

Biodata of the ScientistDivision/Section: Regional Centre of Central Tuber Crops Research Institute**A. Personal information**1. Name(With Title): Dr. K. LAXMINARAYANA1.a. Qualification: M. Sc (Ag) Ph.D2. Designation: Principal Scientist3. Address (Personal): Regional Centre of C.T.C.R.I., Dumuduma Housing Board Post; Bhubaneswar, Khurda District, PIN: 751019, Odisha

4. Phone Numbers:

(a)Residence: --

(b) Intercom: --

(c) Mobile: +91-94370181695. Email: klnarayana69@rediffmail.com6. Countries visited: Bangladesh**B. Professional information**

1. Area of specialization: Soil Fertility/ Soil Chemistry/ Soil Microbiology

2. Area of interest: Soil Fertility/ Soil Chemistry/ Soil Microbiology

3. Number of institute projects completed (Add list): 17

S. No	Title of the project	Funding agency	Duration From To	P.I./ Co-PI/ Associate	Budget of the project (Rs.)
1	Integrated Nutrient Management in Paddy and Groundnut	ICAR Res. Complex, Umiam, Meghalaya	1998-2002	P.I.	20.88 lakhs
2	Nutrient Dynamics under various Land Use/ Cropping Systems	ICAR Res. Complex, Umiam, Meghalaya	2000-2002	P.I.	19.05 lakhs
3	Cropping System Research under Rainfed/ Upland/ lowland Conditions	ICAR Res. Complex, Umiam, Meghalaya	2001-2003	P.I.	35.31 lakhs
4	Nitrogen transformations in the hill ecosystem and its availability in the rice growing soils of Meghalaya	ICAR Res. Complex, Umiam, Meghalaya	2003-2005	P.I.	22.03 lakhs
5	Soil quality indices under various land use systems	ICAR Res. Complex, Umiam, Meghalaya	2003-2005	Co-PI	35.20 lakhs
6	Leaching behaviour of N in acid soils	ICAR Res. Complex, Umiam, Meghalaya	2003-2006	Co-PI	22.32 lakhs
7	Collection, evaluation and development of package of practices in cole crops	ICAR Res. Complex, Umiam, Meghalaya	2003-2005	Co-PI	20.88 lakhs
8	Spices improvement	ICAR Res. Complex, Umiam, Meghalaya	2003-2005	Co-PI	30.73 lakhs

9	Nutrient Management in Tuber Crops based Cropping Systems	CTCRI, Trivandrum, Kerala	2006-2013	P.I.	41.96 lakhs
10	Studies on salt tolerance in sweet potato	CTCRI, Trivandrum, Kerala	2006-2013	P.I.	29.59 lakhs
11	Development and transfer of appropriate tuber crops technologies for north eastern India	CTCRI, Trivandrum, Kerala		Co-PI	--
12	Sweet potato based cropping system	CTCRI, Trivandrum, Kerala	2006-2009	Co-PI	--
13	Organic farming of orange flesh sweet potato	CTCRI, Trivandrum, Kerala	2006-2009	Co-PI	--
14	Collection, conservation, cataloguing and evaluation of germplasm of tuber crops	CTCRI, Trivandrum, Kerala	2006-2013	Co-PI	--
15	Characterization of hydro-physical and microbial properties of soil under different cultivation practices of horticultural crops in Eastern India	CTCRI, Trivandrum, Kerala	2009-2011	Co-PI	30.30 lakhs
16	Bioprospecting of agriculturally important microorganisms in various horticultural cropping systems for their potential exploitation for disease management, plant growth promotion and soil enrichment	CHES-IIHR, Bhubaneswar	2010-2014	Co-PI	84.00 lakhs
17	Validation of a sweet potato growth simulation model for field application	CTCRI, Trivandrum, Kerala	2009-2012	Co-PI	--

4. Number of Institute projects being handled (Add list): 6

S. No	Title of the project	Funding agency	Duration From To	P.I./ Co-PI/ Associate	Budget of the project (Rs.)
1	Studies on salt tolerance in sweet potato	CTCRI, Trivandrum, Kerala	2006-2013	P.I.	29.59 lakhs
2	Bioprospecting of agriculturally important microorganisms in various horticultural cropping systems for their potential exploitation for disease management, plant growth promotion and soil enrichment	CHES-IIHR, Bhubaneswar	2010-2014	Co-PI	84.00 lakhs

