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Education:

Ph. D. (Ag.) (1993-1997)	: Indian Agricultural Research Institute, New Delhi.
M. Sc. (Ag.) (1991-1993)	: Banaras Hindu University, Varanasi.
B. Sc. (Ag.) (1987-1991)	: Visva Bharati University, Shantiniketan.

Career:

1996 – 2000	: Scientist, Indian Institute of Vegetable Research (IIVR), Varanasi
2000 – 2004	: Scientist (Sr. Scale), IIVR, Varanasi
2004 – 2010	: Associate Professor, School of Life Sciences, JNU.
2010 – present	: Professor, School of Life Sciences, JNU

Area of Research:

Geminivirus : Biology, host-virus interactions and control options

Research in our laboratory targets interfering with interactions between plant viruses and their hosts, and developing strategies to control begomoviruses (Family – *Geminiviridae*) in plants. We are currently studying steps of begomovirus pathogenesis especially how they enter into nucleus, replicate, and spread throughout the host. We also aim to identify host genes that respond to infection. Virus replication is regulated by both host-encoded and virus-encoded genes. Similarly, host cells and tissues respond to infection by viruses and either permit or restrict replication and local and long distance spread of infection. We are engaged in studies to determine how successful pathogenesis is established and developing strategies to control infection and to restrict replication and spread of begomoviruses.

Begomoviruses are very destructive viruses that can cause devastating diseases in vegetable crops in all tropical regions of the world including India. Their genomes are composed of circular single stranded DNA and they are subjected to gene silencing through an unknown mechanism. We have demonstrated that virulent pseudo-recombination and synergism

between two distinct species of begomoviruses, *Tomato leaf curl New Delhi virus (*ToLCNDV) and *Tomato leaf curl Gujarat virus (*ToLCGV-Var) that infect tomato, reasons of which are being investigated in our laboratory. RNAi mediated host recovery and role of suppressors of PTGS in modulating symptom expression is also being analyzed in our laboratory. We have developed virus induced gene silencing (VIGS) vector to identify role of plant gene(s) responsible for either facilitating or restricting viral pathogenesis.

We have been assessing molecular diversity among begomoviruses causing leaf curl disease in chillies, tomato, radish and okra. We have identified several distinct new species of begomoviruses causing severe leaf curl diseases on tomato (*Tomato leaf curl Gujarat virus* & *Tomato leaf curl Patna virus*) on radish (*Radish leaf curl virus*) and also on chillies. We discovered a wealth of infectious viral molecules from chilli and we also found that together they do cause a disease; we have further identified the molecular mechanisms behind this phenomenon. For the first time, we have demonstrated Koch's postulates using clone DNA molecules associated with chilli leaf curl disease by agroinoculation. We have developed strategies for generating broad spectrum resistance against begomoviruses using RNAi technologies. Recently, we have initiated genome editing based methods for developing tolerance in plants.

Research Projects

A) On-going

1. Elucidating novel immune signaling pathway in modulating geminivirus pathogenesis, **DBT**, 2022-25.
2. CRISPR-Cas9- mediated gene editing to generate geminivirus resistant tomato, **DBT**, 2020-23.

B) Completed

1. Elucidating the role of NbUBC2 and NbHUB1 of the Histone Mono-Ubiquitination machinery in geminivirus pathogenesis, **SERB**, 2019-22
2. Structural and Functional analyses of Geminiviral Rep Proteins; **DST-Indo-South Africa Grant**, 2017-2020.
3. Development of transgenic chilli cv. Bhut Jolokia for resistance to virus causing leaf curl disease using RNA interference; **DBT - North-East Twinning**; 2016-2020.
4. Engineering TOLCV resistance in tomato by single and multiple artificial micro RNAs and synthetic rep gene containing multiple to resist VIGS, **SOL genome Network Project (DBT),** 2014-2019.
5. Plant virology in the new era-breeding for resistance (BRAVE) **Erasmus Mundus - European Commission,** 2014-2018.
6. Role of Beta C1 in tomato leaf curl virus pathogenesis **DST,** 2014-2017.
7. Identification of host factors conferring natural resistance in paprika, red chilliies against chilli leaf curl virus**, DBT,** 2014-2017.
8. Engineering broad-spectrum resistance against geminiviruses, **DBT**, 2011-2016.
9. Development of transgenic resistance against Bhindi yellow mosaic virus, **DBT**, 2012-2015
10. Engineering broad-spectrum resistance against plant-infecting RNA viruses, **CSIR**, 2011-2014.
11. Engineering RNAi mediated broad-spectrum resistance against chilli begomoviruses, **DBT**, 2010-2013.

12. Molecular identification and characterization of virulence factors of Tomato leaf curl virus, **DST**, 2010-2014.
13. Molecular diversity of begomoviruses causing chilli leaf curl disease and identification of virulence factors, **DBT**, 2007-2010.
14. Strategy for engineering broad-spectrum resistance against geminiviruses, **DBT**, 2006-2010.
15. Molecular determinants of supervirulent pseudo-recombinant and asymmetric synergism between genomic components of two distinct begomoviruses causing severe leaf curl disease on tomato in India, **International Foundation for Science**, Sweden, 2006-2008.
16. Molecular Characterization of Pepper leaf curl geminivirus and development of DNA based screening technique, **DST**, 2005-2008.
17. Development of transgenic cowpea (*Vigna unguiculata* L.) resistant to cowpea golden mosaic geminivirus, **ICAR** (2000 - 2003).
18. Molecular characterization of whitefly transmitted geminiviruses infecting selected leguminous vegetable crops, **ICAR Lal Bahadur Shastri young Scientist award project** (2001 – 2004).
19. Detection and differentiation of whitefly transmitted geminiviruses infecting cucurbitaceous vegetable crops, **ICAR**, 2003-2004.

Awards and Honour

I. **Prof. A Gnanam Endowment lecture award** by Madurai Kamraj University (2022)
II. **Recognition award** by the **National Academy of Agricultural Sciences** (2020-21)
III. **Fellow** of the **Indian National Science Academy** (2020)
IV. **Fellow** of the **National Academy of Sciences India** (2017)
V. **Fellow** of the **National Academy of Agricultural Sciences** (2017)
VI. **Pran Vohra Award** by **Indian Science Congress Association** (2004-05)
VII. **Certificate of Merit** by the **Indian Society of Seed Technology** (2004)
VIII. **Certificate of Achievement** by **Donald Danforth Plant Sciences Center**, USA (2003)
IX. **Dr. Harbhajan Singh Memorial Award** by **Indian Society of Vegetable Science** (2003)
X. **BOYSCAST** fellowship by **Department of Science and Technology**, GOI (2001-02)
XI. **Lal Bahadur Shastri Young Scientist Award** by **Indian Council of Agricultural Research** (1999-2000)
XII. **Jawaharlal Nehru Award** by **Indian Council of Agricultural Research** (1998)
XIII. **Best student** of **Indian Agricultural Research Institute** (IARI) (1997)
XIV. **IARI Merit Medal** (1997)
XV. B**est student of Plant Pathology**, *Division of Plant Pathology, IARI,* New Delhi (1997)
XVI. **Best student of Mycology and Plant Pathology** of **Banaras Hindu University** (1993)

Membership

1. Member of American Society of Microbiology.
2. Life member of Indian Science Congress Association.
3. Life member of Indian Phytopathological Society.

4. Life member of Indian Virological Society.

Student Guidance

Ph D : 21 (17 - sole supervision; 4 – joint supervision)
M Phil : 3
M Sc : 14
RA/SRF/JRF/PA : > 25
Post doctoral : 12
Trainees / interns :- >60

Patents

S Chakraborty and N Kushwaha. (2015) "Chilli leaf curl virus based vector for tissue specific (phloem) silencing of endogenous gene and over-expression of foreign genes". Patent application no. 2620/DEL/2015 filed on 24.08.2015. (RFE submitted on 23.08.2019)

S Chakraborty, N Kushwaha and AK Singh. (2015) "Development of Chilli leaf curl virus DNA-based chimeric construct for efficient plant inoculation". Patent application no. 2619/DEL/2015 filed on 24.08.2015. (RFE submitted on 23.08.2019)

