

SANTOSH KUMAR

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Education

<u>Degree</u>	<u>Institution</u>	<u>Year</u>	<u>GPA</u>
Doctor of Philosophy (Plant Science) <i>Thesis: Molecular and physiological characterization of the Flowering Time Control Protein, HvFCA and its role in ABA signalling and seed germination</i>	University of Manitoba	2004-2010	4.0/4.5
Master of Science (Plant Physiology) <i>Thesis: Phytosiderophore production and release by roots of bread and durum wheat and its relationship with Zn efficiency.</i>	Indian Agricultural Research Institute (IARI), India	2002-2004	8.4/10
Bachelor of Science (Agricultural Sciences) <i>Elective: Plant Breeding.</i>	Punjab Agricultural University, India	1998-2002	8.2/10

Work Experience

Research Scientist (Wheat Breeder)	Brandon Research Center, AAFC	2014- Present
Adjunct Professor	Brandon University	2015-Present
Research Associate	Cereal Research Center, AAFC	2010-2014

Identification and validation of Single Nucleotide Polymorphic (SNP) markers, genetic map development, quantitative trait loci analysis, molecular and physiological characterization of important genes from flax cultivars under the TUFGEN (Total Utilization of Flax Genomics) project. The project involved extensive training in physiology, genomics and bioinformatics.

Teaching Assistant (Introductory Genetics)	University of Manitoba	2004-2010
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- Introducing students to the basics of genetics and familiarizing them with the experimental principles.
- Organizing experimental material for lab sessions.
- Responsible for composing, supervising and marking lab exams.

Teaching Assistant (Crop Production)	University of Manitoba	2005-2010
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- Introducing students to the basics of crop production principles and crop identification.
- Responsible for composing, supervising and marking lab exams.

Techniques and procedures

- In depth knowledge of crop variety registration in Canada including inspection procedures for variety registration trials.
- **Biotechnology:** Genomic and plasmid DNA extraction; RNA extraction; gene cloning; protein isolation, purification and characterization (native and SDS-PAGE analysis); Southern, Western and Northern blotting; PCR, RT-PCR and real time PCR analysis; biolistics mediated transformation, screening and characterization of transgenic tissue lines; various biochemical assays such as hormone protein interaction, GST and His pull downs.
- **Bioinformatics:** Working knowledge of Linux (OS) and Perl language. Working on Python language. Hands on experience on Bowtie, BWA, MIRA, SAMtools, SOAP, Tablet, Multipoint mapping and MultiQTL, QTL cartographer, DNAMAN, Joinmap.
- **Databases:** NCBI, Sequin, Softberry, Triannot, Expasy, CerealDB, Phytozome, Kew.
- **Breeding:** Wheat, barley and flax.

Awards

• NSERC visiting Fellow, PBI, Saskatoon (Not Aailed)		2010
• Clark Newman Clayton Award	(\$2500)	2009
• Keystone Symposium Scholarship from NIH, USA	(\$1000)	2008
• Meredith Fellowship for Barley Research by Canadian Grain Commission	(\$1450)	2005-2008
• UMSU Travel award from University of Manitoba	(\$1250)	2006-2007
• Helgason Travel award from University of Manitoba	(\$750)	2006-2007
• George Duff travel award from Canadian Society of Plant Biology	(\$250)	2006
• University of Manitoba Student Union (UMSU) award for academic excellence	(\$250)	2005
• International Graduate Student Scholarship from University of Manitoba	(\$4000)	2005
• University of Manitoba Graduate (PhD) Fellowship (UMGF)	(\$16000)	2005-2008
• Department of Plant Science PhD UMGF Top-Up Award	(\$5000)	2005-2008
• CSIR-UGC Junior Research Fellowship (JRF) for Ph.D and Lectureship (Not Aailed)		2003
• Research Assistantship in Department of Plant Physiology IARI		2002-2004
• Junior Research Fellowship for M.Sc		2002-2004
• University Merit Scholarship and Merit Certificate in Graduation, PAU, Punjab, India		1998-2002
• Merit Scholarship from Jawahar Navodaya Vidyalaya		1989-1994

