UC CE

NITROGEN BEST MANAGEMENT PRACTICES

Cindy Fake, Horticulture & Small Farms Advisor, Nevada & Placer Counties

Publication Number 31-080C
(Feb. 2016)

Nitrogen is a critical pollutant in the surface and ground waters of the State of California. Thus, its use is monitored by the Regional and State Water Quality Control Boards. Nitrogen is also a critical nutrient for most crops, and many plants need significant quantities to produce adequate yields. Most fertilizers contain soluble nitrogen, which is very mobile in the soil, and easily leached into runoff, surface, and groundwater. Planning and management are necessary to be sure that the nitrogen you are applying is taken up by your crops, and not lost to the environment.

Key Practices to Reduce Nitrogen Losses on Farm

- Use recommended amounts of nitrogen for your crop. Do not exceed the requirements for your crop as it may have negative impacts on crop quality as well as polluting surface and groundwater.
- Have your soil and plant tissue tested regularly to monitor nitrogen availability and crop needs.
  - For perennial crops, test soil every 3 years after a baseline is established and your nutrient management program is set. Test plant tissue every other year; annually if you are still establishing a baseline.
  - For annual crops, test soil annually or seasonally if you are planting multiple crops on the same ground. Test plant tissue once or twice per season.
- Consider nitrogen from all sources when calculating fertilizer needs. These may include crop residues, cover crops, mulch or compost, and irrigation water. In the foothills,11-25 lbs. of N are deposited per acre per year from air pollution in the valley.
- Apply irrigation to meet crop needs. Overwatering increases nitrogen loss through leaching and can delay fruit ripening and diminish fruit quality.
- Maintain soil organic matter through planting cover crops. Legume cover crops fix nitrogen, which is stored in an organic form and is not leachable. It is broken down as needed by soil microbes into forms that plants can absorb. Grass cover crops do not fix nitrogen but they can capture applied nitrogen and reduce leaching. The soil organic matter that cover crops provide serves as a storehouse for nitrogen and other important plant nutrients such as phosphorus and sulfur.
- Maintain soil vegetative cover, either "native cover" or cover crops. Vegetative cover reduces the impact of rain droplets and the speed of runoff, reducing soil and nitrogen losses. The plant roots stabilize soil and reduce erosion on slopes.
- Use organic mulches, compost, or composted manures under trees and vines. These increase soil organic matter and can slow nitrogen losses to runoff and volatilization (N loss to the air).
- Do not apply manure or compost immediately before rain.
- In annual crops, use mulch between beds to capture runoff, and on beds, if practicable.

Placer County 530.889.7385 **Nevada County** 530.273.4563
http://ucanr.edu/sites/placernevadasmallfarms/

United States Department of Agriculture, University of California, Placer and Nevada Counties cooperating.

- Plant hedgerows or grasses on lower slopes to slow runoff and catch soil and nutrients moved in rainfall or irrigation water.
- Incorporate manures, if possible, as that reduces nitrogen leaching and volatilization losses. For orchard and vine crops, mix manure with wood chips to hold it in place and reduce leaching.

Timing of Nitrogen Applications

- Do not apply nitrogen in the dormant season. In normal rainfall years, research shows up to 90% of nitrogen applied in late fall/winter can be lost in runoff.
- Apply nitrogen during the growing season when plants can take it up rapidly and incorporate it. Start applications after heavy rainfall has diminished in the spring. Apply during rapid growth periods, such as shoot growth or growth flushes.
- Nitrogen application timing depends on species:
  - ***Citrus***: Apply March thru June or July, depending on species. Split into 3 or more applications.
  - ***Grapevines***: Apply from budbreak through fruit set. Split applications in decomposed granite soils to avoid leaching losses. If you plan to apply nitrogen after harvest, your vines need full, functional canopies to take up N. Apply before October 1.
  - ***Peaches and Nectarines:*** Apply N in mid-spring at the beginning of vegetative growth and in late summer after harvest, as long as the leaves are still green and temperatures are warm.
  - ***Pear***: Apply N in spring and one month before harvest
  - ***Plums:*** Apply N in spring, during the period of rapid shoot growth, from mid-April to June. A late summer application supports the next year's flowers.
  - ***Walnuts***: Apply N from start of shoot growth to nut fill (April to late July/early August).

Best Nitrogen Practices for Vegetables/Annual Crops

- Apply nitrogen through irrigation; it provides minute quantities which are readily taken up by plants and used. Match your N application amount to the growth stage of the plant.
- ***Tomatoes*** take up very little N in the early growth period. Most of the N uptake happens during rapid growth between early fruit set and early red fruit stage, so be sure there is adequate N in that period. For indeterminate tomatoes, continue to add small amounts during the long production season.
- For ***broccoli***, N uptake is very low in the first 3-4 weeks of growth, so if preplant N or starter N maybe susceptible to leaching. N is used up rapidly, during the last 4-6 weeks before harvest, so side dressing is a critical component of the nutrient program.

Sources

CDFA & UC Davis California Fertilization Guidelines. https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Guidelines.html

UC Vegetable Research and Information Center (VRIC) http://vric.ucdavis.edu