Agro Services International

Fertilizers or Varieties. Which increases crop production?

Dr. Terrence Fullerton

Increasing crop yields is absolutely necessary if we are to be able to feed the increasing world population. This is especially important in developing countries where most of the population increase is occurring. However, there seems to be some confusion as to how this yield increase can be achieved.

In many parts of the world, there is an incessant search for new high yielding crop varieties. These new varieties often fail to increase crop production. Why?

We also have many people constantly conducting fertilizer trials, and no matter how much fertilizer is used, they do not increase yields. Why?

To understand the problem, let us compare our crops with factories. A high producing factory requires three things no matter what the product is. It requires efficient machinery, an adequate supply of all necessary raw materials and a good manager to ensure that things run smoothly.

If we want to increase the production of a factory, we need to first determine what is the limiting factor is; what is slowing down the production process.

If the equipment is old and simply cannot run faster, we need to get new equipment. If the equipment can produce more but we do not have enough raw materials, we need to get more materials. If we have good equipment and enough raw materials but the production system is not well organized, then buying new equipment or more raw materials will not help, we need better management.

Crop production is not different from our factory. High crop yields needs the same three things; good crop producing machine (the variety), a good supply of raw materials (nutrients, water, sunlight, air) and a good manager (the farmer) to make sure things run smoothly.

If we want to increase crop yields in any situation, we first need to determine what is holding back production. If the problem is a poor variety, then that is what we need to change.

An excellent example can be found in tropical rice production. Tropical countries have been growing rice for centuries, but yields remained stagnant at around 2 tons per hectare.

There were attempts to increase yields early in the 1900's by applying fertilizers, but this was an absolute failure. The reason was simple; the varieties that existed then simply could not produce more. More raw materials (nutrients) could not make inefficient machinery (varieties) produce any better. Yield increases were not achieved until improved varieties were introduced.

If we have good varieties but the nutrient supply is inadequate, better varieties cannot help, we need improved

fertilization. Again, an excellent example can be found in rice production.

After the new varieties were introduced into many countries, rice yields increased from 2 tons per hectare to around 4 tons per hectare. The aim is now to go to at least 8 tons per hectare. The plant breeders have been busy developing varieties that can produce much higher yields, but they have failed to increase yields in many cases.

The reason is simple. The new machinery (the varieties) is now capable of producing more than 8 tons per hectare, but the raw material supply (nutrients) is sufficient for only 4 tons per hectare. Under these conditions, new varieties cannot help, we need better fertilization.

A better raw material supply does not simply more material, it means more of the materials that are in short supply. In our factory, if we run out of screws, buying more paint will not help, we need screws. In our crop, if we do not have enough phosphorus, applying more nitrogen will not help, we need the phosphorus.

Too many people are making this mistake in the field. For example, many rice (and other) researchers and growers are trying to apply more nitrogen to fields that do not contain enough phosphorus or potassium. When they get no increase, they conclude that fertility is not the problem.

Then we have the most important factor, the grower. The best varieties, fertilizers, irrigation equipment and pesticides are of no use unless the grower knows how to manage his crop. We all know growers who produce less than their neighbors simply because they do not do manage their fields properly.

So, what should we focus on if we want to increase yields? There is no one answer; that depends on the actual circumstances.

In many countries where agriculture is well developed and very efficient, you will find that the fields are well fertilized and managed, the variety is the limiting factor. In this case, searching for new varieties makes sense.

In other areas, especially in the less efficient countries, the existing varieties are producing much less than they can; nutrition or management (or both) is the problem. The solution is obviously to improve fertilization and/or management, not varieties.

It is very important to remember that improving fertilization does not mean increasing the rates of the existing fertilizers. It is necessary to examine the supply of all the nutrients, including secondary and micro nutrients, then apply those which are in short supply.

205 East Michigan Avenue
Orange City, Florida, 32763
Tel 386 775 6601 Fax 386 775 9890
E-mail agro@bitstorm.net
www.agroservicesinternational.com