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FERTILIZER AND FOOD PRODUCTION

The world demand for food will increase sharply over the coming years as population is expected to increase by almost 40% from the current 6.7 to an expected 9.2 billion by 2050. Aside from the increased population projections, another factor impacting food concerns is consumer affluence, where a shift toward more meat consumption is seen in countries where diets have traditionally been more grain based. For example, since 1995 meat consumption in the developing world has increased by 16% and in China it has increased by almost 40%. This increasing demand for meat protein means greater demand for feed grains.

Food production will clearly need to increase to meet the demands of a larger and more affluent population. One report (The Millennium Project, State of the Future, 2008) indicated that food production will have to increase by 50% by 2013 and double in 30 years to help solve the food issue. Increased food production will require intensified production since the amount of available arable land is finite. Genetics and biotechnology will help intensify production, as will fertilizer and other inputs.

A fundamental question that the fertilizer industry has sought to address for some time now is “how much of crop production is attributable to fertilizer input?” An *Agronomy Journal* paper addressing this question was published by Stewart et al. (2005). Several long-term studies in the USA, England, and the tropics, along with the results from an agricultural chemical use study and nutrient budget information, were evaluated. A total of 362 seasons of crop production were included in the long-term study evaluations. Crops utilized in these studies included corn, wheat, soybean, rice, and cowpea. The average percentage of yield attributable to fertilizer generally ranged from about 40 to 60% in the USA and England and tended to be much higher in the tropics. The paper concluded that the commonly cited generalization that at least 30 to 50% of crop yield is attributable to commercial fertilizer nutrient inputs is a reasonable, if not conservative estimate.

Intensification of production and increasing yield on limited arable land is clearly important in securing an adequate food supply, and the importance of the role of fertilizer in this is undeniable. However, another important aspect of fertilizer and its role in food production involves crop quality and human health. There are many affects of nutrient input on crop quality, and among the more interesting is the impact fertilizer inputs can have on human health affecting compounds. IPNI has published several papers and supported studies in this area over the past few years. One of the most noteworthy studies was one involving cantaloupe in the Rio Grande Valley of Texas. This study showed that foliar K applications during cantaloupe fruit development and maturation improves fruit marketable quality by increasing firmness and sugar content, and fruit human health quality by increasing ascorbic acid, beta-carotene, and K levels (Lester et al., 2007, *Better Crops*).

Meeting the world’s escalating food needs cannot be achieved without fertilizer input. Sans fertilizer, the world would produce only about half as much staple foods and more forested lands would have to be put into production (Roberts, 2009, *Better Crops*). Inorganic commercial fertilizer plays a critical role in the world’s food security and is important from both the yield and food quality perspectives.

Intensification of production will be increasingly essential to the challenge of meeting future food demands. However, this intensification must be done so as to minimize environmental impact. That’s why the concepts of Ecological Intensification (EI) and the Four Rights (4R) Nutrient Stewardship framework (right fertilizer source-rate-time-place) are so timely. For more information on these concepts, visit the IPNI website at [>www.ipni.net<](http://www.ipni.net).

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Abbreviation: K = potassium.

Note: *Plant Nutrition TODAY* articles are available online at the IPNI website: www.ipni.net/pnt