Dr. M. C. KHARKWAL
Principal Scientist
Division of Genetics
Indian Agricultural Research Institute
New Delhi, India
and
Ex-President
Indian Society of Genetics and Plant Breeding

Office Address:
Pulses Research Laboratory
Division of Genetics
Indian Agricultural Research Institute (IARI)
Pusa Campus
New Delhi 110 012, India
Phone: 011-25841138 / 25841481; Cell: 91-09818463269
E-mail: mckharkwal@gmail.com; mckharkwal@yahoo.com

Date and Place of Birth: June 5, 1948 at Champawat, Uttarakhand, India

Academic Qualification: Ph.D. (Botany)

Field of Specialization: Mutation Breeding

EDUCATIONAL QUALIFICATIONS:

Ph.D. (Botany)	:	Agra University, Agra (Place of work: Division of Genetics, Indian Agricultural Research Institute, New Delhi) 1978 on "Comparative Mutagenesis and Cytogenetical Studies in chickpea (*Cicer arietinum* L.)".
M.Sc. (Botany)	:	D.S.B. College, Nainital, Uttarakhand (Agra University, Agra), 1968
B.Sc. (Biology)	:	D.S.B. College, Nainital, Uttarakhand (Agra University, Agra), 1966
Intermediate (Biology)	:	Ranikhet Intermediate College, Ranikhet, Uttarakhand, 1964
High School (Science)	:	Ranikhet Intermediate College, Ranikhet, Uttarakhand, 1962

Foreign Languages Qualifications:

German Language:

Passed High School (1969), Intermediate (1970) in German from U.P. Board, Allahabad, U.P.; Basic Diploma in German (1972) from Goethe Institute, Munich, Germany; and Diploma in German (1981) from Delhi University, Delhi, India.

Russian Language:

Passed Russian Language Elementary Certificate Course (1973) from Post Graduate School, I.A.R.I., New Delhi; Certificate Course (1982) and Diploma (1983) in Russian from Delhi University, Delhi, India.

PROFESSIONAL EXPERIENCE:

1998 – till present	:	Principal Scientist at the Division of Genetics, IARI, New Delhi
1982 – 1998	:	Senior Scientist at the Division of Genetics, IARI, New Delhi
1975 – 1982	:	Scientist at the Division of Genetics, IARI, New Delhi
1970 – 1975	:	Research Assistant at the Division of Genetics, IARI, New Delhi
1969 – 1970	:	Biology Teacher under the Directorate of Education, Delhi

RESEARCH INTERESTS:

A practical plant breeder by training and having forty-long-years research experience of working actively in the fields of the Indian Agricultural Research Institute (IARI), New Delhi on grain legume crops, I am specialized in mutation breeding in pulses crops in general and chickpea (*Cicer arietinum* L.) in particular. My working experience in this crop has been fairly productive. My research interests have primarily been induction of variability in chickpea through physical (gamma rays and fast neutrons) and chemical mutagens (EMS, NMU, MMS and Sodium Azide) in *desi, kabuli* and green seeded types of chickpea, isolate morphological mutants (macro-mutations) and polygenic mutations (micro-mutations), make rigorous selection in various generations to sift out the positive variability to finally develop them into high yielding genotypes after thoroughly testing them in advanced generation replicated station trials along with best available control varieties. Top ranking mutant entries from these station trials were being submitted each year in the All India Coordinated Chickpea Improvement Trials under the BGM series starting from BGM-401 (entered in 1979) to BGM-572 (entered in 2009) to compete against all the entries developed through conventional breeding methods submitted by breeders from all over the country. The four mutant varieties Pusa 408 (Ajay), Pusa 413 (Atul), Pusa 417 (Girnar) and Pusa 547 released from this BGM series of 172 mutant entries contributed by me are briefly described below. During the past few years we have made efforts to study effects of radiation and chemical mutagens on induced variability for nutritional quality characters like protein content and anti-nutritional factors (ANFs) like trypsin inhibitor units and tannins in chickpea. Attempts have also been made to study nodulation characters in chickpea and also conduct diversity analysis of the root nodulation bacteria of chickpea through molecular studies. To study whether these mutational changes are reflected at molecular level, analytical studies of the genome of rhizobia from the root nodules of the M_2 plants were conducted. We used RFLP and PCR techniques for identifying broad molecular variation using specifically designed primers for the gene. Results of the rhizobial diversity studies of root nodules undertaken have revealed that diversity is enhanced significantly in certain chickpea genotypes by radiation, while some genotypes are recalcitrant to change. An up-to-date database of all the mutant varieties developed and released in India is also personally maintained and updated by me.

SIGNIFICANT RESEARCH ATTAINMENTS:

Four induced mutant cultivars of chickpea released by Govt. of India:

First author of the four high yielding and disease resistant chickpea mutant varieties – **Pusa 408** (Ajay), **Pusa 413** (Atul), **Pusa 417** (Girnar) and **Pusa 547 –** the first ever examples of induced micro-mutant varieties in a grain legume crop in the world, developed through mutation breeding, have been released and notified by Central Varieties Release Committee (CVRC), Govt. of India for commercial cultivation by farmers.

1. **Pusa 408 (Ajay):** Released in **1985** for commercial cultivation by farmers, an induced mutant of *desi* var. G-130 through 600 Gy gamma rays, Pusa 408 has superior average yield of 23q/ha and a yield potential of 35 q/ha. It is suitable for normal as well as late plantings, under rainfed and irrigated conditions. Pusa 408 has resistance to Ascochyta blight and Fusarium wilt, stunt virus and collor rot. It shows low incidence of pod borer and nematode damage. Mutant variety released for the states of North West Plains Zone i.e., Punjab, Haryana, Rajasthan, Delhi and Western Uttar Pradesh.

2. **Pusa 413 (Atul):** Released in **1985** for commercial cultivation by farmers, an induced mutant of *desi* var. G-130 through 600 Gy gamma rays, Pusa 413 has superior average yield of 21 q/ha and a yield potential of 35 q/ha. It is suitable for normal as well as late plantings, under rainfed and irrigated conditions. Pusa 413 has resistance to Fusarium wilt and Ascochyta blight, stunt virus, foot rot and root rot. It shows low incidence of pod borer and nematode damage. Mutant variety released for the states of North East Plains Zone i.e., Uttar Pradesh, Bihar, Jharkhand, West Bengal, Orissa and Assam.

