



### 13.2 : PUBLICATIONS :

1. Sarkar, A. K., Mahapatra, P. and Kumar, A. (2007). Management of Macronutrients in Acid Soils. Bull. Indian Soc. Soil Sci. 25 : 10-26.
2. Mishra, B., Sharma, A., Singh, S. K., Prasad, J. & Singh, B. P. (2008) Influence of continuous application of amendments to Maize-wheat cropping system on Dynamics of Soil Microbial Biomass in Alfisol of Jharkhand. Indian Soc. Soil Sci., 56(1) 71-75.
3. Kumar, Rakesh., Karmkar, S. & Prasad, J. (2008) Critical levels of Sulphur for green gram (*Vigna radiata*) in acidic soils of Jharkhand. J. Indian Soc. Soil Sci. 56(4) 448-451.
4. Singh, A. K., Sarkar, A. K., Kumar, A. & Singh, B. P. (2009) Effect of long term use of mineral fertilizers, lime and Farm Yard Manure on the crop yield, available plant nutrient and heavy metal status of an acidic loam soil. Indian Soc. Soil Sci. 57 (3) : 362-365.
5. Singh, A. K., Sarkar, A. K. & Mishra, B. (2009) Long term effect of residue incorporation on crop yield, nutrient uptake and availability of plant nutrients in an acid soil. Indian Journal Agril. Sci. 79(1), 68-70.
6. Sarkar, A. K. (2009). Managing Natural Resources for increasing Agricultural Production in eastern India. Jharkhand J Dev. and Manage. Studies 7(4) : 3585-3604.
7. Kumar, Rakesh, A. K. Sarkar, K. P. Singh, B. K. Agarwal and S. Karmakar (2009). An Appraisal of available nutrients status in Santhal Parganas region of Jharkhand, J. Indian Soc. Soil Sci. 57(3) 366-369.
8. Kumar Rakesh, Rakesh Kumar, S. Karmakar and B. K. Agarwal (2010). Vertical and topographical distribution of Co, Ni & Pb in relation to soil characteristics in different agroclimatic zones of Jharkhand. Indian Soc. Soil Sci. 58(3) : 293-298.
9. Sarkar, A. K., Jena, D. & Raychoudhuri Mausami (2012) Managing Acid Soils for efficient use of nutrients and water for crop production – challenges & options. Bull. Indian Soc. Soil Sci., New Delhi (in press).
10. Sarkar, A. K. (2011) Micronutrient Management in soils for higher crop productivity. 15<sup>th</sup> Dr. B. V. Mehta Memorial Lecture of Indian Soc. Soil Sci. delivered at BCKV, Kalyani.
11. Pattanayak, S.K.; Mishra, U.K.; Sarkar, A.K. and Majumdar, K. (2011) Integrated Nutrient Management for Groundnut and Redgram in Acid Soils of Odisha. *Better Crops South Asia*, 5 (1): 8-10



12. Sarkar, A. K. (2011) Concept note on “Integrated soil-water management in Eastern India” NAAS discussion paper held at NAAS, New Delhi pp 1-8.
13. Sarkar, A. K., Kumar Rakesh, Karmakar, S. & Majumdar, K. (2011) Site specific nutrient management in maize under rainfed conditions of eastern India, Summary 11<sup>th</sup> Asian Maize Conference, Nanning, China 7-11 Nov. 2011 pp 394-395.
14. Kumar, Rakesh., Karmakar, A., Majumdar, K. and Sarkar, A. K. (2011) Nitrogen management to improve maize-wheat system productivity in soils of eastern India. Summary 11<sup>th</sup> Asian Maize Conference, Nanning, China 7-11 Nov. 2011, pp 413-414.
15. Sarkar, A. K., Karmakar, S. and Kumar Rakesh (2012) Issues on soil fertility research in eastern India with special reference to Fibre crops. Publ. CRIJAF (ICAR) (In Press).
16. Sarkar, A. K. (2012) Zinc in crops and human health in Jharkhand. Keynote address FAI-IZA Symposium 3.3.2012 Ranchi pp 1-4.

### BOOKS & BOOK CHAPTERS

1. Rattan, R. K., Sarkar, A. K. & Singh, A. K. (2009). Soil and Water Management for Agricultural transformation in Eastern India. Bull. Indian Soc. Soil Sci., 26: 1-120.
2. Panda, N., Sarkar, A. K., & Chmuah, G. C. (2009). Chapter on ‘Soil Acidity’ in “Fundamentals of Soil Science (2<sup>nd</sup> Ed.). Indian Society of Soil Science, New Delhi. Pp 317-328.
3. Pasricha, N. S. and Sarkar, A. K. (2009). Chapter on ‘Secondary Nutrients’ in Fundamentals of Soil Science (2<sup>nd</sup> Ed.). Indian Society of Soil Science, New Delhi. Pp 449-457.
4. Sarkar, A. K., Singh R. P. and Mahapatra, P. (2010). In “Soil, Water and Plant Nutrient Management for rainfed crops”. Publ. Agrotech Publishing Academy, Udaipur (India) Under Publication.
5. Sarkar, A. K., Singh, R. S., Yadav, M. S. & Singh, C. S. (2011) in ‘Integrated Farming System for Sustainable production’ Publ. Agrotech Publishing Academy, Udaipur (India) 1-266.

### TECHNICAL BULLETINS

1. Mahapatra, P., Singh, R. P., Singh, B. P., Mishra, B. & Sarkar, a. K. (2007). Long term effects of Fertilizer, Organic manure & amendments on soil health, crop productivity and sustainability, SSAC (BAU) Tech. Bull. 4:1-75.
2. Anonymouse (2007) ‘Abstracts of Thesis’ Department of Soil Science and Agril. Chemistry, BAU, Ranchi p 1-154.
3. Singh, R. P., Sarkar, A. K., Mishra, B. & Rusia, D. K. (2007) Technologies for efficient management of Soil, water and plant nutrients for crop production in Jharkhand. SSAC (BAU) Tech. Bull. 3/2007 pp 1-46.



4. Sarkar, A. K. (2009) Use of Basic slag for crop production in Acid Soils. SSAC (BAU) Tech. Bull. P 1-13.
5. Sarkar, A. K., Mahapatra, P., Kumar Arvind & Kumar, Ajay (2010) Boron for high crop yield, quality and profitable agriculture. NAE Tech. Bull. 1/2010 pp 1-11.
6. Sarkar, A. K., Kotur, S. C., Raghupati, H. B. & Satisha, G. C. (2011) Advanced Diagnostic techniques for Improved Nutrition of Vegetable and Fruit Crops. ICAR NAE Publ. 03/2011 pp 1-100.

#### **VIDEO CASSETTES**

- Soil Health (in Hindi).
- Organic manures and Biofertilisers (in Hindi).
- Balanced Fertilizer Use.
- Soil and Water pollution.

#### **13.3 : PATENTS FILED : NIL**

#### **13.4 : SUCCESS STORIES DEVELOPED :**

- GIS based district level soil fertility maps developed for the State.
- Plant Clinic & Leaf Tissue Analysis Lab. established.

#### **13.5 : TECHNOLOGIES GENERATED / TRANSFERED :**

- ✓ GIS based soil nutrient maps at district & block level is helping the State Government in balanced nutrient use, use of soil amendments and input supply management in the State.
- ✓ Knowledge enhancement of soil testing staff & extension functionaries on Integrated Plant Nutrient Management in rainfed areas.
- ✓ Provided insight on soil & water quality related to crop productivity and sustainability.
- ✓ Site specific nutrient management studies have helped in promoting nutrient use efficiency in cropping systems.

#### **13.6 : RESOURCE GENERATED :**

##### **Biofertilizer Production**

Altogether 57,756 pkts (100 gm of each pkt) of Rhizobium cultures, 3999 pkts. of 100 gm each of Azotobacter culture, 40,018 pkts of 100 gm of PSB culture and 60 pkts. of 1 kg of Blue green algae (BGA) were produced.



## Vermi Compost Production

The Vermicompost production unit of the Department produced about 326 quintal of vermicompost to meet the demand of farming community.

## Soil Testing Services to Agencies

5455 soil samples were received from ATMA, Jamtara, Garhwa & Chatra, KVK, Bokaro & NAIP project. These samples are analyzed on payment basis. The received soil samples were analyzed and Soil Health Card issued to concerned agencies based on STLs.

S.N.	Soil sample received	No. of samples	Parameter analyzed
1.	ATMA, Jamtara	268	O.C., P & K
2.	ATMA, Garhwa	950	P, K, S
3.	ATMA, Chatra	400	Avail. B, Zn & S
4.	KVK, Bokaro	500	P, K, S & pH
5.	NAIP	40	Avail. S, P, K, OC and soil pH
	<b>TOTAL</b>	<b>5455</b>	

## 13.7 : CURRICULAR RESEARCH :

S. N.	Name	Topic Research	Year
1.	Sri Anjani Kumar M. Sc. (Ag.)	Assessment of soil and water quality in farmers fields around some industries of Jharkhand	2007
2.	Sri Subhash Chandra Samad, M. Sc. (Ag.)	Assessment of Fluoride and nitrate content in surface and ground water in Palamau district of Jharkhand.	2008
3.	Sri A. K. Singh, Ph.D.	Effect of cropping, fertilizer use and residue incorporation on the availability of Ca, S, B and Zn in an Alfisol.	2008
4.	Mrs. Ragini Kumari, Ph.D.	Leaf analysis for nutrient diagnosis, recommendation and management in Litchi	2009
5.	Mrs. Geeta Kumari, Ph.D.	Long term effect of manure, fertilizers and lime application on carbon sequestration and yield sustainability in Alfisol of Ranchi.	2010
6.	Sri A. K. Jha, Ph.D.	Remediation of trace metal contaminated soils of Jharkhand	2012

## 13.8 STUDENT ACHIEVEMENTS

Year	Name of student	Achievements
2008-09	Sri Deepak Kumar Gupta	JRF (Physical Sciences)
2008-09	Sri Vikash Kumar	JRF (Physical Sciences)
2008-09	Sri Rakesh Kumar	SRF (Soil Science)
2009-10	Sri Anjani Kumar	NET (Soil Science)
2009-10	Mrs. Kumari Nisha	NET (Soil Science)
2010-11	Mrs. Ragini Kumari	NET (Soil Science)
2010-11	Sri Rajan Kumar Ojha	NET (Soil Science)
2010-11	Sri Rajeev Kumar	NET (Soil Science)



### **13.9 : AWARD / RECOGNITION RECEIVED**

- Received 'Best Poster Presentation Award' at the 11th Asian Maize Conference held at Nannig, China from Nov. 7-11, 2011.
- Presented Keynote address on 'Zinc in crops and human health' in FAI-IZA Symposium held at Ranchi on 03.03.2012
- Delivered 15th Dr. B.V. Mehta Memorial Lecture of the Indian Society of Soil Science at BCKV, Kalyani in 2011.
- Presented Concept note on 'Acid Soil Management' at NAAS in 2010.

### **13.10 : ASSOCIATED INSTITUTIONS & PROGRAMMES**

- ✓ State Department of Agriculture
- ✓ NBSS & LUP Regional Centre, Kolkata
- ✓ Jharkhand Space Application Centre
- ✓ Krishi Vigyan Kendras
- ✓ Zonal Research Stations
- ✓ State Horticulture Mission
- ✓ Horticulture & Agroforestry Research Programme (ICAR) Ranchi
- ✓ NAIP Project, BAU, Ranchi
- ✓ Rastriya Krishi Vikash Yojana (GOI)
- ✓ ATMA & SAMETI at State Level
- ✓ IPNI India Programme
- ✓ NPSFM (Ministry of Agriculture, GOI)
- ✓ International Potash Institute
- ✓ Fertilizer Association of India – Eastern Region

### **13.11 : PPP DEVELOPED, IF ANY : TWO**

- M.O.U. between TATA STEEL, State Department of Agricultural and Cane Development & BAU on supply of Basic slag as an ameliorant for Acid soils.
- GVT & BAU on developing Soil Test Laboratory at Godda district.



## 13.12 : CAPACITY BUILDING PROGRAMME :

### Training/Workshop/Seminar/Orientation Programme Organized



Events	Date	Participants	No. of Participants
Spl. Training Program on Integrated Nutrient Management on Horticultural Crops	18-20 July, 2007	DHOs, BHOs, NGOs & Farmers	47
72 <sup>nd</sup> Annual Convention of Indian Society of Soil Science	2-5 Nov., 2007	Soil Scientists	250
National Seminar on Development in Soil Science-2007	4 Nov., 2007	Soil Scientists	250
ICAR Winter School on "System approach for water resources management"	4-24 Dec. 2007	Crop and Soil Scientist	20
Orientation Programme on "Microwatershed Management for Efficient use of Natural Resources"	6-10 March, 2008	BAU-KVK/ZRS Scientist	24
Orientation Programme on "Organic & Biological Sources of Plant for Production Organic Production in selected crops"	12-16 March, 2008	BAU-KVK/ZRS Scientist	24
Site Specific Nutrient Management Training Programme	26-27 March 2008	Soil Science, Agronomy & Horticulture Scientist	30
ICAR Winter School on Integrated Farming Systems for Sustainable Production	10-30 Nov., 2008	Crop & Soil Scientist	19
40 <sup>th</sup> & 41 <sup>st</sup> Joint Annual Convention of Indian Society of Agricultural Chemists	12-13 Dec., 2008	Soil Scientists	50
National Symposium on Water & Fertilizer Management: Present day chemical Agriculture in India	13 Dec., 2008	Soil Scientists	50
Entrepreneurship development training Program on Soil Testing	15-29 Jan. 2009	+2 passed Progressive Farmers	20
Training Programme on Balance use of Fertilizers, Soil sampling and analysis of available Soil & Plant Nutrient	1-8 Feb. 2010	STLs & FQCLs Staff and Field functionaries	20
IPNI Research Cooperators meet and National Symposium on Future Strategies for Nutrient Management Research	17-19 Aug. 2010	Faculty members of Soil Science, Agronomy and Agril. Physics	40
FAI Orientation Programme on Balanced Fertilization and Integrated Management	16 Sept. 2010	Input dealer, NGO's & Agriculture Dept. and Research Officials	40
FAI Orientation Programme for Agriculture student	17 Sept. 2010	UG and PG student of Agriculture of BAU	80
Training Programme on Importance of Biofertilizers and Manures for Crop Production	3-5, 7-9 and 28-30 Sept. 2010	Progressive Farmers	120
Orientation Programme on Nutritional Management of Horticultural Crops	23-25 Feb. 2011	Faculty Members of Soil Science, Horticulture and Agronomy	30
IPNI Meet on Strategy Developed for analysis of Soil Physical Parameter and Carbon Pool Study	9-10 April 2011	Crop and Soil Scientist	20
FAI Orientation Programme on Soil Fertility Mapping- Challenge and Opportunity	21 Oct. 2011	Soil, Agronomy, Horticulture Scientist, UG & PG students & BTM (ATMA)	150
7 - days practical oriented training programme on Analytical Methods of Soil Testing	30 Jan. - 5 Feb. 2012	STL, KVKs staffs & Scientists	12
FAI-IZA symposium on Zinc in Crops and Human Health in Jharkhand	2 March, 2012	Soil Science and Agronomy Scientist, DAOs, PDs- ATMA	30



## AWARENESS PROGRAMME OF FARMERS UNDER NAE (ICAR) PROGRAMME

S.N.	Year	Name of Programme	No. of Programmes	Venue	No. of Farmers participated
1.	2007-08	Sustainable Soil, Water and Plant Nutrient Management for Rain fed cropping System	12	12 KVK's, Jharkhand	647
2.	2008-09	Soil, Water and Nutrient management in rainfed farming system	22	20 KVK's and 2 ATMA's, Jharkhand	1246
3.	2008-09	Soil, Water, Nutrient, Insect and Pest Management for rainfed farming	24	20 KVK's, 2 ATMA's and 2 DAO's, Jharkhand	1600
4.	2009-10	Soil, Water Nutrient and Integrated Pest Management under rainfed cropping systems	10	8 KVK's and 2 ATMA's	673
Total			68		4166

### SPECIAL LECTURES & ORIENTATION PROGRAMMES :

S.N.	Date	Topic
1.	22-23 July 2010	NASC Brainstorming Session on Acid Soils (ICAR)
2.	17-19 August 2010	Future strategies for Nutrient Management Research (Collaboration with IPNI)
3.	11.10.2010	Climate change : Adaptation and Mitigation strategies for rainfed agriculture (Collaboration with CRIDA, ICAR)
4.	23.12.2010	Toxic Elements and other pollutants in soil – a threat to Nutritional Quality (Collaboration with BCKV, Kalyani)
5.	24.12.2010	Soil potassium reserves in India and Potassium Availability : Myths realities and future directions of Research Policy (Collaboration with BCKV, Kalyani)
6.	23-25 Feb. 2011	Advanced Diagnostic techniques for Improved Nutrition of Vegetable and Fruit Crops (In collaboration with IHR, Bangalore)
7.	28.02.2011	Innovation is key to agricultural growth & prosperity (In collaboration with ICRISAT)

### 14.0 : OUTCOME / IMPACT :

#### 14.1 : TECHNOLOGIES

- ✓ GIS based soil nutrient maps at district & block level is helping the State Government in balanced nutrient use, use of soil amendments and input supply management in the State.
- ✓ Knowledge enhancement of soil testing staff & extension functionaries on Integrated Plant Nutrient Management in rainfed areas.



- ✓ Provided insight on soil & water quality related to crop productivity and sustainability.
- ✓ Site specific nutrient management studies have helped in promoting nutrient use efficiency in cropping systems.

## 14.2 : IMPACT ON STATE AGRICULTURE

- ✓ Soil nutrient maps made available.
- ✓ Enhanced knowledge and awareness on soil health management.
- ✓ Soil amendment & nutrient use for acid soil management promoted.
- ✓ Greater realization at State level on the imperative need of soil and water management for improving crop productivity in rainfed area.
- ✓ Soil testing and quality input supply ensured.

## 14.3 : SOCIO-ECONOMIC BENEFITS THROUGH QUALITY INPUT SUPPLY & SOIL FERTILITY ASSESSMENT

### 14.3.1 : BIOFERTILIZER PRODUCTION & REVENUE GENERATION

Year	Bio fertilizer Production					Revenue generated (in Rs.)
	Rhizobium culture (100gm/Pkt.)	BGA (1kg/pkt.)	Azotobacter culture (100 gm/ each pkt)	PSB culture (100 gm/ each pkt)	Azolla (Kg)	
2007-08	26203	52	-	-	-	3,02,250
2008-09	34898	12	3615	4967	-	3,71,980
2009-10	61045	50	22041	3963	-	3,40,000
2010-11	57756	60	3999	40018	-	15,01,135
2011-12	41816	48	801	29456	18.5	10,82,425

### 14.3.2 : VERMI COMPOST PRODUCTION

Year	Vermicompost produced (in quintal)	Revenue generated (in Rs.)
2006-07	34.00	20,000
2007-08	191.57	25,000
2008-09	123.9	30,000
2009-10	133.00	55,000
2010-11	326.00	1,63,375
2011-12	84.83	42,415