Eumonhystera, Prismatolaimus, Acromadora, Apelenchus, Tylencholemus, Dorylamidae, Tripyla, Trichodorus, and Tylenchidae) were observed to be

more abounding in pine as opposed to field soil in at least one treatment. Four taxa (Rhabditis, Cruznema, Plectus and Aphelenchoides) were more prevalent in pine forest soils than in field soils in the smallest treatments.

D. K. Kocher et al (2014) Soil samples for the current investigation have been collected in both summer and winter from four districts of Punjab, Ludhiana, Bathinda, Hoshiarpur and Ferozepur. Four different nematode trophic communities have been explored in this survey plant parasites, bacterivores, predators and fungivores. Fungivorous nematodes can be seen in sour soil extracted from Ludhiana surface area especially in winter No cases of such nematodes were identified in Bathinda, Hoshiarpur, or Ferozepur districts in summer or winter.

Shavish Vaid et al (2014) Rhabditida represented a significant percent-age of the 43 genera found in the DKG forests of Poonch, which include Dorylamida (20%), Mononchida (15%), Areolamida (14%), Tylenchida (7%), Monhysterida (5%). Anoplida (5%), having a huge variety of a decrease evidence was Rhabditida (51%), followed by Dorylamida (25%), Mononchida (9%), Ariolemida (7%), Tylenchida (4%), Monhysterida (2%) and Anoplidae (2%). Trophic divisions had been established to represent 43 species with the most significant number being bacterivores (48%) followed by plant parasites (11%) and omnivores (18%). Fungi-eating organisms were completely exterminated.

Ardhini Rin Maharning et al (2016) The soil in which A. The hypogea that were planted was healthier than the soil that lacked the plant, as it was rich in bacteria. In comparison with heterotrophic bacteria, S. Significantly higher numbers of autotrophic bacteria were observed in the soil of Lycopersicum (60%) and Amaranthus sp. (56%). Specific subtypes of heterotrophic bacteria include isolates-1, -3, -4, and -12, although isolate-10 includes normal autotrophic but heterobacteria. A new type of bacteria has been discovered in isolates 18 and 20, respectively, called A. Hypogaea and C. reticulata were identified in the soil. Amaranthus sp. The soil contained twice as many bacteria as the O. sativa soil.

Carmen Guti errez et al (2016) Through the study data it proved that approximately fifty-six taxa plant feeders (13), omnivores (7), predators (7), fungus feeders (6), and bacterial feeders (23). Only 16 distinguished taxa were found in the industrial and agricultural divisions, whereas the forest tract had the greatest overall frequency in terms of nematodes and biomass. The industrialized geographical area had the smallest proportional value of bacterial feeders (20.99%), and it was almost double the value reported in the agricultural sector (38.56%). It showed a significant correlation between industrially affected areas and the major bacterial feeder Acrobelloids (9.35%)

Krassimira Ilieva-Makulec et al (2016) It assessed that hypothesis during a three-year investigation, by analysing nematode richness taxonomic organization and structure of communities in soils of winter wheat crops during commercial and organic administration. Only in sandy soils and especially in the autumn season, the cumulative nematode population of the organic farm maintained much greater in terms of classic farming. On many sampling days, nematode genera diversity was higher in organic crops (ranging from 15 to 35 genera) than in conventional crops (ranging from 15 to 29 genera). In all types of agriculture, communities were dominated by the bacteria-consuming taxa Panagrolaimus, Rhabditis, Cephalobus and Acrobelloides.

Sara Sanchez-Moreno et al (2014) According to their evalution of biological variables in a specific location associated with soil-management methodologies, 48 and 33 nematode species had been identified in research areas 1 and 2, accordingly. Thirteen taxa in area 2 were bacterivores, five fungivores, eleven herbivores, three predators and one omnivore. In Region 1, seventeen taxa were classified as bacteria feeders, seventeen herbivores, two omnivores and seven predators.

Ab. Rashid Mir et al (2016) In this study samples of soils were collected from apple orchards in Bandipora, 37 nematode families had been discovered, with the largest number (46%) of these species comprising bacterivores. Out of the 37 species observed, the hierarchy Rhabditida represented the extensive taxonomic group (59), and in terms of richness, Rhabditida was similarly the most abundant group (59%). The prevailing group in terms of individual frequency was fungus feeders (64%). Each of the samples had been found to contain a baseline of four and a maximum of twenty-five genera, with the overwhelming majority part of the sample which includes twelve to eighteen genera. Each soil sample had 141–686 specimens observed in terms of individual abundances, with most collected being 200–300 specimens.

