

■ Importance of Nematodes in Agriculture

In the United States, the nematodes are known to cause six per cent loss in field crops, (\$ 100 million / year), 12 per cent loss in fruits and nuts (\$ 225 million / year), 11 per cent loss in vegetables (\$ 267 million / year) and 10 per cent loss in ornamental (\$ 60 million / year).

Root knot nematode, *Meloidogyne* species causes spectacular galls on the roots of vegetable crops, pulses, ornamental and fruit crops.

Burrowing nematode, *Radopholus similis* causes severe damage to many fruit crops, spice crops and plantation crops. It is responsible for spreading decline of citrus in Florida, pepper yellows in Indonesia and rhizome rot or black head disease of banana in different parts of the world.

In India, the cereal cyst nematode, *Heterodera avenae* causes the 'molya' disease of wheat and barley in Rajasthan, Punjab, Haryana, Himachal Pradesh and Jammu and Kashmir. The loss due to this nematode is about 32 million rupees in wheat and 25 million rupees for barley in Rajasthan State alone.

Golden nematode of potato, *Globodera rostochiensis* is a serious problem in Nilgiri and Kodaikanal hills. About 3050 ha in Nilgiri hills and 200 ha in Kodaikanal hills are infested with this nematode.

Root lesion nematode, *Pratylenchus coffeae* is a serious pest of coffee in South India. About 3500 hectares of coffee plantations is infested by this nematode.

Burrowing nematode, *Radopholus similis* is responsible for slow wilt disease of pepper in Karnataka and Kerala states.

Citrus nematode, *Tylenchulus semipenetrans* causes slow decline disease of citrus is also found associated in producing dieback disease of citrus trees in India.

Reniform nematode, *Rotylenchulus reniformis* attacks a large number of plants and causes considerable losses to vegetables and pulses.

History of Plant Nematology

Anguina tritici
mounting 3 times

Some of the important milestones on the history of plant nematology are listed below in chronological order.

- 1594 - There is indirect reference to the ear cockle diseases of wheat in William Shakespeare's play 'Loves labours Lost', Act IV, Scene 3 where he wrote the line "Sowed cockle, reaped no corn". AD
- 1656 - Borellus discovered first free living nematode 'vinegar eels' (Turbatrix aceti)
- 1743 - Needham - Discovery of wheat seed gall nematode Anguina tritici, the first plant parasitic nematode to come to the attention of the early investigators.
- 1837 -1915 - Bastian described 100 new species belonging to 30 genera, of which 23 were new. His monograph of the Anguillulidae marked the beginning of the science of Nematology. Looking to the significant contribution he was considered as "Father of Nematology"
- 1855 - Berkeley - Determination of root-knot nematode, Meloidogyne spp. to cause root galls on cucumber plants in greenhouse in England.
- 1857 - Kuhn - Reported the stem and bulb nematode, Ditylenchus dipsaci infesting the heads of teasel.
- 1857 - C.Devaine studied the life cycle of wheat seed gall nematode.
- 1859 - Schacht - Report of sugarbeet cyst nematode, Heterodera schachtii from Germany.
- 1871 - First soil fumigation experiments by Kuhn using Carbon disulphide for the control of the sugarbeet cyst nematode, Heterodera schachtii.
- 1871 - Schmidt described and named the sugarbeet cyst nematode as Heterodera schachtii.
- 1873 - Butschli - Descriptions of the morphology of free - living nematodes.
- 1884 - deMan - Taxonomic monograph of soil and fresh water nematodes of the Netherlands.

- 1887 - Goeldi described Meloidogyne exigua causing galls on the roots of coffee in Brazil.
- 1888 - Strubell published the first detailed life cycle of Heterodera schachtii.
- 1889 - Atkinson and Neal - Publication about the root-knot nematodes in the United States.
- 1891- Ritzema-Bos discovered the foliar nematode, Aphelenchoides fragariae on strawberry.
- 1892 - Atkinson-Report of root-knot nematode and Fusarium complex in vascular wilt of cotton.
- 1900 - Goldschmidt - Nervous system of Nematodes.
- 1901 - Hunger reported the association of root knot nematode with bacterial wilt of tomato, Ralstonia solanacearum.
- 1907 - N.A.Cobb - joined the USDA and considered to be the Father of American Nematology. He has described more than 100 species of nematodes. He is credited with coining of the word Nematology.
- 1909 - Marcinowski for the first time gave the idea of hot water treatment for freeing planting materials from nematode infestation.
- 1913 - N.A.Cobb - Published a book entitled Contributions to the Science of Nematology.
- 1918 - N.A. Cobb - Development of methods and apparatus used in Nematology.
- 1919 - Highly toxicant fumigant, Chloropicrin was discovered.
- 1930 - Paramanov - nemic relationships, evolution and phylogenics.
 - Filipjev - basis for current classification of Nemata
- 1933 - T. Goodey - Book on "Plant parasitic nematodes and the diseases they cause"
- 1930s - 1990s - Barron, Duddington, Mankau, Linford, Sayre and Zuckerman - they provided an insight on the Biological control of plant - parasitic nematodes. Enhanced

understanding of antagonists and related biology enhancing the potential for practical biocontrol.

- 1934 - Filipjev - Book on "Nematodes that are importance for Agriculture" translated from Russian to English in 1941 by S. Stekhovan under the title "A Manual of Agricultural Helminthology".
- 1940-s - 1990s - Triantaphyllou - Provided advancement in Cytogenetics, modes of reproduction/sexually - and information data base for genetics/molecular research. Enhanced understanding of evolution and taxa interrelationships.
- 1941- Discovery of potato cyst nematode, *Globodera rostochiensis* in Nassau county, Long Islands, USA. (Rostock)
- 1943 - Carter - Description of nematicidal value of DD which is used in the era of soil fumigation.
- 1945 - Christie - Description of the nematicidal value of EDB.
- 1948 - Allen - Taught the World's first formal university course in Nematology at the University of California, Berkeley.
- 1950 - Oostenbrink - Wrote a Book of on "The Potato Nematode, A dangerous parasite to Potato Monoculture".
- 1950s - 1990s - Caveness, Jones, Oostenbrink, Sasser and Seinhorst - International programme such as International Meloidogyne project - They expanded educational base of nematologists world wide and provided ecological - taxonomic data base.
- 1951 - Christie and Perry - Role of ectoparasites as plant pathogens.
T. Goodey - Wrote a book on "Soil and fresh water nematodes".
Food and Agriculture Organisation of the United Nations organized the first International Nematology course and Symposium held at Rothamstead Experiment Station, England.
- 1953 - Discovery of burrowing nematode, *Radopholus similis* as the causal organism of spreading decline of citrus in Florida (USA) and yellows disease of pepper in Bangka islands, Indonesia.

- 1955 - Lesion nematode, Pratylenchus penetrans discovered the causal organism of peach replant problem in Canada. Mountain and Patrick while working on this nematode for the first time demonstrated the pathogenicity of a plant parasitic nematode to the satisfaction of Koch's postulates. 7Rf
- Lucas and associates demonstrated that wounding of roots by penetration of Meloidogyne larvae facilitated infection of tobacco roots by Ralstonia solanacearum
- European Society of Nematologists founded.
- 1956 - Nematologica - The first journal published entirely for Nematology papers from The Netherlands.
- 1958 - First report of transmission of viruses by nematodes (Xiphinema index) transmitting fanleaf grapevine in grapevine in the USA by Hewitt, Raski and Goheen.
- Pitcher and Crosse demonstrated the association of the nematode Aphelenchoides ritzemabosi with the bacterium Corynebacterium (Rodococcus) fascians in the fasciation disease of strawberry known as cauliflower disease.
- 1960s- 1990s - Nickle, Poinar and Steiner - Biological control of insects with nematodes.
- 1960s- 1990s - Brenner, Dougherty and Nicholas - Caenorhabditis elegans developmental biology and genetics - model system - provided fundamental information on cell lineage, behaviour, gene function ageing and overall genome for this model biological system.
- 1961 - Society of Nematologists founded in the United States.
- 1967 - Organization of Tropical American Nematologists founded.
- 1969 - Journal of Nematology was first published by the Society of Nematologists, USA.