3. **Pusa 417 (Girnar):** Released in **1985** for commercial cultivation by farmers, an induced mutant of *desi* var. BG-203 through 600 Gy gamma rays, Pusa 417 has superior average yield of 21q/ha and a yield potential of 35 q/ha. It is suitable for normal as well as late plantings, under rainfed and irrigated conditions. Pusa 417 has high resistance to Fusarium wilt and moderate resistance to Ascochyta blight, stunt virus, collor rot, foot rot and root rot. It shows low incidence of pod borer and nematode damage. Mutant variety released for the states of Central Zone i.e., Madhya Pradesh, Chhattisgarh, Maharashtra, Gujarat, parts of Rajasthan, Uttar Pradesh and Andhra Pradesh.

4. **Pusa 547:** Released in **2006** for commercial cultivation by farmers, an induced mutant of *desi* var. BG-256 through 600 Gy gamma rays, Pusa - 547 has superior average yield of 18 q/ha and a yield potential of 31 q/ha. A golden brown bold seeded (25 g/100 seeds) variety, it is specially suitable for late plantings, under rainfed and irrigated conditions. Pusa - 547 seeds have thin testa and good cooking quality. It has tolerance to Fusarium wilt, stunt virus and root rot. It shows low incidence of pod borer damage. Mutant variety released for late sown conditions in the states of North West Plains Zone i.e., Punjab, Haryana, Rajasthan, Delhi and Western Uttar Pradesh.

MUTANTS CONTRIBUTED IN THE ALL INDIA COORDINATED TRIALS:

Induced mutant genotypes of chickpea developed and contributed in the All India Coordinated Chickpea Improvement Programme during the last thirty years:

One hundred seventy two chickpea mutant genotype entries developed from my project on mutation breeding in the Division of Genetics, IARI, New Delhi starting from **BGM-401 (*desi* type)** entered in 1979 to **BGM-572 (*desi* type)** entered in 2009 have been contributed **for testing in All India Coordinated Chickpea Trials**. These chickpea entries included 123 *desi* (reddish brown) types, 37 *kabuli* (salmon white) types and 12 green seeded types. Besides the four mutant cultivars (Pusa 408, Pusa 413, Pusa 417 and Pusa 547) released by Govt. of India for farmers cultivation, several other mutant entries from this Project i.e. BGM-405 (*desi*), BGM-418 (*desi*), BGM-425 (*desi*), BGM-429 (*kabuli*), BGM-430 (*kabuli*), BGM-448 (*kabuli*), BGM-456 (green seeded), BGM-505 (*desi*) possessing high yield, disease resistance and other desirable seed quality characters performed well in various zones to be among the varieties better than the checks during their testing years in All India Coordinated Trials and got promoted to Advanced Varietal Trials (AVT – 1 and AVT – 2) and also proposed for identification.

SEED PRODUCTION PROGRAMME OF MUTANT VARIETIES:

State Farms Corporation of India (SFCI), National Seeds Corporation (NSC) and other State Seed Production Agencies have taken up breeder seed production of the newly released chickpea mutant varieties in large scale. Among the released chickpea varieties Pusa-547, the latest released mutant variety with very attractive golden brown bold grains (25 g/100 grains) was taken up in a big way by the State Farms Corporation of India for breeder and foundation seed production at its Hisar (Haryana), Suratgargh (Rajasthan), Sardargarh (Rajasthan) and Jaitsar (Rajasthan) farms during *rabi* 2008-2009. Pusa 547 has again received the largest indent (120 Quintals) among all the chickpea varieties from the Department of Agriculture and Cooperation, Govt. of India for production of breeder seed during *rabi* 2009-2010.

PROJECT MANAGEMENT:

In House Research Project:

A Project Leader in the Division of Genetics, Indian Agricultural Research Institute, (I.A.R.I.) since last **36 years**, currently leading a Project on “Creating genetic variability through induced mutations in pulse crops”.

Externally Funded Research Projects:

I. Principal Investigator of the Department of Atomic Energy (DAE) / Board of Research on Nuclear Sciences (BRNS), Bhabha Atomic Research Centre (BARC), Mumbai funded research project (2004-2008) on "**Radiation Induced Mutagenesis for Genetic Improvement of Biological Nitrogen Fixation and other Morphological and Quality Traits in Chickpea**"

II. International Atomic Energy Agency (IAEA), Vienna, Austria funded Project on **"Evolution of New Plant Type in Chickpea for High Yield Through Mutation Breeding".** One high yielding and wilt resistant mutant variety **Pusa 417 (Girnar)** developed from this project was **released** and notified by Central Varieties Release Committee of Govt. of India for farmers commercial cultivation in the states of Central Zone i.e., Madhya Pradesh, Chhattisgarh, Gujarat, parts of Rajasthan, Uttar Pradesh and Andhra Pradesh.

HONOURS/ RECOGNITIONS/ DISTINCTIONS:

1. **Certificate of Appreciation for Outstanding Contribution** to The Indian Society of Genetics and Plant Breeding, New Delhi in various capacities during different terms as its **Treasurer, Secretary, Editor** and **Organizing Secretary** was **presented by the Hon'ble Vice-President of India** at the Inaugural Session of the Fourth International Food Legumes Research Conference (IFLRC– IV) on October 18, 2005 at the Indian Agricultural Research Institute, New Delhi, India.
2. **President,** Indian Society of Genetics and Plant Breeding, New Delhi, India.
3. **Member of the International Steering Committee** of the Fifth International Food Legumes Research Conference (IFLRC-V) to be held in April 26-30, 2010 at Antalya, Turkey.
4. **Member of the International Steering Committee** of the International Symposium on Induced Mutations in Plants (ISIMP), organized by FAO/IAEA at Vienna, Austria from August 12 to 15, 2008.
5. **Organizing Secretary** of the Fourth International Food Legumes Research Conference (IFLRC-IV) on **"Food Legumes for Nutritional Security and Sustainable Agriculture"** at I.A.R.I., New Delhi, India from October 18 to 22, 2005.
6. **Member of the International Steering Committee** of the Fourth International Food Legumes Research Conference (IFLRC-IV) held at I.A.R.I., New Delhi, India from October 18 to 22, 2005.
7. **Editor,** Indian Journal of Genetics and Plant Breeding for five years from 2002 to 2007.
8. **Secretary,** Indian Society of Genetics and Plant Breeding for three terms from 2000 to 2006.
9. **Organizing Secretary** for the Diamond Jubilee International Symposium on **"Hundred Years of Post-Mendelian Genetics and Plant Breeding – Retrospect & Prospects",** held at I.A.R.I., New Delhi, India from November 6 – 9, 2001.
10. **Organizing Secretary** for the **National Symposium** on **"Advances in Genetics and Plant Breeding – Impact of DNA Revolution",** held at U.A.S., Dharwad, India from October 30 – 31, 2003.
11. **Organizing Secretary** for the **National Symposium** on **"Regulatory Measures and Crop Improvement – Policy Implications"**, held at M.P.K.V., Rahuri, M.S., India from December 23 – 24, 1999.
12. **Organizing Secretary** for the **National Symposium** on **"Meeting the Future Needs of Higher Education in Genetics and Related Disciplines – Courses and Curriculum",** held at New Delhi, India from April 21-23, 1999.
13. **Treasurer,** Indian Society of Genetics and Plant Breeding for two terms from 1997 to 1999.
14. **Trustee,** XV Genetics Congress Trust for six terms from 1994 to 2009.

