

FAI Activities

FAI Training Programme for Senior Maintenance Engineers in Fertilizer Industry

FAI organized the Training Programme for Senior Maintenance Engineers in Fertilizer Industry during 17th -22nd February, 2019 at Gandhinagar. The six day programme was opened by Dr. S. Nand, Deputy Director General, FAI-New Delhi. Mr. Rajesh Kumar Aggarwal, Ex-Operations Director, KRIBHCO -Hazira delivered special address in the opening session. The programme was attended by 35 participants from 20 fertilizer plants.

Dr. S. Nand in his address highlighted the policy environment governing the urea and P&K fertilizers. He explained that historically many sectors were operating under controlled environment. During 1991-1996, massive reform programme took place in every sector but this process completely by-passed the fertilizer sector. He further mentioned that subsidy scheme was introduced in early 1970's when there was oil crisis and price of crude oil went exorbitantly high. The objective of subsidy was to sell fertilizers to farmers at affordable price. The cost of production of urea was higher than MRP fixed by the government. The difference between two was paid as subsidy to fertilizer companies. The scheme was then known as retention pricing scheme (RPS). Companies were reimbursed based on certain norms such as energy consumption and capacity utilization. As a result, the country witnessed tremendous growth of fertilizer industry in 1970's and 1980's as the policy was quite supportive during that period. He expressed that problem started when the policy did not evolve with time. The retail price of urea which was being controlled by Government did not keep pace with the cost of production or import. Natural gas price escalated by 10-15 times and similarly naphtha by 20 times but urea sale price did not go up even by 3 times in last 25 years.

He mentioned that in year 2003, Administrative Reforms Commission suggested that there should be an increase of 7 % in urea retail price every year. It was proposed that in 6-7 years the cost of production and price for farmers will equalize and then the industry can be de-controlled. But retail price was never increased and reforms at industry level did not happen at all. In 2010, nutrient based subsidy (NBS) was introduced for P & K sector. But urea was left outside the purview of NBS. In NBS scheme, the subsidy is fixed per kg or per tonne of N, P, K and S. The subsidy is fixed in the beginning of the year for the decontrolled fertilizers. However, this fixed subsidy was reduced year by year. The price ratio of urea to DAP, increased from 1:2 in 2010 to 1:5 or more at present. This encourages farmer to apply more urea



Executives seen in the picture (L-R) are Mr. Manish Goswami, Dr. S. Nand and Mr. R.K. Aggarwal at the opening session

as it is cheaper than DAP leading to distortion in application of N, P and K. Once these nutrients are not used in proper ratio, yield increase will not be as much as when nutrients were applied properly. He pointed out that the subsidy which was introduced to increase agriculture productivity and to increase farmers' income in fact is working in reverse.

Dr. Nand further mentioned that cost of production is based on three elements. The first and foremost element is energy cost. Government has fixed energy consumption norm for urea unit. Up to 2002-03, Government used to revise capital related charges and energy consumption norms every three years. Industry was allowed time to recover investment in energy saving schemes.

The second element of cost of production is capital related charges(CRC) which comprises of depreciation, interest on borrowed capital & return on net worth. After 2003, the policy mandated that neither the energy consumption saving would be mopped up nor CRC would be recognized for fresh investment. Contrary to this, energy norms have been revised thrice since 2003 but there has not been any increase in the fixed cost. In New Urea Policy 2015 norms were fixed for 2015-16 to 2018-19 and beyond 2018-19. With effect from 1.4.2018 three groups were formed with three energy levels viz. 6.5, 6.2 and 5.5 Gcal/MT urea. Eleven units have achieved these norms. However, 14 units were unable to achieve the same and have been imposed with some penalties. Government has given time till 2020 to achieve these norms to avoid further penalty. The plants which have achieved the norms are also suffering due to the fact that no time has been given for servicing the capital invested in energy saving schemes.

The third element is conversion cost or fixed cost that includes salary & wages, repair and maintenance, marketing & selling expenses, etc. There is no transparency in determining the fixed cost by the



Mr. D.G. Inamdar distributing certificate to a participant

government. This cost has not been revised since 2002-03. In 2014, Government collected data under four heads i.e. maintenance, salary & wages, marketing expense & contract labour and decided to increase fixed cost by Rs. 350 tonne with a minimum fixed cost of Rs. 2300 per tonne but this amount remains unpaid. This has led to financial constraints and plants are left with limited resources for capital replacement.

