



Improved Nutrient Management in Agriculture

a Key to the Low Carbon Economy



UK-China
Sustainable Agriculture
Innovation Network

The issue

- Nitrogen (N) fertilizer is an essential input for food security – in China and worldwide
- But nitrogen fertilizer has a large environmental footprint, especially emissions of greenhouse gases (GHGs) – carbon dioxide (CO₂) during its manufacture from fossil fuels and nitrous oxide (N₂O) when it is used in the field, plus some N₂O during manufacture of some fertilizer products. N₂O is particularly serious as it is 298 times more powerful as a greenhouse gas than CO₂
- Here is clear evidence of widespread over-use of N fertilizer in China – so greenhouse gas emissions are greater than necessary. Reducing applications rates to a rational level provides an opportunity to cut GHG emissions: at low cost; with no threat to food security; with other local, national and global environmental benefits.

Project objectives

- Estimate GHG emissions associated with the manufacture and use of N fertilizer in China using a life cycle assessment approach to identify opportunities for improving energy and N use efficiency and decreasing emissions, thus lowering the carbon intensity of food production
- Review current and emerging technologies for increasing efficiency of use of N fertilizer, N from manure and manufactured organic fertilizers, building on results from the Ministry of Agriculture project “Fertilizer recommendations and soil testing”
- Assessing improved means of communicating information on rational use of N fertilizers and manures to farmers and extension staff
- In addition to studies at the national scale, conduct in-depth studies in four Provinces having contrasting agricultural industries – Jiangsu, Shandong, Shaanxi, Jilin
- Providing information to policy makers on the GHG savings possible from improved management of N in agriculture and the ways of achieving this.





Activities

- Establishing the life cycle assessment approach to be applied to both the manufacture and the agricultural use of N fertilizer in China
- Estimating the total GHG emissions associated with the manufacture and use of N fertilizer in China – at national level and in the 4 case-study Provinces: Jiangsu, Shandong, Shaanxi, Jilin
- Reviewing current and emerging technologies and approaches for increasing efficiency of use of N from fertilizers and manures
- Identifying “win-win-win” opportunities such that GHG emissions are cut, water pollution decreased and farmers’ incomes increased.

Project outputs

- Policy briefs for Chinese policy makers at national and province level
- Listing of appropriate technologies for increasing efficiency of use of N fertilizer and manure, and thus decreasing GHG emissions and water pollution, evaluated for effectiveness, cost and practicability in different regions and farming systems
- Information to underpin facilitating policies
- Scientific publications on life cycle assessment of N fertilizer manufacture and use in China and appropriate technologies for decreasing N use and GHG emissions while maintaining food security.

Progress

- Produced Policy Brief No. 1 in English and Chinese, entitled “Improved nutrient management in agriculture - a neglected opportunity for China’s low carbon growth path”. A short version by Chinese partners was submitted to the State Council and got encouraging comments from the national leaders
- Results from Policy Brief No. 1 were presented to the NDRC and other government officials at national and provincial levels. Analysis to date indicates that a reduction of at least 2% of China’s total GHG emissions could be made by correcting the over-use of N fertilizer in agriculture. This can be achieved at low cost and with a range of other benefits including increased farm incomes, with benefits for the rural economy, decreased non-point pollution and long-term agricultural sustainability
- The evidence shows clearly that GHG emissions can be significantly cut with no negative impacts and some positive impacts on food production and food security
- Policy Brief No. 2 entitled “Greater food security and a better environment through improved nitrogen fertilizer management” due for publication in November 2010
- Review of technologies for improving efficiency of use of N from fertilizers and manures under way.

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