15. **Vice-President,** Agricultural Research Service Scientists Forum (ARSSF) 1998 to 2000.
16. **Secretary,** Genetics Club, Division of Genetics, I.A.R.I., New Delhi for two terms 1996-1997 & 1997-1998
17. **Secretary**, Botany Association, Department of Botany, Th. D.S.B. Govt. College, Nainital, Uttarakhand 1967-68.

FELLOWSHIPS / AFFILIATION OF PROFESSIONAL SOCIETIES:

1. **Fellow & Life Member,** Indian Society of Genetics and Plant Breeding, New Delhi, India
2. **Fellow & Life Member,** Indian Society of Pulses Research & Development, Kanpur, India
3. **Fellow & Life Member,** Indian Society for Nuclear Techniques in Agriculture & Biology, New Delhi, India
4. **Life Member,** Indian Nuclear Society, Bhabha Atomic Research Centre, Mumbai, India

POST GRADUATE FACULTY TEACHING & GUIDANCE:

Faculty Member: Post Graduate School, Indian Agricultural Research Institute, New Delhi

Teaching: Course Leader of Gen. 204: **Mutagenesis** (2005 – till present) and A-10: **Elements of Genetics and Plant Breeding** (2000 – 2002) and Member, Seminar Committee.

Guidance: Guided one student for Ph.D. degree in Agricultural Botany on the thesis topic "Genetical and Allelopathic Studies in Chickpea with Special Reference to Disease Resistance" and one M.Sc. Biotechnology student on the thesis topic "Studies on Induced Mutagenesis in Chickpea (*Cicer arietinum* L.) with Special Reference to Biological N_2 Fixation and Nutritional Status of Legume Crops".

Examinership: Recognized Examiner for M.Sc., M.Phil. and Ph.D. thesis, Viva-Voce and Paper Setter for theory and practical examinations of Genetics & Plant Breeding and Seed Technology subjects of the following **18** Universities in India:

1) Indian Agricultural Research Institute, New Delhi; **2)** Chaudhary Charan Singh University, Meerut, Uttar Pradesh; **3)** Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand; **4)** Hemwati Nandan Bahuguna University, Srinagar, Uttarakahand; **5)** Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana; **6)** Punjab Agricultural University, Ludhiana, Punjab; **7)** CSK Himachal Pradesh Krishi Viswavidyalay, Palampur, Himachal Pradesh; **8)** Y.S. Parmar University of Horticulture and Floriculture, Nauni, Solan, Himachal Pradesh; **9)** Rajasthan Agricultural University, Bikaner, Rajasthan; **10)** Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan; **11)** Gujarat Agricultural University, Sardarkrushinagar, Gujarat; **12)** Junagarh Agricultural University, Junagarh, Gujarat; **13)** Navsari Agricultural University, Navsari, Gujarat; **14)** Anand Agricutural University, Anand, Gujarat; **15)** Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra; **16)** Pune University, Pune, Maharashtra; **17)** ANGR Agricultural University, Hyderabad, Andhra Pradesh; **18)** Utkal University, Bhubaneswar, Orrissa.

SYLLABUS DEVELOPMENT:

"**National Syllabus of Genetics and Plant Breeding**" was developed, edited and published by me as the Proceedings of the National Symposium on "Meeting the Future Needs of Higher Education in Genetics and Related Disciplines – Courses and Curriculum" held at I.A.R.I., New Delhi from April 21-23, 1999.

EXPERT MEMBER (Genetics & Plant Breeding):

Expert Member of genetics, plant breeding and biotechnology for assessment of candidates for Professor rank under Career Advancement Scheme/ Flexible Complementing Scheme/ Assessment Committees of State Agricultural Universities (SAU), Council of Scientific and Industrial Research (CSIR), and Indian Council for Forestry Research and Education (ICFRE).

JUDGING ASSIGNMENTS:

Invited by the Govt. of National Capital Territory of Delhi, Directorate of Education, Science Branch to be Judge for several years for judgment of participants in the State Level Science Seminars and exhibits displayed in the State Level and National Level Science Exhibitions on various important themes related to genetics, plant breeding and agriculture.

TRAININGS OBTAINED:

1. "Network Management and Information Processing in Agriculture" January 13 to February 1, 1997 at the Indian Agricultural Statistical Research Institute, New Delhi, India.
2. "Plant Genetic Resources: Documentation and Information Management" February 2 to 12, 1993 at the National Bureau of Plant Genetic Resources, New Delhi, India.

EDITORIAL EXPERIENCE:

1. **Editor** of the **Indian Journal of Genetics and Plant Breeding** for five years (**20 Issues** of **five Volumes)** from **May 2002** [Volume 62 (2)] to **February 2007** [Vol. 67 (1)].
2. **Executive Editor** of the **Indian Journal of Genetics and Plant Breeding** for **5** Issues from **Feb. 2001** [Volume 61 (1)] to **February 2002** [Volume 62 (1)].
3. **Editorial Board Member** of the **Indian Journal of Genetics and Plant Breeding** for **12** Issues from **Nov. 1997** [Volume 57 (4)] to **Nov. 2000** [Volume 60 (4)].
4. **Editor** of the **Food Legumes for Nutritional Security and Sustainable Agriculture,** Vol. 1, 2008 (Invited papers) M. C. Kharkwal (ed.) Proceedings of the Fourth International Food Legumes Research Conference, October 18-22, 2005 at IARI, New Delhi, India. Pp. 1030. ISBN 978-81-908995-1-2
5. **Editor** of the **Food Legumes for Nutritional Security and Sustainable Agriculture,** Vol. 2, 2008 (Contributed Papers) M. C. Kharkwal (ed.) Proceedings of the Fourth International Food Legumes Research Conference, October 18-22, 2005 at IARI, New Delhi, India. Pp. 860. ISBN 978-81-908995-2-9
6. **Editor** of the **Abstract Book** of the Fourth International Food Legumes Research Conference on Food Legumes for Nutritional Security and Sustainable Agriculture, M. C. Kharkwal (ed.). October 18-22, 2005 at IARI, New Delhi, India, Pp. 511.
7. **Editor** of the book "**Plant Breeding – Mendelian to Molecular Approaches**" Jain, H.K. & Kharkwal, M.C. (ed.) Narosa Publishing House, New Delhi, India. Pp. 1-811. ISBN 81-7319-503-X.
8. **Compiler & Editor** of the ISG&PB **Presidential Addresses** (1941 – 2001), 2001. Pp 1 – 312.
9. **Compiler & Editor** of the **"Diamond Jubilee Directory 2001"**. Indian Society of Genetics and Plant Breeding. Pp 1 – 260.
10. **Editor** of the **Abstract Book** of the National Symposium on **"Regulatory Measures and Crop Improvement – Policy Implications"** organized by the Indian Society of Genetics and Plant Breeding December 23-24, 1999 held at MPKV, Rahuri, Maharashtra, India.

11. **Editor** of the **"National Syllabus of Genetics and Plant Breeding"** Proceedings of the National Symposium, April 21-23, 1999 organized by the Indian Society of Genetics and Plant Breeding at I.A.R.I., New Delhi, India. Pp. 1 – 217.

12. **Editor** of the **Abstract Book** of the National Symposium on **"Meeting the Future Needs of Higher Education in Genetics and Related Disciplines – Courses and Curriculum"** April 21-23, 1999 organized by the Indian Society of Genetics and Plant Breeding, at I.A.R.I., New Delhi, India. Pp. 1–79.

ORGANIZATIONAL AND MANAGERIAL EXPERIENCE:

1. **Organizing Secretary** of the **Fourth International Food Legumes Research Conference** (IFLRC-IV) on **"Food Legumes for Nutritional Security and Sustainable Agriculture"** October 18 – 22, 2005 at I.A.R.I., New Delhi, India. Nearly 600 delegates, including 100 from foreign countries participated.

2. **Organizing Secretary** of the **Diamond Jubilee International Symposium** on **"Hundred Years of Post-Mendelian Genetics and Plant Breeding – Retrospect & Prospects",** November 6 – 9, 2001 at I.A.R.I., New Delhi, India. Nearly 800 delegates, including some international Speakers participated.

3. **Organizing Secretary** of the **National Symposium** on **"Advances in Genetics and Plant Breeding – Impact of DNA Revolution",** October 30 – 31, 2003 at UAS, Dharwad, India. Nearly 350 delegates participated.

4. **Organizing Secretary** of the **National Symposium** on **"Meeting the Future Needs of Higher Education in Genetics and Related Disciplines – Courses and Curriculum",** April 21-23, 1999 at I.A.R.I., New Delhi, India. Nearly 450 delegates participated.

5. **Organizing Secretary** of the **National Symposium** on **"Regulatory Measures and Crop Improvement – Policy Implications"**, December 23 – 24, 1999, at MPKV, Rahuri, M.S., India. Nearly 250 delegates participated.

INVITED / PLENARY LECTURES DELIVERED ABROAD:

I. MALAYSIA (May 25 – June 2, 1979):

Attended the First FAO/IAEA Research Coordination Meeting on the "Use of Induced Mutations for Improvement of Grain Legumes" at **Kuala Lumpur**, Malaysia and delivered an invited lecture on "Reconstruction of Plant Type in Chickpea Through Induced Mutation".

II. USA (June 29 – July 12, 1986):

(i) Attended the First FAO/IAEA Workshop on "Improvement of Grain Legume Production Using Induced Mutations" at **Pullman, Washington, USA** from June 29 to July 5, 1986 and delivered an invited lecture on "Induced Mutations for Improvement of Chickpea, Lentil, Pea and Cowpea".

(ii) Attended the "First International Food Legumes Research Conference (IFLRC-I)" at **Spokane, USA** from July 6 to July 10, 1986 and present a paper on "Breeding High Yielding Chickpea Varieties Through Mutation Breeding,".

III. BANGLADESH (April 11-16, 2008):

(i) Chaired a Plenary Lecture Session on **"Plant Breeding Systems for Increasing Agricultural Productivity"** at the Plant Tissue Culture & Biotechnology Conference, 2008 on **"Opportunities and Challenges of Agricultural Biotechnology in Developing Countries"** organized by Bangladesh Association for Plant Tissue Culture & Biotechnology

Conference (BAPTCB&B) at the Dhaka University, **Dhaka,** Bangladesh and delivered an invited Plenary Lecture on **"Mutation Breeding and Food Security: Achievements and Prospects"** on April 11, 2008.

(ii) Delivered an invited lecture on **"Mutation Breeding for Crop Improvement – Concepts and Procedures"** at the Faculty of Earth Sciences, Rajshahi University, **Rajshahi**, Bangladesh on April 13, 2008.

(iii) Delivered an invited lecture on **"Role of Mutation Breeding in Improvement of Pulse Crops"** at the Bangladesh Agricultural Research Institute (BARI), Regional Pulses Research Station, Ishurdi, **Pabna,** Bangladesh on April 14, 2008.

(iv) Delivered an invited lecture on "**Mutation Breeding in Food Crops: Achievements and Prospects – with special reference to contribution of Bangladesh"** at the Bangladesh Institute of Nuclear Agriculture (BINA), **Mymensingh**, Bangladesh on April 15, 2008.

IV. AUSTRIA (August 11-16, 2008):

Invited by The Joint Food and Agriculture Organization (FAO) / International Atomic Energy Agency (IAEA), Division of Nuclear Techniques in Food and Agriculture, Vienna, Austria to be a **Member** of the **International Steering Committee** of the International Symposium on Induced Mutations in Plants, organized by IAEA at **Vienna**, Austria from August 12-15, 2008 and to deliver the very first Plenary Lecture on **"Role of Induced Mutations in World Food Security"**.

V. ITALY (August 18-19, 2008):

Delivered a seminars on "**Mutation Breeding and Crop improvement"** at the Department of Agronomy and Environmental Sciences, Faculty of Agriculture, Udine University, **Udine**, Italy.

VI. CZECH REPUBLIC (August 19-25, 2008):

Visited the following institutes and Delivered a seminars on "**Mutation Breeding and Crop Improvement"** at the Department of Biotechnology, Agritec Plant Research Pvt. Ltd., **Sumperk,** Czech Republic.