5. Number of externally funded projects completed (Add list): 2

S. No	Title of the project	Funding agency	Duration From To	P.I./ Co-PI/ Associate	Budget of the project (Rs.)
1	Promotion of sweet potato to increase cropping intensity, livelihood enhancement and nutritional security in coastal saline soils of Erasama block, Jagatsinghpur district of Orissa'	NABARD	2010-13	P.I.	9.97 lakhs
2	Establishment of Leaf/Tissue Analysis Laboratory	Horticulture Dept., Govt. of Odisha	2012-13	P.I.	19.98 lakhs

	(NHM)			
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6. Number of externally funded projects being handled (Add list): 3 (As an Associate)

S. No	Title of the project	Funding agency	Duration From To	P.I./ Co-PI/ Associate	Budget of the project (Rs.)
1	Sustainable Rural Livelihood and Food Security to rainfed Farmers of Orissa	NAIP (ICAR)	2008-2014	Associate	37.19 lakhs
2	Food Security Through Asian Roots and Tubers (FoodSTART)	CIP-IFAD	2011-2016	Associate	US \$40,000
3	Differential plant volatile emission: Unfolding the new mechanism of host plant resistance against important insect pests of sweet potato	DBT	2012-2015	Co-PI	24.00 lakhs
4.	Promotion of Sweet potato to increase cropping intensity, livelihood enhancement and nutritional security in coastal saline soils of Erasama block, Jagatsinghpur district of Orissa	NABARD	2011-2014	PI	10.6 lakhs
5.	Leaf/Tissue Analysis Laboratory	NHM	2012-14	PI	21.98 lakhs

7. Number of students guided for a) Ph.D: --- b) M.Phil ----- c) M.Sc. 8

8. Number of students being guided for a) Ph.D: --- b) M.Phil_ ----- c) M.Sc . ---

8a. information about the students under your guidance

Name of the student	Course undergoing (Ph.D/M.Phil/M.Sc)	Title of the project/Thesis
Mr. Anil Kumar Muduli	M. Sc.	Effect of lime, inorganic, biological and organic sources on soil micro-flora and enzyme activities in Alfisols of Orissa
Mr. Sudhira Kumar Baral	M. Sc.	Effect of <i>Bacillus subtilis</i> on Phosphorus Transformations and Phosphatase Activity under Various Temperature Regimes
Mr. Satish Jay Prakash Acharya	M. Sc.	Long term effect of lime, biological, inorganic and organics on microbial activity, soil fertility, yield and nutrient uptake of sweet potato in Alfisols of Orissa
Ms. Archana Mai Naik	M. Sc.	Enumeration of microbes and microbial activities in coastal saline soils of Odisha
Ms. Rajeswari Hota	M. Sc.	Effect of Lime, Biological, Inorganic and Organic Sources on Soil Quality, Yield and Proximate Composition of Colocasia (<i>Colocasia esculenta</i> L) in Alfisols of Odisha
Ms. Rashmita Dash	M. Sc.	Effect of Lime, Mycorrhiza, Inorganic and Organic Sources on Soil Microbes and Biological Activity in Relation to Yield and Proximate Composition of Colocasia (<i>Colocasia esculenta</i>) in Alfisols

9. Information on guide ship

Guide-ship for Ph.D/M.Phil/ M.Sc	University	Subject
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3 M. Sc. Students (Mr. Anil Kumar Muduli, Mr. Sudhira Kumar Baral, Mr. Satish Jay Prakash Acharya)	Siksha 'O' Anusandhan University, Bhubaneswar, Odisha	Department of Industrial Biotechnology
2 M. Sc. Students (Ms. Archana Mai Naik, Ms. Rajeswari Hota)	MITS School of Biotechnology, Affiliated to Utkal University, Bhubaneswar, Odisha	Department of Biotechnology
1 M. Sc. Student (Ms.)		

