

Analysis of Macro-Economic Efficiency of Balanced Fertilization in China

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The positive impact on yield and profit from the use of inorganic fertilizers has been reduced because of their imbalanced use, particularly potassium (K). While inorganic fertilizer use is increasing, grain yields are not increasing at the same rate. This is due to imbalanced use of nitrogen (N), phosphorus (P) and K and the fact that large amounts of inorganic fertilizers are being used on cash and fruit crops instead of the grains. Balanced fertilizer use could produce a huge increase in fertilizer use efficiency. By the year 2000 China will need to import at least 4 million tonnes of potash annually to maintain high production and high fertilizer use efficiency.

The recent positive impact of inorganic fertilizers on crop production has been compromised because of imbalanced N, P and K use. Today, 59 percent of the cultivated land in China is deficient in P, 23 percent deficient in K, and 14 percent deficient in both nutrients. Imbalanced use of N, P and K in the long term will obviously restrict overall efficiency of applied inorganic fertilizer. This means economic losses to farmers and the nation.

Recent data demonstrate that while inorganic fertilizer consumption is increasing, grain production is not rising at the same rate as before. This undoubtedly is due to two factors: 1) reduced use-efficiency of inorganic fertilizers because of imbalanced application rates, and 2) farmers fertilizing cash and fruit crops at high rates and reducing nutrient applications on grain crops.

The main reason for the historical imbalance in fertilizer use is the nature of domestic fertilizer production. The average N:P₂O₅:K₂O ratio of this production has been approximately 1:0.25:0.05 for many years. In order to overcome this imbalance and increase efficiency of domestically produced P and K, more potash must be imported because local resources are very limited.

Balanced fertilizer use significantly improves both fertilizer efficiency and economic benefit to farming wherever it is applied. Considering the period up to 1993, China's efforts in implementing more fertilization boosted national yields by 8 to 15 percent, increasing total grain production by approximately 12 billion kg and providing an increased value of grains plus cash crops in excess of 10 billion Yuan (RMB)¹.

¹Yuan (RMB) can be converted to value in U.S. dollars as follows: 8.2 RMB = US\$1 (one U.S. dollar).

By the year 2000 this balanced fertilization should be practiced on 60 million ha, where grain would occupy 47 million ha. Grain production will be increased by an estimated 17.5 billion kg; 3 million ha of cotton will have increased yields of 450 million kg; while 5.3 million ha in oil seed crops would produce 1.4 billion kg oil. This total increase is estimated to contribute an additional 23.4 billion RMB of income to farmers. However, to achieve this, more P and K fertilizers must be imported.

Shortages of potash continue to exist, even in the areas where balanced fertilization is being promoted. This is a costly shortage because without it China cannot sustain high yields, high quality products and high fertilizer use efficiency.

Potash fertilizer use efficiency has become much higher, particularly in the red soils regions of southern China where potash use efficiency is outstanding. It has been shown that 3.0 million tonnes of potash would create a 14.8 billion RMB increase in production, giving an output to input value ratio of 3.3:1.

Potash plays an important role in raising farmer incomes. In southern China, the value of increased rice yield from potash was 5.1 million RMB, or 15 percent of the net income.

In China, there is a great potential to raise grain yield with potash fertilizer. To achieve this potential, imported potash must increase from 3.0 million nutrient tonnes in 1993 to 4.0 million by the year 2000 (Table 1). Estimates indicate that for rice in southern China higher potash consumption would increase the production by 9.9 million tonnes with a value of 9.9 billion RMB at an output to input ratio of 4.5:1. The efficiency and net benefit is indeed very high. BCI

“China must import more potash for balanced fertilization.”

Table 1. Inorganic fertilizer demand and output for 1990 and projections for 2000 and 2020.

Demand	1990	2000	2020
Total	25.9	34.5	54.0
N	18.2	18.0	30.0
P ₂ O ₅	7.25	9.0	15.0
K ₂ O	0.26	4.5	9.0
N:P ₂ O ₅ :K ₂ O ratio	1:0.40:0.15	1:0.50:0.25	1:0.50:0.30
Rate, kg/ha	188	230	377
Output			
Total	1,880	2,650	4,600
N	1,464	1,850	3,000
P ₂ O ₅	411	740	1,500
K ₂ O	5	50	100
Imported fertilizers (10,000 t.)	925	800	800
Compound fertilizers (%)	14	30	50

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