

CURRICULUM VITAE

PERSONAL:

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 Employment: Research Professor
 Nationality: Sri Lankan
 Date of Birth: 11 May 1962
 Sex: Male
 Civil status: Married

EDUCATION:

1986-1993: **University of Peradeniya, Sri Lanka.** Department of Botany. Doctor of Philosophy (Ph. D.) in Botany, November 1993.
Thesis title: Optimization the productivity of sustainable traditional rice farming in the dry zone of Sri Lanka.
 1981-1984: **University of Peradeniya,** Faculty of Science. Bachelor of Science, (B. Sc.) December 1984. Subjects: Botany, Chemistry and Zoology.

EXPERIENCE:

May 2009 **Research Professor**
 Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka.
 Current research interests are N₂O emissions and soil carbon sequestration in tropical ecosystems, and development of biofilms for plant growth improvement and, medical and environmental applications. Supervised and guided undergraduate and postgraduate students working in research projects on Biological Nitrogen Fixation and soil carbon sequestration in ecosystems.

January 2001 **Senior Research Fellow**
 -May 2009 Conducted research on mitigation of N₂O emissions in tropical ecosystems and its implications in the global N₂O budgets, soil carbon and nutrient dynamics as predicted by artificial neural networks, soil carbon sequestration, and rhizobial biofilms and their importance in plant-microbe interactions. Over ten years of post-doctoral research experiences. Supervised and guided undergraduate and postgraduate students working in research projects on Biological Nitrogen Fixation and soil carbon and nutrient dynamics in ecosystems.

January **Research Fellow**
 1993-2001 Supervised and guided local as well as foreign undergraduate and postgraduate students working in research projects on Biological Nitrogen Fixation and soil fertility. Coordinated a Belgian-Sri Lankan project on Biological Nitrogen Fixation. Participated in several seminars/workshops organized by joint FAO/IAEA division on nuclear related methods in soil/plant aspects on sustainable agriculture. Presented a paper at the Open Science Conference of the IGBP, held in July 2001 in Amsterdam. Conducted studies on greenhouse gas emissions from agroecosystems in a post-doctoral fellowship in Belgium.

- 1991-1992: **Research Assistant/Assistant Lecturer**
Department of Botany, University of Peradeniya, Sri Lanka.
Developed and conducted a course on Biometry/Statistics.
- 1985-1990: **Postgraduate Research Assistant**
Trained on ^{15}N isotopic techniques under field conditions and methods used in soil/plant analyses. Conducted designed field experiments under control conditions as well as on-farm trials in farmers' fields, on fallow vegetational succession, nitrogen cycling, soil organic matter and phosphorus dynamics in different rice farming systems. Assessed N_2 fixation and N cycling by legume green manure (*Sesbania* species) in the conservation rice farming system using ^{15}N methods. This was funded by SAREC, Sweden.
- 1985: **Research Assistant**
Field experimentation with *Azolla* on N_2 fixation and N transfer to rice using ^{15}N isotopic techniques. This was coordinated and funded by joint FAO/IAEA division.

PROFESSIONAL

ACTIVITIES:

- Member, Soil Science Society of America/American Society of Agronomy.
- Member, International Society for Soil Science.
- Member, American Society for Microbiology.
- Associate Editor, Agriculture, Ecosystems & Environment (Elsevier).
- Member, Editorial Board, Ceylon Journal of Science (Biological Sciences)
- Life Member, Sri Lanka Association for the Advancement of Science (SLAAS).
- Member, Institute of Biology, Sri Lanka.
- Member, NASTEC, Sri Lanka.

REVIEWER (JOURNALS & GRANTS): Soil Biology & Biochemistry; Agriculture, Ecosystems & Environment; Hydrobiologia; Ecological Research; Soil Science Society of America Journal; Agronomy Journal; Journal of Environmental Quality (JEQ); Australian Journal of Agricultural Research; Nature (London) – Open reviewer; European Journal of Soil Biology; Bioresource Technology. Antonie van Leeuwenhoek International Journal of General and Molecular Microbiology; Agroforestry Systems. Local journals [Journal of the National Science Foundation of Sri Lanka; Journal of Soil Science Society of Sri Lanka; Annals of the Sri Lanka Department of Agriculture (ASDA)]. Two major local granting bodies (National Science Foundation (NSF); Council for Agricultural Research Policy (CARP)].