10. Number of Research papers (Add list): 65

1. Research Articles

A. Full Length Papers:

1. Laxminarayana, K. and Subbaiah, G.V. 1996. Influence of added clay and potassium on dry matter accumulation in groundnut grown on low potassium sandy soil. *The Andhra Agricultural Journal* **43**(1): 27-29.
2. Laxminarayana, K. and Subbaiah, G.V. 1994. Influence of added clay and potassium on nutrient uptake at different stages of groundnut grown on a sandy soil. *Journal of the Indian Society of Coastal Agricultural Research* **13**(1): 19-24.
3. Aariff Khan, M.A., Singhanian, R.A., Hameedunnisa Begum, **Lakshminarayana, K.** and Srinivas, T. 1996. Effect of nitrogen and phosphorus fertilization on nutrient status and uptake in sugarbeet. *International Journal of Tropical Agriculture* **14** (1-4): 169-175.
4. Laxminarayana, K. and Rajagopal, V. 2000. Evaluation of chemical methods for the determination of nitrogen availability in rice soils. *International Journal of Tropical Agriculture* **18**(1): 39-46.
5. Laxminarayana, K. and Rajagopal, V. 2000. Comparison of different methods for evaluation of available nitrogen. *Journal of the Indian Society of Soil Science* **48** (4): 797-802.
6. Laxminarayana, K. and Rajagopal, V. 2000. Correlations between indices of nitrogen availability and dry matter yield, nitrogen uptake and yield response of rice. *Journal of the Indian Society of Coastal Agricultural Research* **18**(1): 16-20.
7. Laxminarayana, K. 2000. Effect of clay and potassium on yield attributes and nutrient composition in groundnut (*Arachis hypogaea* L.). *Journal of the Indian Society of Coastal agricultural Research* **18**(2): 124-132.
8. Sarma, B.K., Singh, J.K., Verma, D.K., Annadurai, Pattanayak, A. and **Laxminarayana, K.** 2000. Collection of crop diversity from north east India. *Journal of the Assam Science Society* **41**(4): 326-335.
9. Laxminarayana, K. and Rajagopal, V. 2002. Relative contribution of different inorganic fractions of soil phosphorus to P uptake by rice. *Journal of Research ANGRAU* **30** (4): 17-26.
10. Laxminarayana, K. 2002. Effect of phosphorus solubilizing microorganisms on yield parameters of paddy. *Indian Journal of Hill Farming* **15**(1): 22-25.
11. Laxminarayana, K. and Rajagopal, V. 2004. Estimation of critical levels of available P for predicting response of paddy to applied P in submerged soils. *Journal of the Indian Society of Soil Science* **52**(1): 74-79.
12. Laxminarayana, K. 2003. Effect of chemical and biofertilizers on yield and nutrient uptake of rice in acid soils of Mizoram. *Annals of Agricultural Research*. **24**(4): 760-767.
13. Laxminarayana, K. 2003. Changes in redox potential, pH and inorganic P transformations in submerged rice soils. *Annals of Agricultural Research*. **24**(4): 880-889.

