

# Science Is On The Side of Inorganic vs. Organic Fertilizers

*Striking examples of desperately needed yield increases in Africa and Asia offer solid proof, not pipedreams.*

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**Summary:** *The recognizable solution may rest in the ability to produce more, healthier plants on less land than we have been able to accomplish in the past. It has been estimated that a total of 30 percent of cereal production worldwide has been attributed to fertilizer inputs. Nitrogen (N) alone has increased small grains by over 20 percent. Since the mid-1960s, 50 to 75 percent of the crop yield increases in Asia have been attributed to inorganic fertilizers in combination with local supplies of organic matter such as manure. By withholding N, corn production in the U.S. was estimated to be reduced by over 40 percent and rice production by almost 30 percent. It is little wonder then that the U.N.'s World Food Organizations (FAO) embraces the use of inorganic fertilizer as an essential part of food security and feeding the world's burgeoning societies. On the other hand, it amazes one to hear others decry the use of inorganic fertilizers when the proof is they boost yields in many areas of the world that otherwise suffer food shortages, potential malnutrition, and droughts.*



Feeding a family in sub-Saharan Africa is a challenge even in areas where there are productive soils, adequate water, and a good growing season. Families struggle at lower wages and the vast majority (50 to 60%) of that income is spent on food. Zambia and Mozambique are good examples. Traditionally, small growers raise enough in small vegetable gardens to feed only themselves, with a small portion to share with neighbors within their villages. "Things have improved," says Marymey Jossan from the Kafu River area of Zambia. "As a child, we suffered much greater hardships. Our gardens failed to provide my family with enough food for ourselves, let alone anyone else." Mary still struggles. But allowing advances from developed countries to influence the lives of others is improving food sustainability. Yet many people in these countries face hardships. The average life expectancy in many places in South Africa is less than 40 years of age. The question is where can we help? Obviously appropriate improvements in knowledge, inputs, and resources need to be explored and put into place to improve some of the basic

opportunities of life. In this regard, there are certain cornerstones that must be met.

**Stability.** A country's ability to sustain itself and create an environment of peace and stability is based in great part on its capability to feed itself. As a nation's population grows and develops these same obligations increase. The absence of limitations being placed on any nation as it works to accomplish this basic responsibility inevitably will invite an environment of instability and potential chaos. The goal, and the way out of this obviously, is food security. Or more properly defined: stability, where all people at all times have both physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs for an active and healthy life. If these conditions do not exist--where this type of access is not met and sufficient food is not available--then food insecurity simply exists. Among the culprits causing this may be:

- Lack of productivity
- Lack of knowledge to improve productivity

- Insufficient funds to purchase food
- Governmental limitations on food accessibility or distribution.

Another frightening trend that could rattle world stability is a report by the United Nations Food and Agricultural Organization (FAO) that undernourishment will remain high through 2011. When global food prices--as a result of fertilizer, seed, water delivery, and other associated input costs--show a sharp rise there is inevitably a corresponding concern for food unavailability, further dampening any feelings about food security.

**Population.** Population increases are undeniable and with those projected increases will come more demand for crop production on less and less available land. The expected increase in population, by some estimates, is projected to be greater than 38 percent by the year 2050. This will put enormous pressure on the world to provide for its food needs, some projections showing up to 9 billion people. It becomes a huge responsibility to provide both food and fiber to provide for the needs of this type of geometric increase. For those

who have traveled to Asia, India, the Philippines, and parts of Africa, these numbers speak volumes in areas where higher resource inputs are required to sustain the needs of the ever-increasing populations and a hungry world. Even conservative estimates acknowledge that more being produced on limited arable land will have to be accomplished to meet world demands. Distribution of resources from one location to another will be a part of this, but that alone is not enough. Many from FAO have estimated that a combination of improvements needs to be used to address these concerns. They could include:

- Producing more on land already in production
- Open up larger tracks of land that are not currently being accessed
- Improve water delivery programs to marginal lands to increase production capacity.

But increasing arable land is not that simple. Accessing that which is available within South America or Africa has problems. Infrastructure in both locations is not in place and to develop it could be a political challenge as well as an environmental hurdle that could stand in the way of this process. However, China is developing an urbanization plan that involves moving smaller villagers into more concentrated cities while at the same time moving forward to develop this resource of available land to improve food security. While these policies may seem harsh, they can be effective. They would be harder to implement in other areas of

the world.

The ultimate and recognizable solution rests in the ability to produce more healthier plants on less land than we have been able to accomplish in the past. Estimates show that 30 percent of cereal production worldwide can be attributed to inorganic fertilizer inputs. Nitrogen alone has increased small grains by over 20 percent. Since the mid 1960s, 50 to 75 percent of the crop yield increases in Asia have been attributed to inorganic fertilizers in combination with local supplies of organic matter such as manure. By withholding N, corn production in the U.S. dropped an estimated 40 percent. Rice production fell almost 30 percent. Small wonder, then, that FAO embraces the use of inorganic fertilizer as an essential part of food security and feeding of the world's burgeoning societies. One can only listen in amazement as there are those who disparage the use of inorganic fertilizers as one of the causes of droughts and low yields in many parts of the world.

The facts show otherwise. In long-term studies that have been conducted at several locations around the world, inorganic fertilizer combinations of NPK have increased yields between 50 to 80 percent. Such compelling responses can be implemented immediately on cropping systems of both small- and large-scale farmers anywhere. This includes many traditional areas as well as those lands that are being expanded more under increasingly intense production management strategies. It is not just the

NPK inputs that will be responsible for production increases, but a combination that will include secondary and in most cases essential micronutrients.

### **Sustainability**

The Fluid Fertilizer Foundation supports the 4Rs of nutrient stewardship being promoted by several fertilizer organizations. Within the context is the right form of fertilizer. In many instance the right form may very well be an "enhanced efficiency" fertilizer. While not all are available in every area, many are. Research has been initiated in several emerging nations to take a closer look at how these types of enhanced fertilizers may create a more efficient delivery system that would have long-term benefits for improving development in traditional inorganic fertilizers. Enhanced efficiency fertilizers are available for both nitrogen and phosphorus.

**Combination counts.** Organic matter is also an essential component to productivity, and science supports this. To continue to improve food sustainability, a combination of organic matter management with inorganic fertilizer inputs creates an environment where long-term productivity can take place. These improvements in production allow food security to become a reality at a time and place where an ever-increasing population depends on what can be produced.

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