Vinita Sharma et al (2016) This investigation covers extensive descriptions of soil-free living, plant parasitic and predatory nematodes associated with Dorylamida Pierce, 1942 and Mononchida Jayarajpuri, 1969. This research was presented on Chir pine of Govind Wildlife Sanctuary (GWLS), Uttarkashi. Additionally, Dorylamidae currently contains 22 species identified in 12 genera and 5 families and Mononchidae contains 12 species in 4 genera and 3 families. Tjepkema is one of the Microdorylaemus thornii species. Among the pine nematodes used by the present investigation, 22 species of Dorylames and 12 species of Monochiids were identified.

Puneet Kumar et al (2017) The present investigation has revealed a surprising amount of diversity among soil-dwelling nematodes, with 58 species belonging to 11 genera and 39 families identified samples of soil obtained from high-altitude natural forests of Uttarakhand. Both particular density and general diversity, the order Dorylamida represents the best discovered taxonomic groups. Here, within the trophic group observed from high-altitude natural forests, bacterivores dominated in terms of both individual frequency and general diversity.

Shikha Ahalavat et al (2017) Here research samples of soil had been obtained from the field close to the river Yamuna in Faridabad, Haryana also indicated the actual identity of 22 household. The most prevalent order with respect to the number of genera was the order Rhabditida (38%), followed by Dorylamida (9%), Encolpia (6%), and Monhistrida (3%). In terms of trophic diversity, bacterivores (44%) were the most dominating group in terms of number of genera, However, the group Tylenchida (60%) had the largest number of individuals. The herbivorous group was the most widely fragmented group in terms of individuals (62%), followed by bacterivores (Acrobales) and herbivores (Meloidogyne, Apelenchus, Mesodorylemus and Mononocides), which were the most frequently occurring genera of all, including fungi, omnivores and predators, respectively.

Soumi Paul et al (2017) Among the diverse nematode feeding groups in soil, monochiids belonging to a higher trophic level and were termed. Approximately 140 monochid species mentioned from our peninsula in the past, more than thirty belong to the Iotonchidae family. As well as updating the state soil faunal series of Uttarakhand and the species diversity of plant-soil nematodes from India, it also performed a survey and reported fresh observations to be added to the national predatory nematode diversity list.

Christian Mulder et al (2017) During an ongoing monitoring research in the Netherlands, samples of soil were taken from 200 sites (4 soil types and 5 land-use types, yielding 9 combinations), and the functionally varied composition of nematode populations was determined. To further demonstrate the use of beneficial parameters as land use descriptors, an amalgamated index of overall body-mass distribution can be derived consisting of three function indices appropriate for single features (divergence, evenness and richness). Includes a widely used variety.

Gabriela Silva Moura et al (2017) In their research on diversity of nematodes they demonstrated that the several analyses operate as beneficial evidence regarding modifications in the environment and their positive impacts. According to their source of nourishment, nematodes can be divided into three trophic levels: fungivores, also called fungivores, bacterivores, and omnivores. Among these, 10% had been associated with harming plant. Many nematode species exhibit a tendency to serve as physiological indicators of soil quality.

Sefi Mekonen et al (2017) Given their significance to ecological events and important position in the soil food web, soil nematodes had been applied as a tool to evaluate ecological principles and gain knowledge about how organisms work in soil. It is uncertain what premises regarding biology, colonization, optimal foraging, and nematode niche partitioning. As a result, important checks on nematodes in agricultural and natural soils should be carried out by monitoring of the Environment and Rehabilitation Authority test ecological hypotheses Submit applications for the most effective seeking and specific division strategies for better ecological management integrate natural occurring modifications for encourage disease restriction Align the distribution of nutrients compared to plant requirements and are readily available and develop more effectively forecasting approaches for land-use selections.

C. Villenave et al (2018) Their initial collection of data shows that nematodes readily enter technosols created from recycled waste materials. A variety of communities were observed during assessment, although those communities fluctuate across time. Certainly, produced waste, especially manure, provides a vital source of essential nutrients for bacteria, thus becoming an increasingly component of the ecology. As a result, the dissolved substrate stimulates the system upward during the early growth phase. The bacteria essentially reverse and then the nematodes that attack the bacteria also take over.