14. Laxminarayana, K. and Rajagopal, V. 2003. Effect of submergence on P transformation in coastal rice soils of Andhra Pradesh. *Journal of the Indian Society of Coastal Agricultural Research* **21** (2): 14-23.
15. Laxminarayana, K. and Rajagopal, V. 2004. Estimation of critical levels of available P for predicting response of paddy to applied P in submerged soils. *Journal of the Indian Society of Soil Science* **52**(1): 74-79.
16. Laxminarayana, K. and Patiram 2004. Studies on carbon-nitrogen relationship to predict N availability in rice soils of Mizoram. *Journal of Hill Research* **17**(2): 43-51.
17. Laxminarayana, K. 2004. Effect of organic and inorganic manures on yield and nutrient uptake of groundnut in Ultisols of Mizoram. *Journal of Oilseeds Research* **21**(2): 280-283.
18. Laxminarayana, K. and Munda, G.C. 2004. Performance of rice (*Oryza sativa*) and maize (*Zea mays*)-based cropping systems under mid-hills of Mizoram. *Indian Journal of Agronomy* **49**(4): 230-232.
19. Laxminarayana, K. and Patiram 2005. Influence of inorganic, biological and organic manures on yield and nutrient uptake of groundnut (*Arachis hypogaea*) and soil properties. *Indian Journal of Agricultural Sciences* **75**(4): 218-221.
20. Laxminarayana, K. 2005. Effect of P solubilizing microorganisms on yield of rice and nutrient availability in an acid soil of Mizoram. *Journal of the Indian Society of Soil Science*. **53**(2): 240-243.
21. Laxminarayana, K. and Rajagopal, V. 2005. Effect of organic matter on P transformations in submerged soils and their relationship with P availability to rice. *Oryza* **42**(4): 271-279.
22. Laxminarayana, K. and Patiram 2006. Effect of Integrated Use of Inorganic, Biological and Organic Manures on Rice Productivity and Soil Fertility in Ultisols of Mizoram. *Journal of the Indian Society of Soil Science* **54** (2): 213-220.
23. Sanwal, S.K., **Laxminarayana, K.**, Yadav, D.S., Rai, N. and Yadav, R.K. 2006. Growth, Yield, and Dietary Antioxidants of Broccoli As Affected by Fertilizer Type. *Journal of Vegetable Sciences* **12**(2): 13-26.
24. Laxminarayana, K. and Rajagopal, V. 2006. Organic carbon and available nitrogen relationship in soils of Andhra Pradesh. *Journal of Research ANGRAU* **34**(3): 30-35.
25. Laxminarayana, K. 2006. Evaluation of available nitrogen indices for rice in soils of Mizoram. *Journal of the Indian Society of Soil Science* **54**(3): 322-326.
26. Laxminarayana, K., Tulasi Rai and Bhatt, B.P. 2006. Effect of organic sources on soil fertility, yield and nutrient uptake of rice (*Oryza sativa*) in degraded Alfisols of Meghalaya. *Indian Journal of Hill Farming* **19** (1&2): 11-17.
27. Sanwal, S.K., **Laxminarayana, K.**, Yadav, R.K., Rai, N., Yadav, D.S. and Mousumi Bhuyan. 2007. Effect of organic Manures on soil fertility, growth, physiology, yield and quality of turmeric. *Indian Journal of Horticulture* **64**(4): 444-449.
28. Laxminarayana, K. 2007. Distribution of Inorganic P Fractions and Critical Limits of Available P in Rice Soils of Mizoram. *Journal of the Indian Society of Soil Science* **55**(4): 481-487.
29. Laxminarayana, K., Sanjeev Bharali, Saha, R., Venkatesh, M.S. and Patiram. 2007. Evaluation of Nitrogen Availability Indices for Predicting Crop Response to Applied N in Rice Soils of Meghalaya. *Journal of Hill Research* **20**(2): 62-67.
30. Saha, R., **Laxminarayana, K.** and Venkatesh, M.S. 2007. Water Retention and Transmission Characteristics of Rice Soils of Meghalaya. *International Journal of Tropical Agriculture* **25**(4): 1011-1017.

