FAI ABSTRACTS – MAY 2007

PART I – ABSTRACTS

A. FERTILISER PRODUCTION

NITROGENOUS FERTILISERS

A.78 Latest Developments in Ammonia Production Technology , Svend Erik Nielsen(Haldor Topsoe A/S Lyngby, Denmark**) FAI International Conference on Fertiliser Technology held at New Delhi, April 12-13 , 2007, p.1-14, FAI, New Delhi, 2007**

Many Indian Ammonia Plants struggle with high feedstock prices. In order to survive in the competition from new plants in areas with low gas cost, many plants owners of existing plants have decided to revamp their plants to reduce the energy consumption and/or increase the capacity. New developments are needed in order to fulfil these needs of the market. The article highlights some of the developments made that are suitable to be implemented in revamp jobs. Furthermore, these developments are also important for design of new very large capacity ammonia plants, and process schemes for a 4000 and a 5000 MTPD ammonia plants will be covered, including an attractive option, which has been in full-scale commercial operation since January 2003, the proprietary and patented Haldor Topsoe Exchange Reformer (HTER).

A.79 Ammonia Casale Technologies and Case Histories, S. Iob and S. Panza(Ammonia Casale S.A., Lugano, Switzerland**)) FAI International Conference on Fertiliser Technology held at New Delhi, April 12-13 , 2007, p.14-29, FAI, New Delhi, 2007**

The strategy followed by Ammonia Casale in ammonia plant revamping has always been to develop and apply new advanced technologies to improve the plants' performances at a minimum cost and at maximum benefit. The performance improvement is normally a reduction in energy consumption, an increase in capacity or a combination of the two. Following this strategy, in recent years AMMONIA CASALE has developed and applied a number of proprietary items to revamp existing plants or to build brand new plants in the most efficient way. In the first part of this paper, an overview of the most important Casale technologies applied to ammonia plants is given together with the main results obtained. In the second part, the paper gives an overview of the most recent projects involving the application of the Casale technologies for both revamped and new plants.

A.80 Carbon Dioxide Recovery (Cdr) From Flue Gases Of Primary Reformer at IFFCO, Aonla Unit, N.C. Nigam et al (IFFCO Aonla Unit, Bareilly, Uttar Predesh **) FAI International Conference on Fertiliser Technology held at New Delhi, April 12-13 , 2007, p.31-47, FAI, New Delhi, 2007**

IFFCO, a premier fertilizer company has installed and commissioned Carbon Dioxide Recovery (CDR) Plant at its Aonla & Phulpur Units for recovery of CO_2 from Primary Reformer Flue Gases based on the technology from M/s Mitsubishi Heavy Industries (MHI) Limited, Japan and Detailed Engineering from M/s Technimont ICB (TICB) Private Limited, Mumbai. The paper describes the experience of IFFCO Aonla Unit for the installation of CO_2 recovery (CDR) Plant, since its conceptualization up to successful commissioning of the plant. The CO_2 recovered from flue gases makes up for deficit of CO_2 due to use of Lean NG / R-LNG & leads to conversion of all the Ammonia produced to Urea, thus avoiding Ammonia stock build up. The recovery of

CO_2 from flue gases also reduces CO_2 emissions (Green house gas) to atmosphere and thus contributes to cleaner environment.

A.81 Reliability Enhancement of Critical Equipment in Ammonia And Urea Plant, **N.R. Raykar & G.K. Sadekar** (Larsen & Toubro Limited, Heavy Engineering Division, Powai Works, Mumbai, 400 072) **FAI International Conference on Fertiliser Technology held at New Delhi, April 12-13 , 2007, p.105-110, FAI, New Delhi, 2007**

Analysis of downtime in Indian ammonia and urea plants shows that mechanical equipment related problems are second most important reason for forced shutdowns, the first reason being non-availability/shortage of inputs, water, power. The mechanical problems can be managed by appropriate engineering methods to improve reliability of the critical equipment. The present paper gives an equipment manufacturer's perspective on the enhancement of reliability of critical equipment. This involves proper understanding of design & engineering, material selection and manufacturing aspects of equipment building. Critical equipment such as Reformed gas boiler, Ammonia Converter, Urea Rector, Carbamate Condenser & Urea Stripper are also discussed in this regard.

A.82 Snamprogetti's Urea Technology Reliability through Built – in Features and New Developments, Alessandro Gianazza (Snamprogetti, S.p.A., Viale De Gasperi, 16 San Donato Milanese, Italy **) FAI International Conference on Fertiliser Technology held at New Delhi, April 12-13 , 2007, p.119-135, FAI, New Delhi, 2007**

This paper elaborates the reliability of Snamprogetti's Urea Technology as a consequence of its distinguishing characteristics. The process schemes implemented recently for revamps in India are presented as well as the available schemes for future revamps involving significant increase of capacity. Furthermore, the suitability of Snamprogetti's Urea Technology to set up the first very high capacity (>5000 MTPD) urea plant is illustrated along with the envisaged process schemes. The Omegabond^{tm} Advanced Tubing Solution for urea stripper design is also presented.