Simone Cesarz et al (2018) Further data on the composition of nematode communities to capture functional changes as they occur due to environmental changes, as these outcomes suggest that nematode functional organizations were more accurate indicators of soil than nematode trophic groups. To demonstrate chemical processes in a similar trophic group, examine the following while the total number of sensitive fungal-feeders increased in both normal N and CO2, with the addition of N the overall amount of fungal infections grew. The impact of the release of CO2 have been more significant.

A.K. Keshari et al (2018) Twenty-three taxa of soil nematodes representing seven orders and twenty families had been detected in vegetable crops of Dhading area during the period of present study. Among the bacteriovores, the most dominant genus was Rhabditis, as fungivores, most prevalent was Aphelenchoides, for predators, Mononchus for omnivores, Dorylamus, and for herbivores, it was Helicotilenchus. In all twenty-three species were identified, the order

Tylenchida constituted 39% of the taxonomic range, followed by Rhabditida (31%), Mononchida (13%), Aphelenchida (9%), Areolamida (4%). and Dorylamida (4%).

Carmen Vazquez et al (2019) Twenty-six genera included 45 objective taxa that were found in at least 23 areas. Some dominant nematode species may interact with as many as 69 taxa in twenty different locations (gamma diversity), with a mean of 19 different taxa per site (alpha diversity). Psilenchus displayed a realized niche width of 0.524, whereas Heterocephalobus displayed a realized niche width of 0.689, as estimated using Jaccard's dissimilarity. The combination of realized niche breadth with herbivorous diet, c-p value, herbivorous community and the overall species density didn't generate either economically significant individuals.

Dandan Gao et al (2019) Evaluation of two-way ANOVA revealed that total nematode, bacteriophage, and fungal distributions were significantly affected by certain types of land use. Nematode and fungivorous abundance across the country was strongly influenced by seasons. Total populations of nematodes and fungi were larger in bare land, eucalyptus plantations and prehistoric forest adjacent to gardens during both seasons. These populations were also more important in secondary forests, eucalyptus plantations and gardens than in bare land. Compared to other land use classes, the total number of bacterivores in the prehistoric forest was higher; It was higher in secondary forest than in bare land, eucalyptus plantations and gardens.

A.A. Shah et al (2019) Twenty-five distinct nematode taxa were found in 25 soil samples obtained from the Pir Panjal Biodiversity Park, of which the most notable proportion (54.60%) were bacteriophages. The order Rhabditida comprised 34.28% of all phylogenetic classifications, with parasites (114.28%), fungivores (2.85%), omnivores (22.85%), and bacterivores (45.71%) being the predators classified in line with the tropical classification. According to statistical comparison, the most frequent species were Cuticularia and Helicotylenchus, whereas Jansenchus and Protorhabdis being among the most common genera. The average number of occurrences is 62% (Helicotylenchus), 57% (Cuticularia), 28% (Jensenchus), and 25% (Protorhabdis).

KD Thete (2019) The objective of this investigation was to investigate a wide range of nematodes from seasonal crop sites of several states in the Sakur region. Their associations with plants and other organisms had been apparent by a broad range of nematodes. Rotylnchulus sp., Heterodera glycines, Paratrichodorus sp., Meloidogyne incognita, and M. javanica were the nematode species that had been detected. M. incognita and M. javanica, whose can be appeared in all seasonal crops, are each the most common species.

Jun Yan et al (2020) Using plant genotypic diversity, the research results were discovered indicate a distinct connection between belowground plant biomass and nematode frequency. The average number of belowground plant biomass in the entire monoculture areas were1455.60 × 547.05 g m (mean × SD). The overall biomass of Phragmites australis next to the cultivar was significantly influenced by genotype similarity ($F_{1,5} = 4.925$, $P < 0.05$). In contrast, $F_{1,3} = 0.377$, $P > 0.05$, indicating that plant genotypic diversity showed no obvious effect on the biomass retained underground.

