Name **Dr Pawan K. Jaiwal**

Present Designation Professor Emeritus

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Maharshi Dayanand University,
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Academic Qualifications

Degree	Marks obtained	Year of passing	University
Ph.D. (Botany)	Outstanding	1984	K. U. Kurukshetra
M. Sc. (Botany)	67% (Merit holder)	1977-1979	-do-
B. Sc. (Honours) Botany	60%	1974-1977	University of Delhi, Delhi

Post-doctoral Research Experience

◇Institute of Plant Science, ETH, Zurich, **Switzerland** from Oct. 1995-Oct. 1996 (worked in the Lab. of Prof Ingo Potrykus).

◇National Research Centre on Plant Biotechnology, **IARI**, New Delhi from May 1998-Aug., 1998.

◇University of Ghent, **Belgium**, International Institute of Plant Biotechnology for Developing Countries, from Aug. 14-23, 2007.

Professional Experience

Position held	Period	University/Institute
Professor Emeritus	Jan 1, 2021, to date	M. D. University, Rohtak
UGC-Basic Science Research (BSR)-Faculty Fellow	Jan 2017- Dec. 2020	-do-
Professor	June 27, 2006 to Dec 31, 2017	M. D. University, Rohtak
Reader	1998-2006	-do-
Senior Lecturer	1991-1998	-do-
Lecturer	1986-1991	-do-
Junior/Senior/Res. Assoc. (CSIR, New Delhi)	1980-1985	K. U. Kurukshetra

♦**Field of Specialization:** Plant Tissue Culture & Plant Genetic Engineering

♦**Areas of Research**: Development of transgenics of grain legumes, oil and cereal crop plants for resistance to biotic & abiotic stresses and nutritional improvement

♦ **PG courses taught:** Plant Biotechnology, Molecular Biology, rDNA technology, Molecular Plant Physiology & Development Biology and Metabolic engineering for the last three and half decades

Administrative experience:

1. Member of **MDU Executive Committee** (EC) for two years 2015-2017
2. **Dean, Faculty of Life Sciences, M. D**. University, Rohtak from Sept 2014 to Dec 31, 2017.
3. **Director, Centre for Biotechnology, M. D. University**, Rohtak, from March 1, 2012 to Feb 28, 2015.
4. **Director, Centre for Medical Biotechnology, M. D. University**, Rohtak from Oct 2015 to Dec 31, 2017
5. **Chairman, Institutional Biosafety Committee**, 2014-2017
6. **Chairman, Institutional Animal Ethics Committee** from 2014-2017
7. **Chairman, Unfair Means Committee** for the year 2013-2014
8. **Coordinator, UGC-SAP**, 2014-2017
9. **Coordinator, DST-FIST**, 2014-2017
10. **Coordinator, Department of Biotechnolog**y, University Institute of Science & Technology, Rohtak from 2004-2006

11. **President, MDU Teachers Association** from 2011-2012
12. Member of the **Research Directorate, M. D. University, Rohtak,** from 2011 to Dec 31, 2017
13. Member of **Central Purchase Committee of the University** 2012- Dec 31, 2017
14. Member of **University House Allotment Committee**, 2012
15. Member of the **University Admission Committee**, 2014 till date, Dec 31, 2017
16. Member of the **University Grievance Committee**, 2012
17. Member of the **University Finance Committee**, 2014 to 2016
18. Member of the **University Provost Committee**, 2014 till date
19. Member of the **Working Committee of the University Film Club**, 2012
20. Member of the **Managing Body of the University Campus School**, 2012
21. Member of the **Governing Body of the Satguru College, Faridabad**

Professional assignments

- **Member of DRC** in the subject of Botany, CCS University, Meerut, DCRUST, Murthal, and of Biotechnology, MDU
- **Member of PG board of studies** in Environmental Sciences, BBA University Lucknow, MDU, Rohtak, DCRUST, Murthal and CDLU, Sirsa
- Member of the **Academic Council** of YMCA, Faridabad, and MDU, Rohtak,
- **Member of selection committees** for Life-sciences at M. D. University, Rohtak DCRUST, Murthal and Manav Rachna International Univ., Faridabad
- **Resource person for refresher courses** organized by JNU, New Delhi, CCS University, Meerut and HAU, Hisar
- **Reviewer of the research papers** for the journals Plant Biotech J., Plant Cell Rep., Plant Cell Tiss. Org. Cult., Plant Sci., Transgenic Research, Scientia Horticulture, Acta Physiol. Plantarum, African J. Biotech., Curr Sci., Indian J. Exp. Biol., Indian J. Biotechnology, Physiol Mol Biol. Plants, 3-Biotech etc.