AWARDS & CREDENTIALS:

- 1) Presidential Research Awards in 1999, 2000 and 2001. First in the country in this award scheme in 2000.
- 2) Listed as a top researcher in Sri Lanka by the University Grant Commission (UGC).
- 3) According to the data of a report of the National Research Council (NRC), Sri Lanka, 2nd most productive scientist in the country in 2002 and 2003. Further, 5th most productive scientist out of about 1,800 scientists listed in the report for the period 1991-2006. At present (i.e. for the last five years), the most productive scientist in the field of biological sciences.
- 4) Listed as one of the most productive scientists in Sri Lanka in the Third World Academy of Sciences, Italy.
- 5) Listed as a leading scientist in Asia in "Who's Who in Asia", published in USA.
- 6) Name listed in "2000 outstanding intellectuals of the 21st Century in the world".
- 7) Short-term Visiting Collaborative Research Fellow at University of Sydney, Australia (April-June 2007). Only successful applicant from the Asian region in this fellowship in the year.
- 8) Visiting Professor of the University of Sydney, Australia from January-May 2009, funded by AusAID, Canberra.

PUBLICATIONS:

- Seneviratne, G., Weerasekara M. L. M. A. W. and Zavahir, J. S. (2010). Microbial Biofilms: How Effective in *Rhizobium*-Legume Symbiosis? In: Khan, M. S., Zaidi, A. and Musarrat, J. (eds.) *Microbes for Legume Improvement*. Springer-Verlag/Wien, pp. 123-136.
- Seneviratne, G., Weerasekara M. L. M. A. W., Seneviratne, K.A.C.N., Zavahir, J. S., Kecskés, M.L. and Kennedy, I.R. Importance of biofilm formation in plant growth promoting rhizobacterial action. In: Maheshwari, D. K. (ed) *Bacteria and Plant Health, Microbiology Monographs (Springer series)*, in press.
- Seneviratne, G., Thilakarathne, R.M.M.S., Jayasekara, A.P.D.A., Seneviratne, K. A. C. N., Padmathilake, K. R. E. and De Silva, M.S.D.L. (2009) Developing beneficial microbial biofilms on roots of non-legumes: A novel biofertilizing technique. In: Khan, M. S., Zaidi, A. and Musarrat, J. (eds.) *Microbial Strategies for Crop Improvement*. Springer-Verlag, Germany, pp. 51-62.
- Seneviratne, G. (2009) Collapse of beneficial microbial communities and deterioration of soil health: a cause for reduced crop productivity. *Current Science* 96: 633.
- Seneviratne, G. (2009) Effect of forest drought on global warming is enigmatic. *Current Science* 97: 9.
- Seneviratne, G., Peyvast G. A., Olfati, J. A. and Kariminia, A. (2009) Rhizobia as biofertilizers for mushroom cultivation. *Current Science* 96: 1559.
- Seneviratne, G., Henakaarchchi, M. P. N. K., Weerasekara, M. L. M. A. W. and Nandasena, K. A. (2009) Soil organic carbon and nitrogen pools as influenced by polyphenols in different particle size fractions under tropical conditions. *Journal of National Science Foundation of Sri Lanka* 37: 67-70.
- Ambagahaduwa, I. M., Prasad, N., Gunatilleke, I. A. U. N., Seneviratne, G. and Gunatilleke, C. V. S. (2009) Estimation of above ground biomass of a *Pinus caribaea* Morelet stand in lower Hantana. *Journal of National Science Foundation of Sri Lanka* 37: 195-201.
- Ratnayake, R. R., Seneviratne, G. and Kulasooriya, S. A. (2008) Characterization of clay bound organic matter using activation energy calculated by weight loss on ignition method. *Current Science* 95: 763-766.
- Seneviratne, G. (2008) Biological nitrogen fixation: Potential biotechnological applications beyond biofertilizers. *Current Science* 95: 7.
- Seneviratne, G. (2008) Two-thirds law of nitrogen mineralization under undisturbed soil conditions: a new theory. *Pedosphere* 18:149-153.
- Seneviratne, G., Zavahir, J. S., Bandara, W. M. M. S. and Weerasekara, M. L. M. A. W. (2008) Fungal-bacterial biofilms: their development for novel biotechnological applications. *World Journal of Microbiology and Biotechnology* 24: 739-743.
- Siddique, I., Gutjahr, C., Seneviratne, G., Breckling, B., Ranwala, S. W. and Alexander, I. J. (2007) Changes in soil chemistry associated with the establishment of forest gardens on eroded, acidified grassland soils in Sri Lanka. *Biology and Fertility of Soils* 44: 163-170.
- Zavahir, J. S. and Seneviratne, G. (2007) Potential of developed microbial biofilms in generating novel bioactive compounds. *Research Journal of Microbiology* 2: 397-401.
- Ratnayake, R. R., Seneviratne, G. and Kulasooriya, S. A. (2007) A modified method of weight loss on ignition to evaluate soil organic matter fractions. *International Journal of Soil Science* 2: 69-73.
- Bandara, W. M. M. S., Seneviratne, G. and Kulasooriya, S. A. (2006) Interactions among endophytic bacteria and fungi: effects and potentials. *Journal of Biosciences* 31: 645-650.
- Seneviratne, G. and Indrasena, I. K. (2006) Nitrogen fixation in lichens is important for improved rock weathering. *Journal of Biosciences* 31: 639-643.
- Jayasinghearachchi, H. S. and Seneviratne, G. (2006) Fungal solubilization of rock phosphate is enhanced by forming fungal-rhizobial biofilms. *Soil Biology and Biochemistry* 38: 405-408.
- Jayasinghearachchi, H. S., Seneviratne, G. and Weerasinghe, H. M. S. P. M. (2006) Tannin interactions with legume-rhizobial N₂ fixing symbiosis. *International Journal of Agricultural Research* 1: 1-7.

- Jayasinghearachchi, H. S. and Seneviratne, G. (2006) A mushroom-fungus helps improve endophytic colonization of tomato by *Pseudomonas fluorescens* through biofilm formation. *Research Journal of Microbiology* 1: 83-89.
- Seneviratne, G., Tennakoon, N. S., Weerasekara, M. L. M. A. W. and Nandasena, K. A. (2006) Polyethylene biodegradation by a developed *Penicillium-Bacillus* biofilm. *Current Science* 90: 20-21.
- Seneviratne, G., Kuruppuarachchi, K. A. J. M., Somaratne, S. and Seneviratne, K. A. C. N. (2006) Nutrient cycling and safety-net mechanism in the tropical homegardens. *International Journal of Agricultural Research* 1: 169-182.
- Jayasinghearachchi, H. S., Seneviratne, G. and Weerasinghe, H. M. S. P. M. (2006) A polyacrylamide gel electrophoretic approach of fingerprinting soil polyphenols. *International Journal of Soil Sciences* 1: 53-57.
- Chandrasekara, C. M. C. P., Weerasinghe, H. M. S. P. M., Gunatilleke, I. A. U. N. and Seneviratne, G. (2005) Spatial distribution of arbuscular mycorrhizas along an elevation and edaphic gradient in the forest dynamics plot at Sinharaja, Sri Lanka. *Ceylon Journal of Science (Biological Science)* 34: 47-64.
- Somaratne, S., Seneviratne, G. and Coomaraswamy, U. (2005) Prediction of soil organic carbon across different land-use patterns: A neural network approach. *Soil Science Society of America Journal* 69: 1580-1589.
- Seneviratne, G. and Jayasinghearachchi, H. S. (2005) A rhizobial biofilm with nitrogenase activity alters nutrient availability in a soil. *Soil Biology and Biochemistry* 37: 1975-1978.
- Tennakoon, M. M. D., Gunatilleke, I. A. U. N., Hafeel, K. M., Seneviratne, G., Gunatilleke, C. V. S. and Ashton, P. M. S. (2005) Ectomycorrhizal colonization and seedling growth of *Shorea* (Dipterocarpaceae) species in simulated shade environments of a Sri Lankan rain forest. *Forest Ecology and Management* 208: 399-405.
- Jayasinghearachchi, H. S. and Seneviratne, G. (2004) Can mushrooms fix atmospheric nitrogen? *Journal of Biosciences* 29: 293-296.
- Jayasinghearachchi, H. S. and Seneviratne, G. (2004) A bradyrhizobial-*Penicillium* spp. biofilm with nitrogenase activity improves N₂ fixing symbiosis of soybean. *Biology and Fertility of Soils* 40: 432-434.
- Seneviratne, G. and Nanayakkara, A. (2004) Isotope/element fractionation during surface adsorption. *American Journal of Physics* 72: 73-75.
- Seneviratne, G. (2003) Development of eco-friendly, beneficial microbial biofilms. *Current Science* 85: 1395-1396.
- Seneviratne, G. (2003) Global warming and terrestrial carbon sequestration. *Journal of Biosciences* 28: 653-655.
- Seneviratne, G. and Somapala, K.L.A. (2003) Litter controls on soil nitrous oxide emission. *Current Science* 84: 498-499.
- Seneviratne, G. and Jayasinghearachchi, H.S. (2003) Mycelial colonization by bradyrhizobia and azorhizobia. *Journal of Biosciences* 28: 243-247.
- Seneviratne, G. and Jayasinghearachchi, H.S. (2003) Phenolic acids: Possible agents of modifying N₂-fixing symbiosis through rhizobial alteration? *Plant and Soil* 252: 385-395.
- Seneviratne, G. (2002) Planting trees for C sequestration: A reality? *Current Science* 82: 777.
- Seneviratne, G. (2002). Litter controls on carbon sequestration. *Current Science* 82: 130-131.
- Seneviratne, G. and Ekanayake, E.M.H.G.S. (2001). A simple method of producing green manure *Sesbania rostrata* to achieve N synchrony in lowland rice. *International Rice Research Notes* 26: 34-35.
- Seneviratne, G. (2001). Mitigating nitrous oxide emission in tropical agriculture: Myths and realities. *Current Science* 80: 117-118.
- Seneviratne, G., Van Holm, L.H.J. and Ekanayake, E.M.H.G.S. (2000). Agronomic benefits of rhizobial inoculant use over nitrogen fertilizer application in tropical soybean. *Field Crops Research* 68: 199-203.
- Seneviratne, G. (2000). Litter nitrogen release in tropical agroecosystems. *Current Science* 79: 1054.
- Seneviratne, G. (2000). Litter quality and nitrogen release in tropical agriculture: a synthesis. *Biology and Fertility of Soils* 31: 60-64.
- Seneviratne, G., Van Holm, L.H.J. and Ekanayake, E.M.H.G.S. (1999). Effect of peat and coir dust-based rhizobial inoculants on the nodulation, plant growth and

yield of Soybean (*Glycine max* [L.] Merrill) cv PB 1. *Tropical Agricultural Research and Extension* 2: 132-134.

- - Seneviratne, G., (1999). A cheap way to control N₂O in agriculture. *Ambio* 28: 378.
- - Seneviratne, G., Van Holm, L.H.J., Balachandra, L.J.A. and Kulasooriya, S.A., (1999). Differential effects of soil properties on leaf nitrogen release. *Biology and Fertility of Soils* 28: 238-243.
- - Seneviratne, G., Van Holm, L.H.J. and Kulasooriya, S.A. (1998) Quality of different mulch materials and their decomposition and N release under low moisture regimes. *Biology and Fertility of Soils* 26: 136-140.
- - Seneviratne, G. and Van Holm, L.H.J. (1998). CO₂, CH₄ and N₂O emissions from a wetted tropical upland soil following surface mulch application. *Soil Biology and Biochemistry* 30:1619-1622.
- - Seneviratne, G. and Van Holm, L.H.J. (1996). Green manure and rice straw recycling potentials in rice of Sri Lanka: A review. In. *Sesbania rostrata*, a potential green manure for lowland rice in Sri Lanka. (L.H.J. Van Holm, ed.). The BNF Project, IFS, Sri Lanka. pp. 1-13.
- - Seneviratne, G., Karunaratne, J., Kulasooriya, S.A. and Rosswall, T., (1994). Theory to predict potentially mineralizable nitrogen in soils. *Soil Biology and Biochemistry* 26: 1491-1493.
- - Seneviratne, G., Kulasooriya, S.A. and Rosswall, T. (1994). Sustainment of soil fertility in the traditional rice farming, dry zone, Sri Lanka. *Soil Biology and Biochemistry* 26: 681-688.
- - Seneviratne, G., and Kulasooriya, S.A. (1994). Fate of applied N in the traditional, modern and conservation farming systems of lowland rice in Sri Lanka. *International Rice Research Notes* 19(1): 18.
- - Kulasooriya, S.A., Seneviratne, G. and Wijesundara, C. (1994). An evaluation of some factors that limit the widespread use of *Azolla* in rice cultivation. In. *Nitrogen Fixation with Non-legumes*. (N.A. Hegazi, M. Fayez and M. Monib, eds.). The American University in Cairo Press, Cairo, Egypt. pp 469-474.
- - Seneviratne, G. Kulasooriya, S.A., Gunatillake, C.V.S. and Rosswall, T. (1992). Ecology of a rice fallow vegetation under lowland traditional farming in the dry zone of Sri Lanka. *Tropical Ecology* 33: 17-28.
- - Seneviratne, G., Kulasooriya, S.A., Weerakoon, W.L. and Rosswall, T. (1992). N₂-fixation in two *Sesbania* species and its transfer to rice (*Oryza sativa* L.) as revealed by ¹⁵N technology. *Biology and Fertility of Soils* 14: 37-42.
- - Weerakoon, W.L., Seneviratne, G., De Silva, A.P. and Seneviratne, A.M. (1992). Evaluation of *Sesbania speciosa* as a green manure for lowland rice in the dry zone of Sri Lanka. *Plant and Soil* 145: 131-139.
- - Weerakoon, W.L., Seneviratne, G. and Seneviratne, A.M. (1992). Flowering, seed production and germination of *Sesbania speciosa* used as a green manure for lowland rice. *International Rice Research Newsletters* 17(6): 21.
- - Kulasooriya, S.A., Seneviratne, G., De Silva, W.S.A.G., Abeysekera, S.W., Wijesundara, C., and De Silva, P. (1988). Isotopic studies on N₂-fixation in *Azolla* and the availability of its nitrogen to rice. *Symbiosis* 6:151-166.