Johan van den Hoogen et al (2020) The numbers and diversity of soil nematodes vary considerably within and between terrestrial biomes 6. The most common recorded prevalence of nematodes per 100 grams of dry soil is 859, whereas the average abundance is 2,671. The highest captured quantity, however, is more than 20,000 worms per 100 grams of dry soil. Invasive nematodes had been a relatively common trophic range in all biomes However, bacteriophages are the most widely represented. When each factor is taken into account the greatest abundances were observed in soils of subtropical broadleaf forests (mean = 2,119), boreal forests (mean = 2,016), and tundra (mean = 2,695 nematodes per 100 g of dry soil). The soil types with the largest abundance can be seen in deserts with high temperatures (median = 44), flooded grasslands (median = 124), Antarctica (median = 89), and Mediterranean ecosystems (median = 374).

Qiaofang LU et al (2020) The community characteristics including richness, diversity, composition of communities, and physiological footprint of soil nematode populations are all deeply interconnected with the soil environment, rendering them valuable environmental indicators of soil health status. Soil conditions are evident in the diversity, complexity and structure of the community. Nematodes, which perform essential functions as primary, secondary and tertiary feeders in food webs, in addition to being able to be free-living and plant parasites can serve as helpful ecological indicators.

Rutger A. Wilschut et al (2020) This review demonstrates how the assembly of nematode guilds to particular plant species could relate to nematodes shifting patterns of vegetation. It distinguishes between nematodes results in channels that were direct and indirect and predict potential changes in those connections driven by drivers of global change. The final analysis, it provided perspectives on how recent advances in methodology in the study of plants and nematodes can improve their appreciation of plant–soil communications and the sharing of knowledge among

nematode fields of study about the importance of nematodes in plants. Can help in increasing awareness. Performance in both natural systems as well as agriculture.

Silvia Landi et al (2020) According to research, the results of reducing processes were not stable and fluctuated over time. Nematode community organization was observed to decline in the number of omnivores and predators in the first few years, despite thinning evaluates having little effect on total worm populations. Soil indicators have shown inconsistent findings. Even though the fact that eu-edaphic taxa of Chilopoda, Diplopoda and Pauropoda were not affected by degradation, hemi-edaphic and epi-edaphic taxa of Coleoptera, Diptera, Hymenoptera, Tysanoptera and Hemiptera were negatively impacted. Among microarthropods, mites as well as with Collembola played the most important role in the conservation of biodiversity in terms of number and species.

PG Kavitha et al (2020) The aim of obtaining data about the distribution and frequency of nematodes in forest soils and determind to their importance in soil health, soil and root samples were randomly obtained and compared to tree species, including Tectonagrandis, Contains *Spathodea campanulata, Jacaranda mimosifolia, Grevillea. robusta, Pongamia pinnata,* with *Kizelia pinnata* throughout the forests.

Mehroosa Shabir et al (2020) A total of 50 samples of soil were obtained from saffron fields in Chandrahara in Pulwama district of Jammu and Kashmir. General diversity were assessed, including plant parasites, predators, as well as community assessment of free-living nematodes. Soil samples collected from Chandahara geographical sites were observed to be contaminated with several types of nematodes. The above include ten nematodes that live freely (Acrobelloides, Rhabditis, Cephalobus, Acrobales, Ephelenchus, Pteratorhabditis, Pseudoacrobeloides, Phyllenchus) and eight species of plant parasitic nematodes (Helicotylenchus, Hemicryconemoides, Pratylenchus, Xiphenema, Tylenchus, Rotylenchus, Aphelenchoides).

Pranaya Pradhan et al (2020) During 2015 and 2017, 240 samples had been obtained at the base of the rhizosphere, in several different areas around Bhubaneswar, Odisha, from various fruit plants, including cashew, guava, lime and papaya. Based on a general investigation of nematodes, thirteen nematode species had been determined to be correlated with these berry crops. Overall, among many different plant parasitic nematodes, *Rotylnchulus reniformis* had the highest average probability of dispersal (196), followed by Hoplolymus indicus (104), *Tylnchorhynchus mashhoodi* (84), *Helicotylnchus dihystera (80),* and *Meloidogyne spp*. (20) had the smallest probability of prevalence.

Sandip Mondal et al (2020) Various types of nematodes had been identified in the rhizosphere of crops grown in Dhapa area of Kolkata. These include the swelling nematode (*Pratylenchus zeae*), root-knot nematode (Meloidogyne incognita), sword nematode (*Hoplolemus indicus*), spiral nematode (*Helicotylenchus dihystera*), hurdle nematode (*Tylenchorhynchus brevilineatus*), reniform nematode (*Rotylenchus reniformis*), and the nematode nematode (*Tylenchorhynchus brevilineatus*). Engagement ring nematode (*Criconemoides onoensis*). Due to their high frequency of incidence and population size, R. reniformis and P. zea were considered to be the most prevalent species. The frequently encountered genera *Acrobales, Eucephalobus, Panagrolaimus* (rhabditids), Mylonchulus etc. (*mononchids*), Dorylaemus and *Eudoralymus* (dorylamids) constructed the saprozoic and predatory nematode fauna.