A.83 Stamicarbon Innovation in Urea Plants, Al Tarazi, FAI International Conference on Fertiliser Technology held at New Delhi, April 12-13 , 2007, p.137-147, FAI, New Delhi, 2007

Stamicarbon has more than sixty years experience in designing and innovating the urea process. With over 217 Urea projects realized and a global nameplate capacity share of around 60%, Stamicarbon is the world market leader in Urea. Activities include process licensing of new plants, improvement of existing units, supply of high pressure equipment and waste water treatment facilities. Stamicarbon licenses its CO_2 Stripping Process and Urea 2000plus^{TM} Technology through Licensed Contractors, which are Chemoprojekt, Chiyoda, KBR (Kellogg, Brown & Root), Technimont and Uhde. Stamicarbon's Services Department can assist in procurement services for new high pressure equipment items, corrosion inspections in high and low pressure equipment items during shut downs, troubleshoot, optimization and other equipment manufacturing and process related services.

A.84 Recent Achievements and Advances in Urea Technology, Genshi Nishikawa, Toyo Engineering Corporation, 8-1, Akanehama 2- chome, Narashino-shi, Chiba 275-0024, Japan)) FAI International Conference on Fertiliser Technology held at New Delhi, April 12-13 , 2007, p.149-163, FAI, New Delhi, 2007

In January 2006, Toyo Engineering Corporation (TOYO) has successfully completed the second but the first complete new 1,725 mtpd Urea project, called Kujang-1 B, in Indonesia based on its own ACES21$^{(R)}$ technology. Commissioning of Kujang-1B urea plant has proved low energy consumption, high operability and reliability of ACES21® incorporating state-of-the-art technologies. TOYO has also completed design and engineering for 3,000 – 4,500 mtpd "Jumbo Urea Plant" incorporating up-to-date technologies and knowledge obtained through intensive efforts in R&D as a technology provider and extensive surveys on components, logistics and construction for urea plants as a globally acting engineering contractor. This paper reviews the latest advances in urea process technology; updated status of ACES21® process, and TOYO's approach to Jumbo Urea Plant.

A.85 Urea Casale Technologies and Industrial Experiences in Urea Field : An Overview with Latest Developments, F. Zardi & A. Scotto (Urea Casale S.A., Lugano, Switzerland) **) FAI International Conference on Fertiliser Technology held at New Delhi, April 12-13 , 2007, p.166-184, FAI, New Delhi, 2007**

Since the start of its activity, Urea Casale has developed several innovative technologies for the revamping of urea plants. With the application of these technologies, Casale has been able to revamp more than 70 plants in the last 20 years achieving considerable increases in plant efficiencies and capacities, and gaining a leading position in urea plant revamping. In the paper, an overview of the most important Casale technologies applied to urea plant revamping is given together with the main results obtained. Particular emphasis is given to the latest technologies developed by Urea Casale, namely the Full-Condenser^{TM} and Split-Flow-Loop^{TM} designs. These two technologies drastically increase the efficiency of CO_2 stripping plants introducing a new configuration for the HP Carbamate Condenser (HPCC), to obtain a more favourable condensation regime and improve its efficiency, and a new HP loop configuration, to reduce the amount of inerts present in the reactor. In the second part, the paper gives an overview of the most recent projects involving the application of the Casale technologies applied to revamping.

PHOSPHATIC FERTILISERS

A.86 New Development in the Tilting Pan Filter Technology Allowing to Reduce Investment, Maintenance and Energy Costs, Marc Collin, (Prayon Technologies S.A., Rue Joseph Wauters 144, 4480 Engis, Belgium**) Paper presented during IFA Technical Symposium held at Vilnius, Lithunia, from April 25-28, 2006 pp. 12 , IFA, France, 2006.**

For a long time the "classical" tilting pan filter has been used in the field of phosphoric acid production. More than 300 exemplars of sizes ranging from a few square metres in the 1940's up to 240 m^2 have been sold by Prayon to equip not only phosphoric acid plants but also the hydro-metallurgical industry. A new model of tilting pan filter, called TDI filter, has been developed recently by Prayon with a new concept of cake discharge. Instead of rotating along a radial axis the cells pivot around a tangential axis up to a vertical position. This simple difference allows an increase of about 30 to 50% of the filtration area within the same ground space. Along with this, it authorizes filtrations producing very thick cakes and therefore, would be particularly suited to applications in the potash and the activated carbon industry. The TDI filter has been designed with a view of reducing the number of components. Therefore, with investment and maintenance costs significantly lower than for a classical one, the TDI filter offers the same operational advantages.

COMPLEX FERTILISERS

A.87 Improving Productivity of DAP/NPK Fertilizer Complex through Innovation and Reliability Measures, S. Srinivasan (IFFCO, Kandla) FAI International Conference on Fertiliser Technology held at New Delhi, April 12-13 , 2007, p.85-103, FAI, New Delhi, 2007

The DAP / NPK Complex fertilizer industry largely depends upon innovative and reliability measures for improving productivity. This paper focuses on the technical problems that have been solved through in-house modifications based on operational and maintenance needs. Some of the modifications may apparently look small but have significant impact on stabilizing the operations. A compilation of such modifications is presented in the paper. Retrofitting old plants with obsolete technologies is one of the best ways to improve productivity and two such cases are illustrated in the paper. Improving reliability of equipment leads to reduced maintenance and reliability also improves productivity by increasing the on – stream days. Another significant feature is the use of alternate major raw materials and the paper has attempted to bring out such measures adopted at IFFCO – Kandla. This paper covers comprehensively the salient feature to improve productivity with special emphasis on innovative modifications which are also economical and tailored to suit the needs of the industry.

