Biodata of the Scientist

Division/Section: Division of Crop Protection

A.Personal information

1.Name(With Title): Dr. Harish E R

1.a. Qualification: Ph.D.

2. Designation: Senior Scientist

3. Address (Personal): CTCRI officers quarter (IV/2), Sreekariyam, Thiruvananthapuram, PIN-695017

4. Phone Numbers:

(a)Residence

_____(c)Mobile: 8281337852

5. Email: harisher4@gmail.com, harish.er@icar.gov.in

6. Countries visited: Thailand

B. Professional information

1. Area of specialization: Integrated management of tuber crop pests

2. Area of interest: Genetic variability studies of pests, endosymbionts, pest management

3. Number of institute projects completed (Add list): 3

1. Management of sucking pests of cassava and tracking virus-vector interactions
2. Development of suitable strategy for the management of whitefly, *Bemisia tabaci*, in cassava
3. Virus–vector relationship and vector management

4. Number of Institute projects being handled (Add list): 4

1. Management of sucking pests of cassava and tracking virus-vector interactions
2. Development of suitable strategy for the management of whitefly, *Bemisia tabaci*, in cassava
3. Virus–vector relationship and vector management
4. Management of important pests and documentation of emerging pests in tuber crops

5.Number of externally funded projects completed (Add list): 5

1. Popularisation of cassava biopesticide against borer pests of banana in three districts of Kerala
2. ORP on management of sucking pests of Horticultural crops
3. Indo-Swiss cassava network

4. On-farm trials of cassava biopesticides against borer pests of banana in Kerala

5. Augmentation of biopesticides production from cassava leaves using fully automated manufacturing facilities

6. Number of externally funded projects being handled (Add list): 8

1.Popularisation of cassava biopesticide against borer pests of banana in three districts of Kerala

2. ORP on management of sucking pests of Horticultural crops

3. Indo-Swiss cassava network

4. On-farm trials of cassava biopesticides against borer pests of banana in Kerala

5. Augmentation of biopesticides production from cassava leaves using fully automated manufacturing facilities

6. Development of ICT applications in tuber crops

7. Empowerment of farmers through tuber crops based technological interventions under SCSP

8. Development of Smart Solutions for Managing Biotic and Abiotic Stresses in Cassava, Sweet Potato and Taro through Artificial Intelligence

7. Number of students guided for a) Ph.D_____b) M.Phil_____c) M.Sc 7

8. Number of students being guided for a) Ph.D_____b) M.Phil_____c) M.Sc 7

8.a. information about the students under your guidance

Name of the student	Course undergoing (Ph.D/M.Phil/M.Sc)	Title of the project/Thesis	E-mail address
Farhana Abdul Rahim	MSc (Microbiology)	Screening potential microbes against cassava whitefly *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae)	farhana.arahim@yahoo.com
Hizaana Noushad	MSc (Biotechnology)	Molecular characterization	hizana832@gmail.com

		and barcoding of whiteflies infesting tropical tuber crops	
Nishana P	MSc (Microbiology)	Molecular identification of endosymbiotic bacteria associated with whiteflies infesting tropical tuber crops	nishanap14@gmail.com
S Gopakumar	MSc (Microbiology)	Genetic variability in important sucking pests of tropical tuber crops	**gopu7912@gmail.com**
Arya Sukumar	MSc (Biotechnology)	Characterization of intestinal microbiome of *Rattus* sp	aryasukumar1997@gmail.com
Aryalakshmi Mohan	MSc (Microbiology)	Endosymbiont diversity of mealy bugs in cassava	aryamohanan8353@gmail.com
Archana Vijayan	MSc (Microbiology)	Bacterial endosymbionts of whiteflies in cassava	archanavgra2015@gmail.com

9. Information on guideship NA

Guide ship for Ph.D/ M.Phil/ M.Sc	University	Subject

10. Number of Research papers (Add list): 7

1. M. K. Tripathi, B. Chaudhary, H. R. Bhandari and E. R. Harish. 2012. Effect of varieties, irrigation and nitrogen management on fibre yield of sunhemp. *J. Crop and Weed* **8**(1): 84-85.