(i) AGRITEC Plant Research Ltd. Plant Biotechnology Department, Sumperk;
(ii) Institute of Experimental Botany, Czech Academy of Sciences, Olomouc;
(iii) Mendel University of Agriculture and Forestry, Brno, and
(iv) Institute of Plant Production, Prague

VII. TURKEY (August 26 – September 1, 2008)

(i) Akdeniz University, Antalya, Turkey: Delivered a seminars on "**Mutation Breeding and Crop Improvement"** at the Department of Field Crops, Faculty of Agriculture, Akdeniz University, Antalya, Turkey.

(ii) Aegian Agricultural Research Institute, Menemen, Izmir, Turkey: Delivered a seminars on "**Mutation Breeding and Crop Improvement"** at the Department of Field Crops, Faculty of Agriculture, Aegian Agricultural Research Institute, Menemen, Izmir, Turkey.

SELECTED PLENARY / INVITED LECTURES DELIVERED IN INDIA

1. **Kharkwal, M.C.** 2009. Applications of Radiations in Crop Improvement. *In* Winter School on Training and Capacity Building on Applications of Ionizing and Non-Ionizing Energies in Agriculture, November 4 – 24, 2009 at Nuclear Research laboratory, Indian Agricultural Research Institute, New Delhi, India.
2. **Kharkwal, M.C.** 2008. Mutation breeding for crop improvement with special reference to pulses.

Plenary Lecture *In* National Symposium on Plant Cytogenetics: Recent Trends. February 15-16, 2008. Department of Botany, Punjabi University, Patiala, India.

3. **Kharkwal, M.C.**, *et al*., 2005. Mutation breeding for improvement of food legumes. *In*: Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi, India.
4. **Kharkwal, M.C.**, 2004. Mutation breeding in crop improvement – Achievements and Prospects. *In*: Nuclear Technology and Societal Needs. Fifteenth Annual Conference of the Indian Nuclear Society (INSAC-2004), Nov. 15-17, 2004. BARC, Mumbai
5. **Kharkwal, M.C.** 2003. Mutation breeding in crop improvement – Indian contribution. *In*: National Symposium on Advances in Genetics and Plant Breeding – Impact of DNA Revolution, October 30 – 31, 2003 at University of Agril. Sciences, Dharwad.
6. **Kharkwal, M.C.** *et al*., 2001. Mutation Breeding for Crop Improvement. *In* International Diamond Jubilee Symposium on "Hundred Years of Post-Mendelian Genetics and Plant Breeding – Retrospect and Prospects" November 6 – 9, 2001, New Delhi, India.
7. **Kharkwal, M.C.** *et al*., 2001. Seventy five Years of Research on Induced Mutations with special reference to Crop Improvement in India. *In*: NAARRI International Conference on Applications of Radioisotopes and Radiation Technology in the 21st Century", December 12-14, 2001, Mumbai, India.
8. **Kharkwal, M.C.** 1996. "Accomplishments of Mutation Breeding in Crop Improvement in India", *In*: "Isotopes & Radiation in Agriculture & Environment Research", Indian Society for Nuclear Techniques in Agri. and Bio. N.R.L., New Delhi, India.

IMPORTANT SYMPOSIA, CONFERENCES AND WORKSHOPS ATTENDED:

International Symposia/ Conferences:

1. International Symposium on Induced Mutations in Plants. Aug. 12-15, 2008. Organized by The Joint Food and Agriculture Organization (FAO) / International Atomic Energy Agency (IAEA), Division of Nuclear Techniques in Food and Agriculture, Vienna, Austria.
2. Plant Tissue Culture & Biotechnology Conference, 2008 on "Opportunities and Challenges of Agricultural Biotechnology in Developing Countries" organized by Bangladesh Association for Plant Tissue Culture & Biotechnology Conference (BAPTCB&B) April 12-13, 2008 at the Dhaka University, Dhaka, Bangladesh.
3. Dr. B.P. Pal Centenary International Conference on Agriculture, Nutritional Security and Rural Growth, May 25 – 27, 2006, TERI, Habitat Centre, New Delhi, India.
4. International Conference on Recent Scientific Developments in Biotechnology: Sharing Experiences and Knowledge, September 29 – 30, 2006 at Hotel Merideien, New Delhi, India.
5. Fourth International Food Legumes Research Conference (IFLRC-IV) on "Food Legumes for Nutritional Security and Sustainable Agriculture" October 18 to 22, 2005 at I.A.R.I., New Delhi, India.
6. International Conference on "Beyond Universal Goals – Steering Development Towards Global Sustainability", February 3-5, 2005 at Vigyan Bhavan, New Delhi, India.
7. Second International Congress of Plant Physiology on "Sustainable Plant Productivity Under Changing Environment", January 8 – 12, 2003, I.A.R.I., New Delhi, India.
8. Diamond Jubilee International Symposium on "Hundred Years of post-Mendelian Genetics and Plant Breeding – Retrospect & Prospects" November 6 – 9, 2001, I.A.R.I., New Delhi, India.

9. NAARRI International Conference on Applications of Radioisotopes and Radiation Technology in the 21st Century", December 12-14, 2001, Mumbai, India.
10. Second International Crop Science Congress on Crop Productivity and Sustainability – Shaping the Future, November 17-24, 1996, Vigyan Bhavan, New Delhi, India.
11. First International Symposium on Pulses Research, April 2-6, 1994, Ashok Hotel, New Delhi, India.
12. International Symposium on Allelopathy, Sept. 5-7, 1994, I.A.R.I., New Delhi, India.
13. FAO/IAEA Workshop on "Improvement of Grain Legume Production using Induced Mutations", June 29 to July 5, 1986 at Pullman, Washington, USA.
14. First International Food Legumes Research Conference (IFLRC-I) July 6 to 11, 1986 at Spokane, USA
15. XV International Congress of Genetics, Dec.12-21, 1983, Hotel Ashok, New Delhi, India.
16. Fifth International Wheat Genetics Symposium, Feb. 23-28, 1978,Vigyan Bhavan, New Delhi, India.
17. First FAO/IAEA Research Coordination Meeting on the "Use of Induced Mutations for Improvement of Grain Legume Production", May 25 to June 2, 1979 at Kuala Lumpur, Malaysia.
18. International Workshop on Chickpea Improvement, Feb. 28 – March 2, 1979, ICRISAT, India..
19. Second Society for the Advancement of Breeding Researches in Asia and Oceania (SABRO) Congress, Feb. 22-28, 1973, New Delhi, India.
20. International symposium on "The Use of Isotopes and Radiation in Agriculture and Animal Husbandry Research", 1971, New Delhi, India.