Wheat Cultivars released

1. Kumar, S. (2016). Spring Wheat - AAC Jatharia / BW483, BD110B-POR-215-C-8-1-PNB-13-N.
2. Kumar, S. (2016). Spring Wheat - AAC Cameron / BW485, G0439-3-NPNB-15-N.
3. Kumar, S. (2016). Spring Wheat - AAC Tradition / BW487, BC07B-ORG-NZ-12-UUU-01-N.
4. Kumar, S. (2017). Spring Wheat - AAC Warman / BW1025, BG48A0-3-3-16.
5. Kumar, S. (2018). Spring Wheat - AAC Magnet
6. Kumar, S. (2018). Spring Wheat - AAC LeRoy
7. Kumar, S. (2019). Spring Wheat - AAC Redstar
8. Kumar, S. (2020). Spring Wheat – AAC Hodge

Peer-reviewed scientific publications

1. Yuefeng Ruan, Wentao Zhang, Ron E. Knox, Samia Berraies, Heather L. Campbell, Raja Ragupathy, Kerry Boyle, Brittany Polley, Maria Antonia Henriquez, Andrew Burt, **Santosh Kumar**, Richard D. Cuthbert, Pierre R. Fobert, Hermann Buerstmayr and Ron M. DePauw (2020). Characterization of the genetic architecture for Fusarium Head Blight resistance in durum wheat: The complex association of resistance, flowering time, and height genes. **Front. Plant Sci.**, doi.org/10.3389/fpls.2020.592064
2. Kirby T. Nilsen, Sean Walkowiak, **Santosh Kumar**, Oscar I. Molina, Harpinder S. Randhawa, Raman Dhariwal, Brook Byrns, Curtis J. Pozniak and Maria A. Henriquez (2020). Histology and RNA sequencing provide insights into Fusarium Head Blight resistance in AAC Tenacious. **Front. Plant Sci.**, doi: 10.3389/fpls.2020.570418
3. A.J. Burt, D.G. Humphreys, J. Mitchell Fetch, D. Green, T.G. Fetch, B.D. McCallum, J. Menzies, R. Aboukhaddour, M.A. Henriquez, and **S. Kumar** (2020) AAC Redstar hard red spring wheat. **Can. J. Plant Sci.** https://doi.org/10.1139/CJPS-2020-0148
4. M M Uzzal A. Liton; Curt A. McCartney; Colin W. Hiebert; **Santosh Kumar**; Mark C. Jordan; Belay T. Ayele (2020). Identification of loci for pre-harvest sprouting resistance in the highly dormant spring wheat RL4137. **Theoretical and Applied Genetics.** https://doi.org/10.1007/s00122-020-03685-y
5. Sudhakar Pandurangan, Kirby T Nilsen, **Santosh Kumar** (2020). Validation of a SNP-KASP marker for the Fusarium head blight resistance QTL on chromosome 5AS. **Can. J. Plant Sci.** https://doi.org/10.1139/CJPS-2020-0099
6. Sari E, Knox RE, Ruan Y, Konkin DJ, Henriquez MA, **Kumar S**, Cuthbert RD, Campbell HL, Lokuruge P, Hsueh E, Boyle K, Fobert PR (2020). Historic recombination in a durum breeding panel enables high-resolution mapping of Fusarium head blight resistance quantitative trait loci. **Scientific Report.** https://doi.org/10.1038/s41598-020-64399-1

7. A. Nakhforoosh, **S. Kumar**, T. Fetch and J. Mitchell Fetch (2020). Peduncle breaking resistance: a potential selection criterion to improve lodging tolerance in Oat. **Can. J. Plant Sci.** <https://doi.org/10.1139/CJPS-2019-0286>
8. **S. Kumar**, S. L. Fox, J. Mitchell Fetch, D. Green, T. Fetch, B. McCallum, R. Aboukhaddour and M-A. Henriquez (2019). AAC LeRoy western red spring wheat. **Can. J. Plant Sci.** <https://doi.org/10.1139/CJPS-2019-0184>
9. **S. Kumar**, S. L. Fox, J. Mitchell Fetch, D. Green, T. Fetch, B. McCallum, R. Aboukhaddour and M-A. Henriquez (2019). AAC Magnet western red spring wheat. **Can. J. Plant Sci.** <https://doi.org/10.1139/CJPS-2019-0180>
10. **S. Kumar**, S. L. Fox, J. Mitchell Fetch, D. Green, T. Fetch, B. McCallum, R. Aboukhaddour and M-A. Henriquez (2019). AAC Warman western red spring wheat. **Can. J. Plant Sci.** **99(2): 289-298**
11. J. Toth, S. Pandurangan, A. Burt, J. M. Fetch, and **S. Kumar** (2018). Marker-assisted breeding of hexaploid spring wheat in the Canadian Prairies. **Can. J. Plant Sci.** **99(2): 111-127**
12. Ehsan Sari , Samia Berraies , Ron E. Knox , Asheesh K. Singh, Yuefeng Ruan, Richard D. Cuthbert, Curtis J. Pozniak, Maria Antonia Henriquez, **Santosh Kumar**, Andrew J. Burt, Amidou N'Diaye, David J. Konkin, Adrian L. Cabral, Heather L. Campbell, Krystalee Wiebe, Janet Condie, Prabhath Lokuruge, Brad Meyer, George Fedak, Fran R. Clarke, John M. Clarke, Daryl J. Somers, Pierre R. Fobert et al. (2018) High density genetic mapping of Fusarium head blight resistance QTL in tetraploid wheat. **PLOS ONE** **13(10): e0204362**. <https://doi.org/10.1371/journal.pone.0204362>
13. **S. Kumar**, S.L. Fox, D.G. Humphreys, J. Mitchell Fetch, D. Green, T. Fetch, B. McCallum, J. Menzies (2018). AAC Prevail western red spring wheat. **Can. J. Plant Sci.** **98:475-482**
14. **S. Kumar**, S.L. Fox, D.G. Humphreys, J. Mitchell Fetch, D. Green, T. Fetch, B. McCallum, J. Menzies (2017). AAC Jatharia western red spring wheat. **Can. J. Plant Sci.** **97:368-376**
15. Fox, S.L., **Kumar, S.**, Thomas, J.B., Humphreys, D.G., Mitchell Fetch, J., Green, D., Wise, I., Smith, M., Fetch, T., Gilbert, J., McCallum, B., and Menzies, J. (2016). AAC Cameron western red spring wheat. **Can. J. Plant Sci.** **96: 1065–1072**.
16. Suresh Desai, **Santosh Kumar**, Robert Hill and Robert Currie (2015). Occurrence, detection, and quantification of economically important viruses in healthy and unhealthy honey bee (Hymenoptera: Apidae) colonies in Canada. **The Canadian Entomologist**; doi : **10.4039/tce.2015.23**
17. **Santosh Kumar**, Frank M. You, Scott Duguid, Helen Booker, Gordon Rowland and Sylvie Cloutier (2014). Detection of minor QTLs for fatty acid content and yield components in CDC Bethune/Macbeth recombinant inbred population of flax (*Linum usitatissimum* L.). **Theoretical and Applied Genetics**. DOI : **10.1007/s00122-015-2483-3**
18. Frank M You, Pingchuan Li, **Santosh Kumar**, Raja Ragupathy, Zhengnan Li, Yong-Bi Fu and Sylvie Cloutier (2014). Genome-wide identification and characterization of the gene families controlling fatty acid biosynthesis in flax (*Linum usitatissimum* L.). **Journal of Proteomics and Bioinformatics**. **7:10**
19. **Santosh Kumar**, Zining Wang, Travis W. Banks, Mark C. Jordan, Brent D. McCallum and Sylvie Cloutier (2014). Lr1-mediated leaf rust resistance pathways of transgenic wheat lines revealed by a gene expression study using the Affymetrix GeneChip® Wheat Genome Array. **Molecular Breeding**. DOI: **10.1007/s11032-014-0022-6**
20. **Santosh Kumar**, Mark C. Jordan, Raju Datla and Sylvie Cloutier (2013). The LuWD40 gene encoding WD repeat protein regulates growth and pollen viability in flax (*Linum usitatissimum* L.). **PLoS One**. **8: e69124**.
21. **Santosh Kumar**, Frank M. You and Sylvie Cloutier (2012). Genome wide SNP discovery in diverse flax genotypes through next generation sequencing of reduced representation libraries. **BMC Genomics**. **13:684**.
22. Shiling Jiang, **Santosh Kumar**, Young-Jae Eu, Sravan Kumar Jami, Claudio Stasolla and Robert D. Hill (2012). The Arabidopsis mutant, fy-1, has an ABA-insensitive germination phenotype. **Journal of Experimental Botany**. **63:2693-703**.
23. **Santosh Kumar**, Shiling Jiang, Sravan K Jami and Robert Hill (2011). Cloning and characterization of barley caryopsis FCA. **Physiologia Plantarum**. **143:93-106**

Peer-reviewed review papers

1. Singer, S.D., Laurie, J.D., Bilichak, A., **Kumar, S.**, Singh, J. (2021). Genetic Variation and Unintended Risk in the Context of Old and New Breeding Techniques, **Critical Reviews in Plant Sciences**; **40(1), 68-108**.
2. **Kumar, Travis W. Banks, and Sylvie Cloutier** (2012). SNP discovery through Next-Generation Sequencing and its applications. **International Journal of Plant Genomics**, Article ID 831460, 15 pages.

Peer-reviewed book chapters

1. **Santosh Kumar**, Arvind H. Hirani, Muhammad Asif and Aakash Goyal (2013). Molecular mechanisms controlling dormancy and germination in barley. **Crop production**. Aakash Goyal (ed), **InTech, New York, USA, pp 69-98**.

2. Sudhakar Pandurangan, Clare Workman, Kirby Nilsen and **Santosh Kumar (2021)**. Introduction to marker-assisted selection in wheat breeding. **Accelerated Breeding of Field Crops**. Andriy Bilichak and John D. Laurie (ed). **Springer Nature, USA**

Edited books

1. **Kumar, S. (Ed.) (2014)**. The Role of Bioinformatics in Agriculture. **Apple Academic Press Inc. New Jersey**.
2. **Kumars, S. (Ed) (2016)**. Crop Breeding: Bioinformatics and Preparing for Climate Change. **Apple Academic Press Inc. New Jersey**.

Recent oral and poster presentations

1. **Santosh Kumar**. (2020). Traditional and participatory wheat breeding. **Invited presentation at the Department of Plant Science**, University of Manitoba, Manitoba, Canada. January 10, 2020
2. **Santosh Kumar**. (2020). Wheat breeding in Western Canada. International Maize and Wheat Improvement Center (CIMMYT). El Batan, Mexico, January 13-17, 2020
3. **Santosh Kumar**. (2020). Wheat breeding in Western Canada: Technology and Innovation. **Invited presentation at the Ag-Days**, Brandon, Manitoba, Canada. January 22, 2020
4. **Santosh Kumar**. (2019). Impact of Fusarium head blight resistance on wheat cultivar registration in Western Canada. **Invited presentation at the Wheat scab meeting**. Milwaukee, Wisconsin, USA. December 8-10, 2019
5. **Santosh Kumar** and Jennifer Mitchell-Fetch. (2019). Western Canadian cereal breeding: incorporating resiliency to climate change. Keystone symposium on Climate Change-Linked Stress Tolerance in Plants, Hanover, Germany. May 11-17, 2019
6. Jacob Toth, Cherilyn Babel, **Santosh Kumar**. (2018). Marker development for gluten subunits affecting grain quality in elite Canadian wheat. Canadian Wheat Symposium, Winnipeg, Canada
7. **Santosh Kumar**. (2018). Wheat breeding in the Canadian Prairies. Plant Biology Europe, Copenhagen, Denmark. June 18-21, 2018
8. Sudhakar Pandurangan, Jacob Toth, Jennifer Mitchell Fetch, Andrew Burt, **Santosh Kumar**. (2018). Development and validation of a single nucleotide polymorphic marker for the yield component kernel weight in wheat. Plant and Animal Genomics, San Diego, California, USA. January 13-17, 2018
9. Jacob Toth, Sudhakar Pandurangan, Andrew Burt, Jennifer Mitchell Fetch and **Santosh Kumar** (2017). Marker assisted wheat breeding for the Canadian prairies. 2017 Joint Meeting of the Canadian Phytopathological Society and the Canadian Society of Agronomy, June 18-22, 2017, Winnipeg, Manitoba. Poster number 30. Page 23.
10. **Santosh Kumar**, Andrew Burt, Richard Cuthbert and Harpinder Randhawa. (2016). Breeding for enhanced Fusarium head blight resistance in Canadian bread wheat. 8th Canadian Workshop on Fusarium Head Blight, Ottawa, Canada, November 20-22, 2016. S20
11. Samia Barraies, Richard Cuthbert, Ron Knox, Firdissa Bokore, Maria Antonia Henriquez, Andrew Burt, **Santosh Kumar**, Yuefeng Ruan, Curtis Pozniak, Amidou N'Diaye and Andrew Sharpe. (2016). 8th Canadian Workshop on Fusarium Head Blight, Ottawa, Canada, November 20-25, 2016. S
12. Samia Barraies, Richard Cuthbert, Ron Knox, Maria Antonia Henriquez, Andrew Burt, **Santosh Kumar**, Yuefeng Ruan, Curtis Pozniak, Amidou N'Diaye, Andrew Sharpe and Firdissa Bokore. (2016). Molecular mapping of QTL for leaf spot disease complex resistance in spring wheat. 3rd Canadian Wheat Symposium. Ottawa, Canada, November 20-25, 2016. P
13. Jennifer Mitchell Fetch, Andy Tekauz, Xiben Wang, **Santosh Kumar** and Andrew Burt. (2016). *Fusarium* head blight of oat-progress in dealing with a sly foe. 8th Canadian Workshop on Fusarium Head Blight, Ottawa, Canada, November 20-25, 2016. S23
14. Yuefeng Ruan, Ron Knox, Curtis Pozniak, John Clarke, Asheesh Singh, Ron DePauw, Maria Antonia Henriquez, Brent McCallum, Anita Brule-Babel, Andrew Burt, **Santosh Kumar**, Richard Cuthbert. (2016). Fhb resistance breeding in durum wheat: progress and perspectives. 8th Canadian Workshop on Fusarium Head Blight, Ottawa, Canada, November 20-25, 2016.
15. Curt A. McCartney, Mulualem T. Kassa, Curtis J. Pozniak, Frank M. You, Sylvie Cloutier, Ian L. Wise, Marjorie A.H. Smith, Andrew G. Sharpe, Pierre R. Fobert, **Santosh Kumar**, Andrew Burt, Frank Ordon, Cristobal Uauy and Alejandro C. Costamagna. (2016). Wheat midge resistance: breeding and genetics. 3rd Canadian Wheat Symposium. Ottawa, Canada, November 20-25, 2016. S10
16. **Santosh Kumar**, Andrew Burt and Jennifer Mitchell-Fetch. (2016). A snapshot on wheat breeding for the Canadian Prairies. EUCARPIA 2016, Zurich, Switzerland, August 28-September 1, 2016. P156
17. Sudhakar Pandurangan, Jacob Toth, Jennifer M. Fetch, and **Santosh Kumar**. (2016). Characterization of potential disease resistance related polymorphic genes in wheat. Plant Biotechnology 2016. Edmonton, Alberta, June 19-21, 2016. P 119.

18. Frank M. You*, Pingchuan Li, Raja Ragupathy, **Santosh Kumar**, Tingtin Zfu, Ming-Cheng Luo, Scott D. Duguid, Khalid Y. Rashid, Helen M. Booker, Michael Deyholos, Yong-Bi Fu, Andrew G. Sharp, and Sylvie Cloutier*. (2016). "The draft flax genome pseudomolecules". Proceedings of the 66th flax institute of the United States. Fargo, North Dakota, March 31-April, 2016. P17
19. Jasdeep Kaur, **Santosh Kumar***, Tom Fetch, Andrew Burt and Jennifer Mitchell-Fetch. (2015). "Prevalence of *Sr2* in Canadian wheat varieties using molecular markers". Botany 2015, Edmonton, AB, Canada, July 25-29, 2015
20. You, F.M., Li, P., **Kumar, S.**, Ragupathy, R., Banik, M., Duguid, S.D., Booker, H.M., Deyholos, M.K., Fu, Y.B., Sharpe, A.G., and Cloutier, S. (2015). "The refined flax genome, its evolution and application.", XXIII Plant and Animal Genome Conference, San Diego, CA, USA, January 10-14, 2015, P1039
21. **Santosh Kumar** and Sylvie Cloutier (2013). Total Utilization Flax GENomics (TUFGEN): Major Thrust-Genomics. Oral presentation on behalf of Dr. Sylvie Cloutier (PI, TUFGEN) at **The Manitoba Flax Growers Association AGM** held on January 14, 2013 at Brandon, Manitoba, Canada.
22. Frank M. You, **Santosh Kumar**, Raja Ragupathy, Michael K. Deyholos, Yong-Bi Fu, Andrew Sharpe and Sylvie Cloutier (2013). Organization and evolution of the flax genome. Poster presented at the **55th annual meeting of the Canadian Society of Plant Biologists**, poster no. F6, page no. 89 of the abstract book, June 25-28, 2013, Quebec City, Quebec, Canada.
23. **Santosh Kumar**, Frank M. You and Sylvie Cloutier (2013). The 10K+ SNP maps of flax. Poster presentation at the **Plant and Animal Genomics XXI**, held on January 12-16, 2013, in San Diego, CA, USA.
24. Frank M. You, **Santosh Kumar**, Mitali Banik, Raja Ragupathy, Michael K. Deyholos, Yong-Bi Fu, Andrew Sharpe and Sylvie Cloutier (2013). Ordering draft genome sequence of flax (*Linum usitatissimum*). Poster presentation at the **Plant and Animal Genomics XXI**, held on January 12-16, 2013, in San Diego, CA, USA.