2. M. T. Ranjith, ManiChellappan, E. R. Harish, D. Girija and P. A. Nazeem. 2016. Bacterial communities associated with the gut of tomato fruit borer, *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) based on Illumina Next -Generation Sequencing. *J. Asia Pac. Entomol.* **19**: 333-340.

3. Harish, E. R., Mani Chellappan., Makeshkumar, T., Ranjith, M. T. and Ambavane, A. R. 2017. Morphometric variations in cassava (*Manihot esculenta* Crantz) whitefly, *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae) from different agro-ecological zones of Kerala, India. *J. Root Crops.* **42**(2): 90-102.

4. Harish, E.R., Mani Chellappan, Makeshkumar, T., Deepu Mathew, Ranjith, M.T. and Girija, D. 2019. Next generation sequencing reveals endosymbiont variability in cassava whitefly, *Bemisia tabaci*, across the agroecological zones of Kerala, India. *Genome*, **62**(9): 571-584.

5. Harish, E.R., Farhana, A.H. and Sangeetha, B.G. 2019. Screening potential microbes against whitefly (*Bemisia tabaci* (Gennadius)), the most important pest of cassava (*Manihot esculenta* Crantz). *J. Entomol. Zool. Stud.*, **7**(6): 601-606.

6. Sangeetha, B.G., Sreejitha, E.V., Jayaprakas, C.A. and Harish, E.R., 2019. Endosymbiotic bacteria associated with Aphis gossypii Glover (Hemiptera: Aphidae) infesting taro. *Journal of Root Crops*, *45*(1), pp.41-46.

7. Krishnan, J.U., Jayaprakas, C.A., Harish, E.R. and Rajeswari, L.S. 2020. Banana (*Musa* spp.)-an unseen umbrella crop? Insect diversity on *Musa* spp. in the Indo-Pacific region. *Oriental Insects*, 1-13. doi: 10.1080/00305316.2019.1667926.

11. Number of Books/Book chapters (Add list): 5

1. M. Mani, M. Kalyanasundaram, C. A. Jayaprakas, E. R. Harish, R. S. Sreerag, and M. Nedunchezhiyan. 2016. Tuber crops. In: M. Mani and C. Shivaraju (eds), *Mealybugs and Their Management in Agricultural and Horticultural Crops*. Springer India, New Delhi, pp. 471-494.

2. Harish E.R. and Ranjith M. T. 2016. Save that bug! A case for conservation biological control. Lambert Academic publishing. 110p.

3. Harish E. R and Ranjith M. T. 2018. Endosymbionts: Hidden Players in Insects. Lambert Academic publishing, 53pp.

4. Jayaprakas C. A. and Harish E. R. 2020. Development of ecofriendly strategies to manage emerging pests in tropical tuber crops under changing climate. In: *Proceedings of the International Webinar on Harnessing the Potential of Tropical Tuber Crops Under Changing Climate (HPTTC 2020)*, (Ed.) Byju G., Sanket J. More and Jaganathan, 27 October 2020, ICAR-CTCRI, Thiruvananthapuram, Kerala, India, pp. 61-69.

5. Harish, E.R., Jayaprakas, C.A. and Sangeetha B.G. 2021. Important Pests and Their Management in Tropical Tuber Crops. In: Sanket J. More, Giri Namrata A., Suresh Kumar J., Visalakshi Chandra C., Sirisha Tadigiri. (eds), *Recent Advances in Root and Tuber Crops*. Brillion Publishing, New Delhi, India, pp. 227-242.