Publications

A) Published papers

1) F Zarreen, MJ Karim, S Chakraborty. (2022). The diverse roles of histone 2b monoubiquitination in the life of plants. ***Journal of Experimental Botany***. https://doi.org/10.1093/jxb/erac120
2) D Ghosh, S Chakraborty, H Kodamana, S Chakraborty. (2022). Application of machine learning in understanding plant virus pathogenesis: trends and perspectives on emergence, diagnosis, host-virus interplay and management. ***Virology Journal***. https://doi.org/10.1186/s12985-022-01767-5
3) R Devendran, T Namgial, KK Reddy, M Kumar, F Zarreen, S Chakraborty. (2022) Insights into the multifunctional roles of geminivirus-encoded proteins in pathogenesis. ***Archives of Virology***. https://doi.org/10.1007/s00705-021-05338-x
4) D Ghosh, S Chakraborty. (2021). Selective REcruitmeNt of plant DNA polymerases by geminivirus. ***Trends in Genetics***. https://doi.org/10.1016/j.tig.2021.12.001
5) M Kumar, F Zarreen, S Chakraborty. (2021) Roles of two distinct alphasatellites modulating geminivirus pathogenesis. ***Virology journal***. https://doi.org/10.1186/s12985-021-01718-6
6) N Sharma, PP Sahu, A Prasad, M Muthamilarasana, M Waseem, Y Khan, J Thakur, **S Chakraborty** and M Prasad (2021). The Sw5a gene confers resistance to ToLCNDV and triggers an HR response after direct AC4 effector recognition. ***Proceedings of the National Academy of Sciences*** 118 (33) https://doi.org/10.1073/pnas.2101833118
7) P Gnanasekaran, N Gupta, K Ponnusamy and **S Chakraborty** (2021) Geminivirus betasatellite-encoded βC1 protein exhibits novel ATP hydrolysis activity that influences its DNA-binding activity and viral pathogenesis. ***Journal of Virology***, JVI0047521. https://doi.org/10.1128/JVI.00475-21

8) R Ruhel, M Mazumder, P Gnanasekaran, M Kumar, S Gourinath and **S Chakraborty** (2021) Functional implications of residues of the B' motif of geminivirus replication initiator protein in its helicase activity. ***The FEBS Journal.*** https://doi.org/10.1111/febs.16053.

9) R Devendran, M Kumar, D Ghosh, S Yogindran, MJ Karim and **S Chakraborty** (2021). Capsicum-infecting begomoviruses as global pathogens: host–virus interplay, pathogenesis, and management. ***Trends in Microbiology.*** https://doi.org/10.1016/j.tim.2021.05.007

10) S Basu, AK Singh, D Singh, SK Sahu and **S Chakraborty** (2021). Role of viral suppressors governing asymmetric synergism between tomato-infecting begomoviruses. ***Applied Microbiology and Biotechnology*** 105 (3), 1107-1121.

11) N Gupta, K Reddy, D Bhattacharyya and **S Chakraborty** (2021) Plant responses to geminivirus infection: guardians of the plant immunity. ***Virology Journal*** 18. 143 https://doi.org/10.1186/s12985-021-01612-1

12) D Ghosh, M Malavika and S Chakraborty (2021). Impact of viral silencing suppressors on plant viral synergism: a global agro-economic concern. ***Applied Microbiology and Biotechnology*** 105(16-17):6301-6313. https://doi.org/10.1007/s00253-021-11483-9

13) D Ghosh and **S Chakraborty** (2021). Molecular interplay between phytohormones and geminiviruses: a saga of a never-ending arms race. ***Journal of Experimental Botany*** 72:2903-2917 doi: 10.1093/jxb/erab061.