CONFERENCE PROCEEDINGS Etc.:

- Seneviratne, G. (2001). ¹⁵N enrichment in upper oceanic N₂O reveals the existence of a novel N₂O sink. In Proceedings of the **Global Change Open Science Conference of the IGBP**, Amsterdam, The Netherlands, 10-13 July 2001.
- Seneviratne, G. (2002). Variability in universal deuterium enrichment explained. In Proceedings of the **World Space Congress (sponsored by COSPAR, NASA etc.)**, Houston, Texas, USA, 10-19 October 2002.
- Seneviratne, G. (2003). Growth and Litterfall Trends of Global Tropical Forests. In Proceedings of the **Biotic Interactions in the Tropics: A Special Symposium of the British Ecological Society and The Annual Meeting of the Association for Tropical Biology and Conservation**, University of Aberdeen, Scotland, UK, 7-10 July 2003.

- Participated in the **Soils and Hydrology Workshop at the Smithsonian Tropical Research Institute**, Republic of Panama, 1-8 June 2004.
- Seneviratne, G., Kecskés, M. L. and Kennedy, I. R. (2008) Biofilmed biofertilisers: Novel inoculants for efficient nutrient use in plants. Kennedy, I.R., Choudhury, A.T.M.A, Kecskés, M.L. and Rose, M.T. (eds) **Efficient nutrient use in rice production in Vietnam achieved using inoculant biofertilisers**. Proceedings of a project (SMCN/2002/073) workshop held in Hanoi, Vietnam, 12–13 October 2007. ACIAR Proceedings No. 130, 137pp.

SOME CONTRIBUTIONS TO THE NATIONAL DEVELOPMENT

- 1) Pioneered in producing a local, beneficial bacterial fertilizer for soybean and green gram in Sri Lanka, for replacing urea. This bacterium was introduced to Sri Lanka. At present, this fertilizer is being used for about 5,000 acres in the dry zone. It is estimated that it will be about 20,000 acres in the next “Yala” season (2009). Similar fertilizers have been developed at the IFS for rice and tea in order to partially replace the use of urea and other chemical fertilizers, and they are being tested in order to introduce to the country. If we could cut down the use of urea by about 50% by using those microbial fertilizers, we would be able to save about 9,000 million rupees of foreign exchange, annually.
- 2) Introduced Fungal-bacterial Biofilm Biotechnology to the world. This technology can be used for enhanced efficiency of the conventional microbial biotechnologies, for example, improved solubilization of Eppawala rock phosphate, improved degradation of polythene, drug discovery, biofuel production etc. Microbial formulations for those are being developed at the IFS at present.
- 3) Collected an extensive dataset of soil stable carbon in Sri Lanka. This is important for soil carbon banking, which has environmental implications in carbon sequestration and trading. The first map of stable soil carbon for Sri Lanka is being developed.
- 4) Trained over 100 students for advanced research as well as post graduate degrees (M. Sc., Ph.D. etc.).
- 5) Represented Sri Lanka in international research journals and scientific societies.

REFERENCES:

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