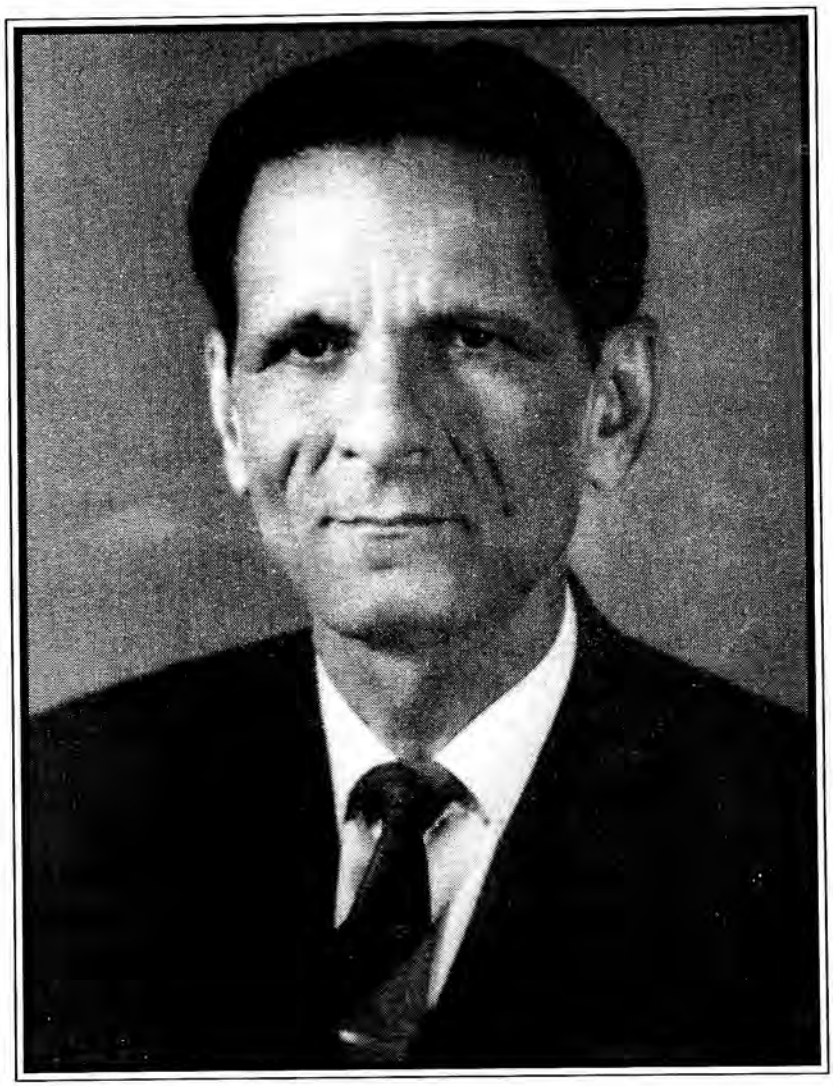
ABRAR MUSTAFA KHAN

(23 October 1918– 09 December 2004)

Biog. Mem. Fell. INSA, New Delhi **33** 83-100 (2008)



Akbar Ali Khan

ABRAR MUSTAFA KHAN

(1918-2004)

Elected Fellow 1979

FAMILY BACKGROUND AND EARLY EDUCATION

ABRAR MUSTAFA KHAN was born in a reputed Pathan family of Khurja, a town known for its world-famous potteries and ceramics. It is situated in district Bulandshahar, Uttar Pradesh, not so far away from New Delhi. He was the youngest son of Haji Mohammad Mustafa Khan and Ms Mubarak Khatoon, a leading *Zamindar* and orchadist of west UP. His great grandfather Muhammad Rahmat Khan was a close friend and associate of Sir Syed Ahmad Khan, the Founder of the Aligarh Muslim University in 1920. Both of them were employed by the British Government and had worked together. The early education of Dr Khan was in a traditional Muslim *madarsa*, named Madarsa-e-Qasmia, after which he was admitted to the Government High School, Bulandshahar from where he passed Matriculation.

After successfully completing his High School education he was sent to the historical Aligarh Muslim University for higher studies. From AMU, he passed Intermediate, BSc (Science) and MSc (Botany) Examinations in the years 1938, 1940 and 1942 respectively. Upon obtaining his Masters degree, he preferred joining research in Botany under the guidance of an eminent teacher of the Department Dr Rafiq Ahmad Khan, who himself was a PhD from Cambridge University in UK.

PROFESSIONAL CAREER

Prior to the completion of PhD degree, Dr AM Khan was appointed a Lecturer in the Women's College of the Aligarh Muslim University in 1944. Along with his teaching assignment in Women's College, he was also given some responsibility of teaching on a part-time basis as a Lecturer in the newly established Agriculture College at Aligarh. Dr. Khan continued to remain in these positions till June 1948. At that point of time he got an opportunity to proceed abroad for advanced research work in the USA, in the Department of Plant Pathology at the University of Minnesota, under the guidance of world-renowned scientist, Professor Elvin Charles Stakman. The laboratory of Professor Stakman those days was like a Mecca for Plant Pathological research. Professor Stakman's name had also figured in a book "The Hundred Most Important People" by Dr Donald Robinson. Within a short period of two years and based on this hard work, Professor Khan was awarded the PhD degree in 1950. His

doctoral work under Professor Stakman concerned the deficiency of bivalent ions namely; Calcium and Magnesium predisposed soybean and pea varieties to the attack of *Rhizoctonia solani*. Part of his thesis on this problem was published by the University of Minnesota as a Bulletin of the Experimental Station which was a rare thing and showed the importance of his research work. Upon his return from USA in 1950, he joined his parent Department of Botany, AMU as a Senior Lecturer and initiated research in Plant Pathology, a subject on which he had gained valuable experience in the United States. Plant Pathology till then was rather a neglected field of study in India and more so in Aligarh. Based on the experience of his research in USA, he was promoted as a Reader in Botany in 1953.

