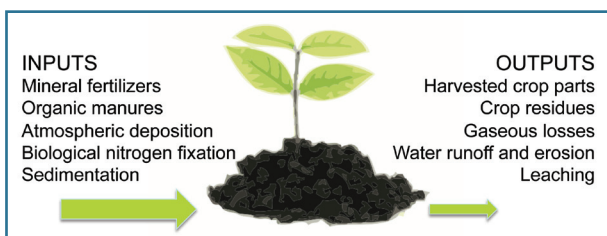


Nutrient Balance Can Be Achieved Using Both Inorganic and Organic Sources

Nutrient Balance involves keeping track of nutrient additions and removals to maintain soil fertility and environmental protection.

Calculating this balance generates useful and practical information on whether the nutrient status of a soil is being maintained, built up, or depleted with the use of various inorganic and organic nutrient sources.



Understanding crop nutrient balance is important. Most current intensive production systems are characterized by heavy nutrient removal during harvest. In these cases, inadequate nutrient replenishment results in a negative balance, eventually leading to depletion of soil nutrient reserves. Thus, for sustaining crop productivity, building and maintaining soil fertility is important. Both inorganic and organic sources play a crucial role in providing optimum nutrient balance.

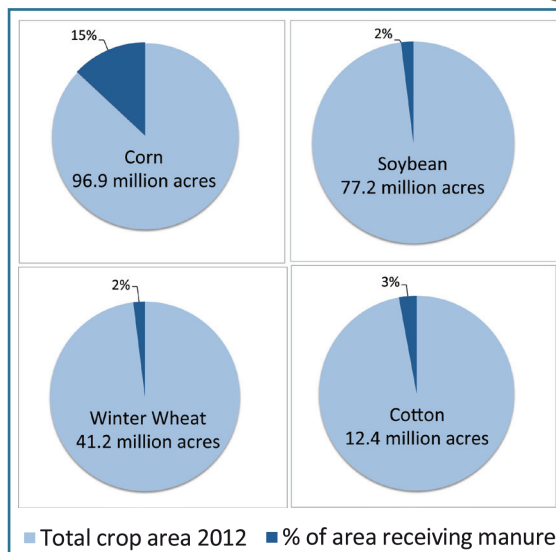
In some cases, nutrient balances are calculated considering inputs only from inorganic fertilizer sources. However, it is important to consider and quantify nutrient contributions from organic sources such as animal manure, crop residues, composts and others including irrigation water and rainfall when calculating nutrient balances.

The impact of modern agriculture on the environment has been the subject of much discussion. Some challenge the sustainability of high yield crop production, particularly from an environmental standpoint. Some claim that any synthetic input—such as commercially produced mineral (inorganic) fertilizers—will eventually damage, if not destroy, the environment. The fact is, that nutrient balance using both inorganic and organic sources goes hand-in-hand with ecologically intensive crop production.

Positive nutrient balances should prompt further examination. When nutrient balances are positive (more nutrient inputs than outputs), further questions should be asked to determine why this is occurring. In nutrient-deficient soils, it is generally

recommended that more nutrients be applied than are removed in the crop, in order to build soil fertility. Not all of the nutrients added in fertilizer or organic sources will be recovered by the plant in the year it is applied. Sometimes, a multi-year nutrient budget that addresses crop rotations is more appropriate. If nutrient balances are consistently very positive, questions about potential leaks into the air or water should also be considered.

Using both inorganic and organic nutrient sources, farmers can provide balanced nutrition necessary to achieve high crop yields while protecting the environment. Farmers should use all available nutrient sources (a practice called Integrated Nutrient Management) to grow crops. It is not possible to change the ratio of nutrients of organic materials to meet the specific requirements of individual fields and crops. However, inorganic sources can be precisely blended to meet specific crop needs and can offer the greatest flexibility in tailoring nutrient applications to keep nutrients in balance.



U.S. planted acres in 2012 and estimates of acreage receiving manure in the most recent surveyed years (2006 to 2010) (USDA National Agricultural Statistics Service and Economic Research Service).

FOR FURTHER READING:

- Chander et al. 2012. *Journal of Tropical Agriculture*, 50 (1-2): 24-29.
- Dobermann, A. and K.G. Cassman. 2002. *Plant and Soil* 247: 153-175.
- Potter et al. 2010. *Earth Interactions*. 14(2): 1-22. doi: 10.1175/2009EI288.1
- Vitousek et al. 2009. *Science* 324:15-19-1520.