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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:

Host – geminivirus Interactions and Transgenic resistance

Research in our laboratory targets interfering with interactions between plant viruses and their hosts, and developing strategies to control begomoviruses 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 (Family – *Geminiviridae*) 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 are now attempting to determine 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. Recently, we have initiated to develop strategies for generating broad spectrum resistance against begomoviruses.

Research Projects

A) On-going

1. Structural and Functional analyses of Geminiviral Rep Proteins; by **DST-Indo-South Africa Grant**, 2017-2020.
2. Development of transgenic chilli cv. Bhut Jolokia for resistance to virus causing leaf curl disease using RNA interference; **DBT - North-East Twinning**; 2016-2019.
3. 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),** 2014-2017.
4. Plant virology in the new era-breeding for resistance (BRAVE) **Erasmus Mundus - European Commission,** 2014-2018.

B) Completed

1. Role of Beta C1 in tomato leaf curl virus pathogenesis **DST,** 2014-2017.
2. Identification of host factors conferring natural resistance in paprika, red chilliies against chilli leaf curl virus**, DBT,** 2014-2017.
3. Engineering broad-spectrum resistance against geminiviruses, **DBT**, 2011-2016.
4. Development of transgenic resistance against Bhindi yellow mosaic virus, **DBT**, 2012-2015
5. Engineering broad-spectrum resistance against plant-infecting RNA viruses, **CSIR**, 2011-2014.
6. Engineering RNAi mediated broad-spectrum resistance against chilli begomoviruses, **DBT**, 2010-2013.
7. Molecular identification and characterization of virulence factors of Tomato leaf curl virus, **DST**, 2010-2014.

8. Molecular diversity of begomoviruses causing chilli leaf curl disease and identification of virulence factors, **DBT**, 2007-2010.
9. Strategy for engineering broad-spectrum resistance against geminiviruses, **DBT**, 2006-2010.
10. 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.
11. Molecular Characterization of Pepper leaf curl geminivirus and development of DNA based screening technique, **DST**, 2005-2008.
12. Development of transgenic cowpea (*Vigna unguiculata* L.) resistant to cowpea golden mosaic geminivirus, **ICAR** (2000 - 2003).
13. Molecular characterization of whitefly transmitted geminiviruses infecting selected leguminous vegetable crops, **ICAR Lal Bahadur Shastri young Scientist award project** (2001 – 2004).
14. Detection and differentiation of whitefly transmitted geminiviruses infecting cucurbitaceous vegetable crops, **ICAR**, 2003-2004.

Awards and Honour

1. **Fellow** of the **National Academy of Sciences India** during 2017.
2. **Fellow** of the **National Academy of Agricultural Sciences** during 2017.
3. **Jawahar Lal Nehru Award** by the **Indian Council of Agricultural Research** (ICAR), New Delhi during1998.
4. **Pran Vohra Award** by the **Indian Science Congress Association** during 2005.
5. **Lal Bahadur Shastri Award** by the **Indian Council of Agricultural Research** (ICAR), New Delhi during 2000.
6. **Dr. Harbhajan Singh Award** by the **Indian Society of Vegetable Science** during 2005.
7. **BOYSCAST** fellowship by the **Department of Science and Technology**, Govt. of India, during 2002 for one year Advanced training in Molecular Virology at Danforth Plant Science Center, Saint Louis, Missouri, USA.
8. **Best student of** Indian Agricultural Research Institute (IARI), New Delhi during 1997.
9. **IARI Merit medal** during1997.
10. **Best student of Plant Pathology,** IARI, New Delhi during 1997.
11. **Best student of Plant Pathology of** Banaras Hindu University (BHU), Varanasi 1993.
12. **Best Oral paper presentation** in the National Symposium on Biotechnology of Plant Protection held at BHU, Varanasi 2000.
13. **IARI Senior Research Fellowship** by the IARI, New Delhi 1993.

Membership

1. Life member of Indian Science Congress Association.
2. Life member of Indian Phytopathological Society.
3. Life member of Indian Virological Society.

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.

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.

Publications

A) Published papers

1) S Basu[†], N K Kushwaha[†], A K Singh[†], P P 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*** [doi:10.1093/jxb/ery043]

2) N K Kushwaha, B Mansi and **Chakraborty S*.** (**2017)** The replication initiator protein of a geminivirus interacts with host monoubiquitination machinery and stimulates transcription of the viral genome. ***PLOS Pathogens*** **(DOI:10.1371/journal.ppat.1006587)**.