12. Number of Technical Bulletins (Add list): 3

1. Byju, G., Ravi, V., Sheela, M.N., Jayaprakas, C.A., Suja, G., Veena, S.S., Asha, K.I., Ramesh, V., Muthuraj, R., Rejin, D.T., Sunitha, S., Asha Devi, A., Sreekumar, J., Jyothi, A.N., Murugesan, P., Mohan, C., Santhosh Mithra, V.S., Harish, E.R., Jaganathan, D., Shiny, R., Sajeev, M.S., Shirly Raichal Anil, Makeshkumar, T., Jeeva, M.L., Saravanan Raju, Kesava Kumar, H., Vivek Hegde, Koundinya, A.V.V. and Sasankan, V.R. 2018. *Post-flood Loss Assessment and Rehabilitation of Tuber Crops in Kerala*. Technical Bulletin No. **69,** ICAR-Central Tuber Crops Research Institute, Sreekariyam, Thiruvananthapuram, Kerala, 97 p.

2. Byju, G., Veena, S.S., Ramesh, V., Suja, G., Ravi,V., Sunitha, S., Sheela, M.N., Jayaprakas, C.A., Sajeev, M.S., Asha Devi, A., Shirly Raichal Anil, Sreekumar, J., Makeshkumar, T., Jyothi, A.N., Jeeva, M.L., Murugesan, P., Saravanan Raju, Mohan, C., Kumar, H.K., Asha, K.I., Santhosh Mithra, V.S., Hegde, V., Harish, E.R., Koundiniya, A.V.V., Muthuraj, R., Jaganathan, D., Sasankan, V.R., Rejin, D.T. and Shiny, R. 2020. Deluge of August 2018 in Kerala State, India: Changes in soil properties. Technical Bulletin Series No. 78, ICAR-Central Tuber Crops Research Institute, Sreekariyam, Thiruvananthapuram, Kerala, 32 p.

3. Jeeva M.L., Harish E.R., and Kesav Kumar H. 2020. Pests and disease management. In: *Standard operating procedures for AICRP on tuber crops*, (Ed.) Sunitha S., Suresh Kumar

J., Ravi V. and James George, Technical Bulletin Series No. 81, AICRP (Tuber Crops), ICAR-Central Tuber Crops ResearchInstitute, Sreekariyam, hiruvananthapuram, Kerala, 128 p.

13. Consultancies offered (Add list and give a brief description):

14. Technologies developed (Add list and give a brief description): 8

1. Management of sucking pests in vegetable crops by using CTCRI developed bioformulation

2. **Biotype of whitefly 'Asia I' identified as a pest of cassava, for the first time.** In the study different stages of whitely like eggs, nymphs and adults were collected from cassava plants and were successfully reared separately in cages. To confirm the results as cassava is a natural host for this biotype of whitefly, we have observed for the development of settled 'red eyed nymph' or pseudo pupa which will be formed only in natural hosts of the pest. Further, the biotype was confirmed using *mtCO1* sequence analysis.

3. Mining out of functional diversity of bacterial community present in the insect, revealed their role in making *B. tabaci* a successful vector and polyphagous pest of global importance. **NGS Analysis also showed the presence of specific endosymbionts like *Asenophonus* which was found present only in high CMD infested area and it was present only in Asia II 5 biotype**.

5. Whiteflies infesting tuber crops were identified as *Bemisia tabaci* (cassava, sweet potato), *Aleurodicus rugioperculatus* (arrowroot) and *Aleurodicus dispersus* (cassava) through molecular methods.

6. **Molecular identification of endosymbiotic bacteria associated with whiteflies infesting tropical tuber crops**

7. **Genetic variant/ biotype specific banding patterns**

Bemisia specific ten ISSR primers were developed for the first time and it will be useful in genetic variability study in whiteflies and genetic variant/ biotype specific banding patterns were developed for Asia I and Asia II 5 biotypes of whitefly

8. Diagnostic PCR technique for the presence of bacterial endosymbionts in whiteflies using specific bacterial primers

15. Patents/Copyrights obtained (Add list and give a brief description):

16. Any other information: