

Crop Production and Environmental Protection

Since soils were first cultivated to grow food, crop production has had an impact on the environment. Farming affects both soil and water quality, and those effects have not always been positive. But with modern agricultural techniques and careful management, a positive balance can be maintained between well-nourished crops and environmental protection.

Through ancient history, farmers tilled their fields and harvested the crops, but did not appreciate the importance of replacing the nutrients removed in the harvested crops. Over time these soils became infertile, resulting in poor yields, increased erosion and runoff, and the pollution of rivers and streams. As soils 'wore out', farmers and their families moved on to new locations and began the process again.

In too many parts of the world today, poor soil and water stewardship is practiced by farmers, many desperate to grow enough food to survive. Sloping, hilly soils are cultivated, often resulting in massive loss of topsoil and surface water pollution. Soils are mined of their fertility, and then left to the ravages of nature. The environment suffers as the land erodes or slowly heals.

However, modern farming practices have helped to change the relationship between crop production and the environment. Progressive farmers are good stewards of their soil and water resources, and they are aware of their role in conserving global resources. Modern farmers recognize that crop management and planning, including the use of fertilizers, must consider a long-term perspective, rather than simply those results expected for the current year.


As the world population grows and the demand for food increases, farmers are being challenged to produce more crops on their land. The task of providing food for an additional million mouths every five days makes the link between food production and maintaining environmental quality even more urgent. To accomplish this, farmers must use fertilizer and manure to supplement soil nutrients to grow high-yielding, high-quality crops. At the same time, though, they must be careful to maintain a close balance with nature, and they are increasingly doing a credible job of that.

As farm yields continue to increase, so does the efficiency of fertilizer use. This is reflected by the fact that significantly more



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units of crops are now being produced per unit of fertilizer applied to the soil. This means that more of the applied nutrients are taken up by high-yielding crops, with less potentially washed into surface waters or at risk of leaching into groundwater. It also means that more ecologically fragile land can be taken out of crop production and set aside for wildlife, recreation, wetlands, and other uses protective of the environment.

The dividing line between environmental protection and potential damage to our soil and water resources is not always clearly marked. However, modern farmers walk that line every day and are learning to manage plant nutrients to grow high-yielding crops while protecting their environment. Farmers and their families drink the water, breathe the air, and eat food from their farm. **Everyone wants to get the balance between crop production and environmental protection right!** 

FOR FURTHER READING:

- Burney, J.A., S.J. Davis, and D.B. Lobell. 2010. *In*. Proceedings of National Academy of Science 107(26): 12052-12057.
- Cassman, K.G. 1999. *In*. Proceedings National Academy of Science 96: 5952-5959.
- Foley et al. 2005. Science 309: 570-574.
- Foley et al. 2011. Nature 478: 337-342.