Dr. Nand highlighted the challenges faced by the P&K fertilizer sector. He pointed out that the sector is highly dependent on import of raw materials and finished products. The dynamics of operation are affected with change in the prices of raw materials & intermediates in international market. Sale of complex fertilizers is even though decontrolled, MRP is still regulated indirectly by the government. Further, complex fertilizers also face unfair competition from imported fertilizers. The capacity utilization of complex fertilizer plants has gone down to 70% from 100%. He mentioned that fertilizer industry despite being a low tax industry has certain anomalies. For example, the customs duty on imported raw materials except rock phosphate is same as finished products. In case of GST, there is higher GST on raw materials than finished products. With the efforts of FAI, GST on fertilizer was reduced from proposed 12% to 5%. In case of phosphoric acid, GST was reduced from 18% to 12% and subsequently to 5%. However, GST is still higher at 18% for ammonia and sulphuric acid. Due to higher GST on these raw materials than finished products, there is accumulated input tax credit and its recovery remains an area of concern.

Dwelling on DBT, Dr. Nand mentioned that there are lot of issues under DBT that still remained to be addressed. He expressed that in the present mode, there is no incentive for the retailer and farmer for adopting new system. Industry incurs more expenses

due to increase in working capital requirement from 45 days to 6 months. Therefore, implementation of DBT is very challenging for the industry.

He hoped that the participants will share their experience during the programme and find the programme useful.

Mr. R.K. Aggarwal, shared his experience with participants. He informed that he started working in 1974 with FCI, Gorakhpur. At that time, focus on energy consumption was not there. The emphasis was more on production and thus maintenance was more reliable. The capacity of the ammonia plant at that time was 300 MTPD and it had 5 reciprocating compressor pumps and syn loop operating at a pressure of 400 kg cm². He explained about the evolving technology over the period of time. One such instance is usage of centrifugal pumps in place of reciprocating pumps.

He advised the participants that during changes or modifications carried out in the plant, proper safety majors should be followed. Careful supervision is of prime importance during the changes or modifications in the plant. He further mentioned that welding plays an important role in maintenance of plant. Quality of workmanship in weld joints plays a pivotal role on its strength, safety and life of the equipments. The service of a professional quality control expert should be availed especially for welding jobs of high pressure equipments.

Mr. Aggarwal advised the participants to avoid unnecessary addition of equipment as they increase maintenance activities. He cited the example of cooling tower which plays an important role in ammonia-urea plant. He mentioned that most of the cooling towers were designed with higher degree of approach but now it is possible to bring down degree of approach by 1-1.5 °C. This reduction would improve the cooling efficiency up to 20% without increasing circulation. Thus, addition of cell can be avoided.

He shared a novel idea for improving life of air heater downstream of primary reformer. The air heater is made up of carbon steel and gets affected due to sulphur present in the fuel. He mentioned that a small amount of sulphur always remains in fuel. The air preheater has tendency to corrode and resulting in leakage. This air heater cannot be repaired and has to be replaced which requires a huge downtime. This sulphur of the order of 2-3 ppm was removed effectively by utilizing vessels of LT or HT shift catalysts which had become spare after debottlenecking of plant.

Mr. Aggarwal mentioned that overhauling of syngas machines is undertaken every 5-7 years and entails 20-25 days shutdown. The maintenance jobs are carried out for replacement of rotor and complete over



Mr. R.K. Aggarwal, Dr. S. Nand and FAI officials with participants

hauling. But the steam saved is very small compared to the long shutdown. He advised that guide blades carriers should also be replaced along with machine to derive more benefits.

Referring to urea reactor, he mentioned that confined space maintenance requires lots of intermittent breaks. This leads to human fatigue which ultimately affects the quality of workmanship. He suggested to install a lift on each urea reactor, which has been done at KRIBHCO, Hazira. That will not only help during shutdown but also in day to day inspection of reactor from outside for weep holes or other defects. This will improve the maintenance performance and save time.