ENVIRONMENTAL MANAGEMENT

A.88 Gaseous Emissions in the Fertilizer Industry and Their Impact on Specific Energy Consumption per Tonne of Product, Sri Chandra(Ministry of Chemicals & Fertilisers, Department of Fertilisers, A-Wing, Shastri Bhawan, New Delhi 110 001**)Paper presented during IFA Technical Symposium held at Vilnius, Lithunia, from April 25-28, 2006 pp. 17 , IFA, France, 2006**

The fertilizer sector is one of the major energy-specific and polluting industries in India ranking 7th out of 17 highly polluting sectors. Various types of fertilizers are being produced in these industries by using different feedstocks. The current Study is confined to the plants producing Ammonia and Urea using Natural Gas as a feedstock. The various types of gases/pollutants like CO2, SOx, NOx, H2S, urea dust, ammonia, SPM are being emitted from these industries to the environment. The specific energy consumption per tonne of urea in various Indian fertilizer plants varies from 5.201 Gcal to 14.163 Gcal. Abnormally high specific energy consumption in mainly on account of high level of gaseous emissions, frequent breakdowns, lower percentage capacity utilization, poor preventive maintenance, and old generation low-capacity plants.

PLANT & EQUIPMENT

A.89 Wireless Applications in Process Plants, Graham Moss (Elpro Technologies, 3492 Rancho Diego Circle, San Diego, California 92019, USA**) Chemical Engineering 112(13) 36-40 (2005)**

Wireless technology allows easy, flexible installations and enables advanced networking capabilities that provide fast , reliable data transfer. Industrial wireless devices are being found in all industry sectors and in an increasingly wide range of applications. The driving factors are cost and convenience. The paper details the application of wireless technology in various process plants including a urea plant.

MISCELLANEOUS

A.90 Pilot Plant Cost Estimating : Choose the Right Estimating Method, Richard Palluzi, Exxon Mobil Research & Engineering Co., 1545 Route 22 East, Annandale , NJ) **Chemical Engineering 112(13) 42-47 (2005)**

The paper discusses general issues related to estimating the capital costs of pilot plants, then looks more closely at similarity based estimating, one of the main approaches for making such estimates. The article discusses the other major methods, then compares the features and drawbacks of all of them.

B. FETILISER USE

GENERAL AGRICULTURE

B. 97 Biodiesel: Implications for Fertilizer Consumption , Fert.Intern. No.407 32-38 (2005)

The article assesses biodiesel. This can be produced from oilseed crops, notably rapeseed and soya. The article first sight, the drive to develop biodiesel represents a positive opportunity for fertilizer producers, but several pitfalls remain before the product can gain wider acceptance. Also noteworthy are the different routes being taken by Western Europe and the United States over the wider use of biodiesel. (9755)

B.98 Biotechnology and Its Implications for The Fertilizer Industry , Luc Maene & Patrick Heffer, Arab Fert. No.41 42-50 (2005)

The paper reviews current and future biotechnological developments of potential interest to the fertilizer industry. It also makes a preliminary assessment of their likely influence on medium to long-term fertilizer demand, which is relevant for investment decisions facing the fertilizer industry today. Finally, it highlights both the challenges and opportunities for the fertilizer industry emerging from this area of research and development (RD) (9746)

B.99 Essential for Health and Profits , Arab Fert. No.39 30-33 (2004)

The concept of balanced nutrition is not confined to the nutrients N, P and K, but must also embrace secondary nutrients and the full range of micronutrients if high productivity of crops and cropping systems is to be sustained. All nutrients can be considered of equal importance in promoting a plant's growth and metabolism, even though they may occur at different concentrations in the plant tissue. (9745)

B.100 Charcoal Forms Basis for Slow-Release Fertilizer : Agronomic Extra , Fert.Intern. No. 411 30-32 (2006)

The risk of contamination in surface and ground water quality as a result of the widespread use of fertilizers in modern agriculture is well known. Numerous efforts have been made to develop more efficient fertilizers which release their nutrients more slowly, thus allowing for a better uptake of nutrients by the plant. Experiments have been undertaken with fertilizers impregnated with charcoal. The results have been most encouraging, as described in the paper. (9744)

B.101 Biomass, Energy Production and the Bio-Refinery Concept , Fert.Intern. No. 410 27-32 (2006)

The use of biomass as a source of renewable energy promises to provide another alternative to fossil fuels, and is furthermore a positive factor in any assessment of the longer-term prospects for fertilizer consumption. However, biomass tends to be a low density and bulky material, for which the handling, storage and transportation are major cost items. The paper assesses the merits of biomass in the production of energy and furthermore examines the concept of bio-refining, whereby a crop could be converted into a range of food, feed, fuel and other chemical products. (9743)