Research Guidance

♦**Guided 27 students for PhD,** 3 for M.Phil. and several for M.Sc. dissertation, and currently, 3 students are pursuing PhD.

S.No.	Name of Student	Title of Ph. D. thesis	Year of Award	Co-guide/ Co-supervisor
1.	Anju Gulati	Isolation and Characterization of salt tolerant cell lines of *Vigna radiata* L. Wilczek	1992	-
2.	Sujata Bhanote	Ethnobotanical survey of a North East Indian State	1998	Dr S K Gakhar, MDU
3.	Ragini Kumari	*Agrobacterium tumefaciens* mediated gene transfer in mungbean (*Vigna radiata* L.	2001	-

		Wilczek)		
4.	Lingaraj Sahoo	Production of transgenic plants of mungbean via particle bombardment of meristems	2001	-
5.	N. Dolendro Singh	Regeneration and genetic transformation of Pigeon pea (*Cajanus cajan* (L.) Millsp.)	2001	-
6.	Sonia	Development of transgenic mungbean seeds resistant to storage pests, bruchid beetles	2002	-
7.	Raman Saini	*In vitro* plant regeneration and *Agrobacterium*-mediated genetic transformation of black gram (*Vigna mungo* L. Halper)	2003	-
8.	Amita Gupta	Proline metabolism and antioxidative defense system in mungbean under salt stress	2005	Dr R P Singh, MDU
9.	Saroj Dahiya	Development of slow-release fertilizers for improved nutrient utilization and high yield in rice and mungbean	2007	-do-
10.	Sudesh Chhikara	Development of transgenics in Indian oilseed mustard (*Brassica juncea* Czern.) resistant to fungal pathogens.	2007	-
11.	Seema Madanpotra	Genetic transformation of mungbean with MYMIV replicase gene in sense and antisense orientation to confer resistance to yellow mosaic disease	2007	-
12.	Anila Baloda	Metabolic engineering of glycine betaine biosynthesis in mungbean plants for salt and drought tolerance	2009	-
13.	Darshna Chaudhary	*In vitro* plant regeneration and *Agrobacterium*-mediated genetic transformation of cowpea (*Vigna unguiculata* L. Walp)	2009	-
14.	Manju Yadav	*In vitro* plant regeneration and *Agrobacterium*-mediated genetic transformation of sesame (*Sesamum indicum* L.)	2009	-
15.	Lalita Badgujjar	*In vitro* plant regeneration and genetic transformation of cucumber (*Cucumis sativa* L.)	2011	-
16.	Rakesh Kumar	Molecular characterization of mRNA segment of watermelon bud necrosis virus genome and studies on transgene expression in watermelon	2011	Dr Bikas Mandal, IARI
17.	Gulshan Chabra	*In vitro* regeneration and *Agrobacterium*-mediated genetic transformation of a duck weed (*Lemna* sp.)	2012	-
18.	Savita Dahiya	RNA interference for generation of transgenic	2012	-