Bing Yang et al (2021) Twenty existing vegetation areas, 20 organic vegetation fields and 20 wide grassland areas in Switzerland were the focus of the investigation. After analysing more than 30,000 nematode species, it identified 98 non-traditional nematode taxa. The total amount of herbivores (+82%), bacterivores (+206%), and omnivores (+135%) had expanded dramatically, primarily due to ecological farming instead of more conventional farming. Additionally, the inclusion of biological fertilizer resulted in a corresponding +451% increase in herbicide and combination material footprints. These results show that the soil food community faces substantial demands in both energy and carbon across each of these categories of functions.

Dorota L. Porazinska et al (2021) The density of nematodes fluctuated from one in the vegetated plots to 39 plots, with the highest number of diverse plant populations in the 80 plots that were intensively studied, including 126 different species of nematodes each considered and exposed, are suitable for studying. The population and structure of the nematode trophic group appeared to be positively correlated with both community parameters of essential plants. Across groups, the amount of divergence due to plant abundance and abundance fluctuated from 46% for fungivores to 8% for acquired omnivores.

Yasmeen Kouser et al (2021) Researchers retrieved 15,091 nematodes from every 100 g of soil from 40 locations, including 47 species. *Plectus, Acrobales, Mesorhabditis, Mylonchulus, Aphelenchus, Alaemus, Wilsonsema* and *Eudoraelemus* were among the most prevalent genera found in low-elevation soils observed in forest areas in contrast, genera found in soils between 2,500 and 3,500 m were. *Mesodorelaemus, Prodorelaemus, Aphelenchoides,*

Teratocephalus, Panagroelemus, Tylencolymus, Paratylenchus and Helicotylenchus. In addition, some herbivorous and omnivorous taxa, including *Pratylenchus, Longidorella, Prodorelaemus and Panagroelaemus*, established the greatest proportion of nematode populations within 3,500 m above sea level.

Govindan Shanmugam et al (2021) The PPN species belonging to 84 plant families were identified in the research conducted by us as *Helicotylenchus spp., Meloidogyne spp., Paratylenchus spp., Pratylenchus spp., Tylenchorhynchus spp., Criconema spp., Paratricodorus spp., Aphelenchus spp. Ditylenchus spp., Heterodera spp., Xiphenema spp., Hoplolaimus spp., along with Hemicycliophora spp. Among the most of Meloidogyne varieties frequently determined were Hoplolymus spp. and Hemicycliophora spp.,* alongside with species belonging from genera, Meloidogyne, Heterodera, Pratylenchus, Ditylenchus and Xiphenema, were shown to have the least prevalent of PPNs causing to major losses of crops in global agriculture when taken together.

Yasmeen Kouser et al (2021) Researchers obtained 15,091 nematodes from every 100 g soil sample at 40 locations, comprising 47 species. The genera *Plectus, Acrobales, Mesorhabditis, Mylonchulus, Aphelenchus, Alaemus, Wilsonsma, as well as Eudoraelemus constitude* a large proportion of the low-altitude soils found in forested regions, and these ranged from 1,000 to 2,500 m in high altitude. -The descent came. The genera *Mesodorelaemus, Prodorelaemus, Aphelenchoides, Teratocephalus, Panagroelaemus, Tylencolemus, Paratylenchus* and *Helicotylenchus* were found at altitudes ranging from 2,500 to 3,500 m.

Rawhat Un Nisa et al (2021) In addition of altitudinal, nematodes vary arbitrarily between trophic groups of many kingdoms. The number of bacteriovorous nematodes is higher than that of other trophic groups. The highest concentrations of nematode diversity occur between 1000 and 1500 m.a.s.l. Has been displayed inside, which has 1000 m.a.s.l. But the situation of bacteriophage nematodes is also included. likewise, the highest level of variations occurs at 1500 m.a.s.l. it has been found. For other parasite categories, those included predators, plant parasites, omnivores and fungivorous nematodes.