B.102 Reassessing the Role of Fertilisers in Maintaining Food, Nutrition and Environmental Security , K.N. Tiwari (International Plant Nutrition Institute India Programme, 133, Sector 23, Gurgaon 122 017) **Indian J.Fert. 3 (1) 33-48 , 51-52 (2007)**

To feed an expanding population of India in future, the only way is to produce more from land already under cultivation. Most of the increased production has come from increasing the land area under cultivation and there is only limited land area suitable for agricultural expansion and if this area is expanded for cultivation, environmental degradation cannot be avoided. Food production systems must operate to be socially acceptable, environmentally benign and economically viable. As the availability of land and water resources is rapidly declining, there is urgent need to increase the productivity of remaining natural resources, including energy, while at the same time observing nutrition and environmental needs. The single most efficient and cost-effective input that can increase the productivity of land in India is fertiliser. Fertiliser can increase foodgrain production, release marginal lands from production and reduce environmental degradation and reduce the risk and uncertainly associated with the production of agricultural commodities. Efficient management of plant nutrients ensures that fertilisers are used in the most environmentally acceptable and sustainable way and that crops are supplied with all essential plant nutrients at the appropriate time and in the required quantity. Site specific nutrient use, integrated plant nutrient supply, nutrient placement including fertigation and synchronising nutrient supply with demand, biotechnology etc. are some of the means by which fertilisers can be used more efficiently. They will help to make more economical use of natural resources, protect the environment and thereby also improve public image of farming and the fertiliser industry (9733)

B.103 Crop Management and Conservation Factors of the USLE for Tea in the Nilgiris , M. Madhu et.al. (Central Soil and Water Conservation Res.Training Inst., Res. Centre, Udhagamandalam, Tamil Nadu) **J.Indian Soc.Soil Sci. 54 (2) 221-225 (2006)**

Growing of tea on sloping land without any soil and water conservation measures causes enormous soil loss in the initial years. Therefore a field experiment was conducted to evaluate the performance of different conservation measures viz., Contour staggered trenching (CST) , cover crop of beans and CST + beans on runoff and soil loss in new tea (*Commellia sinensis*) plantations in the Nilgiris. Average soil loss for seven years was minimum in contour staggered trenching (CST) 0.93 t ha-1 year-1) followed by CST + beans (1.02 t ha-1 year-1) and over crop of beans alone (1.95 t ha-1 year-1) as against 2.84 t ha-1 year-1 from the control. The crop management factor (C) of tea and conservation factor (P) for different conservation measures for use in the universal soil loss equation (USLE) were estimated. Based on the canopy development, the growing period of tea was divided into three stages viz., initial stage (1st year) , establishing stage (2nd to 4th year) and established stage (5th year onwards) . The average values of crop management factor for initial stage, establishing stage and established stage were found to be 0.193, 0.0267 and 0.0163, respectively. The average value of conservation factor for CST, cover of beans and CST + beans were found to be 0.39, 0.38 and 0.69 respectively. (9728)

B.104 The Implications for Energy, Agriculture and Fertilizers : Biofuels , Fert.International No.404 31-34,36 (2005)

Biofuels are in vogue. They are seen by some as providing both the assurance of future fuel sufficiency and a solution to global warning. The paper examines to whether a programme to produce biofuels have significant positive or negative implications for such things as land use, agricultural practices, fertilizer consumption, the environment food and cost, and trade. (9694)

SOIL FERTILITY

B.105 Indices of Soil Health and their Significance in Sustaining Crop Productivity , M.S. Brar & Preeti Sharma(PAU, Department of Soils, Ludhiana) , Indian J.Fert. 3 (1) 27-30 (2007)

The concept of soil health has gained importance recently, because it plays an important role in sustaining crop productivity. The current version of the soil management assessment factors (SMAF) for assessing soil health has scoring curves for indicators such as bulk density, aggregate stability, available water capacity and water filled pores as physical indicators, pH, electrical conductivity, organic carbon, sodium adsorption ratio and extractable P as chemical indicators and microbial biomass and potentially mineralisable N as biological indicators. Total 60 potential indicators have been identified for use in future for assessing soil quality/health. (9732)

B.106 Monitoring Soil Health for Higher Productivity , B.S. Dwivedi & Vandana Dwivedi (IARI, Div.Soil Sci.and Agric.Chem., New Delhi 110 012) **Indian J.Fert. 3 (1) 11-23 (2007)**

The health of Indian soils got deteriorated over the years, as evidenced by depletion of organic matter levels, ever-widening multi-nutrient deficiencies and enhanced soil compaction in many intensively cultivated regions. The agencies charged with the job of developing soil health monitoring techniques for timely diagnosis of any soil ailments, suggest preventive/corrective measures, and implement their adoption should take collective responsibility for any stagnation in crop yields or decline in factor productivity caused due to soil health deterioration. Nevertheless, opportunities are galore to restore and improve soil health, because soil aliments are often reversible in nature. This article analyses various causes behind poor functioning of existing soil health monitoring system, rendering it unable to respond to high productivity aspirations of the farmers, and also offers some suggestions to revamp the same. (9731)

B.107 Effect of Long-Term Fertilization and Manuring on Potassium Balance and Non-Exchangeable K Release in a Reclaimed Sodic Soil , N.P.S. Yaduvanshi & Anand Swarup (Central Soil Salinity Res.Inst., Div.Soil and Crop Management, Haryana 132 001) **J.Indian Soc.Soil Sci. 54 (2) 203-207 (2006)**