14) S Yogindran, M Kumar, L Sahoo, K Sanatombi, **S Chakraborty.** (2021). Occurrence of Cotton leaf curl Multan virus and associated betasatellites with leaf curl disease of Bhut-Jolokia chillies (Capsicum chinense Jacq.) in India. ***Molecular Biology Reports***, 48 :2143–2152. https://doi.org/10.1007/s11033-021-06223-1

15) S Chowdhury, AB Chowdhury, M Kumar, **S Chakraborty** (2021) Revisiting regulatory roles of replication protein A in plant DNA metabolism. ***Planta***. 253(6):130 https://doi.org/10.1007/s00425-021-03641-0

16) S Sultana, F Zarreen, **S Chakraborty** (2021) Insights into the roles of histone chaperones in nucleosome assembly and disassembly in virus infection. ***Virus Research***. https://doi.org/10.1016/j.virusres.2021.198395

17) Kamal Kumar and **S Chakraborty** (2021) Role of long non-coding RNAs in plant virus pathogenesis. ***Journal of Plant Biochemistry and Biotechnology.*** https://doi.org/10.1007/s13562-021-00697-7

18) F Zarreen, **S Chakraborty.** (2020) Epigenetic regulation of geminivirus pathogenesis: a case of relentless recalibration of defence response in plants. ***Journal of Experimental Botany*** 71(22):6890-6906**.** https://doi.org/10.1093/jxb/eraa406

19) V Prakash, A Singh, A K Singh, T Dalmay, **S Chakraborty.** (2020) Tobacco RNA dependent RNA polymerase 1 affects the expression of defence related genes in *Nicotiana benthamiana* upon Tomato leaf curl Gujarat virus infection. ***Planta*** 252(1):11 doi: 10.1007/s00425-020-03417-y.

20) Manish Kumar, R Vinoth Kumar, **S Chakraborty**. (2020) Association of begomovirus-satellite complex with yellow vein and leaf curl disease of hollyhock (*Alcea rosea*) in India. ***Archives of Virology*** 65(9):2099-2103. **doi: 10.1007/s00705-020-04696-2**

21) R KishoreKumar, D Bhattacharya, **S Chakraborty** (2020) Mutational study of radish leaf curl betasatellite to understand the role of the non-coding region in begomovirus pathogenesis. ***Physiological and Molecular Plant Pathology***, **101549** DOI:10.1016/j.pmpp.2020.101549

22) R Devendran, M Kumar, S Chakraborty. (2020). Genome analysis of SARS-CoV-2 isolates occurring in India: Present scenario. ***Indian Journal of Public Health*** 64 (6): 147-155.

23) P Gnanasekaran, K Ponnusamy, **S Chakraborty**. (2019) A geminivirus betasatellite encoded βC1 protein interacts with PsbP and subverts PsbP-mediated antiviral defence in plants. ***Molecular Plant Pathology,*** 20(7):943-960. **doi: 10.1111/mpp.12804**

24) Mansi, NK Kushwaha, A K Singh, MJ Karim, **S Chakraborty** (2019) *Nicotiana benthamiana* phosphatidylinositol 4-kinase type II regulates chilli leaf curl virus pathogenesis***. Molecular Plant Pathology,*** 2019, *20*(10), 1408-1424. doi: 10.1111/mpp.12846

25) P Gnanasekaran, R KishoreKumar, D Bhattacharyya, R Vinoth Kumar, **S Chakraborty**. (2019) Multifaceted role of geminivirus associated betasatellite in pathogenesis. ***Molecular Plant Pathology*****,** 20(7):1019-1033.

26) R Ruhel, **S Chakraborty.** (2019) Multifunctional roles of geminivirus encoded replication initiator protein. ***Virus Disease*****,** 30 (1):66-73.

27) V Prakash, **S Chakraborty** (2019). Identification of transcription factor binding sites on promoter of RNA dependent RNA polymerases (RDRs) and interacting partners of RDR proteins through in silico analysis. ***Physiology and Molecular Biology of Plants*** 25(4):1055-1071. DOI: 10.1007/s12298-019-00660-w

28) NK Kushwaha, Mansi, PP Sahu , M Prasad , **S Chakrabroty** (2019). Chilli leaf curl virus infection downregulates the expression of the genes encoding chloroplast proteins and stress-related proteins. ***Physiology and Molecular Biology of Plants*** 25(5):1185-1196. doi: 10.1007/s12298-019-00693-1

29) CM Alam, G Jain, A Kausar, AK Singh, B Mandal, A Varma, C Sharfuddin, **S Chakraborty**. (2019). Dicer 1 of *Candida albicans* cleaves plant viral dsRNA in vitro and provides tolerance in plants against virus infection. ***Virus Disease*****,** 30 (2):237-244.

30) T Namgial, A Kaldis, **S Chakraborty** and A. Voloudakis (2019). Topical application of double-stranded RNA molecules containing sequences of Tomato leaf curl virus and Cucumber mosaic virus confers protection against the cognate viruses. ***Physiological and Molecular Plant Pathology,*** **108:**101432. DOI:10.1016/j.pmpp.2019.101432

31) S Basu, NK Kushwaha, AK Singh, PP Sahu, R Vinoth Kuma, **S Chakraborty**. (2018) Dynamics of a geminivirus-encoded pre-coat protein and host RNA-dependent RNA polymerase 1 in regulating symptom recovery in tobacco. ***Journal of Experimental Botany*** 69(8):2085-2102. DOI: 10.1093/jxb/ery043

32) G Prabu, **S Chakraborty.** (2018) Biology of viral satellites and their role in pathogenesis. ***Current Opinion in Virology*** 33: 96-105. DOI: 10.1016/j.coviro.2018.08.002

33) D Bhattacharyya, **S Chakraborty.** (2018) Chloroplast: The Trojan Horse in Plant-Virus Interaction. ***Molecular Plant Pathology*** 19(2):504-518. doi: 10.1111/mpp.12533

34) NK Kushwaha, B Mansi, **S Chakraborty.** (2017) The replication initiator protein of a geminivirus interacts with host monoubiquitination machinery and stimulates transcription of the viral genome. ***PLoS Pathogens*** **14(8): e1007281** https://doi.org/10.1371/journal.ppat.1006587.

35) NK Kushwaha, **S Chakraborty.** (2017) *Chilli leaf curl virus* based vector for phloem-specific silencing of endogenous genes and over-expression of foreign genes. ***Applied Microbiology and Biotechnology.*** **101**:2121–2129. DOI: 10.1007/s00253-016-7964-z

36) E Moriones, S Praveen, **S Chakraborty**. (2017) Tomato leaf curl New Delhi virus: an emerging virus complex threatening vegetable and fiber crops. ***Viruses*** 9, 264; doi:10.3390/v9100264

37) R Vinoth Kumar, D Singh, AK Singh, **S Chakraborty.** (2017) Molecular diversity, recombination and population structure of alphasatellites associated with begomovirus disease complexes. ***Infection Genetics and Evolution***.4:49:39-47. DOI: 10.1016/j.meegid.2017.01.001

38) R Vinoth Kumar, HC Prasanna, Achuit K Singh, D Ragunathan, GK Garg and **S Chakraborty.** (2017) Molecular genetic analysis and evolution of begomoviruses and betasatellites causing yellow mosaic disease of bhendi. ***Virus Genes: 53:275–285***. doi: 10.1007/s11262-016-1414-y

39) Ved Prakash, Ragunathan Devendran, **S Chakraborty** (2017) Overview of plant RNA dependent RNA polymerases in antiviral defense and gene silencing. ***Indian Journal of Plant Physiology***. 22(4):493–505. DOI:10.1007/s40502-017-0339-3

40) AK Singh, NK Kushwaha, **S Chakraborty.** (2016) Synergistic interaction among begomoviruses leads to the suppression of host defense-related gene expression and breakdown of resistance in chilli. ***Applied Microbiology and Biotechnology*** *100:4035–4049.*

41) PP Sahu, N Sharma, S Puranik, **S Chakraborty**, M Prasad. (2016) Tomato 26S Proteasome subunit RPT4a regulates ToLCNDV transcription and activates hypersensitive response in tomato. ***Scientific Reports*** (DOI: 10.1038/srep27078)

42) D Bhattacharyya, G Prabu, R Kishore Kumar, NK Kushwaha, VK Sharma, Mohd A Yusuf, **S Chakraborty.** (2015) A geminivirus betasatellite damages structural and functional integrity of chloroplasts leading to symptom formation and inhibition of photosynthesis. ***Journal of Experimental Botany*** **66(19)**: 5881-5895.

43) B George, CM Alam, R Vinoth Kumar, G Prabu, **S Chakraborty**. (2015) Potential linkage between compound microsatellites and recombination in geminiviruses: evidence from comparative analysis. ***Virology*** **482**: 41-50.

44) RV Kumar, AK Singh, AK Singh, T Yadav, S Basu, NK Kushwaha, B Chattopadhyay, **S Chakraborty**. (2015) Complexity of begomovirus and betasatellite populations associated with chilli leaf curl disease in India. ***Journal of General Virology*** **96(10)**: 3143-3158.

45) NK Kushwaha, PP Sahu, M Prasad, **S Chakraborty.** (2015) Chilli leaf curl virus infection highlights the differential expression of genes involved in protein homeostasis and defense in resistant chilli plants. ***Applied Microbiology and Biotechnology*** **99(11)**: 4757-4770.

46) VK Sharma, S Basu, **S Chakraborty**. (2015) RNAi mediated broad spectrum transgenic resistance to chilli-infecting begomoviruses. ***Plant Cell Reports*** **34(8)**: 1389-1399.

47) VK Sharma, NK Kushwaha, S Basu, AK Singh, **S Chakraborty.** (2015) Identification of siRNA generating hot spots in multiple viral suppressors to generate broad-spectrum antiviral resistance in plants. ***Physiology and Molecular Biology of Plants*** **21(1)**:9–18.

48) NK Kushwaha, AK Singh, S Basu, **S Chakraborty.** (2015) Differential response of diverse solanaceous hosts to Tomato leaf curl New Delhi virus infection indicates coordinated action of NBS-LRR and RNAi-mediated host defense. ***Archives of Virology*** **160(6)**: 1499-1509.

49) B George, R Ruhel, M Mazumdar, VK Sharma, SK Jain, S Gourinath, **S Chakraborty.** (2014) Mutational analysis of the helicase domain of a replication initiator protein reveals critical roles of Lys 272 of B' motif and Lys 289 of β-hairpin loop in geminivirus replication. ***Journal of General Virology*** **95(7)**:1591-1602.

50) B George, G Prabu, SK Jain, **S Chakraborty.** (2014) Genome-wide survey and analysis of small repetitive sequences in caulimoviruses. ***Infection Genetics and Evolution*** **27**: 15-24.

51) B George, RV Kumar, **S Chakraborty**. (2014) Molecular characterization of Chilli leaf curl virus and satellite molecules associated with leaf curl disease of *Amaranthus* spp. ***Virus Genes*** **48(2**): 397-401.

52) P Ranjan, AK Singh, RV Kumar, S Basu, **S Chakraborty.** (2014) Host-specific adaptation of diverse betasatellites associated with distinct Indian tomato-infecting begomoviruses. ***Virus Genes*** **48(2)**: 334-342.

53) CM Alam, B George, C Sharfuddin, SK Jain, **S Chakraborty**. (2013) Occurrence and analysis of imperfect microsatellites in diverse potyvirus genomes. ***Gene*** **521(2)**: 238-244.

54) P Ranjan, RV Kumar, **S Chakraborty.** (2013) Differential pathogenicity among Tomato leaf curl Gujarat virus isolates from India. ***Virus Genes*** **47(3)**: 524-531.

55) AK Singh, B Chattopadhyay, **S Chakraborty**. (2012) Biology and interactions of two distinct monopartite begomoviruses and betasatellites associated with radish leaf curl disease in India. ***Virology Journal*** **9**:43.

56) P Kumari, AK Singh, VK Sharma, B Chattopadhyay, **S Chakraborty.** (2011) A novel recombinant tomato-infecting begomovirus capable of trans-complementing heterologous DNA-B components. ***Archives of Virology*** **156(5)**:769-783.

57) B George, Ch Mashhood Alam, SK Jain, Ch Sharfuddin, **S Chakraborty.** (2012) Differential distribution and occurrence of simple sequence repeats in diverse geminivirus genomes. ***Virus Genes*** **45(3)**:546-556.

58) R Vinoth Kumar, VK Sharma, B Chattopadhyay, **S Chakraborty.** (2012) An improved plant regeneration and *Agrobacterium*-mediated transformation of red pepper (*Capsicum annuum* L.). ***Physiology and Molecular Biology of Plants*** **18(4):**357-364.

59) R Vinoth Kumar, AK Singh, **S Chakraborty.** (2012) A new monopartite begomovirus species, Chilli leaf curl Vellanad virus and associated betasatellites infecting chilli in the Vellanad region of Kerala, India. ***New Disease Reports*** **25**, 20.

60) P Kumari, AK Singh, B Chattopadhyay, **S**. **Chakraborty** (2011) A new begomovirus species and betasatellite causing severe tomato leaf curl disease in Ranchi, India. ***Plant Pathology*** (New Disease Reports) **23:** 11.

61) P Kumari, AK Singh, B Chattopadhyay, **S Chakraborty.** (2010) Molecular characterization of a new species of Begomovirus and betasatellite causing leaf curl disease of tomato in India. ***Virus Research*** **152**: 19–29.

62) PP Sahu, NK Rai, **S Chakraborty,** M Singh, HC Prasanna, B Ramesh, D Chattopadhyay, M Prasad. (2010) Tomato cultivar tolerant to Tomato leaf curl New Delhi virus infection induces virus-specific short interfering RNA accumulation and defence-associated host gene expression. ***Molecular Plant Pathology*** **11(4)**: 531-544.

63) NK Kushwaha, A K Singh, B Chattopadhyay, **S Chakraborty** (2010) Recent advances in geminivirus detection and future perspectives. ***The Journal of Plant Protection Sciences*** **2(1)**: 1-18.

64) AK Singh, KK Mishra, B Chattopadhyay, **S Chakraborty.** (2009) Biological and molecular characterization of a Begomovirus associated with yellow mosaic vein mosaic disease of pumpkin from Northern India. ***Virus Genes*** **39(3)**:359-370.

65) P Kumari, B Chattopadhyay, AK Singh, **S Chakraborty**. (2009) A new begomovirus species causing tomato leaf curl disease in Patna, India. ***Plant Disease*** **95(5)**:595.

66) B Chattopadhyay, AK Singh, T Yadav, CM Fauquet, NB Sarin, **S Chakraborty. (**2008) Infectivity of the cloned components of a begomovirus: DNA beta causing chilli leaf curl disease

in India. ***Archives of Virology*** **153(3)**:533-539.

67) **S Chakraborty**, R Vanitharani, B Chattopadhyay, CM Fauquet. (2008) More virulent pseudorecombination and asymmetric synergism between two distinct species of begomoviruses causing tomato leaf curl disease in India. ***Journal of General Virology*** **89(3)**: 818–828.

68) AK Singh, B Chattopadhyay, PK Pandey, AK Singh, **S Chakraborty**. (2007) A new species of Begomovirus causing leaf curl disease of radish in India. ***Plant Disease*** **91(8)**: 1053.

69) SK Singh, **S Chakraborty**, AK Singh, PK Pandey. (2006) Cloning, restriction mapping and phylogenetic relationship of genomic components of MYMIV from *Lablab purpureus*. ***Bioresource Technology*** **97*:*** 1807-1814.

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71) **S Chakraborty,** PK Pandey, MK Banerjee, G Kalloo, CM Fauquet. (2003) Tomato leaf Gujarat virus, a new begomovirus species causing a severe leaf curl disease of tomato in Varanasi, India. ***Phytopathology*** **93(12)**: 1485-1496.

72) **S Chakraborty,** PK Pandey, MK Banerjee, G Kalloo, CM Fauquet. (2003) A new begomovirus species causing tomato leaf curl disease in Varanasi, India. ***Plant Disease*** **87(3)**: 313.

73) **S Chakraborty,** Raj Kumar, M Singh. (2003) Identification of sources of resistance to cowpea golden mosaic geminivirus. ***Vegetable Science*** **30(2)**: 101-105.

74) M Singh, S Kumar, K Srivastava, **S Chakraborty**, PA Kumar, Kalloo G. MK Banerjee. (2003) Transfer of a *Bt* crystal protein gene (Cry1Ab) to brinjal (*Solanum melongena* L.). ***Indian Journal of Plant Physiology (Special Issue):*** 630-633.

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78) M Singh, **S Chakraborty**, S Kumar, G Kalloo (2000) Genetic engineering for insect resistance in vegetable crops. ***Vegetable Science*** **27(2)**: 105-111.

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Honours/Awards received by students :-

1. **Ms. Malavika M** has been awarded the prestigious **Prime Minister's Research Fellowship (PMRF) -2021.**
2. **Ms. Malavika M** received **Best poster presentation (2nd Prize)** -**2021** at the National e-conference on: Plant health and Food security: Challenges and opportunities, from the Indian Phytopathological Society, New Delhi.
3. **Mr. Dibyendu Ghosh** has been awarded the prestigious **Prime Minister's Research Fellowship (PMRF) -2020.**
4. **Ms. Neha Gupta** received the **Best Oral Presentation Award (1st Prize) – 2020** at the International Conference of Virology, VIROCON, from the Indian Virological Society, New Delhi.
5. **Mr. Manish Kumar** received **Best Poster Presentation award (2nd Prize) - 2020** at the International Conference of Virology, VIROCON, from the Indian Virological Society, New Delhi.
6. **Dr. R Vinoth Kumar** received **Jawaharlal Nehru Award for outstanding Doctoral Thesis Research-2018** from Indian Council of Agricultural Research (ICAR), New Delhi
7. **Ms. Neha Gupta** received the **Best Oral Presentation Award -2018 (2nd Prize)** from the Indian Virological Society, New Delhi.
8. **Mr. Tsewang Namgial** received the **Best Oral Presentation Award -2018 (3rd Prize)** from the Indian Virological Society, New Delhi.
9. **Mr. Tsewang Namgial** received the **Best Oral Presentation Award - 2018 (3rd Prize)** from the Indian Virological Society, New Delhi.
10. **Dr. Pranav Pankaj Sahu** received the prestigious **Marie Curie Fellowship -2017** from the European Commission.
11. **Dr. Ashish Kumar Singh** received **Young Scientist Award-2017** from ***the Society of Biological Chemists*** held at New Delhi.
12. **Dr. G Prabu** received **MJ Narsimhan Academic Commendation Award - 2017** from the Indian Phytopathological Society, New Delhi.

13. **Dr. Nirbhay Kumar Kushwaha** received **INSA - Young Scientist Medal - 2016** of the Indian National Science Academy, New Delhi.
14. **Dr. G Prabu** received **Young Scientist Award-2016** in the 8th ***International Geminivirus Symposium*** and ***6th Comparative ssDNA Virus Workshop*** held at New Delhi.
15. **Dr. Rajrani Ruhel** received **Young Scientist Award-2016** in the 8th ***International Geminivirus Symposium*** and ***6th Comparative ssDNA Virus Workshop*** held at New Delhi.
16. **Dr. R Vinoth Kumar** received **ERASMUS MUNDUS ACTION 2 BRAVE SCHOLASHIP-2015** from the European Commission, Brussels.
17. **Dr. Saumik Basu** received the **ERASMUS MUNDUS ACTION 2 SCHOLASHIP-2015** from the European Commission, Brussels.
18. **Dr. Veerendra Kumar Sharma** received **ERASMUS MUNDUS ACTION 2 SCHOLASHIP-2015** from the European Commission, Brussels.
19. **Mr. D Ragunathan** received **ERASMUS MUNDUS ACTION 2 BRAVE SCHOLASHIP-2015** from the European Commission, Brussels.
20. **Mr. Ved Prakash** received **ERASMUS MUNDUS ACTION 2 BRAVE SCHOLASHIP-2015** from the European Commission, Brussels.
21. **Mr. Tsewng Namgial** received **ERASMUS MUNDUS ACTION 2 BRAVE SCHOLASHIP-2015** from the European Commission, Brussels.
22. **Dr. Nirbhay Kumar Kushwaha** received **MJ Narsimhan Academic Commendation Award - 2014** of the Indian Phytopathological Society, New Delhi.