Samuel Maina et al (2022) The vast majority of 46 nematode species or 17 genera were identified as bacteriophages and distributed in five trophic groups. Herbivores (13 genera), omnivores (7 genera), predators (6 genera), and fungivores (3 genera) represented the relict worm genera. Rotilunculus, Longidorus and Meloidogyne were consisted among the most frequently found herbivores. The category of bacterivory, the areas of Gatunguru B, Kambungu and Kanyuri displayed the largest populations of Cervidellus and Acrobelloides, despite Panagrolaimus, Prismatolaimus, as well as Wilsonsema were widespread in Guacathy.

Shiferaw Demissie Tola et al (2022) To facilitate identifying nematodes, overall, 105 samples of soils had been acquired via the rhizosphere of pepper plants in significant pepper growing areas in 2017 and 2018. On the basis of findings nematodes had been identified in 83.3, 87.5, 88.9 and 93.8% of soil samples in Sekoro, Kersa, Shabe Sombo of Omo Nada accordingly. Throughout the pepper crop period, a total of 11 (2017) and 13 (2018) nematode genera were identified in the pepper rhizosphere. As a result, Shabe Sombo, Kersa, Sekoru and Omo Nada districts achieved 5, 7, 11 and 12 generation determination accordingly. The most prevalent and frequent species examined in hot pepper crops include Meloidogyne, Scutellonema, Rotylenchulus, Helicotylenchus, Pratylenchus, and Rotylenchus.

Xianping Li et al (2022) Nematode abundances remained predominantly more significant in maintained environments than in uncontrolled primary and secondary habitats, consistent with land use concentrations in other land use types. The proportion of colonies of nematodes in primary and secondary habitat in well-managed soils is significantly higher than in poorly managed soils, With increases in percentage for holistic (primary, 32%; secondary, 67%) and vegetarian (primary, 75%; secondary, 108).

Anjum N. Rizvi et al (2022) The samples have obtained out of the naturally occurring flora of West Bengal's National Park Singalila, were employed in this research to recognize a total of 50 species, which belonging to 9 orders and 25 families. The most common percentage (30%) of all species were that of plant parasitic nematodes, those were followed by bacterivores (28%), predators (18%), omnivores (16%), and fungivores (8%). In terms of ecological richness, the greatest proportion of organisms were composed of bacterivores (38%), plant parasites (34%), omnivores (13%), fungivores (8%), along with predatory nematodes (7%).

Nazia Kouser et al (2022) Including disturbed and undisturbed vegetation types, a total of 77 taxa have been identified those species included parasitic plant organisms with the greatest relative frequency in undisturbed vegetation types and bacteriophages with the highest comparative frequency in disturbed vegetation types. For decomposed vegetation types, Rhabditida had the greatest abundance of bacterivores, followed by Tylenchida, Dorylamida, and Monochida for

innocuous plant types, Tylenchida represented a small percentage, followed by Mononchida, Dorylamida, and Rhabditida.

Shaheen Majeed Wan et al (2022) In this research, researchers detected 30 nematode genera during their study of wide spectrum of nematode populations in the lower Gulmarg forest geographical region of Baramulla district. Nearly the vast majority of these species were bacterivores, accounting for 57.8% of the total number of species discovered, which were followed by predators (11.95%), parasites (5.08%), and fungivores (2.85%). When it regards to taxonomic classification, 44.33% of the samples collected belongs to the order Rhabditida. The above are followed by Dorylamida (23.33%), Tylenchida (16.66%), Mononchida (10%), and Aphelenchida (3.33%). 50% of the recovered nematodes matched trophic categories of bacterivores, which included omnivores (16.66%), parasites (13.33%), predators (13.33%), and fungivores (6.66%).

Ebrahim Shokoohi (2023) It had been pin down twenty-five species regarding 25 genera. From tomato soil samples, three plant-parasitic species (PPN) had been determined *Rotylenchus brevicudatus, Bitylenchus ventrosignatus, and Rotylenchus parvus*. Fluctuations in MPD in soil spots have been observed in all major nematode species. *Acrobelloides, Aphelenchoides, Aporcella, Ditylenchus, Mesorhabditis, Pratylenchus and Rotylenchus* were among the most commonly found nematodes, each with 100% FO% in 60 soil samples collected at four locations.