A long-term fertilizer experiment, over 10 years, studied the effect of NPK fertilizers alone and in combination with green manuring or farmyard manure on potassium balance and release properties in rice-wheat cropping sequence on Aquic Natrustalfs. The treatments consisted of control, 100 per cent nitrogen, nitrogen and phosphorus,100 per cent nitrogen, phosphorus and potassium, 100 per cent NPK + green manuring, 100 per cent NPK + farmyard manure and 150 per cent NPK. In all the fertilizer and manure treatments removal of K in the crop exceeded K addition and the total soil K balance was negative. Apparent potassium use efficiency of applied K in the 100 per cent NPK treated plot was lower as compared to 100 per cent NPK + GM and 100 per cent NPK + FYM treated plots. The distribution pattern of the water soluble, exchangeable and non-exchangeable K, at various depths of soil profile indicated that a major portion of the applied K remained in the top 30 cm soil and moved in successively decreasing amounts down the profile to a depth of 60 cm in the plots receiving K fertilizer. The neutral 1 N ammonium acetate-extractable K in the surface soil (0-15 cm) ranged from 187 to 324 kg ha-1 in different treatments. The highest values were obtained in 150 per cent NPK and 100 per cent NP treatments. respectively. It was observed that in plots receiving fertilizer K, the contribution of non-exchangeable K to plant uptake was lower as compared to without K fertilisation. The results suggest that sub-soil layers are also stressed for K and the continuous mining of soil reserve K may affect crop yields adversely in long-term. (9725)

B.108 Distribution of Potassium in Soils of Manipur Encompassing Physiographic and Hydrothermal Variations , R.S. Singh et.al. (National Bureau of Soil Survey and Land Use Planning (ICAR) , Regional Centre, Udaipur, Rajasthan 313 001) **J.Indian Soc.Soil Sci. 54 (2) 197-202 (2006)**

Forms of potassium (K) and their relationship with physical and chemical properties of soils belonging to thermic and hyperthermic thermal regimes, udic moisture regime (hydrothermal regimes) and different physiographic locations covered under the soil orders Entisols, Inceptisols, Alfisols and Ultisols in the state of Manipur were investigated. The water soluble, exchangeable, available, HNO3 acid soluble and fixed K in the thermic and hyperthermic regimes constituted 0.05, 1.00, 1.05, 3.97 and 2.72 per cent 0.07, 1.62, 1.69, 2.69 and 3.24 per cent, respectively of the total-K fraction. In the soils under thermic temperature regime, the acid soluble and total-K showed higher values whereas, in hyperthermic the water soluble, exchangeable, available and fixed K maintained the higher values on an average. The Inceptisols and Entisols showed higher value for all the six fractions as compared to the Ultisols, whereas, the acid soluble and total-K fractions were higher in Ultisols as compared to Alfisols. All the K fractions showed positive correction with clay and organic carbon in both thermic and hyperthermic temperature regimes except the total K in the hyperthermic regime. The Inceptisols and Entisols under paddy cultivation in the valley flat and valley fill had higher values for all the K fractions. The multiple regression analysis showed that the maximum contribution towards the different forms of K was from the clay fraction whereas the organic carbon had a meager share in the K contribution. (9724)

B.109 Distribution and Leaching Losses of Applied Urea-N in Sandy Loam and Clay Loam and Clay Loam Soils under Wetland and Upland Moisture Regimes , Varinderpal Singh et.al. (PAU, Dept.Soils, Ludhiana, Punjab 141 004) **J.Indian Soc.Soil Sci. 54 (2) 185-192 (2006)**

Laboratory studies were conducted in 100 cm long columns (10 cm ID) to study distribution and leaching of applied urea-N in a sandy loam and clay loam soils under upland and wetland moisture regimes. At 2 days after application, movement of N coincided with the wetting front in both the soils and under both the moistures regimes. Urea moved to deeper soil layers in the sandy loam soil as compared to in the clay loam soil. Due to rapid transformation of urea-N to NH4 and NO3 forms, no urea-N was detected in the soil profile at day 7 or during later samplings. More downward displacement of NH4+-N and NO3-N was observed in the coarse than in the fine textured soil. Under upland moisture regime, no leaching losses of N occurred beyond 90 cm depth in both the soils. Under wetland moisture regime, no leachate was collected beneath the clay loam soil columns, but leachted from the sandy loam soil column contained 12.0 and 26.6 per cent of the applied N as NH4+-N and NO3-N, respectively. Leaching losses were confined to first two weeks and major losses occurred during first 10 days after urea application. This study suggests that applied urea_N can be lost via leaching beyond 90 cm soil depth in coarse textured soils and under moisture regimes commonly observed under rice. (9722)

CROP PHYSIOLOGY & NUTRITION

B.110 Prospect of Organic Nutrient Resources Utilisation in India , P. Bhattacharyya (National Centre of Organic Farming, Ghaziabad) **Indian J.Fert. 3 (1) 93-107 (2007)**