- 1971 - Bursaphelenchus xylophilus found to be responsible for mysterious pine wilt disease in Japan.
- 1972 - Commonwealth Agricultural Bureau is publishing CIH Descriptions of Plant Parasitic Nematodes series. Each year one folder containing a set of 15 standardized descriptions of plant parasitic nematodes.
- 1973 - Mediterranean Nematological Society publishes its own journal Nematologia Mediterranean - published from Italy.
- 1978 - Revue de Nematologie published from France

■ History of Nematology in India

Nematology as a separate branch of Agriculture Science in India has been recognized only about 37 years back. The history and development of Nematology in India have been listed below in chronological order.

- 1901 - Barber reported root - knot nematode on tea in Devala Estate, Tamil Nadu, South India.
- 1906 - Butler reported root - knot nematode on black pepper in Kerala.
- 1913, 1919 - Butler reported Ufra disease on rice in Bengal due to the infestation of Ditylenchus angustus.
- 1926, 1933 - Ayyar reported root - knot nematode infestation on vegetable and other crops in India.
- 1934, 1936 - Dastur reported white tip disease of rice caused by Aphelenchoides besseyi in Central India.
- 1958 - Vasudeva - Molya disease of wheat (Heterodera avenae) from Rajasthan.
- 1959 - Prasad, Mathur and Sehgal - reported cereal cyst nematode for the first time from India.

- 1961 - Nematology laboratory established at Agricultural College and Research Institute, Coimbatore, with the assistance of Rockefeller Foundation and Indian Council of Agricultural Research.
- Nematology unit established at the Central Potato Research Institute, Shimla.
- Siddiqi reported citrus nematode for the first time from India.
- Jones reported potato cyst nematode for the first time from Nilgiri hills.
- 1963 - Laboratory for potato cyst nematode research established at Uthagamandalam with the assistance of Indian Council of Agricultural Research.
- 1964 - First International Nematology course held at IARI, New Delhi.
- Quarantine detection of potato cyst nematode in certified seed consignments from Scotland.
- 1966 - Nair, Das and Menon reported the burrowing nematode on banana for the first time from Kerala.
- 1966 - Division of Nematology established at IARI, New Delhi
- 1968 - First South - East Asian Post - Graduate Nematology course held in India.
- 1969 - Nematological Society of India founded and first All India Nematology Symposium held at IARI, New Delhi.
- 1969 - 1970 - Third South - East Asian Nematology course conducted at New Delhi.
- 1971 - Indian Journal of Nematology published.
- 1971 - Fourth South - East Asian Nematology course at New Delhi.
- 1972 - First All India Nematology Workshop held at IARI, New Delhi

- 1973 - Fifth South - East Asian Nematology Course at New Delhi.
- 1975 - Sixth South - East Asian Nematology Course at New Delhi.
- 1976 - Summer Institute in Phytonematology held at Allahabad.
- 1977 - Department of Nematology established at Haryana Agriculture University, Hisar.
- 1977 - All India Co-ordinated Research Project (AICRP) on nematode pests of crops and their control started functioning in 14 centres in India with its Project Co-ordinator at IARI, New Delhi.
- 1979 - M.Sc. (Ag.) Plant Nematology course started at Tamil Nadu Agricultural University, Coimbatore.
- 1979- All India Nematology Workshop and Symposium held at Orissa University of Agricultural University, Coimbatore
- 1979 - All India Nematology Workshop and Symposium held at Orissa University of Agriculture and Technology, Bhubaneswar
- 1979 - Seventh South - East Asian Nematology course at New Delhi.
- 1981 - Department of Nematology established at Tamil Nadu Agricultural University, Coimbatore.
- 1981 - All India Nematology Workshop and Symposium held at Tamil Nadu Agricultural University, Coimbatore.
- 1982 - Department of Nematology established at Rajendra Agriculture University, PUSA, Bihar.
- 1983 - All India Nematology Workshop and Symposium held at Solan, Himachal Pradesh.
- 1985 - All India Nematology Workshop and Symposium held at Udaipur, Rajasthan.

- 1986 - National Conference on Nematology held at IARI, New Delhi
- 1987 - All India Nematology Workshop at Govt. Agriculture College, Pune.
- 1987 - Group Discussion on Nematological problems of Plantation crops held at Sugarcane Breeding Institute, Coimbatore.
- 1992 - Silver Jubilee Celebration of Division of Nematology, IARI, New Delhi.
- 1992 - Summer Institute on "Management of Plant Parasitic nematodes in different crops" organized by ICAR at Haryana Agricultural University, Hisar.
- 1995 - All India Nematology Workshop and National Symposium on Nematode problems of India held at IARI, New Delhi.
- 1997 - Summer School on "Problems and Progress in Nematology during the past one decade" was organized by ICAR at IARI, New Delhi.
- 1998 - Afro - Asian Nematology Conference held during April 1998 at Coimbatore.
- 1999 - National seminar on "Nematological Research in India: Challenges and preparedness for the new millennium" at C.S. Azad University of Agriculture and Technology.
- 2000 - National Nematology Symposium on "Integrated Nematode Management" held at OUAT, Bhubaneswar, Orissa.
- 2001 - National Congress on "Centenary of Nematology in India: Appraisal and Future plans" at IARI, New Delhi.

PROFESSIONAL PLANT NEMATOLOGICAL SOCIETIES AND THEIR PUBLICATIONS

Sl. No.	Year	Society / Association	Journal	Frequency of Publication
✓ 1	1956	European Society of Nematologists	Nematology News	<u>Biannually</u>
✓ 2	1961	Society of Nematologists, USA	Journal of Nematology (1969)	<u>Quarterly</u>
✓ 3	1967	Organization of Nematologists of Tropical America	Nematropica (1970)	<u>Biannually</u>
✓ 4	1969	Nematological Society of India	Indian Journal of Nematology (1971)	<u>Half yearly</u>
✓ 5	<u>1971</u>	Japanese Nematological Society	Japanese Journal of Nematology (1972)	<u>Biannually</u>
6	1972	Nematological Society of Southern Africa	African Plant Protection	—
7	1974	Brazilian Nematological Society (Sociedade Brasileira de Nematologia)	Nematologia Brasileira	<u>Quarterly</u>
8	1978	Italian Society of Nematologists (Societa Italiana di Nematologia) (SIN)	—	—
✓ 9	<u>1983</u>	Pakistan Society of Nematologists (PSN)	<u>Pakistan Journal of Nematology</u>	<u>Biannually</u>
10	1989	Australian Association of Nematologists (AAN)	—	—
✓ 11	<u>1990</u>	Afro-Asian Society of Nematologists (AASN)	International Journal of Nematology (1991)	<u>Biannually</u>

12	1993	Egyptian Society of Agricultural Nematology (ESAN)	Egyptian Journal of Agronematology	Biannually
13	1994	Russian Society of Nematologists	Russian Journal of Nematology (1993)	Biannually
14	1996	Chinese Society of Plant Nematologists (CSPN)	—	—

Helminthological Abstracts published by Commonwealth Agricultural Bureau, England dose the abstracting service of world literature on Nematology. One volume is issued in four parts each year.

Nematologica, an International Journal of nematological research from The Netherlands includes research papers on nematodes and general papers on morphology, taxonomy, ecology and physiology. One volume is issued in four parts every year.

The Bibliography on plant, soil and freshwater Nematodes is a card title service published by E.J.Brill, the Netherlands.

Fungicide and Nematocide Tests is being published from the American Phytopathological society, one volume per year.

Newsletters :

1. Organization of Nematologists of Tropical America Newsletter - Organization of Nematologists of Tropical America
2. Pakistan Society of Nematologists Newsletter -Pakistan Society of Nematologists
3. Nematology Newsletter - Society of Nematologists, USA
4. Egyptian Society of Agricultural Nematology Newsletter - Egyptian Society of Agricultural Nematology

MCQs

HISTORY OF PLANT NEMATOTOLOGY

Encircle the most appropriate answer among the following

- *1. The first record of nematodes from birds namely falcons was provided by
- (a) Columella ✓ (b) Albertus Magnus
(c) Vegetius (d) Caesalpinus
2. The free living nematode commonly referred as Vinegar eel (*Turbatrix aceti*) was first discovered by
- ✓ (a) Borellus (b) Owen
(c) Leady (d) Tyson
3. The nematode was viewed under microscope for the first time by
- (a) Bojanus (b) Cloquet
(c) Bastian ✓ (d) Borellus
- *4. The first person to study nemic anatomy and describe a nematode egg was TRF
- (a) Redi (b) Vircho
✓ (c) Tyson (d) Bastian

- *5. Free living nematodes from fresh water was first reported by :
- (a) Herbsle (b) Muller
(c) Schneider (d) Dujardin
- *6. Anatomic studies of varieties of nemas by free hand section and dissection was conducted by
- (a) Bojanus (b) Cloquet
(c) Deising (d) Both a and b
- *7. The detailed description of free living nematodes using camera lucida was first described by
- (a) Butschli (b) Stewart
(c) Paramanov (d) None of the above
8. The nervous system of nematodes was first described by
- (a) Needham (b) Atkinson
(c) Goldschmidt (d) T.Goodey
9. Hypothesis concerning nemic relationship, evolution and phylogenics was formulated by
- (a) Paramanov (b) Christie
(c) Carter (d) Oostenbrink
10. Nematodes as plant parasites was reported for the first time by :
- (a) N.A.Cobb (b) T.Needham
(c) Julius Kuhn (d) A.Schmidt
11. The first plant parasitic nematode (Wheat seedgall nematode) to be noticed and reported by T.Needham in 1743 was
- (a) *Heterodera schachtii*
(b) *Meloidogyne incognita*
(c) *Ditylenchus dipsaci*
(d) *Anguina tritici*

12. The first plant parasitic nematode (wheat seedgall nematode) was named as Vibrio tritici in 1799 by
(a) Filipjev (b) Milne
 (c) Steinbuch (d) None of the above
13. The present name of wheat seedgall nematode, Anguina tritici was given by
(a) Milne (1919) (b) N.A.Cobb (1913)
(c) Steinbuch (1799) (d) Filipjev (1936)
14. The life cycle of wheat seed gall nematode was studied by
(a) T.Needham (1743) (b) J.G.Steinbuch (1799)
 (c) C.Devaine (1857) (d) M.J.Berkeley (1855)
15. Father of Nematology
(a) Cobb (b) Bastian
(c) Jones (d) Barber
16. Occurrence of root knot nematode in cucumber was first reported in 1855 by TRF-2016
 (a) M.J.Berkeley (b) C.Liebscher
(c) Barber (d) A.Strubell
17. Stem and bulb nematode Ditylenchus dipsaci infesting the heads of teasel was first discovered by
(a) W.Carter (1943) (b) Atkinson (1892)
(c) Neal (1894) (d) Julius Kuhn (1857)
18. Sugarbeet cyst nematode was reported in 1859 by
(a) Kuhn (b) Schneider
 (c) H.Schacht (d) Weischer
19. Heterodera schachtii (Sugarbeet cyst nematode) was described and named by
 (a) A.Schmidt (b) E.A.Goeldi
(c) J.Ritzemaboss (d) E.A.Bessey

36. * The burrowing nematode was first observed in 1890 by
 (a) Thorne (b) Linford
 ✓ (c) N.A.Cobb (d) Oliveira
37. * A detailed account on morphology and life cycle of Citrus nematode, *Tylenchulus semipenetrans* was published in 1913 by :
 ✓ (a) N.A.Cobb (b) Filipjev
 (c) Stewart (d) Paramanov
38. * The genus Tylenchorhynchus and Trichodorus was created by Cobb in
 (a) 1911 (b) 1912
 ✓ (c) 1913 (d) 1914
- * 39. The genus Radopholus was described by
 (a) N.A.Cobb ✓ (b) Thorne
 (c) Linford (d) Both a and b
40. The idea of hot treatment for freeing plant materials from nematode infestation was given by
 (a) Julius Kuhn (b) Christie
 (c) Carter ✓ (d) Marcinowski
- * 41. Goodey was known for his contribution in the field of nematode
 (a) Ecology ↑ NOM ✓ (b) Morphology
 ✓ (c) Taxonomy (d) Diseases
- * 42. Nomenclature of Golden nematode of potato, *Globodera rostochiensis* was proposed by
 ✓ (a) Wollenweber (b) Masee
 (c) Zimmerman (d) None of the above
43. Potato cyst nematode was first discovered in Nassau county, Long Islands, USA in the year
 (a) 1913 (b) 1931
 ✓ (c) 1941 (d) 1946

44. The book "Plant parasitic nematodes and the diseases they cause" is written by
 (a) T.Goodey (b) Perry
 (c) Stekhovan (d) Dastur
45. Monograph on Soil and Fresh water nematodes was written by :
 (a) Thorne (b) Parvatha Reddy
 (c) Siddiqui (d) T.Goodey
46. "Nematodes that are importance for Agriculture" is written by :
 (a) Raski (b) Filipjev
 (c) Goheen (d) Hewitt
47. The book "Nematodes that are importance for Agriculture" was translated from Russian to English under the title "A manual of Agricultural Helminthology" by
 (a) J.H.Schuurman Stekhovan
 (b) N.A. Cobb
 (c) Holdeman
 (d) Graham
- *48. Who advanced the survival mechanisms of nematodes?
 (a) Triantaphyllou (b) Van Gundy
 (c) Caveness (d) Oostenbrink
49. Genetics of plant nematode relationship was first reported by
 (a) Raski (b) Norton
 (c) N.A.Cobb (d) Triantaphyllou
- *50. First person to demonstrate that bacteria are carried through digestive tract of nematodes is
 (a) Kalinenko (b) Jensen
 (c) Stewart (d) Schindler

- *51. Norton was known for his contribution in nematode
(a) Management (b) Morphology
(c) Taxonomy (d) Ecology
52. The nematicidal value of DD (Dichloropropane dichloropropene) was discovered in 1943 by
(a) Perry (b) Christie
(c) Carter (d) Dastur
53. The nematicidal value of EDB (Ethylene dibromide) was discovered in 1945 by
(a) Christie (b) Perry
(c) Chitwood (d) N.A.Cobb
54. The World's first formal university course in Nematology was taught by
(a) D.W.Fenwick (b) Allen
(c) M.T.Franklin (d) R.S.Pitcher
55. White tip nematode of rice was identified as Aphelenchoides besseyi in 1951 by
(a) Allen (b) Dastur
(c) Perry (d) None of the above
56. The book "The Potato nematode, A dangerous parasite to potato monoculture was written by
(a) F.G.W.Jones (b) B.G.Peters
(c) Oostenbrink (d) Pitcher
57. Name the Scientists who discovered the role of ectoparasites as plant pathogens
(a) Christie (b) Perry
(c) Van Gundy (d) Both a and b
- *58. Augmentation of Fusarium wilt of cotton by Belanolaimus longicaudatus was first reported by
(a) Christie and Perry
(b) Holdeman and Graham
(c) Barron and Duddington (d) None of the above

59. Who demonstrated that wounding of roots by *Meloidogyne* facilitated infection of tobacco roots by *Pseudomonas solanacearum*?
- (a) Lucas *et al* (b) Hewitt *et al*
 (c) Pitcher *et al* (d) None of the above
60. The first report of virus transmission by a plant parasitic nematode was made by
- (a) Johnson, 1945
 (b) Christie, 1951
 (c) Harrison & Cadman, 1959
 (d) Hewitt, Raski and Goheen, 1958
61. Association of *Aphelenchoides ritzemabosi* with the bacterium *Corynebacterium fascians* was demonstrated by
- (a) Hewitt *et al* (b) Lucas *et al*
 (c) Pitcher and Crosse (d) None of the above
- * 62. The genus *Rotylenchulus* was recorded on cowpea for the first time in 1940 by
- (a) Linford (b) Oliveira
 (c) Mankau (d) Both a and b
- * 63. The nematicidal value of DBCP (Dibromochloropropane) was discovered by
- (a) Ritzemaboss (b) Hue
 (c) McBath (d) None of the above
- * 64. Classification of different species of *Meloidogyne* by perinéal pattern of annulation was discovered by
- (a) T. Goodey (b) Chitwood
 (c) Ritzemaboss (d) G. Thorne
- * 65. The genus *Meloidogyne* was separated from *Heterodera* by
- (a) Chitwood (b) Muller
 (c) Goeldi (d) Cornu

66. An insight on the biological control of plant parasitic nematodes was provided by
- (a) Barron and Duddington
 - (b) Mankau and Linford
 - (c) Sayre and Zuckerman
 - (d) All the above
67. Biological control of insects with nematodes was demonstrated by
- (a) Nickle
 - (b) Poinar
 - (c) Steiner
 - (d) All the above
- * 68. The fundamental information on developmental biology and genetics of Caenorhabditis elegans was provided by
- (a) Brenner
 - (b) Dougherty
 - (c) Nicholas
 - (d) All the above
- * 69. Vapour heat treatment and hot air treatments for nematode control was introduced by
- (a) T.R.Hewitt
 - (b) R.Latta
 - (c) K.Marcinowski
 - (d) All the above
- * 70. The role of burrowing nematode, Radopholus similis in causing spreading decline of citrus was proved by
- (a) Suit
 - (b) Du Charne
 - (c) Oliveira
 - (d) Both a and b
- * 71. The generic name Hirschmanniella is coined in honour of an eminent US Nematologist
- (a) Hedwig Hirschmann
 - (b) N.A. Cobb
 - (c) Chitwood
 - (d) None of the above
72. Root knot nematode on tea in South India was first reported by
- (a) Siddiqi
 - (b) Butler
 - (c) Ayyar
 - (d) Barber

- * 73. Occurrence of Root knot nematode on vegetables in India was first reported by
 (a) Thirumala Rao (b) Ayyar
 (c) Butler (d) Goheen
74. Root knot nematode on black pepper in Kerala was first reported by
 (a) Butler (b) L.C.Coleman
 (c) Nair (d) Menon
75. Ufra disease on Rice (*Ditylenchus angustus*) was first reported from Bengal by
 (a) Milne (b) Prasad
 (c) Butler (d) None of the above
76. Presence of Wheat seed gall nematode was first recorded from Punjab by
 (a) Nair (b) Milne
 (c) Siddiqi (d) Ayyar
- * 77. Lesion nematode was first reported in 1933 from India by
 (a) Mayne (b) Subramanian
 (c) Dastur (d) Both a and b
- * 78. Root knot nematode on citrus in India was first reported by
 (a) Thirumala Rao (b) Dastur
 (c) Barber (d) None of the above
79. Occurrence of white tip of rice *Aphelenchoides besseyi* was reported from Central India by
 (a) Prasad (b) Dastur
 (c) Menon (d) None of the above
80. Potato cyst nematode in India was first reported in 1961 by
 (a) Berkeley (b) N.A.Cobb
 (c) Jones (d) Siddiqi

81. Occurrence of cereal cyst nematode was first reported from Rajasthan by
 (a) Nair *et al* (b) Vasudeva
 (c) Hewitt *et al* (d) None of the above
- *82. Molya disease of barley in India was first reported from Rajasthan by Prasad *et al.*, in the year
 (a) 1959 (b) 1979
 (c) 1969 (d) 1989
83. Citrus nematode, *Tylenchulus semipenetrans* was first reported from Uttar Pradesh by
 (a) Nair (b) Menon
 (c) Siddiqi (d) Das
- *84. The genus Trichodorus was split into Trichodorus and Paratrichodorus by
 (a) N.A.Cobb (b) Siddiqi
 (c) Jones (d) None of the above
- *85. Reniform nematode, *Rotylenchulus reniformis* on cotton was first reported in India in 1963 by
 (a) Seshadri (b) Sivakumar
 (c) Siddiqi (d) Both a and b
- *86. The first person to report the presence of Trichodorus nematode in India
 (a) Sivakumar (b) Siddiqi
 (c) Prasad (d) Both a and b
87. Occurrence of burrowing nematode on banana was reported from Kerala by
 (a) Nair (b) Das
 (c) Menon (d) All the above
88. European society of nematologists was founded in the year
 (a) 1955 (b) 1956
 (c) 1961 (d) 1969

89. Which one of the following is the first international journal devoted for Nematology? 1956 from Netherland

- (a) Nematologia Meditteranea
- (b) Journal of Nematology
- (c) Nematologica
- (d) Nematropica

90. Nematologica journal is published from

- (a) Organization of Tropical American Nematologists
- (b) European society of Nematologists
- (c) Nematological society of India
- (d) None of the above

91. In which year Society of Nematologists was founded in US?

- (a) 1961
- (b) 1959
- (c) 1966
- (d) 1967

92. Organization of Tropical American Nematologists was founded in

- (a) 1965
- (b) 1967
- (c) 1969
- (d) 1971

93. Journal of Nematology is published from

- (a) Organization of Tropical American Nematologists
- (b) European society of Nematologists
- (c) Society of Nematologists, USA
- (d) Nematological society of India

94. Nematology Newsletter is published from

- (a) Organization of Tropical American Nematologists
- (b) European society of Nematologists
- (c) Nematological society of India
- (d) Society of Nematologists, USA

* International Meloidogym Review in 1980. J.N. Sasser

95. Nematologica journal is published from

- (a) Nematological society of India
- (b) Society of Nematologists, USA
- (c) European society of Nematologists
- (d) Organization of Tropical American Nematologists

96. The journal Nematologia Mediterranea is published from

- (a) Italy
- (b) Europe
- (c) USA
- (d) France

97. The Journal Revue de Nematologie is published from

- (a) Australia
- (b) France
- (c) Germany
- (d) None of the above

98. Nematological society of India was founded in the year

- (a) 1965
- (b) 1967
- (c) 1969
- (d) 1971

99. Journal of Nematology published in India is :

- (a) Indian journal of Nematology (HARD YOUNG)
- (b) Journal of Nematology
- (c) Nematologica
- (d) Plant Nematology

*100. In India for the first time Department of Nematology was established in 1977 at

- (a) G.B.Pant University of Agriculture and Technology
- (b) Central Agricultural University
- (c) Haryana Agricultural University, Hissar
- (d) None of the above

101. The first Indian University to introduce postgraduate programme in Plant Nematology in 1979 was

- (a) Marathwada Agricultural University
- (b) Punjab Agricultural University
- (c) Kerala Agricultural University
- (d) Tamil Nadu Agricultural University

109. The headquarter of International *Meloidae* is
- (a) Rothamsted Experimental Station, UK
 (b) University of California, USA
 (c) University of Florida, USA
 (d) North Carolina State University, USA
110. Who has contributed most for the strengthening of Nematology in India ?
- (a) F. G. W. Jones (b) J. N. Sasser
 (c) M. Oostenbrink (d) D. J. Raski
111. Nematology as a separate discipline was first advocated by
- (a) B. G. Chitwood (b) N. A. Cobb
 (c) J. N. Sasser (d) F. G. W. Jones
112. An Introduction to Nematology was authored by
- (a) B.G.Chitwood (b) M.B.Chitwood
 (c) Both a and b (d) N.A.Cobb
113. Author of "Text Book on Introductory Plant Nematology" published by ICAR
- (a) Raman. K. Walia
 (b) Harish K Bajaj
 (c) P. Parvatha Reddy
 (d) Both a and b
114. The book Plant Nematology is written by
- (a) P.Parvatha Reddy (b) R.S.Singh
 (c) K.Sitaramaiah (d) E.I.Jonathan
115. Plant Pathogens: The Plant Parasitic Nematodes is written by
- (a) R.S.Singh (b) K.Sitaramaiah
 (c) Harish K Bajaj (d) Both a and b

116. Fundamentals of Plant Nematology is written by

- (a) E.I.Jonathan
- (b) S.Kumar
- (c) K.Devarajan
- (d) G.Rajendran
- (e) All the above

117. Award instituted by Nematological Society of India for research work based on thesis work

- (a) Raski award
- (b) Shah award
- (c) D'Souza award
- (d) Best thesis award

118. Award instituted by Nematological Society of India for best contributor in the field of Nematology during the preceding five years.

- (a) Raski award
- (b) H.M.Shah award
- (c) D'Souza award
- (d) Best thesis award

119. The most accepted theory of chemotaxis based upon interactions between molecules emanating from host and nematode was proposed by

- (a) Kuhn, 1959
- (b) Klink *et al.*, 1970
- (c) Zuckerman & Jenson, 1984
- (d) Van Gundy & Rackman, 1961

120. Nematode implicated in the Peach Replant problem in Canada

- (a) *Pratylenchus vulnus*
- (b) *Pratylenchus pratensis*
- (c) *Radopholus similis*
- (d) *Pratylenchus penetrans*