3) D Bhattacharyya, **S Chakraborty.*** (2017) Chloroplast: The Trojan Horse in Plant-Virus Interaction. ***Molecular Plant Pathology***. (DOI: 10.1111/mpp.12533)

4) 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.

5) N K 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.

6) Ved Prakash, D Ragunathan and **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.

7) R Vinoth Kumar, H C Prasanna, Achuit K Singh, D Ragunathan, G K Garg and **S Chakraborty*** (2016) Molecular genetic analysis and evolution of begomoviruses and betasatellites causing yellow mosaic disease of bhendi. ***Virus Genes*** (DOI:10.1007/s11262-016-1414-y)

8) A K Singh, N K 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*

9) P P 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)

10) D Bhattacharyya, G Prabu, R Kishore Kumar, N Kushwaha, V K 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.

11) 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.

12) RV Kumar, AK Singh, AK Singh, T Yadav, S Basu, N 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.

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

14) N 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.

15) N Kushwaha, A K 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.

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

17) 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.

18) 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.

19) 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.

20) VK Sharma, NK Kushwaha, S Basu, AK Singh, **S Chakraborty*** (2014). 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.

21) P Ranjan, RV Kumar, **S Chakraborty*.** (2014) Differential pathogenicity among Tomato leaf curl Gujarat virus isolates from India. ***Virus Genes*** **47(3)**: 524-531.

22) 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.

23) 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.

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

25) 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 Molecular Biology of Plants* 18(4):**357-364.

26) 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.

27) 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.

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

29) 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.

30) 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.

31) 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.

32) 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.

33) 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.

34) 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.

35) 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.

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

37) 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.

38) **S Chakraborty*,** B Singh, P K Pandey. (2005) An evaluation of the reactions of okra cultivars and breeding selections to okra leaf curl geminivirus. ***Annals of Applied Biology*** (supplement) *Tests of Agrochemicals and Cultivars* **26**: 32-33.

39) **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.

40) **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.

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

42) 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.

43) B Chattopadhyay, B Rai, **S Chakraborty*. (**2002) *In vitro* efficacy of some systemic fungicides against *Fusarium oxysporum* f. sp. *lycopersici*. ***Annals of Applied Biology*** (supplement) ***Tests of Agrochemicals and Cultivars* 22**:008-009.

44) J Singh, MK Banerjee, **S Chakraborty**, G Kalloo. (2002) Role of phenolics peroxidase in resistance to Fusarium wilt in tomato (*Lycopersicon esculentum* Mill.). ***Annals of Agri Bio Research* 7(1)**: 41-46.

45) G Kalloo, M Singh, **S Chakraborty,** PM Singh, AK Singh and MK Banerjee (2001) Seed protein electrophoresis for varietal identification of cowpea (*Vigna unguiculata*). ***Seed Research* 29(1)**:1-6.

46) **S Chakraborty*,** M Singh, G Kalloo, MK Banerjee, PK Pandey. (1999) Screening of cowpea cultivars against cowpea golden mosaic geminivirus. ***Annals of Applied Biology*** (supplement 134) *Tests of Agrochemicals and Cultivars*. **20**: 40-41.

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

48) **S Chakraborty*,** PK Pandey, B Singh. (1997) Okra enation leaf curl disease - a threat to cultivation of okra (*Abelmoschus esculentus* L). ***Vegetable Science* 24(1)**: 52-54.

49) **S Chakraborty*,** A Sinha, PK Pandey. (1997) Occurrence of watermelon mosaic virus- I on bottle gourd [*Lagenaria siceraria* (Mol.) St I]. ***Vegetable Science* 24(2)**: 147-149.

50) **S Chakraborty,** A Sinha, BVB Reddy. (1995) Post infection changes in total nitrogen, total phosphorus protein contents of cucurbit plants affected by cucumber mosaic virus. ***Advances in Plant Sciences* 8(2)**: 417-419.

51) **S Chakraborty,** A Sinha. (1994) A mosaic disease of pumpkin (*Cucurbita moschata* in Varanasi region. ***Crop Research* 8(1)**: 196-198.

52) **S. Chakraborty,** A Sinha, BVB Reddy. (1994) Effect of cucurbit mosaic viruses on chlorophyll and total phenol content of cucurbits. ***Crop Research* 7(3)**:461-465.

B) *Invited Chapters in Edited Books*

1. Neeti Sanan-Mishra, **S Chakraborty**, Dinesh Gupta, and Sunil Kumar Mukherjee (2017). RNAi Suppressors: Biology and Mechanisms. In: Plant Epigenetics, RNA Technologies (N. Rajewsky et al. Eds.), pp.199-230, Springer International.
2. R Ruhel, R. Vinoth Kumar, **S Chakraborty** (2016). Diverse Roles of Plant and Viral Helicases: Current Status and Future Perspective. In: Plant Viruses: Evolution and Management (R K Gaur, N M Petrov, B. L. Patil and M. I. Stoyanova Eds.), Springer Singapore, pp.39-51.
3. V K Sharma, **S Chakraborty.** 2016. Engineering Pathogen Derived Resistance against Plant Viruses:Current Scenario and Future Prospect. In- Biotechnology, Progress and Applications (S Hameed and Z Fatima Eds.) pp 131-159 (Astrla International Publications Limited, India.
4. S Basu, VK Sharma, D Bhattacharyya, **S Chakraborty**. 2014. An Overview of Antiviral RNA Silencing in Plant: Biogenesis, Host–Virus Interaction and Potential Applications In Approaches to Plant Stress and their Management (R. K Gaur and P Sharma, Eds.) pp317-337, (Springer).
5. George,B., Chattopadhyay, B. and **Chakraborty, S.** 2012. Replication and transcription strategies of geminiviruses : an overview. In: Recent Trends in Plant Virology (Eds. GP Rao, VK Baranwal, B Mandal and N Rishi), pp 47-70, Stadium Press, USA.
6. **Chakraborty S.** 2008**.** Tomato Leaf Curl Viruses from India. Encyclopedia of Virology, 5 vols. (B.W.J. Mahy and M.H.V. Van Regenmortel, Editors), pp. 124-133 Oxford: Elsevier.
7. **Chakraborty**, **S.** Anupam Varma and V.G. Malathi. (2001). Molecular characterization of mungbean yellow mosaic geminivirus - a novel approach for engineering transgenic resistance. **In** proceedings of *International Conference on Environment and Agriculture*, held in Kathmandu, Nepal, Nov. *1-3,* 1998, p.376-382.
8. Singh, M., **Chakraborty, S.,** Srivastava, K. and Kalloo, G. (2000). Biotechnological advances in improvement of vegetable crops. . **In** : Emerging Scenario in Vegetable Research and Development (Eds. G. Kalloo and Kirti Singh), Research Periodicals and Book Publishing House, India, pp 58-84.

Referred Papers in Published Conference Proceedings

1. Gnanasekaran P, Gupta N, **Chakraborty S.** Novel ATPase function of Tomato leaf curl Patna betasatellite encoded βC1 negatively regulates the viral DNA accumulation. In: National Science Day Symposium 2018 held at Jawaharlal Nehru University, New Delhi, India on February 28, 2018.
2. Singh A K, Kushwaha N K, Basu S and **Chakraborty S.** RDR1 of *Nicotiana tabacum promotes methylation of viral promoter and recovers plant from ToLCGV infection. In: Science Day* held at JNU, New Delhi on February 28, 2018.
3. Singh A K, Kushwaha N K, Basu S and **Chakraborty S**. Arm race between pre-coat protein of geminivirus and RDR1 of *Nicotiana tabacum* for symptom development and recovery. In: Indian Phytopathological Society National Symposium & Delhi Chapter Meeting on Innovative Strategies for the Management of Plant Disease

Under Climate Change Scenario held at Division of Plant Pathology ICAR-Indian Agricultural Research Institute, New Delhi, India on December 19, 2017, P. 40

4. Gnanasekaran P, Bhattacharyya D, Kumar RK, Kushwaha NK, and **Chakraborty S.** Elucidation of βC1 protein mediated symptom induction on Nicotiana benthamiana.In: National Science Day Symposium 2017 held at Jawaharlal Nehru University, New Delhi, India on February 28, 2017, P. 142.
5. Gnanasekaran P, Bhattacharyya D, Kumar RK, Kushwaha NK, and **Chakraborty S.** Betasatellite encoded βC1 interact with PSbP and subvert the PSbP mediated impediment on symptom induction and viral pathogenesis. In: the 15th Annual scientific festival "Biosparks 2017" held at Jawaharlal Nehru University, New Delhi, India on March 30-31, 2017, P. 14.
6. Bhardwaj M, Kushwaha NK and **Chakraborty S**. An uncharacterized putative kinase of *Nicotianabenthamiana* modulates Chilli leaf curl virus pathogenesis in 86th Conference of Society of Biological Chemists Emerging Discoveries in Health and Agricultural Sciences Organised by School of Life Sciences, Jawaharlal Nehru University, New Delhi 16-19 November 2017, p. 146
7. Gnanasekaran P, and **Chakraborty S**. A geminivirus betasatellite encoded βC1 protein interacts with PSbP and subvert the PSbP mediated antiviral defense in plants. In: the National Symposium on Plant Health Management: Embracing Eco-sustainable paradigm held at Assam Agricultural University, Jorhat, India on February 15-17, 2018, P. 32.
8. Singh A K, Basu S, Kushwaha N K, Sahu P P, Kumar R V and **Chakraborty S**. Pre-coat protein of geminivirus regulates symptom recovery through dynamic interplay with host RNA dependent RNA polymerase 1 in tobacco. In: 86th Conference of Society of Biological Chemists held at JNU, New Delhi during November 16 – 19, 2017, P. 364.
9. **Chakraborty, S.** Biology and Interactions between geminiviruses and their hosts. In: Foundation Day and 24th General Body meeting, National Academy of Agricultural Sciences, New Delhi held on June 4-5, 2017, P.12.
10. Prabu G, Bhattacharyya D, Kishore Kumar R, Kushwaha N K and **Chakraborty S**. Elucidation of C1 protein mediated symptom induction on *Nicotiana benthamiana*. In : National Science Day Symposium 2017 held at JNU, New Delhi on February 28, 2017, P. 142.
11. Mansi, Kushwaha NK, and **Chakraborty S**. The replication initiator protein (Rep) of a geminivirus recruits monoubiquitination machinery on the viral promoter and stimulates transcription of the viral genome. In : National Science Day Symposium 2017 held at JNU, New Delhi on February 28, 2017, P. 143.
12. **Chakraborty S**. Recent advances in plant virus interactions – learning from geminiviruses. In: the IPS East Zone Meet cum National Symposium – Plant Health Management for Food Security and Safety held at BCKV, Kalyani, West Bengal during December 8-9, 2016, P. 1-3.
13. **Chakraborty S**. New insights into roles of the replication initiator protein in geminivirus pathogenesis. In: the 8th International Geminivirus Symposium & the 6th International ssDNA Comparative Virology Workshop held at Vivanta by Taj and Jawaharlal Nehru University, New Delhi, India during November 7 – 10, 2016, P. 37.
14. Kushwaha N, Mansi and **Chakraborty S**. A monopartite geminivirus encoded V2 protein exploits cellular pathways to traffic via endomembrane system. In: the 8th International Geminivirus Symposium & the 6th International ssDNA Comparative

Virology Workshop held at Vivanta by Taj and Jawaharlal Nehru University, New Delhi, India during November 7 – 10, 2016, P. 34.

15. Gupta N, Kumar R V, Singh Achuit K, Singh Ashish K, Singh, D and **Chakraborty S**. Emergence of chilli-infecting begomoviruses in India and the role of associated satellites in pathogenesis. In: the 8th International Geminivirus Symposium & the 6th International ssDNA Comparative Virology Workshop held at Vivanta by Taj and Jawaharlal Nehru University, New Delhi, India during November 7 – 10, 2016, P. 65.
16. Singh D, Gnanasekaran, P and **Chakraborty S**. Role of DNA B of Tomato leaf curl New Delhi virus in symptom development. In: the 8th International Geminivirus Symposium & the 6th International ssDNA Comparative Virology Workshop held at Vivanta by Taj and Jawaharlal Nehru University, New Delhi, India during November 7 – 10, 2016, P. 66.
17. Kumar M, Kumar R V, Ragunathan, D and **Chakraborty S**. Identification of begomovirus and associated satellite components in *Alcea rosea* L. in India. In: the 8th International Geminivirus Symposium & the 6th International ssDNA Comparative Virology Workshop held at Vivanta by Taj and Jawaharlal Nehru University, New Delhi, India during November 7 – 10, 2016, P. 87.
18. Singh A K, Kushwaha, N and **Chakraborty S**. Consequences of synergistic interaction among chilli-infecting begomoviruses. in India. In: the 8th International Geminivirus Symposium & the 6th International ssDNA Comparative Virology Workshop held at Vivanta by Taj and Jawaharlal Nehru University, New Delhi, India during November 7 – 10, 2016, P. 92.
19. Sahu P, Sharma N, Puranik S, **Chakraborty S** and Prasad M. Tomato 26S proteasome subunit RPT4a regulates ToLCNDV transcription and activates hypersensitive response in tomato. In: the 8th International Geminivirus Symposium & the 6th International ssDNA Comparative Virology Workshop held at Vivanta by Taj and Jawaharlal Nehru University, New Delhi, India during November 7 – 10, 2016, P. 31.
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