Amandeep Kaur et al (2023) Every kind of species were detected at Site 3 from an aggregate of 7 samples out of 10 and a total of 10. The average number of nematode species shown at all four locations was in third place. 13 nematode species had been recognised in this area. Across all specimens collected, each of the 13 species were recognised those were *Anguina tritici, Aphelenchus avenae, Criconema spp., Helicotylenchus spp., Herodera avenae, Hoplolermus indicus, Pratylenchus coffeae, P. neglecrus, P. thornii, Praerilenchus spp.,* and *Tylenchor hynchus.*

Baby Tabassum et al (2023) The centre of Rohilkhand region is located at Bareilly. At the result of the research the varieties of nematodes were detected those were *Meloidogyne incognita, Helicotilenchus indicus, Helicotilenchus dihystra, Tylenchorhynchus nudus, Rotylenchulus reniformis, Xiphinema bassiri, Dorylimids, Tylenchus mashudi, Rhabdites, Aphelenchus costasus, Heterodera avenae, Basiliophora similis. Various species of Discolymus, Pratylenchus zeae, and Tylenchus species* had been discovered while the expedition. Varieties of *Tylenchorhynchus, Helicotylenchus, Xiphinema, and Rotylnchulus* have been shown in almost each of single specimen evaluated.

Keshava Murthy M V et al (2023) Nematodes are the most important classification of multicellular organisms on Earth in terms of number, diversity, and significance. They display a wide spectrum of behavioral traits and prefer different habitats, occupying trophic levels of several states in the soil food chain, which comprising herbivores (plant parasitic nematodes), bacterivores, fungivores, omnivores and predators. Keeping in mind that there had been limited study on nematode ecology in the Udupi region, the present the aim of research focuses on investigate at the functional diversity and community structure within soil insects.

Aaliya Afroz et al (2023) According to the survey result, 800 samples had been recognised, and 7 samples (0.87%) tested the positive of entomopathogenic nematodes (EPN) indicating to different types of soil. Both the existence and geographical distribution of EPNs have been substantiated by the present research in a total of 24 districts of the country Chhattisgarh. This represented the initial comprehensive inquiry of EPN evaluation of Chhattisgarh state. Five of the twenty-four districts of CG, including, Baloda Bazar (for plum crop), Mahasamund (for mango crop), Raipur (for sapota, papaya, and guava), Bijapur (for mango crop), and Sukma. (for mango crops), had been shown having EPN.

Mogeni IH et al (2024) Nematodes that belong to 23 genera and 20 families were found in two different investigation sites, Weru and Kangaita. Of the 23 species of nematodes detected, eleven included plant parasitic nematodes. The following species of plant parasitic nematodes had been determined *Meloidogyne spp., Pratylenchus spp., Rotylenchus spp., Trichodorus spp., Phyllonchus spp., Helicotylenchus spp., Hemicyclophora spp., Heterodera spp., Longidorus spp., Meloidogyne spp., and Tylenchus spp. Alaemus, Cephalobus, Cervidellus, Eucephalobus, Prismatolaemus and Wilsonima* were the six species of bacteria feeders that were occurred.

Swati Deshmukh et al (2024) The basis of this research is an investigation involving the assessment of distribution of economically valuable plant nematodes in various divisions of Aurangabad district. The multiple species of nematodes had been collected vary in incidence in relation to the sampling sites chosen. Despite the decline the degree of quality, they can also result a variety of morphological deviations, particularly excessive wilting, shoot dieback and chlorosis due to delayed growth. The data in the following chart revealed the fluctuation in the distribution pattern among Xiphinema, Dorylemus, Helicotylenchus, Pratylenchus, Eudoraelemus, Tylenchulus, Criconmoides, in addition to Mylonchulus.

3. Conclusion

Nematodes demonstrate considerable variation in addition to the variety of taxa as well as their forms of physiological, pathways of their illness, and their lifespan. All of this variety still not completely comprehended.

Understanding the origins of all these aspects of nematode biodiversity requires a more thorough improved comprehension of the progressive organization of this phylum.

We can more precisely evaluate the phylogenetic boundaries and ecological modification that could have influenced the diversity of nematodes and especially their relationship with tiny mammals, by overlaying pathogen characteristics onto nematode phylogeny.

Nematodes can alter their host's physiological and psychological state, although they rarely result in the death of their host. While an extensive experimental and theoretical study is needed, the capability of nematodes to influence the community fluctuations associated with their hosts may contribute to the extinction of small host populations.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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