The cultivation of plants was initiated 10,000 years ago and it started with the practice of shifting cultivation for which no manures were required. After setting down to agriculture, ancient people started use of dung of animals as manure. During 17-18th century, it was felt that plants require elements for growth and accordingly 17 elements were identified. Looking to the importance of elements, chemicals fertilisers were discovered and commercialised. But nature has adequate potentiality to provide all elements either from air, water or soil. India is endowed with various types of naturally available organic form of nutrients which includes green manure, crop waste, animal dung, sea weed extract, by product of agro-industry and slaughter house, biofertiliser, etc. It has been estimated that the total available nutrient value of organic resources in India is 12.796 million tonnes

and trappable amount is 8.952 million tonnes, while the present utilisation is 3.75 million tonnes roughly. When there is progressive deficiency of elements due to intensive cropping, it would appropriate if emphasis is given to improve inherent fertility of soil by enhancing soil organic pool with use of microflora and fauna which are abundantly present in soil It is high time to promote on-farm development of organic matter which could sustain productivity and fertility with conservation of elements as required by plants. (9737)

B.111 Role of Biofertilisers in Indian Agriculture , R.K. Tewatia et.al.(FAI, New Delhi 110 067) **Indian J.Fert. 3 (1) 111-118 (2007)**

There has been a sharp increase in biofertiliser production and consumption during the last 15 years. However, considering the potential in the country, the consumption of biofertilisers is still low due to low level of farmers acceptance, inadequate distribution network, weak extension and sub-standard material in the market. Biofertilisers offer an economically attractive and ecologically sound route for augmenting nutrient supplies and can play a key role in bridging the gap between nutrient removal by crops and addition through fertilisers. Concerted efforts by the government and the concerned agencies are needed to stengthen the biofertiliser production and marketing network to ensure timely and adequate availability of good quality products at the farmers doorsteps. (9738)

CROP RESPONSE OF FERTILISERS/ORGANICS/BIOFERTILISERS

B. 112 A Growing Solution : Fertigation , Fert.Intern. No.405 22-24 (2005)

Fertigation - the delivery of fertilizers via irrigation water - is becoming increasingly important in Asia as agriculture, the main user of water, must compete for a scarce resource with rapidly developing urban areas. Fertigation attempts to improve the water efficiency of agriculture by delivering carefully balanced fertilizer amounts in an irrigation system. (9752)

B. 113 Which Fertilizers are Best for Oilseeds? : Vegetable Oils , Fert.Intern. No.409 19-22,24-26 (2005)

Oilseed crop offer high returns to growers, but these can only be achieved with a properly balanced nutrition programme, requiring highly specialised fertilizers. The growth potential of these new markets is examined, together with the likely impact on fertilizer demand. (9740)

B.114 Direct Application Status Report : Phosphate Rock , Fert.Intern. No.408 58-60,62,64-65 (2005)

Certain types of sedimentary phosphate rock are sufficiently reactive to be effective as fertilizers when directly applied to acidic soils with no preliminary chemical processing. The combination of rock and soil chemistry and crop types that makes direct application effective and the potential for extending its use in future are examined in the article. (9739)

B.115 Impact of Different Organic Materials on Dry Matter Yield and Concentration of Lead in Maize (*Zea mays*) , A.S. Sidhu & R.P. Narwal (PAU, Regional Res.Station, Bathinda 151 301) **J.Indian Soc.Soil Sci. 54 (2) 232-235 (2006)**

A pot experiment was conducted to study the effect of different organic materials and Pb on the yield, concentration of Pb in maize plants and DTPA- extractable Pb in the post-harvested soils. Results indicated that beneficial effect of Pb on the growth of maize was observed at its lower (25 mg kg-1) level of application. However further increase in supply of Pb significantly reduced the dry matter of the crop. Application of organic material improved the yield of maize in Pb-contaminated soil. The concentration of Pb in plants

increased significantly with increasing levels of Pb in soil. However, application of organic carbon reduced the Pb concentration in maize tissue. The DTPA-extractable Pb increased significantly and consistently with graded levels of Pb in post-harvest soil samples. The addition of organic carbon reduced the extractable Pb in soil amended with different organic materials. (9730)

FERTILISER USE EFFICIENCY

B.116 Effect of Different Types of Coating Materials on the Solubility of Granulated Single Superphosphate , Sundar Singh & B.N. Swami (Rajasthan College of Agriculture, MPUAT, Dept.Agric.Chem.Soil Sci., Udaipur, Rajasthan 313 001) **J.Indian Soc.Soil Sci. 54 (2) 193-196 (2006)**

The present investigation was conducted for evaluating different types of coating materials on granulated single superphosphate i.e. gum, cow dung, Karanj oil, mahua oil and gypsum. In solubility studies, seven types of coated and uncoated 1 g single superphosphate (SSP) fertilizer were placed in a test tube with 10 mL distilled water in the laboratory. For development of solubility curve, different types of coated SSP were studied at seven intervals viz. 1/24, 2, 4, 6, 8, 10 and 12 days. After the required interval, mixture was filtered and P content was determined. The solubility studies clearly indicate that solubility of SSP fertilizer varied with different types of coating materials due to the conversion of slow release fertilizers. Further, solubility of all types of the coated fertilizer increased with increase in the time from 1/24 to 12 days. Release of phosphorus from the coated fertilizer could be described by first order chemical equation. (9723)

