



China Seminar “Sustainable Fertilizer Management” 16-17 September 2013, Beijing, China

Key Findings

China’s Food Security and Environmental Challenges

- China has undergone an impressive increase of its agricultural output over the past decades, with e.g. a 34% expansion of its cereal harvest over the past two decades, to reach 543 million tonnes (Mt) in 2012. During the same period, the proportion of food insecure citizens dropped considerably, from 21 to 12% according to the latest estimates by FAO. Today, China feeds more than 20% of the world population with only 9% of the world's arable land.
- This tremendous achievement has been aided by the widespread adoption of manufactured fertilizers and other inputs (improved seeds, crop protection products, irrigation).
- Domestic fertilizer consumption has increased by 74% between 1991 (29.1 Mt nutrients) and 2011 (50.5 Mt). While this has greatly contributed to improved food security, it has also led to some negative impacts on the environment at the local level following nutrient losses to water bodies and the atmosphere.
- China's population is expected to increase until the mid-2020s (after which it is expected to start declining), and dynamic economic activity is leading to a shift in dietary habits towards more livestock products. Therefore, there is an ongoing need to increase agricultural production.
- A slowdown of population growth and urbanization has an impact on labour availability in agriculture. In China, the number of economically active people in agriculture peaked in 2003 at 506 million. It has declined to 496 million in 2012, and is forecast to drop to 455 million by 2020 according to FAO. Furthermore, an increasing proportion of the farmers work part-time on their farm. Labour shortage is an emerging issue that will trigger mechanization and hence more precise application of nutrients.
- Because arable land and fresh water are scarce in China, expansion of the agricultural output has to come from productivity gains. Increasing yield is also desirable to mitigate greenhouse gas emissions and preserve biodiversity.

- Chinese authorities and stakeholders are paying increased attention to the efficient use of natural and human resources (soils, nutrients, water, energy, labour) and will need to accelerate their efforts.

Addressing Nutrients Deficiencies

- Proper identification of the main soil nutrient deficiencies in a site- and crop-specific manner allows a reduction of the yield gap and an increase in the use efficiency of nitrogen and water.
- Fertilizer management in China must also address deficiencies in potassium, sulphur, magnesium and micronutrients, which are still widespread. This requires improving monitoring the status of these nutrients in soils and plants, and providing updated fertilizer recommendations.
- Nutrients can also contribute to alleviating micronutrient deficiencies in humans, especially for zinc, iodine and selenium. Success stories could be replicated in regions of China where people are affected by these deficiencies.

Managing Fertilizers More Efficiently

- Nitrogen use efficiency in China is low compared to developed countries but it has shown remarkable progress in the past five years, reversing the declining trend of the past decades. Between 2007 and 2011, China's cereal harvest rose by 14% while, during the same period, nitrogen fertilizer consumption expanded by 2% only. It is imperative to continue this virtuous trend without undermining agricultural productivity and food security.
- Improved fertilizer management can reduce nutrient losses and enhance water productivity, among others.
- Specialty fertilizer products also can make an important contribution to improving nutrient management.
- Nutrients should be managed so as to improve water productivity, and preserve water quality. Split application and fertigation are useful fertilizer management options to encourage.
- Nutrient management integrating mineral and organic sources should be promoted in order to optimize nutrient use and enhance soil fertility.
- Fertilizer management and fertilizer products should provide options to meeting the increasing challenge of part-time farming. Promoting the development of contractors for fertilizer application, upgrading fertilizer products, and using slow- and controlled-release or stabilized fertilizers could be beneficial options.

Recommendations

- Reaching hundreds of million (increasingly part-time) farmers to deliver customized and real-time advice is the greatest challenge to improving use efficiency and effectiveness. China's extension services and industry must redouble their efforts to reach out to farmers. Modern communications tools can

help to fill this gap, although these cannot be expected to entirely replace conventional face-to-face extension. It is also essential to listen to farmers' expectations and develop and promote options that are relevant and profitable to them. Outreach to farmers should seek to improve the quantity, quality and timeliness of advice provided.

- It is advisable to focus initially on cereal systems (low-hanging fruits) before addressing more complex cropping systems.
- Whereas China has made great advances in its soil testing program, the coverage of the soil testing programme(s) could be further finessed in order to develop more crop- and site-specific fertilizer recommendations that address the main nutrient deficiencies and the need to improve nitrogen and water use efficiency.
- The scope of fertilizer management practices in China should also be expanded to address micronutrient deficiencies in humans.
- In addition to improved nutrient stewardship efforts, a wider range of fertilizer products can better meet the diversity of Chinese agro-ecosystems, such as complex fertilizers containing the required essential nutrients, liquid/soluble fertilizers for fertigation, slow- and controlled-release fertilizers, etc.
- Improved fertilizer management practices and product options not only increase nutrient use efficiency, but can also address labour constraints and land and water scarcity.
- It is also advisable to review how government policies, i.e. fertilizer support measures and regulations, may impact on nutrient management.
- In view of the magnitude of the challenge, governmental agencies, the scientific community, the industry and other relevant national and international stakeholders should join forces to achieve commonly agreed objectives.
- It will be important to maintain the focus on this important topic of nutrient management and IFA is to be encouraged to keep this very useful exchange going among Chinese and foreign experts, as well as that between Chinese government officials, industry leaders and academics.