He advised that maintenance engineers should also have basic knowledge of operation of plant & equipment and accordingly follow the maintenance practices. For example, safe shutdown is the most essential activity for an ammonia plant. The syngas compressor should be first and reformer be last to stop. Similarly, during startup reformer is first to start and syngas last to start. He pointed out that a number of problems crop up during startup if shutdown was not taken properly. During shutdown focus remains on major jobs and smaller jobs are neglected. Many a times a major shutdown is due to a small equipment such as gland or valve.

He emphasized that utmost attention should be given to the material of construction. He cited an example of phosphoric acid plant where an agitator was utilized with material supplied by a local vendor. The agitator was corroded within a day. He also referred to maintenance of bimetallic stripper which operates at lower temperature than earlier make stripper. He suggested that in such stripper the ferrules gets corroded and industry wide practice is to plug/change the failed ferrules. He advised that rather than plugging/replacing them in bits and pieces, all the ferrules to be changed after 2-3 years.

Mr. Aggarwal advised that top priority should be accorded to reliability, safety and environmental aspects for improvement of the plant. He urged the participants to eliminate trips in plant. Breakdown of the plant should be avoided and failure analysis should be carried out in detail to find the root cause of the problem and its elimination.

Earlier, Mr. Manish Goswami, Chief (Technical), FAI, New Delhi welcomed Dr. S Nand, Mr. R. K. Aggarwal and participants. He gave a brief overview of activities of the technical division of FAI. This includes collection & analysis of data for energy efficiency, downtime, environment and safety. He informed that FAI publishes a monthly journal where the technical articles are published every month. He urged the participants to contribute articles for the same. To encourage plants to improve their performance, FAI has also introduced Awards in various categories such as production, environment, safety and technical innovation. As a part of its activity for capacity building and sharing of information among industry members, FAI also organizes programme in all technical areas. He outlined that the Senior Maintenance Engineers programme is organized every year where experienced faculty from industry are invited to deliver lectures and leading equipment manufacturers are invited to make presentations on latest developments.

Ms. Ankita Pandey, Technical Officer, FAI, New Delhi thanked Mr. R. K. Aggarwal and Dr. S. Nand for sharing their views with participants.

The training programme included lectures delivered by experts from industry and vendors. Mr. Manish Goswami, Chief(Technical), FAI, New Delhi made presentation on 'Reliability and Safety Studies in Fertilizer Industry'. Lectures were delivered by Mr. K.J. Patel, General Manager(Maintenance), IFFCO, Paradeep on 'NDT Techniques in Fertilizer Industry' and 'Inspection and Maintenance of Acid and Complex Fertilizer Plants'; Mr. P. K. De, Metallurgy and

Corrosion Consultant, Mumbai on 'Materials for Fertilizer & Chemical Plants Equipment & Risk based inspection strategy'; Mr. A K Nayak, Chief General Manager(Maintenance) and Mr. J. Sondhi, AGM (Mechanical & CMC), KRIBHCO, Hazira on 'Inspection and Maintenance of High Pressure Compressors, Pumps and Turbines' and Mr. Hiren Patel, Chief(Mechanical), GSFC, Vadodara on 'Role of Welding in Operation'. Programme included presentations on 'Ammonia & Carbamate Pump Maintenance' by Ebara Corporation, Japan; 'Metallurgical Assessments for fertilizer Industry for optimizing asset integrity' by TCR Advanced Engineering, Vadodara; 'Maintenance of HP Critical Pumps in Fertilizer industry' by KSB Pumps Limited, Pune; 'Preventive Maintenance and Refurbishment of Equipments including Piping and valves' by Key-Tech Engineering, Mumbai; 'Repair and Refurbishment of Turbines' by MAN Energy Solutions India Pvt. Ltd., Vadodara; 'Inspection and Maintenance of Conveyer System' by Global Conveyor Systems Pvt. Ltd., Mumbai and 'Design and Maintenance Aspects of Turbomachinery' by Elliott Ebara Turbomachinery

India Pvt. Ltd., Bengaluru. In addition to lectures and presentations, 12 case studies were also presented by the participants.

A visit to the facilities of IFFCO-Kalol was arranged for the participants. The participants appreciated the efforts put in by IFFCO-Kalol to keep the plant in excellent condition.

At the conclusion of the programme, Mr. D.G. Inamdar, Senior General Manager, IFFCO-Kalol shared some of the inspection and maintenance practices followed at IFFCO-Kalol. He mentioned that the modifications carried out at IFFCO, Kalol has resulted in 3.5 % reduction of energy consumption in the last 5 years. He advised the participants to adopt the best practices. He also distributed certificates to the participants.

Mr. Manish Goswami thanked Mr. D. G. Inamdar for sharing his experience and distributing certificates to the participants. He thanked management of IFFCO, Kalol for plant visit, distinguished faculties for sharing their knowledge, vendors and participants for presenting case studies.

Programme on Fertilizer Logistics, Port Handling Operations and Coastal Shipping

The Fertiliser Association of India (FAI), New Delhi, organized a programme on Fertilizer Logistics, Port Handling Operations and Coastal Shipping at Quality Inn Palms, Gandhidham, Gujarat, during 6-9 March, 2019. Sixty three participants representing 19 fertilizer companies inclusive of ports, warehousing and handling of liquid cargo attended the programme.

Mr. Pramod A. Vasave, Commissioner, Goods and Services Tax (GST), Kutch, inaugurated the programme by lighting the lamp on 6th March, 2019. Mr. Ajay Kumar, Additional Commissioner, Customs, Kandla; Mr. S. Kirupanandasamy, Traffic Manager, Deendayal Port Trust, Gandhidham; Mr. B.K. Mansukhani, Managing Director, Rishi Shipping, Gandhidham; Mr. Ashutosh Arora, Chief General Manager, National Fertilizers Limited, Noida; and Mr. P.V. Narayana, Senior General Manager, IFFCO, Kandla graced the inaugural session.

In his inaugural address, Mr. Pramod A. Vasave welcomed the participants to Kutch and hoped for their comfortable stay in Gandhidham. He stated that the programme will certainly be of immense benefit to the participants in understanding various areas related to handling of imported fertilizers at the ports and also about coastal shipping which is becoming



Mr. Pramod A. Vasave, lighting the lamp at the inaugural session. Others seen in the picture are (L-R) Mr. B.K. Mansukhani, Dr. D.S. Yadav, Mr. Ashutosh Arora, Mr. Parag Saxena, Mr. S. Kirupanandasamy and Mr. P.V. Narayana

quite effective way of transporting goods from one location to another. Mr. Vasave gave an overview of implementation of GST which became effective from 1st July, 2017 in the country. He listed GST as the biggest reform in the collection of indirect taxes and stated that it is simple, hassle-free and easy to comply with. In GST, all the taxes are subsumed to one tax *i.e.* GST



A view of the participants, faculty and FAI Officials

and collection of GST is around Rs. 1.0 lakh crore per month in the country. Mr. Vasave surmised that the World Bank has also appreciated the implementation of GST in the country. He stated that there were some problems in the initial stages but now the system has stabilized. He hoped that the problem of accumulation of amount due to inverted duty structure will be streamlined in due course of time. He wished the programme a great success.

In his address, Mr. Ajay Kumar stated that the country is importing different types of fertilizer products to meet the nutrient demand. It is important for executives to have good knowledge on port operation, reducing logistics costs, documentation of ports and customs duty calculation, lay time calculation, etc. Mr. Kumar said that India has acquired a good ranking in the World Bank's ease of doing business index. To improve further the ease of doing business, the Central Board of Indirect Taxes has introduced various concepts for fast clearance of import and export goods. He made a special mention of Authorized Economic Operator, Direct Port Delivery, e-Sanchit and latest concept of 'Turant Customs'- next generation reform for ease of doing business and stated that these steps have been initiated to reduce dwell time. He also revealed that as far as the coastal movement of cargo through Kandla port is concerned, the CBIC has waived off various formalities namely filing of bills of coastal goods (import/export), obtaining port clearance and filing of shipping bills for supply of ship stores, etc.

Mr. S. Kirupanandasamy, in his address, stated that Deendayal Port Trust (DPT) has been consistently promoting handling of fertilizers. He said that the port has 31 godowns/warehouses out of which 21 godowns

measuring 1,87,000 square meters are allotted for handling of fertilizers. Permission to store fertilizers on rental basis is given up to two months in peak season and three months during lean season on the request of fertilizer industries. As per Government directives, 2 berths are demarcated to accommodate fertilizer vessels on priority. DPT commenced a fertilizer packing plant on full railway rake siding in the year 2018 having handling capacity of 1 million MT (MMT) per year. Mechanized fertilizer handling facility is coming up at berth no. 14 with estimated expenditure of Rs. 500 crore with a capacity to handle 2 MMT product per year. In addition, Public Private Partnership projects of DPT with M/s IFFCO and M/s AKPTL – Tuna Port have the capacity of handling 2.5 MMT of fertilizers with mechanized handling facility.

Mr. Kirupanandasamy mentioned that to promote the coastal transportation of fertilizers and ease out the non-availability of rail rake for fertilizer transportation, DPT is providing 80% concession on vessel-related charges. He concluded his address with remarks that DPT is ever willing to consider demands of fertilizer industry favourably.

In his address, Mr. P.V. Narayana gave an overview of production, import and dispatch of fertilizers from Kandla by IFFCO. He expressed his concern on shortages of rakes at Kandla to move the material to hinterland and making a special mention of severe shortages of rakes experienced in 2017-18 and 2018-19. Mr. Narayana stated that it was an uphill task to move the indigenously produced and imported material from Kandla. He made a mention of the initiative undertaken by IFFCO to move finished products from Kandla and Paradeep through coastal shipping. He said that IFFCO has moved 2.83 lakh



Mr. S.P. Yadav giving certificate to a participant

tonnes of fertilizers through coastal shipping in 2018-19. However, freight reimbursement has yet to be made.

Mr. B.K. Mansukhani, in his address, encouraged the participants to acquire pertinent knowledge of international trade and handling operations at the ports as country is largely dependent on import of fertilizers and raw materials to meet its demand. He gave important tips to the participants to reduce the logistics cost and promote coastal shipping.

Earlier, in his welcome address, Dr. D.S. Yadav, Director (Marketing), FAI, New Delhi briefed about the contents and resource persons of the programme. He stated that realizing the need for the programme, FAI started the programme on port handling as early as in 2002 and it has now become a much-appreciated in-demand in regular FAI activity. Dr. Yadav also gave a brief account of FAI activities for the benefit of audience.

The inaugural session was followed by a presentation on 'Issues of Indian Urea Industry and Implication of GST for Fertilizer Sector' by Mr. Ashutosh Arora. In his presentation Mr. Arora gave an overview of fertilizer policy of urea and its objectives, Retention Pricing-cum-Subsidy Scheme, Modified NPS Policy, New Urea Policy-2015, etc. He also highlighted the issues of urea industry and suggested the measures to save the industry. He briefly discussed on implications of GST for fertilizer sector. He also deliberated on the benefits of GST, Input Tax Credit, GST issues related to fertilizer industry, etc.

On 7th March, 2019, seven presentations were made. These included i) 'Fertilizer and Raw Material Scenario and Challenges in Fertilizer Marketing', ii) 'DBT in Fertilizer Sector' by Dr. D.S. Yadav; iii) 'Load-Discharge

Port Operations and Documentations' by Mr. B.P. Mishra, Executive Vice President, Deepak Fertilisers and Petrochemicals Corporation Limited, Pune; iv) 'Significance of Gandhidham Area in Evacuation and Movement of Fertilizers' by Mr. Adish Pathania, Area Railway Manager, Western Railways, Gandhidham; v) 'Overview of the Infrastructure at Indian Ports and Factors in Deciding a Discharge Port for Fertilizer Imports' by Mr. T.G. Kallingal, General Manager (TPT), IFFCO, New Delhi; and vi) 'International Contracts and Payment Terms for Import of Fertilizers/Raw Materials' by Mr. C. Unni Krishnan, Additional General Manager, MMTC, New Delhi. After the presentations, participants were taken to Deendayal Port to show them the available infrastructure and port-operation activities. The participants were shown the discharge operations of fertilizers from the vessel and the bagging plant facilities developed by Rishi Shipping near the railway siding. In his presentation at the floating crane, Mr. B.K. Mansukhani, Rishi Shipping, Gandhidham shared the innovative ideas for 'Cheaper Logistic Cost and Coastal Movement of Fertilizers' with the participants.

On 8th March, 2019, two presentations were made. First presentation was on 'Salient Features of FCO, 1985' by Mr. Shailendra Singh, Director, Central Fertilizer Quality Control & Training Institute, Faridabad and the second on 'Chartering of Fertilizer Vessels in India – Key Parameters and Case Study on Lay Time' was made by Dr. Satish Maheshwari, Consultant, National Fertilizers Limited, Noida.

After lunch, participants were taken to Tuna and Mundra ports. A corporate film on Tuna port was shown. Mr. Vivek Singh, Associate General Manager and Head (Operations), Tuna port and his team accompanied the participants during the visit to Tuna port and showed the infrastructure/facilities available for handling of the imported materials. Participants were glad to see the transfer of fertilizers from the working vessel to godown directly through the conveyer belt. Participants were then taken to Mundra port. Mr. Bhagwant Upadhye, Deputy General Manager (Dry Cargo) and Mr. Mitesh Thacker, Manager, Adani Port and SEZ Limited, Mundra welcomed the participants. Mr. Bhagwant Upadhye gave an overview of world class facilities and infrastructure available at port. He stated that the port is setting records in terms of handling of different types of vessels year after year. The handling operations are hassle-free and totally mechanized. The port has deep draft of 20 meters to berth large size vessels. A film on Adani Group was also shown. Mr.

Bhagwant Upadhye and his team accompanied the participants during the visit. Participants were taken to model room of Adani Port depicting the infrastructure and facilities available and Fertilizer Cargo Complex having 46 online bagging units with centralized control system, etc. Participants were delighted to see the world class facilities created at both the ports. The visits were highly educative and useful to the participants.

On 9th March, 2019, two presentations made included 'Logistics of Fertilizers and Raw Materials from Port' by Mr. B.P. Pagare, Chief (Material Management), Gujarat State Fertilizers and Chemicals Limited, Vadodara and 'Maritime Insurance' by Mr. Kumar

Nityanand Sinha, Senior Manager (Liability Underwriting), IFFCO-TOKIO, Ahmedabad.

In the Concluding Session, Mr. S.P. Yadav, Executive Director (Agri. Business), Gujarat State Fertilizers & Chemicals Limited, Vadodara, Gujarat distributed certificates to the participants. In his address, Mr. Yadav briefed the participants about the development of infrastructure at the Deendayal Port with time which is now capable of handling capesize vessels at the high seas with facilities of floating cranes and barges. He underlined that the cost of fertilizer logistics is considerably high in India compared to China and the same needs to be reduced through innovative interventions.

Fertilizer Orientation Course

The Fertiliser Association of India – Southern Region (FAI-SR) organized a Fertilizer Orientation Course for the students of Agricultural College, Aswaraopet in Telangana State on 26th February 2019. Dr. C. Narendra Reddy, Dean of the college inaugurated the programme. Dr. Afzal Begum, Deputy Director of Agriculture, Department of Agriculture, Government of Telangana, Aswaraopet was the guest of honour. One hundred twenty six students participated in the programme.

In his inaugural address, Dr. Narendra Reddy said that nutrient management in a scientific way is the need of the hour. All out efforts need to be made both at policy and ground level to improve soil health through balanced use of fertilizers. Farmers are to be educated about the need for application of nutrients as per the soil health card recommendations. He stated

that nutrient balance in the soil is linked to environment. He informed that if a nutrient is deficit in soil, it will indicate decline in soil fertility. A surplus of nutrient in the soil indicates a risk of polluting soil, water and air. The nutrient balance is defined as the difference between the nutrient inputs entering a farming system mainly through livestock manure and fertilizers and the nutrient outputs leaving the system through the uptake of nutrients for crop and pasture production. Maintaining the balance of the nutrients is necessary in farming systems as these are critical in raising crop and forage productivity. However, a buildup of surplus nutrients in excess of immediate crop and forage needs can lead to nutrient losses, representing not only a possible cause of economic inefficiency in nutrient use by farmers, but also a source of potential harm to the environment, through



Dr.C. Narendra Reddy delivering the inaugural address. Others seen in the picture (L-R) are Mr. K.V.Rao, Mr. N.V.S.L. Acharyulu, Mr. S. Sai Prasad, Mr. Y.V.N. Murthy, Dr. Afzal Begum and Mr. B. Rajaiah

water pollution or air pollution, notably ammonia or greenhouse gas emissions. This indicator is presented for the two main nutrients, nitrogen and phosphorus, and is measured in tonnes of nutrient and in kilograms of nutrient per hectare of agricultural land. He thanked FAI for selecting Aswaraopet college campus located in a very remote place of Telangana state for organizing the programme for the benefit of the students. He also thanked all the senior managers from fertilizer industry for taking lot of pains in reaching this remote place for making presentations. He informed the students that this is one of the golden opportunity given to them by FAI as the programme is organized for the first time in this campus since the inception of the college in 1989. He advised all the students to be very attentive during the programme and listen to the presentations given by senior managers of fertilizer industry and get their doubts clarified.

In her special address, Dr. Afzal Begum, Deputy Director of Agriculture, Department of Agriculture, Government of Telangana, Aswaraopet stated that the low and declining farm income has emerged as serious threat to sustainable agriculture. The declining farmers' income is largely on account of low average crop productivity and poor price realization. In view of the fact that there is no scope of bringing more area under cultivation, the increase in production to meet food demand of ever-growing population has to come from increase in crop productivity. Enhancing farmers' income is only possible with increase in average yield of major crops which has essentially to come from the increased and efficient use of inputs, particularly fertilizers. She felt that the pricing of fertilizers is not going in right direction and is discouraging the balanced application of nutrients. The price of urea is very low compared to DAP, MOP and other complex fertilizers. The farmers are using more urea than other fertilizers. She felt that Government of India must do balancing act in pricing of fertilizers and also encourage the use of organic fertilizers, bio-fertilizers, micronutrients, etc., by making them available at affordable rates.

Earlier Mr. Y.V.N. Murthy, Regional Head, FAI-SR welcomed the dignitaries and students to the fertilizer orientation course. He explained in brief the activities of FAI and informed that the fertilizer orientation course will enlighten the students about the practical aspects of manufacturing process, distribution, and

marketing of fertilizers; soil health enhancement and promotional programmes; dealer network and market development activities; specialty fertilizers; legal aspects of fertilizer marketing, etc. He further added that the concept of balanced fertilization has gone beyond NPK and should include all the nutrients deficient in soil including secondary and micronutrients. The use of other sources of plant nutrients particularly organic manures and bio-fertilizers has to play important role in supplementing the nutrient needs of the country. The combined use of fertilizers, bio-fertilizers and organic manures helps in improving soil health, nutrient use efficiency and achieving maximum economic yield. Pricing of fertilizer nutrients is one of the important factors for promoting the balanced use of fertilizers. The instrument of fertilizer subsidy should be used to promote balanced and efficient use of fertilizers. Products and practices which improve fertilizer use efficiency need special encouragement, he added.

Topics covered in the orientation course included Manufacturing process of fertilizers by Er. T. Saravanan, Assistant General Manager, SPIC plant, Tuticorin; Fertilizer Scenario and Policy in India by Mr. Y.V.N. Murthy, FAI-SR; Logistics, Warehousing and Inventory Management by Mr. K.V. Rao, Senior Manager (Marketing), KRIBHCO, Warangal; Critical Role and Importance of Organic Fertilizers in Soil Health Management by Mr. Raj Bardhan, Senior Manager (Organic), Coromandel International Limited, Secunderabad; Dealer Network Development and Steps in Product Introduction by Mr. B. Rajaiah, Assistant General Manager (Marketing Services), Nagarjuna Fertilizers and Chemicals Limited, Hyderabad; Market Development and Extension Activities by Fertilizer Industry in Educating Farmers and Dealers by MR. N.V.S.L. Acharyulu, Senior Manager (CSR), Rashtriya Chemicals and Fertilizers Limited, Hyderabad; Financial Aspects of Fertilizer Marketing by Mr. S.K.M. Azad and Mr. K. Ramanaiah, Chief Managers (Marketing), Madras Fertilizers Ltd, Warangal; Specialty Fertilizers by Mr. Sunil Reddy, Manager, Paradeep Phosphates Limited, Khammam; Legal Aspects of Fertilizer Marketing by Dr. Afzal Begum.

The programme ended with vote of thanks by Dr. Gopala Krishna Murthy, Assistant Professor, Agricultural College, Aswaraopet. ■