		black gram (*Vigna mungo* L. Hepper) plants resistant to yellow mosaic disease		
19.	Lakshmikanth Redipalli	Studies on the development of transgenic pigeon pea (*Cajanus cajan* (L.) Millsp.): resistant to pod borer	2013	Dr P A Kumar, IARI
20.	Sanjay Singh	*In vitro* regeneration and genetic transformation of wheat (*Triticum aestivum* L.) for the production of Coenzyme Q10	2013	-
21.	Manish Sainger	Development of an efficient *Agrobacterium*-nediated transformation system in mungbean *Vigna radiata* L.Wilczek) using MYMV-*vig* eplicase gene	2013	-
22.	Nirmala	Use of molecular markers for the identification of salt-resistant genes in mungbean (*Vigna radiata* L. Wilczek)	2013	-
23.	Meenakshi	RNAi-mediated yellow mosaic virus resistance in cowpea (*Vigna unguiculata* (L.) Walp)	2018	-
24.	Deep Shikha	Introduction of CoQ10 biosynthesis into rice endosperm to improve nutritional and agronomical performance	2018	-
25.	Kapil	Metabolic engineering of wheat with *DPS* gene for biosynthesis of an antioxidant CoQ10 for its nutritional enhancement	2020	-
26.	Honey Yadav	Engineering of the mevalonate pathway, decaprenyl diphosphate synthase and polyprenyl transferase genes in wheat for the production of coenzyme Q10	2020	-
27.	Sapna	Engineering Camelina (*Camelina sativa*) for insulin and C-peptide	2023	-
28.	Mukta	Expression of bovine rotavirus antigens in *Trifolium* species	Pursuing	With Dr D. Chaudhary, MDU
29.	Archna Suhag	RNAi for the management of a global pest, whitefly *Bemisia tabaci*	2024	With Dr R. Jaiwal, MDU
30.	Supriya Phogat	Oral immunogenicity of a plant-made subunit tuberculosis vaccine	Pursuing	With Dr R. Jaiwal, MDU

Research Projects

Projects completed as PI / CO-PI:

1. UGC Major Research project entitled "Regeneration of salt tolerant legumes through tissue culture (1988-1990)-0.70 lakhs
2. DST-Young Scientist Research Project on "Development of salt tolerant genotypes of mungbean through tissue culture Selection" (1990-1993), Rs 5 lakhs
3. DBT project entitled "Genetic transformation of a grain legume *Vigna radiata* by *Agrobacterium*-mediated gene transfer" (1995-1998)-Rs 18 lakhs
4. DST project on "Role of Proline and ABA in mungbean salt tolerance" CO-PI, 3 yrs, Rs 29 lakhs
5. CSIR project on "Pyramiding of insect resistance genes in pigeon pea plants by particle bombardment of meristems" 2000-2003, Rs 15 lakhs
6. DBT project on "Development of efficient regeneration and transformation system for *Vigna* species" 2003-2005, Rs 50 lakhs
7. HCST project on "Engineering MYMV resistance in mungbean (*Vigna radiata*) (HCST/150) Rs 5.82 lakhs
8. DBT project on "Development of yellow mosaic virus resistance in black gram (*Vigna mungo* L. Hepper): Transformation of black gram with MYMV-Vig genes" Rs 28.9 lakhs, BT/PR7866/AGR/02/379/2006
9. UGC project on "Metabolic engineering of CoQ10 in wheat (*Triticum aestivum* L.) Rs 8.61 lakhs, S. No. 36-161/2008/(SR)
10. DBT project "Development of yellow mosaic virus resistance in black gram (*Vigna mungo* L. Hepper): Transformation of black gram and cowpea with MYMV-vig genes", 2011-2013, Rs 17.16 lakhs (BT/PR3342/AGR/02/820 /2011)
11. SERB project on "Biofortification of wheat (*Triticum aestivum*) with a potent antioxidant, CoQ10, for nutritional enhancement and abiotic stress tolerance". 2014-17, Rs 32 lakhs, SERB/SB/SO/PS/67/2013
12. **Projects with International collaboration**

● Development of salt tolerant legume for sustainable agriculture and nutrition: Identification of QTLs/genes **Indo-Japan Collaboration for Sci &Tech**, funded by JSPS, Japan and DST, New Delhi

Awards/prizes/medals

- ♦ Merit certificate for standing **first class second** in University in M.Sc., **1979**
- ♦ Awarded **DBT Overseas Associateship by DBT, New Delhi, 1995**
- ♦ Awarded **INSA Visiting Associateship, INSA, New Delhi, 1998**
- ♦ **10th International Association Plant Tissue Culture & B Congress fellowship** recipient held in USA, June 2002
- ♦ **Prof H S Srivastava Gold medal** from the National Academy of Environmental Sciences, Lucknow, India, **2013**.

