



Soil Science News

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EDITORIAL

Arsenic Groundwater Contamination: A Slow Poisoning?

Worldwide, groundwater used for drinking is being contaminated with naturally occurring arsenic - and humanity is grappling with the largest-ever mass poisoning in the history. Arsenic poisoning is more often thought of as a topic for a mystery novel, but in fact, it is a grim part of our global reality. Across the world, millions of people are slowly being poisoned by arsenic contaminated drinking water. Arsenic-tainted water has been found in Thailand, Japan, Australia, The United Kingdom, Mongolia, Hungary, Chile, China, Argentina, Taiwan, Ghana, Mexico, Philippines, New Zealand, Canada, India and Bangladesh. Recently, arsenic contaminated water problem has also been identified in Pakistan as well.

Arsenic, contaminating groundwater as a result of natural geochemical processes, is highly toxic and carcinogenic. Arsenic is generally believed to be about four times as poisonous as mercury. It is mostly found in oxidation states of -3, 0, 3 and 5 valent arsenite. The trivalent arsenic (As III) is considered 60 times more toxic than the pentavalent arsenic (As V). Arsenic can damage the nervous system and can cause various types of cancer. It is also Teratogen as it can enter the metabolic system of newborn children.

The first case of arsenic contaminated groundwater (greater than $50 \mu\text{g As L}^{-1}$ the thresholds was reduced from 50 to $10 \mu\text{g As L}^{-1}$ in 1993) was recorded in the Bengal Basin in 1978 and the initial cases of arsenic poisoning induced skin lesions were diagnosed in 1983. The characteristic skin lesions included pigmentation changes, mainly on the upper chest, arms and legs, and keratoses of the palms of the hands and soles of the feet. But by 1987, several more patients from Bangladesh were identified.

Arsenic problem in Pakistan was identified during 2000 in Attock and Rawalpindi districts and thus emerged as a serious public health hazards. Extent of arsenic contamination in Pakistan can be envisaged from the results of the blanket testing carried out in the provinces of Punjab and Sindh. In Punjab, over 20% population is exposed to arsenic contamination of over 10 ppb in drinking water while nearly 3% population is exposed to over 50 ppb. In Sindh, the situation is even worse with 36% and 16% population exposed to arsenic contaminated water with over 10 ppb and 50 ppb, respectively. Both shallow and deep groundwater sources have arsenic contamination.

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NEWS AND VIEWS

Fertilizer Consumption on Fast Growth but Lacks Balance

Scientists working in National Fertilizer Development Centre, Islamabad observed that fertilizer consumption during 2004-05 was 3,644 thousand nutrient tonnes, reflecting an increase of 14.7 % over 2003-04 (3,222 thousand tonnes). Nitrogen off take was 2,796, phosphate was 865 and potash was 33 thousand tonnes. Increase in nitrogen offtake was 10.7%, phosphate was 28.5 % and potash was 49.2% over the previous year. Despite impressive growth in phosphate and potash use, the gap between N:P is still very wide, showing imbalanced use at farm level. Use of micronutrients is also on the increase; but there is a slow movement towards balanced nutrient use. Thus, more efforts are needed for promoting balanced use for improving crop productivity per unit of fertilizer as well as of cropped area.

Soil Structure and Flow-Saturation Effect on Heavy Metal Ions Transport

While on Humboldt Research Fellowship at University of Karlsruhe, Karlsruhe, Germany, Dr. M. Saleem Akhtar of Land Resources Research Program, NARC, Islamabad has studied modeling heavy metal ions transport through soil to improve predictions on soil and groundwater quality. He constructed breakthrough curves of Cr^{3+} , Cu^{2+} , As^{5+} , Pb^{2+} , $(\text{MoO})^{2-}$, and Cd^{2+} using intact soil columns from four soils presenting a progression in subsoil structure under four constant flow rates as controlled by +10, -10, -40-, and 100 mm water heads. Blue dye flowed through vertical fingers almost parallel to each other in the Lamellic Hapludalf, massive loamy sand and through macropores in the Typic Hapludalf, strongly structured silty clay soils which had the lowest dyed area and the blue dye flowed deepest. Lithic Hapludalf and Typic Udorthent coarse subangular blocky silt loams had blue dye leached through macropore and then spread outward. At saturated flow both Cl and Li arrived fast for all the soils and even faster for the soil with macropores and both were delayed successively with decrease in matric head. Breakthrough of the metals was fast with saturated flow in the well structured silty clay soils while only Mo leached through the massive loamy sand soil. The fast breakthrough was ascribed to macropore flow in the structured silty clay soils. Depending upon the nature of metal ions, variable cut off matric potential for preferential flow was found.

Organic Farming

Agriculture Chemistry Section of ARI, Tandojam has started work on organic farming under the provincial project on wheat,

onion and cauliflower from Rabi 2005-06.

Workshops/Symposiums

National Fertilizer Development Centre (NFDC), Islamabad, in collaboration with World Phosphate Institute (IMPHOS), FAO, IFA and Federal/Provincial organizations, is organizing a two-day Workshop on "Balanced Fertilizer Use for Sustainable Crop Production". Objective of the workshop is to bring all the stakeholders together on a single platform to initiate dialogue and discussion in the context of Pakistan agriculture to search for a way out to break the yield barriers. The Workshop is supposed to be held in 1st week of April 2006.

PROMOTIONS, APPOINTMENTS, AND POSTINGS

Dr. Muhammad Salim, CSO/DDG, Institute of Natural Resources & Environmental Sciences, NARC, Islamabad has been promoted as Chief Scientist-II (BS-21) and has taken over the charge of Member, Plant Sciences, PARC, Islamabad.

Dr. Kazi Suleman Memon, after his retirement in early November 2005, has been re-appointed as Eminent Professor in Department of Soil Science, Sindh Agriculture University (SAU), Tandojam for a period of two years under the HEC Program of "Hiring Eminent Educationists and Researchers having PhD Degree". Dr. Memon is now focusing on teaching and research and also guiding post-graduate students.

Professor Dr. M. Arshad, Institute of Soil and Environmental Sciences, University of Agriculture Faisalabad has assumed the charge of Director of the Institute.

Mr. Syed Sajjad Haider Kazmi has been promoted as District Officer, Soil Fertility and posted at Soil and Water Testing Laboratory, Gujrat.

Mr. Attar Khan Jarwar, Agricultural Chemist (Soils), Agricultural Research Institute, Tandojam has been transferred to Rice Research Institute, Dokri and posted as Rice Technologist in place of **Mr. Mukhtiar Ali Channa** who has been appointed as Agriculture Chemist (Soils) at Agricultural Research Institute, Tandojam.

Mr. Shaheed Ahmed, Agriculture Chemist (Soils), Quaid-e-Awam Agriculture Research Institute, Naudero, Larkana has been transferred and appointed as Deputy Director, ARI, Tandojam.

Dr. Javaid Akhtar Memon, Agriculture Chemist (SF) has been appointed as member of Provincial Registration Committee for registration of firms for plant protection business in Sindh province.

Congratulations to all from Soil Science News!

INTERNATIONAL VISITS/ CONFERENCES/FELLOWSHIPS

Dr. Nisar Ahmad, Chief, NFDC participated in International Fertilizer Industry Association Regional Conference for Asia and the Pacific, 6-8 December 2005, in Singapore. He spoke on "Sustainable Crop Production through Balanced and Integrated Plant Nutrient

Management (IPNM): Pakistan Experience" in a Workshop on Integrated Plant Nutrient Management. Dr. Nisar also participated in a panel discussion as a panellists with Director General, IFA and representatives of India and Indonesia on "Fertilizer Subsidies in Asia: Where are we? Where do we go"? Both the topics generated a lot of interest amongst the 300 participants of different nationalities.

Dr. Zaheer Ahmad, Technical Services Officer, Lahore, Engro Chemical Pakistan Ltd. participated in "4th NESG Summit on Agriculture" in Nigeria during Nov 2005, and presented a paper on "Development and Growth of Agriculture in Pakistan: From Subsistence to Commercial Enterprise"

Dr. M. Saleem Akhtar, Senior Scientific Officer, LRRP, NARC has resumed charge after completing two year Humboldt Research Fellow (June 2003 - October 2005) at the University of Karlsruhe, Karlsruhe, Germany. His research work mainly focused on modeling heavy metal ion transport through soil to improve predictions on soil and groundwater quality.

HONOURS AND AWARDS

At the occasion of 2005 World Food Day, **Dr. Abdul Rashid**, Chief Scientific Officer, NARC has been honored by the Government of Pakistan by bestowing the prestigious **Borlaug Award 2005 (First Position)**. This singular honor, carrying a handsome cash prize, has been conferred in recognition to his outstanding contributions by in micronutrient research. Dr. Rashid is a distinguished soil scientist with more than 30-year

research experience and 200+ publications. He has established boron deficiency in cotton and rice calcareous soils of Pakistan.

Dr. Rashid is a strong advocate of

balanced fertilizer use, including micronutrients. His micronutrient management technologies on "Boron use in rice", "Boron and zinc use in cotton" and "Zinc-enriched rice nursery" have been recommended and got adopted in the country – with highly remunerative returns.

Mr. Khalil Ahmed Dharejo, M.Sc. Student, Department of Soil Science, Sindh Agriculture University, Tandojam won First Position in Essay Writing Competition on the occasion of World Food Day 2005. The essay writing competition was organized by Ministry of Food, Agriculture & livestock, Islamabad on All-Pakistan basis. **Mr. Dharejo** also got first position in All Pakistan Essay Writing Competition on Serat-u-Nabi organised by Ministry of Education, among all public sector universities of the country.

Congratulations to Dr. Rashid and Mr. Dharejo for earning professional distinctions!



Sardar Sikandar Hayat Bosan, Federal Minister, MINFAL, conferring Award to Dr. A. Rashid

RECENTLY COMPLETED PhDs

Dr. Wasiullah Malik successfully completed Ph.D. degree from the Department of Soil & Environmental Sciences, NWFP Agricultural University, Peshawar under the supervision of an eminent scientist, Prof. Dr. Amanullah Bhatti (Izaz-e- Fazilat) in December 2005. The topic of his dissertation was "Mapping of Soils of Kohat and Bannu districts using Spatial Variability and Geostatistical Technique".

Dr. Rifat Hayat has completed his Ph.D. degree in Soil Science, University of Arid Agriculture, Rawalpindi under the supervision of Prof. Dr. Safdar Ali. His thesis research was on "Sustainable legume-cereal cropping system through management of biological nitrogen fixation in Pothwar". Earlier, Dr. Rifat Hayat has been awarded a HEC Indigenous Scholarship for PhD and he was the first ever PhD scholar who completed PhD from the Department of Soil Science, University of Arid Agriculture, Rawalpindi.



The University of Arid Agriculture (UAA), Rawalpindi has conferred PhD degree in Soil Science upon

Mr. Tariq Sultan, Scientific Officer, Land Resources Research Program, NARC, Islamabad. Mr. Sultan worked on "Comparison of Mungbean-Wheat (Legume-Cereal) and Maize-Wheat (Cereal-Cereal) Cropping Systems under Irrigated Condition" under the joint supervision of Professor Dr. Safdar Ali, UAA and Dr. Muhammad Aslam, NARC, Islamabad.



Mr. Ghulam Sarwar, Research Officer, Soil Salinity Research Institute (SSRI), Pindi Bhattian and a Life Member of Soil Science Society of Pakistan has been awarded Ph. D. degree by University of Kassel, Germany. Title of his thesis was "Use of compost for crop production in Pakistan". The studies were supervised by Dr. Nazir Hussain, Agricultural Chemist, SSRI, Pindi Bhattian and Professor Dr. Helge Schmeisky, University of Kassel, Germany.



Congratulations to all for earning the highest academic qualification!

OBITUARY

Professor Dr. Maqsood Ahmad Gill

We, on behalf of Soil Science Society of Pakistan, express deep sorrow and grief at the sad and unexpected demise of Professor Dr. Maqsood Ahmad Gill (1954-2005), Director Institute of Soil & Environmental Sciences, UAF on December 16, 2005. *Inna Lillahe wa Inna Aelehe Rajeoon*. With his unexpected demise, the soil science community has lost a bright, dedicated and accomplished colleague. May Allah Almighty bless his



soul and open the doors of paradise for him.

Dr. Gill got his B.Sc. (Hons.) and M.Sc. (Hons) with distinction, earning silver medals. He joined UAF as Lecturer in 1981 and then Scientific Officer at NARC Islamabad in 1983. In 1988, he got Ph.D. from University of California, Davis USA. His research interests included soil nutrient dynamics and crop nutrition.

To fulfil his passion for teaching and research Dr. Gill again returned to UAF in 1992 as an Assistant Professor, and became full Professor in 1999. In addition to teaching postgraduate courses, he started pioneering research on genetic variability in mineral nutrition of plants. Because of originality and significance of his research, Dr. Gill earned 7 best presentation awards at various international and national conferences.

Dr. Gill was a member of several national and international scientific societies, including Soil Science Society of Pakistan, a member of Research Advisory Board, Technical Committee of Natural Resources Division, PARC, National Committee (Think Tank) on Agriculture and Peer Review Committees constituted by PCST, Islamabad.

Executive Council of SSS and Organizing Committee of 11th Congress of Soil Science, during their meetings on 24th Dec. 2005 at NARC Islamabad, condoled the sad demise of Professor Dr. Maqsood A. Gill and offered *Faetha*. A Condolence Message was approved, which was later passed on to the bereaved family and to the Vice Chancellor, University of Agriculture, Faisalabad as well as was read out by President of SSSP at the well-deserved reference to honour Dr. Gill, organized by the University on 27th December, 2005.

Dr. Abdul Wahab

Dr. Abdul Wahab, a figure of international repute, breathed his last on December 28, 2005 in Islamabad. He left behind his widow, two sons and a daughter. With his demise, the country has lost a seasoned, and accomplished scientist.

Dr. Wahab was born on 5th August, 1913 in Kohat and did his BSc (Hons) from Peshawar University in 1934 and Msc in organic chemistry from Punjab University in 1936. He also earned MSc in Food Technology from University of California (Berkley) in 1948 and PhD and DSc from University of the Punjab in 1964.



He was honored by President of Pakistan with Tamgha-e-Imtiaz in 1960 and Pride of Performance in 1965, and Gold Medal by Pakistan Academy of Sciences in 1989.

Dr. Wahab started his professional career as an agricultural research scientist and in 1950 was appointed as Agricultural Chemist (Soil). Thereafter, Dr. Wahab joined Punjab Agricultural College and Research Institute, Lyallpur. He was posted as Deputy Secretary, Department of Agriculture, West Pakistan in 1962 and promoted as Director, Agricultural Research Institute, Tarnab in 1964 and as Agricultural Development Commissioner, Ministry of Food, Agriculture & Livestock, Government of Pakistan in 1968. Afterwards, he joined FAO of the United Nations in 1970 and served at Rome, Cairo and Islamabad, and retired from FAO in 1976.

Dr. Ihsanul-Haque

Dr. Ihsanul-Haque, Former Head, Soil Science & Plant Nutrition Section, International Livestock Centre for Africa

(ILCA), Addis Ababa, Ethiopia, East Africa and a renowned Soil Scientist has died after a serious illness on 24 December, 2005. Dr. Ihsan was born on 11 April, 1943. He had M.Sc.(1966) in soil science from West Pakistan Agricultural University, Lyallpur, MA (1968) in Pedology from McMaster University, Hamilton, Canada and Ph.D. (1971) from University of the West Indies, Trinidad. He started his professional as Lecturer/Head, University of Sierra Leone, Najala, West Africa in 1972. Afterwards, he joined ILCA as Soil Scientist. Then, Dr. Ihsan rose to the position of Head, Soil Science & Plant Nutrition Section of ILCA in 1986 and was appointed Head, Environmental Sciences Division, ILCA in 1991.



Dr. Ihsan had a specialized soil management and water use efficiency in legume based cropping system and crop-livestock. He had authored/co-authored more than 170 publications. Dr. Ihsan is survived by a wife, a son and a daughter.

Mr. Aijaz Ahmed Sheikh

Mr. Aijaz Ahmed Sheikh, Former Director Soil Chemistry and Soil Physics and Former Director, Agriculture Research Institute, Tandojam died of heart failure on November 29, 2005.



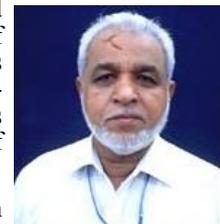
Mr. Sheikh started his professional career as Research Assistant in 1960 from ARI, Tandojam and then he worked as Asstt. Agri. Chemist, Soil Fertility Officer, Agri. Chemist and in 1997, he became Director, ARI, Tandojam. Subsequently, Mr. Sheikh also worked as Director, QAARI, Larkana, Member, ARP-II (Sindh) and Director, WRI, Sakrand. Mr. Sheikh has executed several R & D projects and was a dedicated and productive scientist. He will be remembered by his colleagues.

The Soil Science community of Pakistan records a deep sense of grief and sorrow on the sad demise of these distinguished Soil Scientists and prays for the departed souls.

RETIREMENT

Professor Dr. Kazi Suleman Memon, Dean, Faculty of Crop Production, Sindh Agriculture University (SAU), Tandojam has retired after 37 year of intelligent and devoted

professional career. Dr. Memon possesses an excellent academic record: earned BSc (Hons) Agri. (1968) and MSc (Hons) Agri. (1974) in Agri. Chemistry scoring 1st positions from University of Sindh, Jamahoro and MS and Ph.D (1982) from University of Hawaii, USA. During PhD study, he was honoured with "Team Award of East-West Center, USA, 1980" for his outstanding contribution as a member of the INPUTS Project Team, 1976 - 1980.



He started his professional carrier from Sindh Agriculture College, Tandojam in 1968 and joined SAU, Tandojam in 1973 as Lecturer, and was elevated to the post of full Professor in 1995. Also, served as Chairman, Department of Soil Science, Director General (Agri. Research & Extension) Sindh, and Dean Faculty of Crop Production, Sindh Agriculture University. Dr. Memon has a life long association with Soil Science Society of Pakistan and has served the Society in different positions. He has served on several Technical Committees and worked as Editor of several research journals. Currently, he is Editor "Farming Outlook", and Member, Technical Committee on Agriculture, Pakistan Science Foundation Islamabad.

Dr. Memon, has published a Text Book of Soil Science and around 40 research papers, written several project reports, and presented papers in more than 40 national and international conferences and seminars.

Arsenic Groundwater Contamination: A Slow Poisoning?

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Therefore, the deadly contaminant, arsenic, has created an alarming and catastrophic crisis worldwide, including Pakistan. Every affected country is combating the arsenic contamination menace within the framework of their own socio-economic, legal and cultural perspectives which may not be cost-effective and efficient in time and space dimensions. The reason might be a devoid of integration approach amongst the key stakeholders. Hence, under the circumstances, there is a dire need of an integrated approach to combat arsenic contamination which has virtually emerged as a crisis situation, necessitating formulation of a national action plan for arsenic mitigation. The action plan should include establishing an integrated institutional arrangement and developing capacity, coordination amongst all implementing agencies at various levels of administration with government(s), NGOs, donor agencies and other departments and policy decisions as well as monitoring and surveillance of water quality, and aquifer mapping.

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