B.117 Strategy for Increasing Fertiliser Use Efficiency , Rajendra Prasad (IARI, Div.Agron., New Delhi 110 012) **Indian J.Fert. 3 (1) 53-62,107 (2007)**

Fertiliser Use Efficiency (FUE) is very poor in India, only 8.6 kg cereal grain kg-1 NPK is being currently produced on the farmers fields. Since crop yield is the nominator (directly or indirectly) in all the indices (AE, AR, PFP, PE) of FUE, the strategy for increasing fertiliser use efficiency has to be taking all steps to increase crop yields. This calls for a sound agronomic package (suitable variety, normal sowing, optimum plant population, efficient weed, disease and pest control and proper soil and water management) . As regards fertiliser management adequate amounts of NPKSZn (and other micronutrients if required) have to be applied properly (using suitable methods) on the basis of soil test at proper time. Placement of fertiliser at seeding has to be emphasised for both N and P. Also for sustainable agriculture adequate care has to be taken of soil health and for that integrated nutrient management (INM) has to be forcefully adopted. Emphasis has to be placed on the regular application of organic manures to farm fields. (9734)

B.118 Converting Promise into Results : Controlled Release Fertilizers , Fert.Intern. No.407 22-24,26-27 (2005)

There are many agronomic arguments that favour the development of controlled-release and stabilised fertilizers (CRFs) , but there use has for the most part remained confined to speciality areas. Nevertheless, progress continues in devising fertilizers that can offer an improved nutrient use efficiency (NUE) , and CRFs, remain the best hope in this respect. The growing commercialisation of urease inhibitors in particular provide a new route to more cost-effective CRFs. (9754)

INTEGREATED NUTRIENT SUPPLY SYSTEM

B. 119 Effect of Integrated Use of Inorganic, Biological and Organic Manures on Rice Productivity and Soil Fertility in Ultisols of Mizoram , K. Laxminarayana Patiram (ICAR Res.Complex for NEH Region, Mizoram Centre, Kolasib, Mizoram 796 081) **J.Indian Soc.Soil Sci. 54 (2) 213-220 (2006)**

A field experiment was conducted for two consecutive kharif seasons of 2001 and 2002 to study the effect of integrated use of inorganic fertilizers coupled with organic manures, green manure and phosphate solubilizing bacteria on yield, nutrient uptake of rice and their residual effect on soil fertility in an Ultisol of Mizoram. The results revealed that application of optimum doses of NPK in combination with green manure at the rate of 5 Mg ha-1 recorded highest grain and straw yields and uptake of N, P and K followed by 100 per cent NPK + poultry manure and 100 per cent NPK + FYM. However, the yield and uptake responses were high with the balanced application of NPK in comparison to sub optimal and super optimal doses of NPK. The combined use of organics (green manure/FYM/poultry manure/pig manure) along with the inorganic fertilizers increased the nutrient use efficiency, apparent nutrient recovery and the available nutrient status of the soil. Integrated use of organic manures along with optimum doses of chemical fertilizers not only produced highest and sustainable crop yields but also enhanced the efficiency of added fertilizers as well as fertility status of the soil. (9727)

SECONDARY & MICROPLANT NUTRIENTS

B.120 Micro Sticker Improves Agronomic Efficiencies in Brazil : Micronutrients , Fert.International No.404 19,21-22,24 (2005)

Micronutrients have always been an important factor in efficient and sustainable agriculture. As agriculture has intensified during the past few decades, and as the need increases to harness old, nutrient poor soils in such regions as the Cerrado in Brazil in order to increase food supplies to maintain the current world population, micronutrient deficiencies have become ever more apparent. The paper reports of a liquid additive that fixes powdered micronutrients on to the surface of bulk blended NPK fertilizers. This paves the way for the more widespread application of micronutrients in a crucial market like Brazil. (9692)

B.121 Different Forms of Sulphur and their Relationship with Properties of Entisols of Jaipur District (Rajasthan) under Mustard Cultivation , J.R. Jat & B.L. Yadav (S.K.N. College of Agric., Dept.Soil Sci.Agric.Chem., Jober, Rajasthan 303 329) **J.Indian Soc.Soil Sci. 54 (2) 208-212 (2006)**

The total S content in mustard growing soils of Jaipur district ranged from 101.30 to 302.40 mg kg-1 with a mean value of 154.28 mg kg-1. The mean values of organic -S, SO4-S and non-sulphate-S were 36.39, 14.52 and 102.12 mg kg-1, respectively. All the forms of sulphur gave significant positive correlation with organic carbon indicating sulphur as the integral part of soil organic matter. Correlation studies between silt, clay and forms of sulphur indicate that appreciable quantity of sulphur was absorbed on finer fractions of soils. Significant negative correlation was observed with sand but had non-significant correlation with pH of soils except SO4-S. The step-down multiple regression equations revealed that organic carbon had greater impact on different forms of sulphur followed by soil texture. Approximately, 33.75 per cent investigated soils were deficient in available sulphur. (9726)

B.122 Correcting Sulphur Deficiencies in Soils and Crops , D.M. Hegde & S.N. Sudhakara Babu (Directorate of Oilseeds Res., Rajendranagar, Hyderabad 500 030) **Indian J.Fert. 3 (1) 65-79 (2007)**

Intensive agriculture, use of S-free fertilisers, removal of crop residues and rising crop requirements due to increasing productivity levels have heightened the S demand in soil fertility management and are increasingly becoming major constraints to augment and sustain agricultural production. Soils in nearly 250 districts of the country have varying degree of S deficiency. Sulphur requirements of oilseed crops are highest followed by pulses, forage crops and cereals. Significant response to S application has been reported in all the soils in different crops and the magnitude of response varied with soil type, available S status, crop and S source. Sulphur application also improved protein and oil content and many other quality parameters of commercial and

nutritional importance. In general, application of 20 to 50 kg S/ha proved beneficial to first crop as well as succeeding crops in various cropping systems in different soil types. The critical level of soil S varies from 8 to 30 mg/kg depending on the analytical method, soil and crop. If a field is known to be deficient in S, the best course is to include atleast one S-containing fertiliser in the basal dose so that S requirement is met at the beginning of crop season. Elemental S and pyrites can also be used a source of S by applying 2-4 weeks prior to planting. The negative S balance in Indian agriculture is a matter of great concern for achieving future targets of production on a sustainable basis. The time has come to recognize S as a critical nutrient input and include it in package of practices as a recommendation to the farming community. Simultaneously, there is also need to intensify research on all aspects of S nutrition of crops and cropping systems in various soil types and agroecological regions of the country. (9735)

B.123 Magnesium in Balanced Fertilisation , G.C. Shrotriya (Indian Potash Ltd., Potash Promotion Project, New Delhi) **Indian J.Fert. 3 (1) 83-88 (2007)**

Magnesium, being a major plant nutrient, is taken by crops in substantial quantities. Though magnesium deficiency is not common in India, it is observed particularly in acidic soils and high Mg responsive crops. Responses to Mg application have been obtained in jute, potato, pulses, oilseeds and wheat. At higher level of productivity, Mg application becomes the integral part of balanced fertilisation programme. Efforts are required for delineating the deficient areas, monitoring Mg status of the soils and quantifying the responses. Three sources of Mg are listed in Fertiliser (control) order, however, other commonly occurring and used minerals/compounds and their different grades also need to be studied for incorporation in FCO. (9736)

B. 124 Progress in the Middle East : Micronutrients , Fert.Intern. No.410 20-22,24-26 (2006)

A common denominator among the agricultural systems in the Arab countries of North Africa and the Middle East is an increasing drive towards stepping up the production of added value fruit and vegetable crops, as well as horticulture. This sector of agriculture has a very high requirement for micronutrients and other speciality fertilizers in order to enhance product quality. Progress however has been limited, often by the restricted availability of irrigation, but there are encouraging signs of a take-off, especially in Egypt. (9742)

B.125 Spotlight on an Undervalued Nutrient , Fert.Intern. No.405 16-21 (2005)

Magnesium (Mg) is an essential nutrient, and as an important constituent of chlorophyll, it plays a key role in the photosynthetic process. Mg fertilisation is increasingly attracting the attention of growers and planters, especially in the humid tropics, where intensive rainfall and high temperatures have resulted in large leaching losses. Soils consequently have low Mg contents. Mg can be applied to the plant via a range of different sources, and these are reviewed here. (9751)

C. FERTILISER MARKETING

MARKET DEVELOPMENT

C.23 India: A DAP Reckoning , Fert.Intern. No.405 33-34,36 (2005)

Indian's consumption of fertilizers recorded positive growth for all the three major nutrients in 2003/04, and forecasts for 2004/05 point to a further increase in growth. In common with other countries in the South Asian Region, India has sought to maintain farm gate prices for fertilizers, including DAP. The paper considers the options to whether this will be efficient to stimulate the medium term targets for India's food grain production. (9753)

C.24 Powerhouse of the Ammonia Industry , Nitrogen + Syngas No. 282 20-22,24-25 (2006)

In spite of the seemingly inexorable rise of the Middle East, Russia remains a dominant force in the international nitrogen industry. The paper looks at the prospects for ammonia and downstream products in the new Russia. (9750)

C.25 Growing Hunger for Urea , Nitrogen + Syngas No.282 16-18 (2006)

Bangladesh is attempting to develop new domestic urea capacity in order to meet rising domestic agricultural demand, but export-oriented schemes are also part of the mix. (9749)

C.26 Iran : Ambitious Plans , Nitrogen + Syngas No. 281 15-17 (2006)

Iran has ambitious plans to use its considerable natural gas reserves to become a major regional producer and supplier of syngas-based chemicals. But as always political considerations loom large. (9748)

C.27 Feedstock Issues in the Natural Gas Industry , Nitrogen Methanol No.275 15-18 (2005)

With a few exceptions, such as the growth of coal-derived capacity in China, the nitrogen and methanol industries remain largely dependant upon natural gas a feedstock. The natural gas market is in the process of a long term seismic change, from a series of small, regional markets where gas-based petrochemicals were a significant factor in gas development, to a global market where power production is beginning to become predominant. (9747)

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