In the post-independence era, at the time when Dr Zakir Hussain (who later became the President of India) was the Vice-Chancellor of AMU, a number of very reputed academicians, both in Science and other faculties adored the chairs such as Professors Reyat Khan, a student of famous botanist Professor P Maheshwari; Kafil Ahmad Choudhary FNA, and AM Khan FNA himself in the Department of Botany; Professor MB Mirza FASc, M Afzaal Md Qadri, MA Basir, S Mashhood Alam, SZ Qasim FNA in Zoology; Professor PS Gill FNA, Rais Ahmad in Physics; Professor MO Farooq, AR Kidwai (who later became the Governor of Bihar, West Bengal and Haryana), WU Malik in Chemistry; Professor SM Shah in Mathematics; Professor PN Ganju FNA in Geology, etc. Some very eminent persons were also in other faculties, viz., Professor M Habib and Noorul Hassan (who became the Education Minister in the Government of India and later the Governor of West Bengal and Orrisa), Professors KA Nizami, Rasheed Ahmad Siddiqi, Hadi Hassan, Nazir Ahmad, DP Mukherjee and A Bose etc.

At the time when Professor AM Khan had returned to Aligarh from the USA, the Department of Botany had some excellent teachers, but it had not accomplished much in research. In reality, it is he who had initiated the traditions of research in the Department particularly on certain aspects of Plant Pathology. The first five students who obtained the PhD degrees in Botany were all his research scholars. He had also initiated some work on the etiology of whip-smut of sugarcane; anthracnose disease of several other crops; rust of maize and oats as also some bacterial and viral diseases of pulse crops. He carried out work on the powdery mildew disease of cucurbits caused by some fungi that resulted into heavy losses to this crop. Professor Khan found that both these seldom produce a perfect stage in nature as studies conducted in growth chambers at low temperatures and low humidity showed that it favoured production of a perfect stage. Through this finding, Professor Khan was able to demonstrate that a perfect stage in nature is rarely produced in the plains. He and his group of students tested all varieties of cultivated cucurbits and identified the sources of resistance against the powdery mildew disease. Impressed with the research work carried out by Professor Khan and his co-workers, the university authorities sanctioned him money for the construction of a world class glass-house

in the Department of Botany for conducting further advanced research work in Plant Pathology. This glass-house had Wisconsin type of controlled temperature facilities, something which even today is extremely rare in many institutions in India. The foundation of this glass-house was laid by Dr. Zakir Hussain himself and it was intact until the year 2006 when it was unfortunately decided by the Department to raise it to the ground in order to make way for the construction of a Committee Room for the staff of the Department of Botany. An important facility and a landmark of the University thus suddenly disappeared which many from the older generations of AMU had always remembered.

During the period when Dr Khan joined Aligarh, upon his return from USA, research in the area allied to Plant Pathology, namely Plant Nematology, was making much news in the Europe and USA. Being at Minnesota, Professor Khan would surely have been very well aware of this new and emerging field of study. As he was deeply focused on his own area of research possibly he did not venture into this field until the accomplishment of his PhD work. Once he was back in the Department of Botany at AMU, he had the time and possibility of taking up research work in this area as well. The nematodes inhabiting soil, attack plants thereby causing extensive damage to their roots. Some species may even invade the aerial parts inflicting more damage and limiting the agricultural productivity to a great extent. The symptoms of nematode diseases are incidentally not much different from the diseases caused by other plant pathogens such as bacteria, fungi and viruses. Many times the nematodes may act together with these organisms as well. The plant pathologists, parasitologists, helminthologists, entomologists, agricultural scientists and others had all become keenly interested in 1950's in studying nematodes. Dr AM Khan from the Department of Botany and Professor MA Basir from the Department of Zoology emerged as the leading scientists in the field of Nematology in India.

SCIENTIFIC CONTRIBUTIONS

Professor Khan, his colleagues and students in Botany made significant contributions on several aspects of Nematology. These include investigations on the effects of organic amendments to the soil for controlling plant-parasitic nematodes, fungus-nematode and nematode-nematode interactions, crop-rotation trials, population dynamics of nematode parasites under various cropping patterns, nutritional status of host plants in relation to disease development caused by nematodes. The group led by Dr Khan in the Department of Botany did commendable work on the pathogenecity and disease potential of several species of plant-parasitic nematodes. Further, they also studied the morphometric variations in nematodes under different ecological stresses besides routine surveys that were carried out extensively to assess the distribution and population levels of nematodes in different parts of India particularly in the northern state of India, namely Uttar Pradesh. This work led to the description of a number of new species and some

genera of nematodes by his group. This resulted in the publication of many research papers and articles in Indian Journals and some in the foreign as well. Their work has been cited in some books and other Nematology publications. In spite of the fact that he gave more attention to his "second love" Plant Nematology, instead of his "first love" Plant Pathology, he still maintained deep interest in disease causing fungi. He and his co-workers made some commendable contributions on powdery mildew disease of cucurbits and also those of smut fungi. Their publications on powdery mildew of cucurbits did generate some interest in this area of research in different Plant Pathological laboratories. Their work on the complexes involving nematodes and parasitic fungi was initiated in the 1970s. It was observed that the loss was more severe when caused by either of the pathogens alone. In complex involving root-knot nematodes and *Rhizobium* sp. on *Phaseolus*, it was observed that the presence of root-nodule bacterium mitigated ill effects of the nematodes.

Professor Khan while studying the effects of concomitant inoculation between the three categories of nematodes, namely endoparasitic, semi-endoparasitic and ectoparasitic, inoculated tomato seedlings with four different populations of each nematode types. He observed that the rate of increase in population and dry weight of plants declined with an increase in inoculum levels and there was a tendency for the production of more males. In concomitant inoculation of *Meloidogyne incognita* and *Rotylenchus reniformis*, the populations of both nematodes was suppressed at all combinations that were used. The highest decrease was observed in root-knot as compared to the reniform nematodes. Similar suppression was noticed in *R. reniformis* and *Tylenchorhynchus brassicae* as compared to root-knot and stunt nematodes in all the combinations. Marked increase of males of root-knot and reniform nematodes was noticed in concomitant inoculations as against mono-specific inoculations. The production of males in mono-specific inoculation and in combination of *T. brassicae* did not, however, show much change. He found that rotations in the sequence of eggplant-chilli-tomato; okra-chilli-chilli; okra-tomato-chilli, enhanced root-knot populations. Rotation with Tagetus and other members of Compositae and non-host crops is highly effective in reducing the population levels of majority of the plant-parasitic nematodes.

For controlling plant-parasitic nematodes with chemicals (nematicides), Professor Khan made use of the University Farm at old Scindia Fort. He set up experiments at several other locations on farmers' fields in the districts of Aligarh and Bulandshahar. Different nematicides were used in these experiments which were meant to show the farming community that the species of nematodes are responsible for decrease in the crop productivity which was directly related to the income of the farmers. This was the best way to convince them of the losses due to plant-parasitic nematodes. It was largely due to this convincing type of evidence shown to the farmers that they agreed to allow Professor Khan to use their fields for carrying out his trials. All this helped in the disease management due to nematodes in various crops in Western UP. The best result that he obtained were by using the

nematicide, DD. Seedlings, raised in beds treated with nematicides and later transplanted to naturally infested fields remained relatively free from the attack of nematodes. Professor Khan also found out that foliar and bare root dip applications of some systemic nematicides inhibited the root-knot development on all vegetable crops that he had tested. However, in view of the high cost, pollution hazards and difficulties involved in their application by the farmers, this programme was ultimately abandoned by Dr Khan. Instead, the application of organic amendments in the form of residues, stable dung, green manure, different kinds of oil-cakes, viz. neem, groundnut, castor, mustard, mahua, etc., were recommended to the farmers, as their efficacy for controlling plant-parasitic nematodes was already well established.

In order to further reduce the cost of application, Professor Khan used oil-cakes mixed with inorganic fertilizers. Such mixtures proved to be equally effective in controlling nematodes. Water soluble fractions of oil-cakes and deoiled-cakes were toxic to a variety of nematodes. Their chemical analyses proved that they contained phenols hydroquinones, ketones, aldehydes, etc. Hydroquinones and phenol related compounds were toxic *in vitro*, pre-and post-inoculation. The dipping of roots in hydroquinones suppressed the population levels of juveniles of root-knot as well as other nematodes. The effect of several phenolic compounds was also tested by his group of researchers. The compounds which had OH group at para- or ortho-positions proved to be more toxic to nematodes than those having OH group at meta-position.

Professor Khan in 1960 approached the Colombo Plan Authorities to depute some eminent nematologist to AMU so as to enable the university to carry out its research work in this discipline on more organized and advanced scientific lines. As a result of this request, Dr FGW Jones, Head of Nematology Department of the Rothamsted Experimental Station, United Kingdom came to Aligarh in 1961. During his stay in Aligarh for about a month, Dr Jones helped the Departments of Botany and Zoology in reshaping their existing infrastructural facilities in Nematology on modern lines as per the then prevailing standards. He was also able to redefine and reshape the future research programmes of these two very important Departments of the Faculty of Science. Young and emerging scientists like, MR Siddiqi, MS Jairajpuri, E Khan, SI Husain and some others were greatly benefited by this help. These scientists themselves became important world leaders in Nematology in due course of time. In 1964, again in response to Professor Khan's request the Rockefeller Foundation agreed to finance an International Nematology Course at IARI in which some very distinguished nematologists of that period, namely, Dr DJ Raski from the Department of Nematology, University of California, Davis, USA. Drs FGW Jones and JB Goodey from the Rothamsted Experimental Station, Harpenden, UK participated. The course was jointly sponsored by the Aligarh Muslim University and the Indian Agricultural Research Institute, New Delhi. It was also a great success indeed and a very positive step towards the development of Nematology in India.

In 1963, the Rockefeller Foundation awarded a travel grant to Professor Khan to visit important centres of research in Plant Nematology in Europe and the USA. After visiting the nematological laboratories in UK, Belgium and the Netherlands in Europe, he proceeded to the United States and visited several Universities such as Cornell, Yale, Rhode Island, North Carolina, Florida, Wisconsin, Minnesota, the three campuses of University of California and the University of Hawaii. He spent about a month at Beltsville, Maryland. During the course of his visit, he acquainted himself with all that was required to promote nematological research in India in general and Aligarh in particular.

While Professor Khan was in the Netherlands, he made a request to Dr Oostenbrink, the then Leader and Head of Nematology Laboratories in the State Agricultural University, Wageningen to run an Advance Nematology Course in India like the one he was having in his own institution. On coming back to Aligarh from his trip, he invited Dr Oostenbrink to visit Aligarh. His visit was materialized through the grant sanctioned by the University Grants Commission. While Dr Oostenbrink was in India, he agreed to the request made to him earlier by Professor Khan. Ultimately a contract was signed between the two Governments to run, South-East Asia Postgraduate Nematology Courses for promoting Nematology in India and South-East Asian countries. The Dutch Government not only provided equipments costing several lakhs of rupees and scholarships to foreign participants, but also lent the services of Dr M Oostenbrink, Mr JA van Berkum, JJ's Jacob for the first course which was held in 1967. In all, seven such courses were held in which large number of in-service Indian and South-East Asian scientists were trained and many of them today happen to be heading Nematology in different Agricultural Universities of their countries.

AWARDS AND HONOURS

Dr. Khan was elected Member/Fellow of several learned Societies/Academies including the Indian National Science Academy (INSA) at New Delhi. He was also elected as the First President of the Nematological Society of India as also that of the Society for the Advancement of Botany. He served as the Chairman of the ICAR Panel on Nematology for many years. In recognition of his commendable contributions to Nematology, he was awarded the Rafi Ahmad Kidwai Memorial Prize for the biennium 1968-69 and 1970-71. Professor Khan served as the Sectional President of Agricultural Sciences Section during the 71st session of the Indian Science Congress. He delivered the XVIII Mundukut Memorial Award Lecture that was organized by the Indian Phytopathological Society. The Haryana Agricultural University in Hisar also honoured him for his services to Plant Nematology.

Professor Khan was Chief Investigator of several research projects funded by the various R & D agencies, like ICAR, CSIR, UGC and PL-480 funds of USA. Some of the major projects that he had successfully handled are "Studies on plant-parasitic nematodes associated with vegetables crops in Uttar Pradesh"; "Control of diseases

caused by nematodes by the application of oilcakes, manures"; "Studies on powdery mildew resistance in cucurbits" (all these three were financed by the PL-480 funds of USDA) and "Nematode pests of crops and their control" which was an ICAR coordinated research project.

He was a very widely travelled nematologist. Professor Khan visited many different leading Plant Nematology laboratories in Germany, United Kingdom, the Netherlands, Belgium, USA and Canada. He also arranged visits of many eminent nematologists of the world to Aligarh and maintained enduring relationship with them. Professor Khan participated in several international conferences and symposia. Besides his academic involvements and pre-occupations, Professor Khan was also engaged in corporate life of AMU. He was Vice-Chairman and Secretary of the Games Committee of AMU for many years. During his student life he was awarded colours of the University in cricket and tennis. He was the Vice-President of the UP Cricket Association for well over a decade. Professor Khan had served as Provost of the Sir Ross Masood hall, etc.

AS A PERSON

Professor Khan had a pleasant personality. His friendly gestures and sense of humour left abiding impact on one and all who happened to meet him. He had inspired and moulded a generation of students. His work and efforts in the field of Plant Nematology will serve as a stimulus for greater efforts and excellence in research in future. A number of students qualified for the award of PhD degrees under his guidance. He along with his students had published a very large number of research papers in journals of repute.

LAST DAYS

In the last two-three years of his life, he suffered from an attack of Alzheimer's. When he breathed his last, he had become very weak and suffered a stroke. He attained an age of 86 years upon his death on 9th of December 2004. He is survived by his wife and five children, two sons and three daughters. His elder son, Dr Absar M Khan is a Professor of Entomology in AMU and presently the Chairman of the Zoology Department and the Dean of Faculty of Life Sciences.

Residence:
3/95 Lal Diggi Road
Aligarh-202 002 (UP)

M SHAMIM JAIRAJPURI, FNA
INSA Senior Scientist
Department of Zoology
Aligarh Muslim University
Aligarh-202 002 (UP) India
E-mail: jairajpurims@gmail.com

BIBLIOGRAPHY

1950 Temperature and development of *Rhizoctonia solani* on legumes *Phytopathology (Abst)* **40** 14

1952 Temperature and development of stem rust *Proc Indian Science Congress (Abst)*

– (With KERNKAMP MF *et al.*) Investigation on physiological specialization and parasitism of *Rhizoctonia solani Kuhn Univ Minn Agr Exp Sta Tech Bull* **200**

– (With MAHMOOD K) A new disease of *Bougainvillea speotabiles Proc Nat Acad Sci*

1953 (With MAHMOOD K) Pathogenicity test of recommended wheat varieties against *Helminthosporium sativum Proc Nat Acad Sci*

– (With MAHMOOD K) Varietal resistance of barley against stripe disease fungus *Helminthosporium gramineum Proc Nat Acad Sci*

1954 Hydrogen ion concentration and pathogenicity of *Rhizoctonia* on soybeans and peas *Proc Ind Sci Cong (Abst)*

1955 Apple sab in Kashmir Symposium on High Altitude Research (Abst)

1956 (With ALI K) Physiologic specialization in *Colletotrichum graminicolum Ces Wils Proc Ind Sci Congr*

– (With SIDDIQI MA) Preliminary tests of wheat and barley varieties against *Helminthosporium sativum Proc Ind Sci Cong (Abst)*

– (With SIDDIQI MA) Studies on wheat varieties for resistance against *Helminthosporium sativum Proc Ind Sci Congr (Abst)*

– (With SIDDIQI MA) Studies on varietal resistance of barley varieties against *Helminthosporium sativum* in field *Proc Ind Sci Cong (Abst)*

– (With FAROOQI MH) Indirect germination of conidia in *Perocospora trifolierum Proc Ind Sci Congr (Abst)*

1957 (With SAXENA SK) Preliminary studies on the physiology of monosporidial lines of *Ustaligo scitaminea Syd Proc All India Sugarcane Workshop Conf* 368-374

1958 (With SAXENA SK) Factors affecting the spore germination of *Ustaligo scitaminea Syd Proc Ind Sci Cong p 50 (late Abst)*

1959 (With SAXENA SK) Presence of mycelium of sugarcane smut in cases infected with *Ustaligo scitaminea Syd Proc Ind Sci Cong* p 33 (late Abst)

– (With AHMAD ASAD) Studies on susceptibility of common weeds to root knot nematode *Meloidogyne incognita Proc Ind Sci Cong* p 35 (late Abst)

1960 (With AHMAD ASAD) The attractiveness of plants to root knot nematode *Meloidoygne incognita* I-Excised roots of vegetable seedlings *Proc Ind Sci Cong* p 27 (late Abst)

– (With AHMAD ASAD) The attractiveness of plants to root knot nematode *Meloidoygne incognita* II-Excised roots of ornamental plants *Proc Ind Sci Cong* p 27 (late Abst)

– (With AHMAD ASAD) The attractiveness of plants to root knot nematode *Meloidoygne incognita* III-Excised roots of some weeds *Proc Ind Sci Cong* p 28 (late Abst)

– (With AHMAD ASAD) The attractiveness of plants to root knot nematode *Meloidoygne incognita* IV-Excised roots of tobacco *Proc Ind Sci Cong* p 28 (late Abst)

1960 (With AHMAD ASAD) The influence of temperature and hydrogen ion concentration on larval hatching in Javanese root knot nematode *Meloidoygne javanica Proc Ind Sci Cong* 01 29 (late Abst)

– (With AHMAD ASAD) Further studies on susceptibility of common weeds to root knot nematode *Meloidoygne incognita Proc Ind Sci Cong* p 29

– (With SAXENA SK) Effect of relative humidity on germination of Chlamydospores of *Ustilago scitaminea Syd Proc Ind Sci Cong (Abst)*

– (With SAXENA SK) Effect of different concentrations of agar, glucose and sucrose on germination of chlamydospores of *Ustaligo scitanea* and their volume *Proc All India Conf of Sugarcane Workers (Sugarcane Pathology)* 23-26

– (With SAXENA SK) Effect of free water on chlamydospore germination of *Ustaligo scitaminea* Syd and their Volume *Proc All India Conf of Sugarcane Workers (Sugarcane pathology)* 27-28

– (With GHOUSE AKM) The influence of different carbon sources on the rate of growth of *Colletotrichum falcatum Proc Ind Sci Cong* (late Abst) p 26

– (With GHOUSE AKM) Hydrogen-ion concentration in relation to Nitrogen utilization by *Colletotrichum falcatum Proc Ind Sci Cong* p 27 (late Abst)

1961 (With AHMAD ASAD) Hatching stimulation of root-knot nematode *Meloidogyne incognita* I Effect of root diffusates *Proc Ind Sci Cong (A'st)* p 503

– (With AHMAD ASAD) Hatching stimulation of root-knot nematode *Meloidogyne incognita* II Effect of some carbohydrates *Proc Ind Sci Cong (Abst)* p 503

– (With AHMAD ASAD) Hatching stimulation of root knot nematode *Meloidogyne incognita* III Effect of some amino acids *Proc Ind Sci Cong* p 503 (Abst)

– (With AHMAD ASAD) Hatching stimulation of root knot nematode *Meloidogyne incognita* IV Effect of some vitamins and plant growth substances *Proc Ind Sci Cong* p 504 (Abst)

1962 (With SAXENA SK) Effect of bud diffusates on germination of Chlamydospores of *Ustilago scitaminea Syd Proc Ind Sci Cong (Abst)* p 479

– (With SIDDIQI JA and SIDDIQI MR) On the occurrence of *Longidorus elongates* (De Man, 1876) Thorne and Swanger 1936, associated with roots of *Tamarindus indica* L in Northern India *Current Science* **31** 339-340

– (With SIDDIQI MA) Fungal population in the soil and on the roots of sugarcane *Ind Jr Sugarcane Res & Dev* 176-178

1963 (With SAXENA SK) Studies on sugarcane smut caused by *Ustilago scitaminea Syd* I Effect of temperature on spore germination *Jr Ind Bot Soc* 195-203

– (With GHOUSE AKM) Vitamin requirements of *Colletotrichum* spp on germinaceous host *Ind Jr Expt Biology* 217-220

1964 (With AHMAD ASAD) Factors influencing larval hatching in the root knot nematode *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood, 1949 and *M javanica* (Treub, 1885) Chitwood 1949 I Effect of temperature and hydrogen-ion concentration *Indian Phytopathology* 98-101

– (With AHMAD ASAD) Factors influencing larval hatching in the root knot nematode *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood 1949 II Effect of root leachates and certain chemicals *Indian Phytopathology* 102-109

1964 (With AHMAD ASAD)Attractiveness of excised roots of plants to root knot nematode *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood *Indian Jr Experimental Biol* 209-210

– (With SAXENA SK) Studies on sugarcane smut caused by *Ustilago scitaminea* Syd II Effect of relative humidity on spore germination *Jr Ind Bot Soc* 61-68

– (With SAXENA SK) Effect of temperature and relative humidity on the viability of chlamydospores of *Ustilago scitaminea* Syd *Ind Sug Jr* 55-56

– List of stylet-bearing nematodes reported from India I Aligarh Muslim University *Nematology Publ* No **1**

– (With SAXENA SK) Effect of temperature on the development of ear-cockle disease of wheat and reaction of sixteen varieties of wheat to *Anguini tritici* (Steinbuch 1799) Filipjev 1936 labdev *JS Tech* 238-239

– (With SAXENA SK) Effect of exposure to sunlight on the viability of chlamydospores of *UStilago scitaminea* Syd *All India Conf Sug*

– (With ADHAMI AZRA) Seasonal fluctuation in population of *Hoplolaimus* sp *Helicotylenchus* sp and *Hemicriconemoides* sp in mango orchards *Proc Ind Sci Cong Pt II (Abst)*

1965 (With HUSAIN S ISRAR) A new genus and six new species of Nematodes from India belonging to the family Neotylenchidae with an amendation of the sub family Ecphyadophorinae *Proc Helm Soc Wash* **32(1)** 7-15

– (With HUSAIN S ISRAR) On *Rotylenchulus stakmani* n sp with a key to the species of the genus (Nematoda: Tylenchida) *Proc Helm Soc Wash* **32(1)** 21-23

– (With HUSAIN S ISRAR) A new genus and two new species of Nematodes from India belonging to the family Dorylaimidae with an amendation of the sub family Nordianae *Proc Helm Soc Wash* **32(1)** 49-52

– (With HUSAIN S ISRAR) *Tylencholaimellus thornei* n sp (Dorylaimoidea: Leptonchidae) from India *Proc Helm Soc Wash* **32(1)** 75-77

– *Heterodera mothi* n sp (*Tylenchida: Heteroderidae*) parasitizing *Cyperus rotundus* L ay Aligarh U.P. India *nematologica* **11(2)** 67-72

– (With HUSAIN S ISRAR) Four new species of genus *Diphtherophora* de man 1880 (Nematoda: Diphtherophoridae) with a key to the species of the genus *Proc Helm Soc Wash* **32(2)**

– (With HUSAIN S ISRAR) *Seinura nagini* n sp (Nematoda: Aphelenchoidae) from North India *Proc Helm Soc Wash* **32(2)**

– (With HUSAIN S ISRAR) Two new species of *Boleodorus* Thorne 1941 (Nematoda: Neotylenchidae) from North India *Proc Helm Soc Wash* **32(2)**

1966 (With SAXENA SK and others) Effect of different oilcakes on hatching of larvae and on the development of root knot caused by *Meloidogyne incognita* (Kofoid & White) Chitwood *Intl Sym Plant Patho*

– (With SAXENA SK and others) Efficacy of DD for the control of root knot nematode *Meloidogyne incognita* (Kofoid & White) Chitwood *All India Seminar on Entomology*

1967 (With HUSAIN S ISRAR) A new sub-family, a new sub-genus and eight new species of nematodes from India belonging to the family Tylenchidae *Proc Helm Soc Wash* **34(2)**

1967 (With HUSAIN S ISRAR) On the status of the genera of the superfamily Aphelenchoidea (Fuchs 1937) Thorne 1949 with the description of six new species of nematodes from India *Proc Helm Soc Wash* **34(2)**

– (With HUSAIN S ISRAR) Four new species of nematodes belonging to the family Diphtherophoridae from North India *Nematologica* **13(1)** 43-48

– (With HUSAIN S ISRAR) Four new species of Dorylaqimellus Cobb 1913 (Nematoda: Belondiroidea) from North India *Nematologica* **13(1)** 49-55

– (With SIDDIQI MR) Studies on genus *Hirschmaniella* Luc & Goodey 1963 (Nematoda: Pratylenchidae) with description of two new species and a redescription of *H mucronata* Das 1960 ***Proc Helm Soc Wash*** (in press)

– *Aphelenchoides aligarhiensis* n sp and ***Seinura propora*** (Nematoda: Aphelenchoididae) from North India ***Nematologica***

– *Paurodontella minuta* n gen n sp of nematodes from North India (Nematoda: Neotylenchidae) ***Nematologica*** **13** 493-500

– *Ecphyadophoroides graminis* n sp and two new species of *Ecphyadophora* (Nematoda: *Ecphydophorinae*) from North India *Nematologica* **14** 377-384

– Factors influencing larval hatching in the root knot nematode *Meloidogyne incognita* (Kofoid and White) III Effect of different concentrations of amino acids and carbohydrates and different dilutions of okra root leachate ***Indian Phytopathology*** **21** 62-65

– Influence of organic amendments on plan parasitic nematodes International Congress of Plant Pathology, London

– *Basirotyleptus modestus* n sp and two new species of *Dorylaimoides* Thorne and Swanger 1936 (Nematoda: Dorylaimida) from North India *Nematologica* **14** 362-368

– Three new species of *Nothotylenchus* Thorne 1941 (Nematoda: Neotylenchidae) from India ***Nematologica*** **14**

– (With VERMA VS and RAYCHAUDHURI SP) Properties and nature of inhibitors of potato virus in four medicinal plant extracts (*Biologica Plantarum Czech)* **11(5)** 384-387

– Host parasite interaction of root knot nematode and *Lycopersicon pimpinellifolium All India Nem Sym* p 4

– Reaction of certain economically important plants to *Rotylenchulus reniformis All India Nem Sym* p 8

– Relationship of root knot wilt of okra caused by *Fusarium oxysporum* var *lycopersici All India Nem Sym* p 9

– Seasonal fluctuation in population of *Heterodera mothi All India Nem Sym* p 20

– Effect of soil moisture on nematode population *All India Nem Sym* p 35

– Effect of host nutrition on the development of root knot on okra *All India Nem Sym* p 35

1969 Studies on pre-embryonic development of reniform nematode *Rotylenchulus reniformis All India Nem Sym* p 37

– Effect of treating the seed beds with DD, Vapam, Solvirex, Nemaphos, Thimet G and Roger G on the growth of seedlings of differnt vegetables and nematode population *All India Nem Sy* p 52

1969 Population changes of *Tylenchorhynchus brassicae* in relation to cropping sequences in the field *All India Nem Sym* p 56

– Relative susceptibility of different vegetables and ornamentals to *Tylenchorhynchus brassicae All India Nem Sym* p 63

– Effect of organic amendments on the population of nematodes and fungi in the rhizosphere of eggplant *All India Nem Sym* p 67

– Effect of organic amendments on the population of rhizosphere fungi and nematodes around the roots of some fruit trees *All India Nem Sym* p 68

– Studies on the cucurbit powdery mildew I Perithecial production in cucurbit powdery mildew in Northern India *Ind Phytopathology* **23** 497-502

– (With VERMA VS and RAYCHAUDHURI SP) Effect of medicinal plant extracts on the infectivity of potato virus *Planta Medica* **18(2)** 177-184

– Response of different varieties of tomato and cucurbits to root knot *Meloidogyne incognita Indian Phytopathology* **24** 197-199

– Efficacy of *Tagetes erecta* in reductive root infesting nematodes of tomato and okra *Indian Phytopathology* **24** 166-169

– Studies on soil fungi in sugarcane fields I *J Indian Bot Soc* **50** 153-156

– Interaction of *Rhizoctonia solani* and *Tylenchorhynchus brassicae* in pre-emergence damping off of cauliflower *Ind J Nematol* **1** 85-86

– Soil biota as influenced by application of plant residues *2nd Intl Sym on Plant Pathology, Delhi*

– Status of cucurbit powdery mildew in India *Proc Second International Symp on Plant Pathology, Delhi,* 144-145

– (With KHAN WAJID M and SAXENA SK) Influence of certain oilcake amendments on nematodes of fungi in tomato *Proc Indian Sci Cong Abst* p 59

– (With KHAN WAJID M and SAXENA SK) Fungi and nematodes in vegetable fields with different cropping patterns *Indian Phytopathology* **26** 303-309

– (With SIDDIQUI ZA and SAXENA SK) Host trange and varietal resistance of certain crucifers against *Tylenchorhynchus brassicae Indian Phytopathology* **25** 275-281

– (With KHAN WAJID M and AKRAM M) Perithecial stage of certain powdery mildews including sone new records *Indian Phytopathology* **25** 220-223

– (With UPADHYAY RS and OOSTENBRINK M) Effect of different soil types on the density of nematode populations *Indian J Nematol* **2** 42-53

– (With FASAHAT ALI KHAN) Studies on distribution and population of *Longidorus brevicaudatus, Xiphinema basiri* and *X americanum* in Uttar Pradesh and Rajasthan with description of *Longidorous psidii* n sp (Nematoda: Dorylaimoidea) *Indian Phytopathology* **25** 269-274

1971 (With SIDDIQUI ZA and SAXENA SK) Studies on *Tylenchorhynchus brassicae* II Effect of temperature and moisture on multiplication of nematodes *Indian Phytopathology* **26** 139-147

– (With KHAN WAJID M and SAXENA SK) The fungi and nematodes associated with roots of cauliflower *Indian Phytopath* **26** 303-309

1971 (With UPADHYAY RS and SAXENA SK) Multiplication of nematodes around the roots of castor in autoclaved and naturally infested soil *Indian J Nematol* **2** 121-193

– (With UPADHYAY RS and SAXENA SK) Studies on the effect of different levels of certain elements on the development of root knot I Effect of NPK levels on growth of okra and root knot development *Indian J Nematol* **2** 35-41

– (With ALAM MM and SAXENA SK) A new device for rapid picking up of nematodes from mixed population in aqueous suspension *Indian J Nematol* **2** 79-80

– (With ALI K and AHMAD A) Host parasite interaction and the influence of mineral deficiencies on severity of seedling blight caused by *Colletotrichum* spp on sorghum *International Symposium on Plant Pathology*

– Studies on soil fungi in sugarcane fields I *Indian Phytopath* pp 323

– Influence of certain oilcake amendments on nematodes and fungi in tomato fields *Acta Bot Indica* **1** 49-54

– Effect of certain inorganic fertilizers on survival of nematodes in the absence of host *Proc Indian Sci Cong Abst* 66

– Effect of soil moisture on nematode population in the presence and absence of host plant *Proc Indian Sci Cong Abst* p 66

– Control of root knot nematode on eggplant and okra with Vydate oxamyl *Proc Indian Sci Cong Abst* p 66

– Inhibitory effect of water soluble fractions of certain oilcakes and alkaloids of neem on the growth of some fungi *Proc Indian Sci Cong Abst* p 8

– Mechanism of the control of plant parasitic nematodes as a result of their application of oilcakes to the soil I *Indian J Nematol* **Vol 4**

– Efficacy of vydate oxamyl for the control of root knot nematode on eggplant and okra *Indian J Nematol* **Vol 4**

– Control of root knot nematode *M incognita* (Kofoid & White) Chitwood on tomato and eggplant with VC-13 and Basamid liquid as bare root dip *Indian J Nematol* **Vol 4**

– Some new host records of root knot nematode *Meloidogyne incognita* (Kofoid and White) Chitwood *Indian J Nematol* **Vol 4**

– Reaction of some cultivated varieties of eggplant and pepper and okra to the root knot nematode *Meloidogyne incognita* (Kofoid & White) Chitwood *Indian J Nematol* **4** 64-68

– Perithecial stage of certain powdery mildews including some new records *Indian Phytopath* **26** 698-700

– (With RASHID A) Two new species of *Helicotylenchus* steiner 1945 (Nematoda: Hoplolaiminae) from North India (Abst) 59th Proceedings *Indian Sci Cong* p 595-596

– (With RASHID A) Two new species of the genus *Helicotylenchus* steiner 1945 from India with a redescription of *H solani* Rashid 1972 (Nematoda: Hoplolaiminae) *Indian J Nematol* **2** 123-128

1974 (With RASHID A) Two new species in the sub family Hoplolaiminae Filipjev 1934 from North India *Indian J Nematol* **3** 50-53

– (With RASHID A and KHAN FASAHAT A) Plant parasitic nematodes associated with fruits, vegetables, cereals and other crops in North India I Uttar Pradesh *Indian J Nematol* **3** 8-23

1974 Cultural and nutritional studies of cauliflower isolate of *Rhizoctonia solani Indian Phytopath* **26** 447-455

– Studies on crown rust of oats I Inhibition of uredospore germination in aqueous leaf extracts *Indian Phytopath* **26** 739-740

1978 (With HASEEB A, SINGH BP and SAXENA SK) Evaluation of nematicidal properties in certain alkaloid bearing plants *Geobios* **5:** 116-118

– (With HASEEB A, ALAM MM and SAXENA SK) Nematode population as influenced by soil amendments *Geobios* **5:** 152-155 (India)

– (With HASEEB A, KHAN AH, REHMAN R and SAXENA SK) Population changes in some stylet bearing nematodes associated with four different perennial ornamentals *Acta Bot Indica* (Suppl) **6:** 81-83 (India)

– (With HASEEB A and SAXENA SK) Studies on the histochemical changes induced by the root-knot nematode in tomato *Indian Journal of Nematology* **8** 81-82 (India)

– (With HASEEB A and SAXENA SK) Effect of extracts of certain plants on mortality of plant parasitic nematodes *Proc 65th Sess Ind Sci Cong Sec Bot* p 19-20 (Abst)

– (With HASEEB A and SAXENA SK) Studies on the histochemical changes induced by the root-knot nematodes in Cock's Comb *Proc 65th Sess Cong Sec Bot* p 20 (Abst)

– (With HASEEB A and SAXENA SK) Effect of amending the soil with chopped leaves of certain plants on population of soil nematodes *Proc 65th Sess Cong Sec Bot* p 71 (Abst)

– (With HASEEB A and SAXENA SK) Effect of amending the soil with chopped flowers of certain plants on population of soil nematodes *Proc 65th Sess Ind Sci Cong Sec Bot* p 72-73 (Abst)

– (With HASEEB A and SAXENA SK) Population fluctuations in plant parasitic nematodes around some perennial ornamentals *Proc Symp Adv Front Plant Biol* p 59 (Abst)

– (With HASEEB A and SAXENA SK) Studies on the histochemical changes induced by the root-knot nematodes in eggplant Proc All Ind Symp Physiol Parasitism Jabalpur P 35 (Abst)

1979 (With HASEEB A and SAXENA SK) Studies on histochemical changes induced by the root-knot nematode in Cock's Comb Physiol Host-Pathogen Interaction Ed A Mahadevan Todays and Tomorrow's Printers New Delhi pp 195-198 (India

– (With HASEEB A and SAXENA SK) Influence of root-knot nematode *Meloidogyne incognita* in extracts of certain alkaloid bearing plants Proc 2nd nat Conf Parasitol Banaras Hindu University Varanasi P 44 (Abst)

– (With HASEEB A and SAXENA SK) Role of water-soluble fractions of oil cakes on the development of root-knot caused by *Meloidogyne incognita* (Kofoid & White 1891) Chitwood 1949 in tomato Proc 49th Ann Sess Nat Acad Sci India Nagpur P 58 (Abst)

– (With HASEEB A and SAXENA SK) Studies on the histocheical changes induced by the root-knot nematodes on okra Proc 5th Ann Cong Soc Adv Bot Ludhiana P 59 (Abst)

1979 (With HASEEB A and SAXENA SK) Correlation of inoculum densities of the stunt and reniform nematoes with the growth of okra Proc 3rd All Ind Symp Div Biol Gawalior P 17 (Abst)

1980 (With KHAN AH, HASEEB A, REHMAN R and SAXENA SK) Population fluctuations of some nematodes around roots *Geobios* **7** 55-57 (India) 1980

1980 (With HASEEB A and SAXENA SK) Studies on the histochemical changes induced by the root-knot nematode in eggplant *Bangladesh J Bot* **9:** 98-100 (Bangladesh)

– (With HASEEB A and SAXENA SK) Additional host records of the root-knot nematode *Meloidogyne javanica* (Treub) *Chitwood Plant Science* **12:** 48 (India)

1981 (With HASEEB A and SAXENA SK) Effect of certain alkaloid bearing plants on the larval hatching of *Meloidogyne incognita Geobios* **8** 3-5 (India) 1981

– (With HASEEB A and SAXENA SK) Relationship of inoculum density of *Rotylenchulus reniformis* with the growth of chili and final population of the nematode *J Sci Res* **3** 111-112 (India)

– (With HASEEB A and SAXENA SK) Studies on the mortality of nematodes as affected by leaf extracts of certain plants *Proc 8th Ann Conf Soc Adv Bot Chandigarh* P 2 (Abst)

– (With HASEEB A and SAXENA SK) Plant parasitic nematodes associated with different varieties of sugarcane at Aligarh *Proc 51st Ann Sess Nat Acad Sci Cochin* P 39 (Abst)

– (With HASEEB A and SAXENA SK) Some new host records of the root-knot nematodes *Meloidogyne javanica* (Treub 1885) Chitwood 1949 Proc 4th All Ind Symp Env Biol Kurukshetra University, Kurukshetra P 1 (Abst)

– (With HASEEB A and SAXENA SK) Effect of dipping the seedlings of tomato cv Marglobe in different concentrations of culture filtrate of *Rhizoctonia solani* on the growth of plants and the root-knot development *Proc 3rd Int Symp Plant Pathol* Indian Agricultural Research Insitute New Delhi P 256 (Abst)

– (With HASEEB A and SAXENA SK) Toxicity of plant latex to some plant parasitic nematodes *Proc Nat Sem "Strategies on Pest Manage" Indian Agricultural Research Insitute New Delhi* P 34 (Abst)

– (With HASEEB A and SAXENA SK) Control of stunt and reniform nematodes with Bavistin *Proc Nat Sem "Strategies on Pest Manage" Indian Agricultural Research Institute New Delhi* P 34-35 (Abst)

1982 (With HASEEB A and SAXENA SK) Some new host records of the root-knot nematode Meloidogyne javanica (Treub) Chitwood Bangladesh J Bot 11: 79-80 (Bangladesh)

– (With HASEEB A and SAXENA SK) Toxicity of leaf extract of some plants on the root-knot and reniform nematodes *Indian Journal of Parasitology* **6** 119-120 (India)

– (With HASEEB A and SAXENA SK) Studies on the Suitability of fruit trees to certain plant parasitic nematodes *Proc 16th International Symp European Soc Nematologists* St Andrews Scotland P 101-102 (Abst)

– (With HASEEB A and SAXENA SK) Effect of water-soluble fractions of oil cakes on the growth and sclerotial development of the root knot fungus (*Rhizoctonia solani*) *Proc 4th Int Cong Plant Pathol Melbourne Australia* P 147 (Abst)

– (With HASEEB A and SAXENA SK) Effect *of Meloidogyne incognita* and *Rhizoctonia solani* on germination of seeds of eggplant as influenced by soil amendment with oil cakes *Proc 4th Int Cong Plant Pathol Melbourne Australia* P 147 (Abst)

– (With HASEEB A and SAXENA SK) Population changes ot plant parasitic nematodes associated with different varieties of Sugarcane at Aligarh *Proc 69th Sess Ind Sci Cong Sec Bot* p 25 (Abst)

1982 (With HASEEB A and SAXENA SK) Use of dry crop residue for the control of phytophagus nematodes *Proc 5th Ann Conf Parasitol, Aligarh Muslim University* Aligarh P 56 (Abst)

– (With HASEEB A and SAXENA SK) Efficacy of carbendazin for the control of stunt and reniform nematodes *Proc 16th Int Symp European Soc Nematologists St Andrews Scotland* P 10 (Abst)

1983 (With HASEEB A and SAXENA SK) Population of plant parasitic nematodes associated with different varieties of sugarcane *Indian Journal of Agriculture Sciences* **23** 279-281 (India)

– (With HASEEB A and SAXENA SK) Correlation of inoculum densities of the stunt and the reniform nematodes with the growth of okra *Indian Journal of Forestry* **6** 125-126 (India)

– (With HASEEB A and SAXENA SK) Studies on the histochemical changes induced by the root-knot nematode *Meloidogyne incognita* in *Solanum nigrum* root *Indian Journal of Nematology* **13** 113-115 (India)

– (With HASEEB A and SAXENA SK) Additions to the host records of the root-knot nematode *Meloidogyne javanica* (Treub) Chitwood *Indian Journal of Plant Pathology* **1** 209 (India)

– (With HASEEB A and SAXENA SK) Histochemical localization of certain enzymes in the roots of Impatiens balsamina L induced by the root-knot nematode *Meloidogyne incognita* (Kofoid & White) Chitwood *Indian Journal of Mycology Research* **21** 19-22 (India)

– (With HASEEB A and SAXENA SK) Histochemical localization of certain enzymes in the roots of *Coccinia cordifolia* infected with the root-knot nematode *Meloidogyne incognita Indian Phytopath* **37** 536-537 (India)

1984 (With HASEEB A) Histochemical localization of certain enzymes in the roots of Abelmoschus esculentus indced by the *Meloidogyne incognita* In Environment & Biotic Interact Eds AK Dattagupta & RP Maleyvar pp 72-73 Kurukshetra University Press (India)

– (With HASEEB A and ALAM MM) Control of plant parasitic nematodes with chopped plant leaves *Indian Journal of Plant Pathology* **2** 180-181 (India)

– (With HASEEB A and SAXENA SK) Histochemical localization of oxidase peroxidase and legnin in the roots of tomato infected with the root-knot nematode *Meloidogyne incognita Indian Journal of Nematology* **16** 263 (India)