National Symposia/Conferences:

1. National Symposium on "Plant Cytogenetics: Recent Trends". February 15-16, 2008. Department of Botany, Punjabi University, Patiala, Punjab, India.
2. BARC Golden Jubilee & DAE-BRNS Life Sciences Symposium 2006 on "Trends in Research and Technologies in Agriculture and Food Sciences", December 18-20, 2006, BARC, Mumbai, India.
3. Second National Conference on "Pulses and Related Industries" on August 21, 2005 at Hotel Ashok, New Delhi, India.
4. National Conference on "Seed: A Global Perspective", March 26-28, 2004 at NASC, Pusa, New Delhi, India.
5. Nuclear Technology and Societal Needs. Fifteenth Annual Conference of the Indian Nuclear Society (INSAC-2004), Nov. 15-17, 2004. BARC, Mumbai, India.
6. Symposium on Advancing Frontiers of Molecular Genetics: Exploring New Horizons. XV Genetics Congress Trust, January 21-22, 2004, New Delhi, India.
7. National Seminar on Advances in Genetics and Plant Breeding – Impact of DNA Revolution, Indian Society of Genetics and Plant Breeding, October 30 – 31, 2003 at University of Agricultural Sciences, Dharwad, India.
8. Knowledge Millennium – III. The Business of Biotechnology. ASSOCHAM, March 21-23, 2003, New Delhi, India.
9. Indian Science Congress (88th Session) on Food, Nutrition and Environmental Security, January 3-7, 2001 at I.A.R.I., New Delhi, India.

10. "Regulatory Measures and Crop Improvement – Policy Implications", National Seminar, Indian Society of Genetics and Plant Breeding at MPKV, Rahuri, M.S., India. December 23-24, 1999.
11. "Meeting the future needs of higher education in genetics and related disciplines - Courses & Curriculum", National Symposium, Indian Society of Genetics and Plant Breeding, IARI, New Delhi, India. April 21-23, 1999.
12. DAE-BRNS Symposium on Nuclear Techniques in Increasing Crop and Animal Productivity, Oct. 7-9, 1996, B.A.R.C. Mumbai, India.
13. Isotopes & Radiation in Agriculture & Environment Research, Indian Society for Nuclear Techniques in Agriculture and Biology, N.R.L.,I.A.R.I., New Delhi, 1996, India.
14. National Symposium on Management of inputs in optimizing crop and animal productivity and environmental safety using nuclear and allied techniques, November 15-17, 1994, Birsa Agril. University, Ranchi, India.
15. DAE-BRNS Symposium on Nuclear Applications in Agriculture, Animal Husb. and Food Preservation, March 16-18, 1994, New Delhi, India.
16. Golden Jubilee Symposium Indian Society of Genetics and Plant Breeding, February 12-15, 1991 at Ashok Hotel, New Delhi, India.
17. Golden Jubilee Satellite Symposium on Genetics of Grain Legumes, February 9-11, 1991 at I.A.R.I., New Delhi, India.
18. First National Symposium on Crop Improvement, Feb. 22-28, 1987 at Punjab Agricultural University, Ludhiana, Punjab, India.
19. National Seminar on "Integrated Management Approach for Maximizing Crop Production in Rainfed and Problem Areas". Feb. 26-28 1986 at I.A.R.I., New Delhi, India.
20. National Symposium on Cytogenetic Research: Achievements and Relevance, 5-7 August 1985, Hyderabad A.P., India.
21. DAE National Symposium on the "Role of Induced Mutation in Crop Improvement" September 9 – 13, 1979 at Osmania University, Hyderabad, India.
22. IVth Cell Biology Conference, 1972 at the University of Delhi, Delhi, India.
23. Symposium on Gene Pools, Centres of Origin of Crop Plants and Recent Advances in Mutation Research, Nov.10-11, 1972 at Indian National Science Academy, New Delhi, India.

PUBLICATIONS:

More than **130** research publications; Edited one book, two International and two National Symposium Proceedings, five Abstract Books and contributed several book chapters.

Books published:

1. **Food Legumes for Nutritional Security and Sustainable Agriculture**. **Volume 1**, (Invited Papers). **Kharkwal, M. C. (ed.)**, 2008, Pp. 1030. Proceedings of the Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi, India. ISBN 978-81-908995-1-2.
2. **Food Legumes for Nutritional Security and Sustainable Agriculture**. **Volume 2**, (Contributed Papers). **Kharkwal, M. C. (ed.)** 2008, Pp. 854. Proceedings of the Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi, India. ISBN 978-81-908995-2-9.

3. "**Plant Breeding – Mendelian to Molecular Approaches**". 2004. H. K. Jain and **M. C. Kharkwal (ed.),** Narosa Publishing House Pvt. Ltd., New Delhi, India. Pp. 1-811. ISBN 81-7319-503-X.

SELECTED PUBLICATIONS:

1. **Kharkwal. M. C.** 2009. A Brief History of Plant Mutagenesis. *In:* Q. Y. Shu (ed.) Plant Mutagenesis — Principles, Technologies and Applications. FAO/IAEA, Vienna, Austria.
2. **Kharkwal, M. C.** and Q. Y. Shu. 2009. Role of induced mutations in world food security. *In:* Q.Y. Shu (ed.) Induced Mutations in the Genomics Era. Food and Agriculture Organization of the United Nations, Rome. 33-38.
3. **Kharkwal, M. C.**, T. Gopalakrishna, S.E. Pawar and Haq, M. Ahsanul. 2008. Mutation breeding for improvement of food legumes. p. 194-221. *In:* M. C. Kharkwal (ed.), Food Legumes for Nutritional Security and Sustainable Agriculture. Vol. 1. Proc. Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi. Indian Society of Genetics and Plant Breeding, New Delhi, India.
4. **Kharkwal, M. C.** and Mohan Saxena. 2008. International Food Legumes Research Conference: History and Future. p 949-956. *In*: M. C. Kharkwal (ed.) "Food Legumes for Nutritional Security and Sustainable Agriculture" Vol. 1. Proc. Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi, India. Indian Society of Genetics and Plant Breeding, New Delhi, India.
5. Kaur, Livinder, H.S. Tripathi, Vishwadhar, M.V. Reddy, Gurdip Singh and **M. C. Kharkwal.** 2008. Management of diseases in food legumes. p 608-637. *In*: M. C. Kharkwal (ed.) "Food Legumes for Nutritional Security and Sustainable Agriculture" Vol. 1. Proc. Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi, India. Indian Society of Genetics and Plant Breeding, New Delhi, India.
6. Sunaga, Akiko. Mohan Singh and **M. C. Kharkwal.** 2008. Organic production of food legumes. p 837-864. *In*: M. C. Kharkwal (ed.) "Food Legumes for Nutritional Security and Sustainable Agriculture" Vol. 1. Proc. Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi, India. Indian Society of Genetics and Plant Breeding, New Delhi, India.
7. **Kharkwal, M. C.**, Y.K. Kala, J.P. Nagar, Shine Thomas and Arvind Kumar. 2008. Variability for biological nitrogen fixation traits in chickpea (*Cicer arietinum* L.). p 281-290. *In*: M. C. Kharkwal (ed.) "Food Legumes for Nutritional Security and Sustainable Agriculture" Vol. 2. Proc. Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi, India. Indian Society of Genetics and Plant Breeding, New Delhi, India.
8. B.B. Singh, J.N. Govil, J.L. Tikoo, V.K.S. Rana, **M. C. Kharkwal**, Naresh Chandra, O.R. Faruqui, Jitendra Kumar, S.S. Yadav, R.L. Sapra, S.K. Mishra, V.S. Hegde, Rajendra Kumar, H.K. Dikshit, S.K. Lal, Jaagriti Jain, A. Talukdar and R.S. Raje. 2008. Genetic improvement of food legume crops at IARI, New Delhi, India. p 281-290. *In*: M. C. Kharkwal (ed.) "Food Legumes for Nutritional Security and Sustainable Agriculture" Vol. 2. Proc. Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi, India. Indian Society of Genetics and Plant Breeding, New Delhi, India.
9. Arvind Kumar, M.N. Mishra and **M. C. Kharkwal.** 2007. Induced mutagenesis in blackgram [*Vigna mungo* (L.) Hepper]. *Indian J. Genet.* 67:41-46.
10. **Kharkwal, M. C.**, Nagar, J.P. and Kala, Y.K. 2005. BGM 547 – A high yielding chickpea (*Cicer arietinum* L.) mutant variety for late sown conditions of North Western Plains Zone of India. Indian J. Genet., 65: 229-230.

11. **Kharkwal, M. C.** and Darbeshwar Roy. 2004. A Century of Plant Breeding Methodologies. p. 17-48. *In*: Plant Breeding – Mendelian to Molecular Approaches, Jain H.K. and Kharkwal M. C. (ed.). Narosa Publishing House, New Delhi, India.

12. Darbeshwar Roy and **M. C. Kharkwal.** 2004. Breeding for Wider Adaptability. p. 573 – 584. *In*: Plant Breeding – Mendelian to Molecular Approaches, Jain H.K. and Kharkwal M. C. (ed.). Narosa Publishing House, New Delhi, India.

13. **Kharkwal, M. C.**, Pandey, R.M. and Pawar, S.E. 2004. Mutation Breeding for Crop Improvement. p. 601-645. *In:* Plant Breeding – Mendelian to Molecular Approaches. H.K. Jain and M. C. Kharkwal (ed.), Narosa Publishing House, New Delhi, India.

14. **Kharkwal, M. C.** 2003. Induced mutations in chickpea (*Cicer arietinum* L.) VI. Significance of induced altered correlations. Indian J. Genet. 63: 219 – 224.

15. **Kharkwal, M. C.** 2001. Induced mutations in chickpea (*Cicer arietinum* L.) V. Evaluation of micro-mutations. Indian J. Genet. 61: 115-124.

16. Kalia, C.S., **M. C. Kharkwal,** Singh, M.P. and Alice K. Vari. 2001. Mutagenic effects of environmental chemical agents in inducing cytogenetical changes in wheat. Indian J. Genet. 61: 203-208.

17. **Kharkwal, M. C.**, Pawar, S.E. and Pandey, R.N. 2001. Seventy five years of research on induced mutations with special reference to crop improvement in India. p. 230-235. *In:* "Applications of Radioisotopes and Radiation Technology in the 21st Century" Proceedings of NAARRI International Conference on Applications of Radioisotopes and Radiation Technology in the 21st Century" N. Ramamurty *et al.*, (ed.), December 12-14, 2001, Mumbai.

18. **Kharkwal, M. C.**, Pathak, S.K. and Nagar, J.P. 2000. Effect of Allelopathy on Nodulation in Grain Legumes. Indian J. Genet. 60: 177-184.

19. **Kharkwal, M. C.** 2000. Induced mutations in chickpea (*Cicer arietinum* L.) IV. Types of macro mutations induced. Indian J. Genet. 60: 305-320.

20. Kalia, C.S., **M. C. Kharkwal** and M. P. Singh. 2000. Recovery of desirable mutations in wheat. Indian J. Genet. 60: 465-470.

21. **Kharkwal, M. C.** 1999. Induced mutations in chickpea (*Cicer arietinum* L.) III. Frequency and spectrum of viable mutations. Indian J. Genet. 59: 451-464.

22. **Kharkwal, M. C.** 1999. Seed storage proteins studies in chickpea (*Cicer arietinum* L.) Indian J. Genet. 59: 59-64.

23. **Kharkwal, M. C.** 1998. Induced mutations in chickpea (*Cicer arietinum* L.) II. Frequency and spectrum of chlorophyll mutations. Indian J. Genet. 58: 465-474

24. **Kharkwal, M. C.** 1998. Induced mutations in chickpea (*Cicer arietinum* L.) I. Comparative mutagenic effectiveness and efficiency of physical and chemical mutagens. Indian J. Genet. 58: 159-167

25. **Kharkwal, M. C.** 1998. Induced mutations for improvement of protein in chickpea (*Cicer arietinum* L.) Indian J. Genet. 58: 61-68.

26. **Kharkwal, M. C.** and H.B. Chaudhary. 1997. Grain density as selection criterion in chickpea and wheat. Indian J. Genet. 57: 415-423.

27. **Kharkwal M. C.** 1996. Accomplishments of Mutation Breeding in Crop Improvement in India. p. 196-218. *In:* Isotopes & Radiations in Agriculture and Environment Research. Sachdev M.S. *et al*., (eds.). Indian Society for Nuclear Techniques in Agriculture and Biology. New Delhi, India.

28. **Kharkwal, M. C.**, Jain, H.K. and Sharma, B. 1988. Induced Mutations for Improvement of Chickpea, Lentil, Pea and Cowpea. 89-109. *In:* Proceedings of the FAO / IAEA workshop on

Improvement of Grain Legume Production using Induced Mutations. 1-5 July, 1986, Pullman, Washington (USA), IAEA, Vienna, 1988.

29. Sharma, B., **M. C. Kharkwal.** 1983. Mutation Studies and Breeding in the Grain Legumes. IAEA TECDOC - 299: 65-76

30. Sharma, B., **M. C. Kharkwal.** 1982. Induced Mutations in Grain Legumes. IAEA, TECDOC - 260: 59-64.

31. **Kharkwal, M. C.**, H.K. Jain. 1980. Development of New Plant Types in Chickpea for High Yields Through Mutation Breeding. IAEA, TEC DOC- 234: 55-57.

32. Rana, R.S., **M. C. Kharkwal.** 1972. A monogenic mutation simulating continuous variation. Curr. Sci. 41(1): 38.

BOOKS, ABSTRACT BOOKS AND PROCEEDINGS EDITED:

1. **Kharkwal, M. C. (ed.)** 2008. Food Legumes for Nutritional Security and Sustainable Agriculture. Volume 1, (Invited Papers). Pp. 1030. Proceedings of the Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi, India. ISBN 978-81-908995-1-2

2. **Kharkwal, M. C. (ed.)** 2008. Food Legumes for Nutritional Security and Sustainable Agriculture. Volume 2, (Contributed Papers). Pp. 854. Proceedings of the Fourth International Food Legumes Research Conference (IFLRC-IV), October 18-22, 2005, New Delhi, India. ISBN 978-81-908995-2-9

3. **Kharkwal, M. C. (ed.).** 2005. Abstract Book of the Fourth International Food Legumes Research Conference (IFLRC-IV) on "Food Legumes for Nutritional Security and Sustainable Agriculture" October 18 – 22, 2005, New Delhi, India. Pp. 1-502.

4. Jain, H.K. and **M. C. Kharkwal (ed.)** 2004. Plant Breeding – Mendelian to Molecular Approaches, Narosa Publishing House, New Delhi. Pp. 1 – 811. ISBN 81-7319-503-X

5. **Kharkwal, M. C**. and Mehra R.B. (ed.). 2001. Abstracts of the International Diamond Jubilee Symposium on "Hundred Years of Post-Mendelian Genetics and Plant Breeding – Retrospect and Prospects" November 6 – 9, 2001, New Delhi. Pp 1-417.

6. **Kharkwal, M. C.** (ed.). 2001. Diamond Jubilee Directory of the Indian Society of Genetics and Plant Breeding. Released at the International Diamond Jubilee Symposium on "Hundred Years of Post-Mendelian Genetics and Plant Breeding – Retrospect and Prospects" November 6 – 9, 2001, New Delhi. Pp. 1-260.

7. **Kharkwal, M. C** and Mehra R.B. (ed.) 2001. Presidential Addresses (1941 – 2001). Released at the International Diamond Jubilee Symposium on "Hundred Years of Post-Mendelian Genetics and Plant Breeding – Retrospect and Prospects" November 6 – 9, 2001, New Delhi. Pp 1 – 312.

8. **Kharkwal, M. C.** and R.B. Mehra (ed.). 1999. "National Syllabus of Genetics and Plant Breeding" Proceedings of National Symposium on "Meeting the Future Needs of Higher Education in Genetics and Related Disciplines – Courses and Curriculum" April 21 – 23, 1999. Pp. 1-217.

9. Mehra, R.B., **M. C. Kharkwal,** S. Chandrasekaran, S.M.S. Tomar, D. S. Mathur and V.K.S. Rana. (ed.). 1999. Abstracts of the National Symposium on "Meeting the Future Needs of Higher Education in Genetics and Related Disciplines – Courses and Curriculum" April 21 – 23, 1999. Pp. 1-79.

1**0.** Mehra, R.B., **M. C. Kharkwal** and V.K.S. Rana. (ed.). 1999. Abstracts of the National Seminar on "Regulatory Measures and Crop Improvement – Policy Implications", December 23 – 24, 1999 at M.P.K.V. Rahuri, M.S., India.

BOOK REVIEWS WRITTEN:

1. **Kharkwal, M. C.** 2006. Developmental Genetics. Indian J. Genet. 66:368.
2. **Kharkwal, M. C.** 2006. Plant Biotechnology. Indian J. Genet. 66:174.
3. **Kharkwal, M. C.** 2006. General Plant Breeding. Indian J. Genet. 66:86.
4. **Kharkwal, M. C.** 2006. Plant Breeding: Principles and Methods. Indian J. Genet. 66:85.
5. **Kharkwal, M. C.** and Gupta, V.P. 2003. Advances in Arid Legumes Research. Indian J. Genet. 63: 367.
6. Singh, V.P. and **M. C. Kharkwal.** 2004. A Treatise on the Scented Rices of India. Indian J. Genet. 64: 89-90.
7. **Kharkwal, M. C.** 2003. Breeding Tropical and Sub-tropical Fruits. Indian J. Genet. 63: 97.
8. **Kharkwal, M. C.** 2003. Genetics. Indian J. Genet. 63: 95-96.
9. **Kharkwal, M. C.** and Rajiv K. Sharma. 2002. Plant Breeding – Theory and Practice. Indian J. Genet. 62: 388.
10. **Kharkwal, M. C.** and Rajiv K. Sharma. 2002. Principles and Procedures of Plant Breeding – Biotechnological and Conventional Approaches. Indian J. Genet. 62: 386-387.
11. **Kharkwal, M. C.** 2002. Scientist and Humanist – M.S. Swaminathan. Indian J. Genet. 62: 384-385.
12. **Kharkwal, M. C.** 2002. Genetic Improvement of Field Crops. Indian J. Genet. 62: 285-286.
13. **Kharkwal, M. C.** 2002. Breeding Field Crops. Indian J. Genet. 62: 283-284.
14. **Kharkwal, M. C.** 2002. Advances in Chickpea Science. Indian J. Genet. 62: 188-189.
15. Mehra, R. B. **M. C. Kharkwal** and V.K.S. Rana. 2001. Statistical and Biometrical Techniques in Plant Breeding. Indian J. Genet. 61: 391-392.
16. Thapliyal R.C. and **M. C. Kharkwal.** 2000. Seed and Nursery Technology of Forest Trees. Indian J. Genet. 60: 267-269.
17. **Kharkwal, M. C.** 1998. Glossary of Plant Genetics and Breeding. Indian J. Genet. 58: 387.
18. **Kharkwal, M. C.** 1998. Genetics Manual - Current Theory, Concepts, Terms. Indian J. Genet.58: 242-244.
19. **Kharkwal, M. C.** 1998. Cotton Breeding. Indian J. Genet. 58: 127-128.
20. **Kharkwal, M. C.** 1997. Ornamental Plants: Role of Mutation. Indian J. Genet. 57: 485-486.