

DROUGHT IMPACTS ON SOIL FERTILITY

Key Points

1. Drought reduces crop yields, which reduces fertilizer demand
2. Use soil tests to determine fertilizer requirements
3. Some nutrients are more vulnerable to drought than others - pay particular attention to nitrogen and boron
4. Base your fertilizer program on expected yields

Drought/Crop Yield/Fertilizer Demand

The primary impact of drought on a crop is a reduction in yield. Therefore, if drought is anticipated, you should plan your fertilizer program accordingly. For example, if yields are anticipated to be only 75% of normal, your fertilizer applications may be reduced by a similar amount.



Under irrigated cropping systems, it is important to collect as much information on available water supplies as early as possible, in order to plan your crop management. If reservoirs are low, snowpacks are below normal and well levels are down, it is likely that irrigation use may be restricted.

Knowing when irrigation water is likely to be restricted is also important in planning crop management. If you know early in the spring how much water is likely to be reduced, and when, you can make decisions on planting, re-seeding etc. and determine where, what kind and how much fertilizer you need. If potential drought changes your crop plans from re-seeding an alfalfa field to planting a short growing season cereal crop to provide emergency forage, your fertilizer needs will change. The primary fertilizer required by established alfalfa is phosphorous. Phosphorous is a stable nutrient in the soil and does not change much under drought conditions. In contrast, crops that have a high nitrogen requirement, such as corn and grasses have fertilizer demands that are impacted more by drought. As drought reduces yields, to avoid problems of nitrate accumulation in the plants or loss of unused soil nitrogen due to leaching in the fall/winter period, nitrogen levels also need to be reduced.

Changes to fertilizer application should be based upon soil test results, as changes in application are more critical for some nutrients than others.

Nitrogen

Nitrogen is the most critical of the major nutrients, as it is the most volatile and mobile of nutrients, with the shortest soil storage life. On irrigated forage crops, the best practice may be to split nitrogen applications into two or three applications, rather than one large application. Splitting nitrogen applications, for example, to apply approximately one-half in early spring, with the balance after first and second cuts, allows for adjustments to be made if water restrictions come into effect.

Excess nitrogen, relative to plant growth, can also create problems. Plants that have growth restricted due to drought may accumulate high nitrates, which can be toxic to livestock. This can occur on pasture, as well as in harvested forages (hay or silage, although nitrate level is reduced somewhat by the ensiling process).

Phosphorous & Potassium

Phosphorous and potassium are more stable in the soil than is nitrogen. Fertilizer that is not used by the crop, due to lower yield caused by drought, will most likely be available the next season for use by the crop. This will impact your fertilizer management in the year following a drought, as soil levels of these nutrients will likely be higher, so not as much will be required. It is important to determine levels of these nutrients through use of a soil test to avoid applying excess fertilizer, which is hard on your pocket book and hard on the environment.

Boron

Alfalfa is sensitive to boron levels and drought reduces boron availability. Boron deficiency (bronze to yellow on the top leaves of alfalfa) usually shows up first on dry ridges and light, sandy soils. Boron soil levels become more critical during periods of drought, so it is important that boron levels be maintained if drought stress is anticipated. As the amount of boron required is small, only about 2 kilograms per hectare per year (2 pound per acre per year), application must be based on soil test results. Excess boron can be toxic to many crops.

Fertilize to Expected Yields

Drought can affect irrigated crop producers, by reducing yields, changing crop quality and even determining what crops you grow. Planning your fertilizer program based on anticipated yields and the crops you grow can save you money and protect the environment.