Meetings/Conferences Organized

1. Organized the 2nd **Review meeting of the DBT network project on the Development of virus-resistant transgenic plants at MDU, Rohtak, on July 10, 2008,** sponsored by DBT, New Delhi.
2. Convenor, **National Workshop on "Genomics in Crop Improvement**" at Centre for Biotechnology, MDU, Rohtak from Feb. 27-28, 2014. Sponsored by UGC, Dr RK Foundation and Prof HS Srivastava Foundation.
3. Course-Director of a **DBT short-term training course on "Plant Transgenic Technologies**" organized at the Centre for Biotechnology, MDU from Oct 1 -16, 2014 sponsored by DBT, New Delhi.
4. Convenor of a one-day seminar on 'Antimicrobials' organized at the Centre for Biotechnology, MDU, on March 26, 2015, sponsored by UGC-SAP.
5. Co-ordinator of **GIAN (Global Initiative of Academic Net Works) course on "**Phytoremediation of Toxic Pollutants **(**Course Code: 176021H06**)"** 29th May - 8th June 2019 sponsored by Ministry of Human Resource Development (MHRD), New Delhi**.**

Lectures Delivered

At International Levels

*Invited lecture on Gene transfer in *Vigna* species at 14th International Workshop on Genetic Resources and Comparative Genomics of soybean and Vigna. National Institute for Agrobiological Sciences (NIAS), Tsukuba, **Japan**, Sept 13 to 19, 2009

* Invited by the Chinese Academy of Agricultural Sciences, Beijing, China for a series of lectures on "Genetic transformation of mungbean: Problems and Approaches" at Institute of Crop Sciences, CAAS, Beijing, Jiangsu Academy of Agricultural Sciences (JAAS) and Hebei Academy of Agriculture and Forestry Sciences (HAAFS), China from Nov. 28 to Dec. 5, 2009.

*Delivered a talk on 'Genetic transformation of mungbean (*Vigna radiata*)' at a workshop on Modern Breeding Techniques at Intl. Institute of Plant Biotech for Developing Countries, University of Ghent, Ghent, Belgium, Aug 14-23, 2007

*Delivered an invited talk on 'Transgenic route for developing mungbean resistant to MYMV' at the Final workshop and planning meeting DFID-AVRDC mungbean project organised by Dept for International Development, UK and Asian Vegetable Research and Development Centre, Taiwan, May 27-31, 2004.

At National Level

* Invited for a plenary lecture on "Genetic transformation of Legumes: Problems and Approaches' at an International Conf. on Grain Legumes: Quality Improvement, Value Addition and Trade, Indian Institute of Pulses Research (IIPR), Kanpur, 14-16 February 2009

* Delivered an invited lecture on 'Transgenic plants' at a refresher course in Biology organized by Dept of Zoology, Govt College, Rohtak. (May, 2008)

* Delivered an invited lecture on 'Gene transfer in plants' at a seminar organized by Govt. College, Gurgaon (Feb., 2010)

*Delivered an invited talk on "Chickpea regeneration and genetic transformation" at a one-day workshop on regeneration and transformation of chickpeas organized by National Centre for Plant Genome Research (NCPGR), JNU campus, New Delhi, held on Nov. 30, 2000.
*Invited to deliver a talk on "Towards genetic engineering of mungbean resistant to yellow mosaic virus, bruchids and herbicide phosphinothricin" at Natl Sym. on Plant Biotechnology and Molecular Biology and 24th meeting of Plant Tissue Culture Campus, New Delhi, Univ. of Delhi-South Campus, New Delhi.
*Delivered an invited lecture on 'Molecular biology of abiotic stresses' at a refresher course in botany organized by the Dept of Botany, CCS Meerut Univ., Meerut.
*Delivered an invited lecture on 'Genetic transformation of legumes' at a workshop organized by Dept of Biotechnology and Mol. Biol., CCS HAU., Hisar, 2003
*Delivered an invited lecture on 'Transgenic mungbean – a case study' at a workshop organized by Dept of Biotechnology and Mol. Biol., CCS HAU., Hisar, Dec 15, 2005.
*Delivered invited lectures twice on 'Genetic transformation' at a refresher course in Life Sciences organized by the School of Life Science, JNU, New Delhi, on Jan 12, 2004 and Jan 25, 2006.
*Delivered an invited lecture on 'Transgenics in legumes' at a workshop organized by the Dept of Biotechnology and Mol. Biol., CCS HAU., Hisar, Nov 25, 2006

Conferences/workshop/symposium attended (selected only)

International

#Attended and presented a paper at an international conference Dept of Soil, Plants and Insects University of Massachusettes, Amhrest, USA (Oct. 2007)
Attended an International conference on Abiotic stress held at Intl. Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi, Nov. 2006
Attended an International Conference on 'Plant Biotechnology-2002 and beyond' Xth IAPTC & B congress June 23-28, 2002, at Orlando, Florida, USA.
Attended and presented a paper at 4th International Food Legumes Research Conf. on Food Legumes for Nutritional Security & Sustainable Agriculture organised by Indian Society of Genetics & Plant Breeding at IARI New Delhi Oct.18-22, 2005.
#Attended and presented a paper at the 2nd International Congress of Plant Physiol. On Sustainable Plant Productivity under Changing environment organised by Indian Soc. Plant Physiol. & Intl. Assoc. Plant Physiol. at IARI, New Delhi Jan. 12, 2003
Participated in an International Conference on 'Trends in Cellular and Molecular Biol. held at School of Life Sciences, JNU, New Delhi March 6-8, 2003

National (selected only)

Participated and presented a paper in a Conference on 'Current Scenario of Rapeseed Mustard in India' held at Chokhi Dhani, Jaipur Sept 30, 2006

Participated and presented a paper in a Conference on 'Resource Development and Marketing Issues in Rapeseed Mustard" held at National Institute of Agricultural Marketing, Jaipur, March 28-29, 2005

Actively participated in a National Seminar on 'Genetically modified organisms – biosafety aspects' held at Dept of Botany, Univ of Delhi, March 10-11, 2005

Participated in a Patent Awareness Workshop organised by Patent Information Centre, Hisar at MDU, Rohtak on Dec 30, 2005

Participated and presented a paper in a National Symposium on 'Improving crop productivity in an eco-friendly environment: Physiological and Molecular Approaches' held at GB Pant Univ. of Agriculture & Technology, Pantnagar, Oct. 15 to 17, 2003

Actively participated in a National Convention on 'Transgenic Rapeseed Mustard –an assessment" held at India Intl. Centre, New Delhi, Jan 16-17, 2002

Participated in a Workshop on 'Patenting Awareness' held at Univ of Delhi South Campus, New Delhi, Oct. 15, 2001

Member of the Editorial Board of

- **Associate Editor** of the journal '**Physiol. Mol. Biol. Plants'** published by **Springer,** India
- **Editor** of the journal on '**Plant Biotechnology and Mol. Biol.'** (Soc. for Biology and Biotech.) Kottayam,
- Editorial board member of **Brassica,** Mustard Research and Promotion Consortium, **New** Delhi
- Editorial board member of **Medicinal Plants**, New Delhi

Membership of Learned Societies

- International Association for Plant Tissue Culture
- Society for Biochemistry and Biotechnology, IARI, New Delhi
- Indian Society for Pulse Research, IPRI, Kanpur
- Indian Academy of Sciences, Bangalore

Training courses/workshops/refresher courses attended

- Attended and actively participated in a short course on "Applications of Biotechnology in Agriculture and Forestry" sponsored by ICAR, New Delhi and organized by Dept. of Genetics, CCS Haryana Agriculture University, Hisar from Sept. 18-27, 1989