31. Laxminarayana, K. 2008. Predicting nitrogen availability for rice (*Oryza sativa*) through carbon - nitrogen relationship under Himalayan acidic soils of north east India. *Indian Journal of Agricultural Sciences* **78** (7): 592-598.
 32. Laxminarayana, K. 2009. Microbial biomass in relation to soil properties under integrated farming systems of Meghalaya. *Indian Journal of Agricultural Sciences* **79** (4): 252-258.
 33. Laxminarayana, K. 2009. Estimation of soil potassium availability for predicting the response to applied potassium in rice field. *Oryza* **46**(2): 124-133.
 34. Laxminarayana, K. and Rajagopal, V. 2009. Micro nutrient status of some rice soils of Andhra Pradesh in relation to soil properties. *The Andhra Agricultural Journal* **55**(6): 59-62.
 35. Laxminarayana, K., Bhatt, B.P. and Mildonna Swer, 2009. Effect of Mulching on Soil Fertility, Biomass Production and Nutrient Uptake of Maize in a Degraded Land. *Indian Journal of Agroforestry* **11**(1): 12-15.
 36. Laxminarayana, K. 2010. Microbial Biomass in Relation to Soil Properties under Integrated Farming Systems of Meghalaya, India. *Communications in Soil Science and Plant Analysis* **41** (3): 332-345.
 37. Saha, R., Mishra, V. K., Majumdar, B., **Laxminarayana, K.** and Ghosh, P.K. 2010. Effect of Integrated Nutrient Management on Soil Physical Properties and Crop Productivity under a Maize (*Zea mays*)-Mustard (*Brassica campestris*) Cropping Sequence in Acidic Soils of Northeast India. *Communications in Soil Science and Plant Analysis* **41**(18): 2187-2200.
 38. Laxminarayana, K. and Sanjeeb Bharali. 2010. Distribution of inorganic N fractions and N availability indices in the rice soils of Meghalaya. *Oryza* **47**(2): 128-135.
 39. Bhatt, B.P. and Laxminarayana, K. 2008. Restoration of shifting cultivation areas through hedgerow species in eastern Himalayas, India. *Indian Journal of Agroforestry*.
 40. Laxminarayana, K., Burman, D., Singh, D.P. and Naskar, S.K. 2010. Effect of Salinity on Yield, Quality and Nutrient Uptake of Sweet Potato in Coastal Saline Soils. *Journal of the Indian Society of Coastal Agricultural Research*. **28**(2): 1-5.
 41. Nedunchezhiyan, M., Rajasekhara Rao, K., **Laxminarayana, K.** and Satapathy, B.S. 2010. Effect of strip cropping involving sweet potato (*Ipomoea batatas* L.) on soil moisture conservation, weevil infestation and crop productivity. *Journal of Root Crops* **36**(1): 53-58.
 42. Nedunchezhiyan, M., Laxminarayana, K., Rajasekhara Rao, K. and Satapathy, B.S. 2011. Sweet potato (*Ipomoea batatas* L.)-based strip intercropping: I. Interspecific interactions and yield advantage. *Acta Agronomica Hungarica* **59**(2): 137-147.
 43. Laxminarayana, K., Susan John, K., Ravindran, C.S. and Naskar, S.K. 2011. Effect of Lime, Inorganic and Organic Sources on Soil Fertility, Yield, Quality and Nutrient Uptake of Sweet Potato in Alfisols. *Communications in Soil Science and Plant Analysis* **42**(20): 2515-2525.
 44. Laxminarayana, K. 2012. Location Specific Nutrient Management for Sweet Potato in Coastal Saline Soils of Andhra Pradesh. *Journal of Root Crops* **38**(1): 38-45.
 45. Manas R. Swain, Laxminarayana, K. and Ramesh C. Ray. 2012. Phosphorus Solubilization by Thermotolerant *Bacillus subtilis* Isolated from Cow Dung Microflora. *Agricultural Research* **1** (3): 273-279.
 46. Laxminarayana, K. and Burman, D. 2012. Nutrient Management for Sustainable Production of Sweet Potato (*Ipomoea batatas* L.) in Saline Inceptisols of West Bengal. *Journal of Root Crops* **38**(2): 126-134.
- Laxminarayana, K., Burman, D., Singh, D.P. and Naskar, S.K. 2012. Influence of natural salinity on yield and proximate composition of sweet potato in coastal saline soils of eastern India. *Journal of the Indian Society of Coastal Agricultural Research* **30**(2): 1-8.

48. Laxminarayana, K. 2013. Impact of INM on Soil Quality, Yield, Proximate Composition and Nutrient Uptake of Sweet Potato in Alfisols. *Journal of Root Crops* 39 (1): 48-55.
49. Laxminarayana, K. and Burman, D. 2013. Location Specific Nutrient Management for Sweet Potato (*Ipomoea batatas* L.) in Saline Inceptisols of West Bengal. *Journal of the Indian Society of Coastal Agricultural Research* 31(1): 26-33.