- Attended and actively participated in a short course on "Recent Trends in Plant Tissue Culture and Plant Transformation" sponsored by DBT and Organized by NCL, Pune from Feb 19- March 4, 1990
- Attended **four** Refresher courses on Biotechnology and Botany organized by Academic Staff College, J N U, New Delhi and Academic Staff College, H P Univ., Shimla, Academic Staff College, BHU, Varanasi and Academic Staff College, Panjab Univ., Chandigarh

Research Publications

Books (edited) **: 16**
Reviews/book chapters & Research Papers **: 120**
Popular articles **: 2**

BOOKS

1. **Jaiwal P K**, Singh R P and Gulati A (eds) 1997 Strategies for the improvement of salt tolerance in higher plants. In **dual edition**, Science **Publishers, Enfield (USA)** and **Oxford and IBH Publ**., New Delhi.
2. **Jaiwal P K** and Singh R P (eds) 2003 FOCUS ON BIOTECHNOLOGY Vol. 10A: Improvement strategies in Leguminosae Biotechnology. **Kluwer Acad.Publ., The Netherlands.**
3. **Jaiwal P K** and Singh R P 2003 FOCUS ON BIOTECHNOLOGY Vol. 10B: Applied Genetics of Leguminosae Biotechnology. **Kluwer Acad. Publ., The Netherlands**
4. Singh R P and **Jaiwal P K** (eds) 2003 Plant Genetic Engineering Vol. 1: Applications and Limitations. **Sci-Tech Pub. Co.**, P O Box 720728, Houston, Texas, **USA**
5. **Jaiwal P K** and Singh R P (eds.) 2003 Plant Genetic Engineering Vol 2: Improvement of Food Crops. **Sci-Tech Pub. Co.**, P O Box 720728, Houston, Texas, **USA**
6. Singh R P and **Jaiwal P K** 2003 (eds) Plant Genetic Engineering Vol. 3: Improvement of Commercial Plants I. **Sci-Tech Pub. Co.**, P O Box 720728, Houston, Texas, **USA**
7. **Jaiwal P K** and Singh R P (eds.) 2003 Plant Genetic Engineering Vol 4: Improvement of Commercial Plants II. **Sci-Tech Pub. Co.**, P O Box 720728, Houston, Texas, **USA**
8. Singh R P and **Jaiwal P K** (eds) 2003 Plant Genetic Engineering Vol. 5: Improvement of Vegetables. **Sci-Tech Pub. Co.**, P O Box 720728, Houston, Texas, **USA**
9. **Jaiwal P K** and Singh R P (eds) 2003 Plant Genetic Engineering Vol 6: Improvement of Fruits. **Sci-Tech Pub. Co.**, P O Box 720728, Houston, Texas, **USA.**

10. Singh R P and **Jaiwal P K** (eds) 2006 Focus on Plant Molecular Biology-2. Biotechnological approaches to improve Nitrogen Use Efficiency, Studium Press, LLC, Houston, Texas, USA.
11. Singh R P, Shankar N and **Jaiwal P K** (eds) 2006 Focus on Agriculture-1. Nitrogen Nutrition in Plant Productivity. Studium Press, LLC, Houston, Texas, USA.
12. **Jaiwal P K** (ed) 2006 Plant Genetic Engineering Vol. 7: Metabolic Engineering and Molecular Farming-I. Studium Press, LLC, Houston, Texas, **USA**.
13. **Jaiwal P K** and Singh R P (eds) 2006 Plant Genetic Engineering Vol. 8: Metabolic Engineering and Molecular Farming-II. Studium Press, LLC, Houston, Texas, **USA.**
14. **Jaiwal P K**, Singh R P and O P Dhankher (2008). Plant membrane and vacuolar transporters. CAB International Publication, UK.
15. **Jaiwal P K,** Singh R P and Dhankher O P (2015) Genetic manipulation in plants for mitigation of climate change. Springer. ISBN: 978-81-322-2660-4.
16. **Jaiwal PK**, Chhillar AK, Chaudhary D and Jaiwal Ranjana (2019) Nutritional quality improvement in plants. Springer, ISBN: 978-3-319-95353-3.

Reviews / book chapters contributed in books published from India & abroad

1. **Jaiwal P K** and Singh R P 1995 Regulation of nitrogen assimilation by plant growth regulators. In: Nitrogen Nutrition in Higher Plants, Srivastava H S and Singh R P (eds) Associate Publishing Co., New Delhi pp 401- 416.
2. **Jaiwal P K**, Singh R P and Gulati A 1997 Perception of salt signals by higher plants In: Strategies for the improvement of salt tolerance in higher plants, Jaiwal P K, Singh R P and Gulati A (eds) Science Publ., USA pp 41-53.
3. Gulati A and **Jaiwal P K**.1997 The potential of plant tissue culture and related techniques for the improvement of salt tolerance in higher plants. In: Strategies for the improvement of salt tolerance in higher plants. Jaiwal P K, Singh R P and Gulati A (eds) Science Publ., USA pp 321 - 349.
4. Singh R P, Choudhury A, Gulati A, Dahiya H C, **Jaiwal P K** and Senger R S 1997 Response of plants to salinity in interaction with other abiotic and biotic factors. In: Strategies for the improvement of salt tolerance in higher plants Jaiwal P K, Singh R P and Gulati A (eds) Science Publ., USA pp. 25-35.
5. Mishra S N, **Jaiwal P K**, Singh R P 1999. Legume- *Rhizobium* symbiosis. In: Nitrogen Nutrition of Plants Srivastava H S and Singh R P (eds). Science Publ., USA, pp 1-102.
6. Singh N D, Sonia, Sahoo L, Singh S M & **Jaiwal P K** 1998 Biotechnological approaches for the genetic improvement of pigeon pea, In: Recent Advances in Biotechnology (ed.) Trivedi P C, Panima Publ., New Delhi. pp 154-173.
7. Sonia, Sharma P, Preeti, Ragni & **Jaiwal P K** 1998 Application of molecular biology and biotechnology for the improvement of chickpea, In: Recent Advances in Biotechnology (ed.) Trivedi P C, Panima Publ., New Delhi. pp 135-153.

8. Sahoo, Twinkle Sugla, & **P K Jaiwal** 2003 Genetic transformation and regeneration of *Vigna* species In: Applied Genetics of Leguminosae Biotechnology, Jaiwal P K and Singh R P (eds) Kluwer Acad Publ., The Netherlands, pp. 89-120.
9. Singh N D, Kumar P A and **Jaiwal P K** 2003 *In vitro* regeneration and genetic transformation of pigeon pea. In Applied Genetics of Leguminosae Biotechnology, Jaiwal P K and Singh R P eds Kluwer Academic Publ. , The Netherlands, pp. 47-68.
10. Singh R P, Rizvi M, Sonia, Usha and **Jaiwal P K** (2003) Biotechnological strategies for improving salt tolerance in legumes. In: Improvement strategies in Leguminosae Biotechnology. Jaiwal P K & R P Singh (eds) Kluwer Acad. Publ, The Netherland, pp. 223-243.
11. Sonia, R P Singh, Sharma K K and **Jaiwal P K** (2003) *In vitro* regeneration and transformation of chickpea. In: Applied Genetics of Leguminosae Biotechnology. Jaiwal P K & R P Singh (eds) Kluwer Acad. Publ., The Netherland, pp. 69-87.
12. Sahoo L, Singh N D, Sugla T, Singh R P & **Jaiwal P K** (2003) Genetic transformation in legumes. In: Plant Genetic Engineering Vol 2: Improvement of food crops. Jaiwal P K & Singh R P (eds) Sci. Tech Publ., USA. pp. 267-336
13. Sahoo L, Sugla T, Baloda A, Singh R P & **Jaiwal P K** (2003) Engineering abiotic stress tolerance in crop plants tolerance in plants. In: Plant Genetic Engineering Vol 1: Applications & limitations. Singh R P & Jaiwal P K (eds) Sci. Tech Publ., USA. pp 123-146.
14. Singh RP, Dhania G, Sharma V, Sharma A and **Jaiwal P K** (2006) Biotechnological approaches to improve phytoremediation efficiency for environmental contaminants. In: Bioremediation – a novel technology. Singh S N and Tripathi R D (eds) Springer-Verlag Publ. pp 1-38.
15. Singh RP, Dhull U, Shankar N and **Jaiwal P K** (2006) Nitrogen utilization in plants under salinity stress. In: Nitrogen Nutrition in Plant Productivity. Studium Press, LLC, Houston, Texas, USA. pp 203-276
16. Singh R P, Dahiya S and **Jaiwal P K** (2006) Slow-release fertilizers for sustained nitrogen supply and high plant productivity. In: Nitrogen Nutrition in Plant Productivity. Studium Press, LLC, Houston, Texas, USA. pp 329-349.
17. **Jaiwal P K** and Singh R P (2006) Genetic manipulation of nitrogen assimilation to improve nitrogen use efficiency and yield of plants. In: Biotechnological approaches to improve Nitrogen Use Efficiency, Studium Press, LLC, Houston, Texas, USA, pp 257-284.
18. Savita and Jaiwal P K (2006) Bio-fortification of crop plants with minerals In Plant Membrane and Vacuolar transporters (Ed. Jaiwal P K et al.) CAB International, UK.
19. Singh R P, Kumar M and **Jaiwal P K** (2008) Improvement in nitrogen use efficiency and yield of plants by sustained nutrient supply and enhanced nitrogen assimilation. In: Development in Physiology, Biochemistry and

Molecular Biology of Plants (Eds Bose B and Hemantaranjan A.) New India Publishing Agency, New Delhi, pp 1-31.

20. Sahoo L and **Jaiwal P K** (2008) Asiatic beans In: Compendium of Transgenic Crop plants, Transgenic Legume Grains and Forage (Eds. Kole C and Hall C) Wiley-Blackwell Publishing Ltd. Oxford OX4 2DQ, England.

22 Singh RP, Bauddh K, Sainger M, Sainger PA, Singh J and **Jaiwal PK** (2011) Nitrogen use efficiency in higher plants under drought, high temperature, salinity and heavy metal contaminations. In: Nitrogen Use Efficiency in Plants. (Eds) Jain V and Kumar PA, New India Publishing Agency, New Delhi. Pp. 99-123.

23. Sainger M, Sainger PA, Chaudhary D, Jaiwal R, Singh RP, Dhankher OP, **Jaiwal PK** (2015) GM crops for developing world in the era of climate change: For increase of Farmer's income, poverty alleviation, nutrition and health. In: Genetic Manipulation in Plants for Mitigation of Climate Change (Eds Jaiwal et al) Springer, pp. 223-241.

24. Tomar P R, Dixit AR, **Jaiwal PK**, Dhankher OP (2015) Engineering plants for heavy metals and Metalloids. In: Genetic Manipulation in Plants for Mitigation of Climate Change (Eds. Jaiwal PK et al) Springer, pp. 143-168.

25. Bauddh K, Sainger M, Kumar S, Sainger PA, **Jaiwal PK**, Singh RP (2015) Biotechnological approaches to mitigate adverse effects of extreme climatic factors on plant productivity. In: Genetic Manipulation in Plants for Mitigation of Climate Change, Springer, pp. 187-203

26. Sainger M, Chhillar, AK, Chaudhary D, Jaiwal R and **Jaiwal PK** (2019) Vitamin B6-, C- and E- enrichment in crops, In *Nutritional Quality Improvement in Plants*. Eds. Jaiwal PK, Chhillar AK, Chaudhary D, Jaiwal Ranjana. Springer Nature publisher, Switzerland, pp187-229.

Research Papers in referred journals:

27. Prajapati M, Malik P, Sinha A, Yadav H, Jaiwal YK, Ahlawat YK, Chaudhary D, Jaiwal R, Sharma N, Jaiwal PK, Chattu VK (2024) Biotechnological interventions for the production of subunit vaccines against Group A Rotavirus. Cell Biochemistry and Function, 42: e70031, https://doi.org/10.1002/cbf.70031

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