B. Short Communications/ Short Notes

1. Laxminarayana, K. and Subbaiah, G.V. 1993. Effect of added clay on the physico-chemical properties and nutrient status of coastal sandy soil. *Journal of the Indian Society of Coastal Agricultural Research* 11(1): 49-52.
2. Laxminarayana, K. and Subbaiah, G.V. 1995. Effect of mixing of sandy soil with clay Vertisol and potassium on yield and nutrient uptake by groundnut. *Journal of the Indian Society of Soil Science* 43(4): 694-696.
3. Laxminarayana, K. and Subbaiah, G.V. 1996. Improving the physical properties of coastal sandy soil by hybridization with clayey soil. *The Andhra Agricultural Journal* 43(1): 81-82.
4. Laxminarayana, K. and Azad Thakur, N.S. 1999. Effect of phosphorus on yield performance of wheat in acidic soils of Mizoram. *Journal of Hill Research* 12(2): 138-140.
5. Laxminarayana, K. and Rajagopal, V. 1999. Zinc status of some rice soils of Andhra Pradesh. *Micronutrient News Letter* 13(11): 2-3.
6. Laxminarayana, K. 2000. Effect of integrated use of organic and inorganic manures on yield of low land paddy. *Journal of Hill Research* 13(2): 125-127.
7. Laxminarayana, K. 2001 Evaluation of extractants for available phosphorus in soils for rice (*Oryza sativa*). *Indian Journal of Agricultural Sciences* 71(1): 51-54.
8. Laxminarayana, K. and Azad Thakur, N.S. 2001. Effect of different dates of sowing and genotypes on yield performance of maize under mid hills of Mizoram. *Indian Journal of Hill Farming* 14 (1): 117-119.
9. Laxminarayana, K. 2001. Effect of nitrogen, phosphorus and potassium on yield performance of maize under mid hills of Mizoram. *Indian Journal of Hill Farming* 14 (1): 132-135.
10. Laxminarayana, K. 2001. Effect of *Azotobacter* and *Azospirillum* on yield performance of maize in hilly regions of Mizoram. *Indian Journal of Hill Farming* 14 (2): 134-137.
11. Laxminarayana, K. and Rajagopal, V. 2002. Effect of submergence on phosphorus status and transformations in rice (*Oryza sativa*) soils. *Indian Journal of Agricultural Sciences* 72 (7): 411-415.
12. Laxminarayana, K. 2003. Determination of available phosphorus by iron oxide impregnated filter paper soil test for rice (*Oryza sativa*). *Indian Journal of Agricultural Sciences* 73(12): 684-687.
13. Laxminarayana, K. 2006. Effect of integrated use of inorganic and organic manures on soil properties, yield and nutrient uptake of rice in Ultisols of Mizoram. *Journal of the Indian Society of Soil Science* 54 (1): 120-123.
14. Laxminarayana, K. 2010. Nature of soil acidity and lime requirement in acid soils of Meghalaya. *Journal of the Indian Society of Soil Science* 58(2): 233-236.
15. Laxminarayana, K. Sanjeeb Bharali and Patiram 2011. Evaluation of chemical extraction methods for available potassium in rice soils of Meghalaya. *Journal of the Indian Society of Soil Science* 59(3): 295-299

16. Laxminarayana, K. 2011. Response of rice to phosphorus in acid soils of Meghalaya in relation to its forms and availability. *Journal of the Indian Society of Soil Science* 59(3): 304-307.

Technical Articles

1. Azad Thakur, N.S. and Laxminarayana, K. 1998. Mizoram Mein Bagvani ki Sambhavaneyen. *Purvottar Parvatiya Krishi* 5: 26-27.
2. Azad Thakur, N.S. and Laxminarayana, K. 1999. Mizoram ek Simhalokan. *Purvottar Parvatiya Krishi* 6: 51.
3. Laxminarayana, K. and Verma, D.K. 2000. Diversified uses of maize. *Zoram Loneitu* 42(2): 32-35.
4. Laxminarayana, K., Azad Thakur, N.S. and Verma, D.K. 2001. Baby corn – A potential crop for cultivation in Mizoram. *Zoram Loneitu* 42 (3): 42-46.
5. Laxminarayana, K. 2001. Effect of integrated use of organic and inorganic manures on yield parameters of groundnut. *Zoram Loneitu* 43(1): 35-38.
6. Laxminarayana, K. 2001. Management of water resources for higher sustainable production of maize in Mizoram. *Zoram Loneitu* 43 (2): 37-43.
7. Laxminarayana, K. 2001. Role of biofertilizers for enhancing the maize productivity in Mizoram. *Zoram Loneitu* 43 (3): 27-33.
8. Azad Thakur, N.S. and Laxminarayana, K. 2001. Maize production scenario in Mizoram. *Journal of the North Eastern Council* 21(4): 25-28.
9. Laxminarayana, K. 2002. Role of biofertilizers for enhancing the maize productivity in Mizoram. *Journal of the North Eastern Council* 22(1): 21-25.
10. Laxminarayana, K. 2002. Management of natural resources for sustainable crop production in irrigated command areas of Mizoram. *Zoram Loneitu* 44 (1): 44-49.
11. Laxminarayana, K. 2002. Scope and prospectus of rabi maize cultivation in Mizoram. *Zoram Loneitu* 44 (3): 24-28.
12. Laxminarayana, K. 2003. Effect of long term use of organic and inorganic manures on sustainable crop production. *Zoram Loneitu* 44 (4): 31-33.
13. Laxminarayana, K. 2004. Usage of biofertilizers for sustainable crop production. *Zoram Loneitu* 45 (1): 36-41.
14. Laxminarayana, K. 2004. Prospects of palm based cropping systems in Mizoram. *Huan Enkawltu* 12(1): 31-33.
15. Nedunchezhiyan, M. and Laxminarayana, K. 2006. Tuber crops based cropping systems in Eastern India. *Kisan World* 33 (11): 45-46.
16. Sushanta Kumar Jata, Nedunchezhiyan, M. and Laxminarayana, K. 2011. Site specific nutrient management for rice. *Orissa Review* 67(11): 62-64.
17. Laxminarayana, K. 2012. Scope of Sweet Potato in Saline Soils of Odisha for Livelihood and Nutritional Security. *Odisha Horticulture* 1(2): 28-36.
18. Sivakumar, P.S., Anantharaman, M., Ramanathan, S., Misra, R.S., Laxminarayana, K. and Jha, A.K. 2013. Technologies to make food- and livelihood secured. *Indian Horticulture* 58(3): 41-44.
19. Susan John, K., Laxminarayana, K. and Ravindran, C.S. 2013. Meeting nutrient demand of tubers. *Indian Horticulture* 58(3): 45-49.
20. Laxminarayana, K. 2013. Vermiculture Technology for Maintenance of Soil Quality and Sustainable Crop Production. *Odisha Horticulture* 2 (2): 37-54.

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

1. Laxminarayana, K. 2000. Agroforestry for fertility improvement and management of soils. In ***Natural Resources Conservation and Management for Mountain Development*** (Eds. Tiwari, S.C. and Dabral, P.P.), International Book Distributors, Dehra Dun, India. pp: 323-331.
2. Patiram, Datta, M., Ram, M., Kailash Kumar, Majumdar, B., Venkatesh, M.S., Misra, V.K., Raichowdhury, M. and **Laxminarayana, K.** 2002. Management of soils for sustainable production. In ***Steps towards Modernization of Agriculture in NEH Region*** (Eds. Verma, N.D. and Bhatt, B.P.), Venus Printers and Publishers, New Delhi. pp: 393-415.
3. Azad Thakur, N.S. and **Laxminarayana, K.** 2002. Status and prospectus of Olericulture in Mizoram. In ***Vegetable Growing in India*** (Eds. Prem Singh Arya and Sant Prakash), Kalyani Publishers, Ludhiana. Pp: 152-162.
4. Azad Thakur, N.S. and **Laxminarayana, K.** 2004. Socio-economic and Institutional issues in watershed management in Mizoram. In ***Watershed Management – Social and Institutional Issues in Northeast India*** (Eds. K.K. Satapathy and K.N. Agrawal), Published by Director, ICAR Research Complex for NEH region, Umiam, Meghalaya, pp 300-304.
5. Laxminarayana, K., Bhatt, B.P. and Tulsi Rai. 2005. Soil Fertility Build up through Hedgerow Intercropping in Integrated Farming System: A Case Study. In ***Agroforestry in North East India: Opportunities and Challenges*** (Eds. B.P. Bhatt and K.M. Bujarbaruah), Published by Director, ICAR Research Complex for NEH Region, Umiam, Meghalaya, pp 479-490.
6. Bhatt, B.P., **Laxminarayana, K.**, Singh, K. and Tulsi Rai 2005. Restoration of Degraded Lands through Agroforestry Interventions. In ***Agroforestry in North East India: Opportunities and Challenges*** (Eds. B.P. Bhatt and K.M. Bujarbaruah), Published by Director, ICAR Research Complex for NEH Region, Umiam, Meghalaya, pp 427-436.
7. Laxminarayana, K., Datta, M., Sharma, Y.P., Sharma, U.C. and Gopichand, B. 2006. Soil Microbes and Biofertilizers. In ***Soils and their Management in North East India*** (Eds. U.C. Sharma, M. Datta and J.S. Samra), Published by Director, ICAR Research Complex for NEH Region, Umiam, Meghalaya pp. 242-279.
8. Sreekanth, A., Nedunchezhiyan, M., Laxminarayana, K., Misra, R.S., Rajasekhara Rao, K. and Siva Kumar, P.S. 2010. Sustainable production of sweet potato and technology transfer for enhanced yields in Orissa. In ***Sustainable sweet potato production and utilization in Orissa, India*** (Eds. Sreekanth, A., Janardhan, K.V. and Alison Light). Published by International Potato Center, South, West and Central Asia Region, CIP Liaison Office, Bhubaneswar, pp. 11-18.
9. Laxminarayana, K. 2010. Nutrient management in tuber crops. In ***Agro-techniques and value addition in tropical tuber crops***. Published by Head, Regional Centre of CTCRI, Bhubaneswar, Orissa, sponsored by Orissa Tribal Empowerment and Livelihood Programme, Department of Tribal Welfare, Govt. of Orissa, pp. 59-70.
10. Sivakumar, P.S., Anantharaman, M., Ramanathan, S., Misra, R.S., Laxminarayana, K. and Jha, A.K. 2013. CTCRI Rooting Ahead to North-Eastern Hill India, Central Tuber Crops Research Institute, Thiruvananthapuram, Kerala, pp. 1-32.

12. Technical bulletins

1. Laxminarayana, K. 2013. Sweet Potato for Livelihood and Nutritional Security in Coastal Saline Soils of Odisha, Technical Bulletin 59. CTCRI, Thiruvananthapuram

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

Particulars	Organization	Period	Amount (Rs.)
1. Tuber Focused Survey	Orissa Watershed Development Mission	2008-09	80,340/- (13 days involving 3 scientists)
2. Survey and On-Farm	OTELP (Orissa Tribal	2006-09	0.93 lakh (All the scientists)

Training on Tuber Crops	Empowerment and Livelihoods Programme)		from Regional Centre of CTCRI, Bhubaneswar
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14. Technologies developed (Add list and give a brief description):

S. No.	Technology	Project title	PI/Co-PI
1.	Popularization of Integrated nutrient management strategy involving secondary and micronutrients for sweet potato in Alfisols.	Nutrient management in tuber crops based cropping systems Long term effect of biological, inorganic and organic sources on sweet potato-moong cropping system in acid Alfisols.	PI
2.	Optimization of Zn and Mg for sweet potato in acid Alfisols	Nutrient management in tuber crops based cropping systems Effect of zinc and magnesium on yield and quality of sweet potato in acid Alfisols	PI
3.	INM strategy involving secondary & micronutrients, biological and organic sources for colocasia in Alfisols of eastern India	Nutrient management in tuber crops based cropping systems Effect of lime, biological, inorganic and organic manures on soil fertility, yield, quality and nutrient uptake of colocasia in an acid Alfisol.	PI
4.	Alternate organic sources to farmyard manure to enhance productivity of sweet potato and colocasia, nutrient use efficiency and to sustain soil quality	Nutrient management in tuber crops based cropping systems.	PI
5.	Identified 5 genotypes of sweet potato for salt tolerance suitable for coastal saline soils of eastern India	Studies on salt tolerance in sweet potato 1. Screening of sweet potato genotypes for salt tolerance.	PI
6.	Site specific nutrient management strategy for sweet potato in saline Entisols of Odisha	Studies on salt tolerance in sweet potato 2. Site specific nutrient management for sweet potato in saline soils of eastern India.	PI
7.	Site specific nutrient management strategy for sweet potato in saline Inceptisols of West Bengal	Studies on salt tolerance in sweet potato 2. Site specific nutrient management for sweet potato in saline soils of eastern India.	PI
8.	Site specific nutrient management strategy for sweet potato in saline Alfisols of Andhra Pradesh	Studies on salt tolerance in sweet potato 2. Site specific nutrient management for sweet potato in saline soils of eastern India.	PI
9.	Optimization of phosphorus and potassium for sweet potato in saline Inceptisols	Studies on salt tolerance in sweet potato 3. Response of nitrogen and phosphorus on sweet potato in saline soils	PI
10.	Dissemination and popularization of tuber crops technologies in	Development and transfer of appropriate tuber crops technologies for north eastern India	Co-PI

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11. Isolation and characterization of bacterial strains in horticultural cropping systems for P solubilization Bioprospecting of agriculturally important microorganisms in various horticultural cropping systems for their potential exploitation for disease management, plant growth promotion and soil enrichment. **Co-PI**

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

16. Any other information: