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Fact Sheet 94-11

Using Fertilizers Properly
A Tahoe Landscape BMP* Fact Sheet for Lake Tahoe

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Introduction

Fertilizers are used to supply plants with essential nutrients when they are in short supply in the soil. Because they are needed in large quantities, nitrogen (N), phosphorus (P) and potassium (K) are considered the three **primary nutrients** necessary for plant growth. In Tahoe Basin soils, N and P are the most commonly deficient nutrients. Consequently, when fertilizer containing these nutrients is supplied to plants, there is usually an increase in growth.

To be most effective, fertilizers need to be applied properly. Proper fertilizer application will not only improve plant health and growth, but it will save money and time, and most importantly, help protect the crystal clear beauty of Lake Tahoe. If fertilizers are improperly applied, the nutrients they contain will bypass the plants they are intended for and end up in downstream waters where they stimulate the growth of another plant, algae, spoiling the crystal clear beauty of Lake Tahoe.

Relative Need for Primary Nutrients by Plant Type:	
Vegetables.....high	Lawns.....medium to high
Fruits.....medium	Annual flowers…….....medium
Perennial flowers…..……...…medium to low	Herbs…….....…medium to low
Deciduous shrubs…….…….....medium to low	Deciduous shade trees…....……medium to low
Evergreen shrubs……....……low	Evergreen shade trees……....…low
Native plants……...…very low	

Do you need to fertilize?

Do not routinely apply fertilizer when it may not be needed. Have a good reason for using it. Plants exhibit symptoms of specific nutrient deficiencies. For instance, the most common symptoms of N shortage are a general yellowing of older leaves and poor growth. Young leaves remain green. Phosphorus deficiencies commonly appear as a reddish color along the edges of leaves and next to the veins. Deficiencies of K are not as obvious, but may show up as mottling on leaves and poor growth. Growth reduction is another symptom that may not be apparent unless there are healthy plants nearby. Sierra Nevada soils are typically not deficient in K. Plants native or adapted to the Tahoe Basin and the Sierra Nevada will not need fertilization and in fact may be harmed by it.

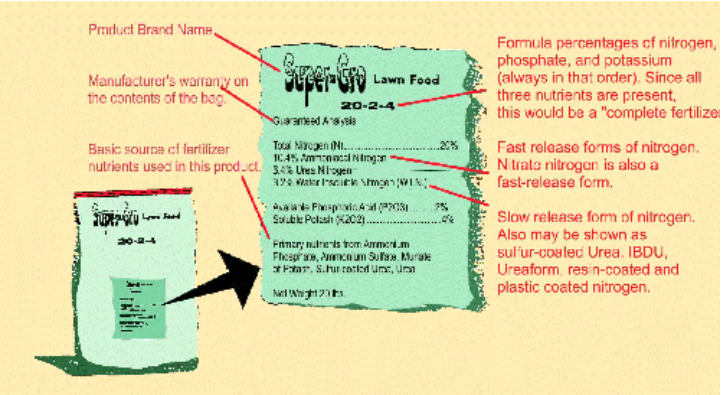
Fertilizer Selection

In Nevada and California, fertilizers are regulated by State Law. Fertilizers must have a minimum content of 5% of one or more of the three primary nutrients (N, P, K). Products not containing this minimum content are classified as AGricultural Minerals. These include gypsum, manure, and some composts. Fertilizers are classified as either organic or inorganic, depending ont he source of their nutrients. Organic fertilizers contain nutrients derived from the remains or by-product of once-living organisms. Inorganic fertilizers are synthesized from non-living materials. The nurient source makes no difference to a plant. Examples of organic fertilizers include compost, bone meal, bloodmeal, sewage sludge, and fish emulsion. Inorganic fertilizers are typically salts, some of which are ammonium sulfate, potassium chloride and potassium phosphate.

Organic Fertilizers	Inorganic Fertilizers
Advantages	Advantages
improve soil health less-leachable contain multiple nutrients	low cost per unit of nutrient consistent nutrient analysis immediately available to plants* most are easily handled
Disadvantages	Disadvantages
high cost per unit of nutrient bulky	potential nutrient loss by leaching* leaching loss causes water pollution* easily over-applied* *slow release N forms are exceptions

Nitrogen fertilizers can be further divided into two categories quickly available to plants, also called soluble or fast release, and slowly available sources, or slow release. The quickly available sources are inorganic salts that are very soluble in water, and include ammonium sulfate, ammonium nitrate, ammonium phosphate, and potassium nitrate. Quickly available nitrogen is easily misused resulting in waste, plant burn and water pollution. To avoid these problems, split the fertilization into two separate applications two to three weeks apart, and irrigate carefully, to avoid deep leaching or causing surface runoff.

Slowly available N includes slowly soluble forms (urea form, IBDU), slow release (sulfur coated urea) and the natural organic types mentioned above. The method of N release differs depending on the source. This means that the environmental conditions causing release are also different for each form. Slowly available forms of N provide lower concentrations of nutrient over a longer period of time. This decreases the likelihood of plant burn and increases the probability the nutrients will be used by the intended plants rather than pollute streams and lakes. Slow release nitrogen in inorganic fertilizers is often listed on the label as W.I.N., or Water Insoluble Nitrogen. Nitrogen fertilizers are classified as fast, medium or slow release depending on the amount of W.I.N. they contain. Fertilizers containing less than 15% WIN are classified as fast release, between 15 and 30% are medium, and more than 30% WIN are slow release. The label shown in Figure 1 contains 3.2 divided by 20 which equals 16% W.I.N. This product would be classified as a medium release fertilizer.



Combination fertilizer-herbicide, or "weed and feed" products, are available for use on lawns. Their popularity is due to their convenience; only one application is required to fertilize the lawn and simultaneously kill weeds. However, the timing for a fertilizer application seldom coincides with the appearance a weed, disease or insect problem. This causes unnecessary, and potentially harmful applications of either fertilizers or pesticides. It is preferable to purchase and apply pesticides separate from fertilizers, and only the amount needed.

How much fertilizer should be applied?

It is best to determine fertilizer application rates in terms of the actual nutrient applied. Fertilizers are characterized by a guaranteed analysis that shows the percentage (by weight) of nitrogen (N), phosphorus (P2Os) and potassium (K2O), in each bag (see Figure 1). For example, a bag of20-2-4, fertilizer contains 20% nitrogen, 2% PROS and 4% K2O by weight. You can use a simple calculation to determine how much fertilizer it takes to apply a recommended amount of a particular nutrient. Using the above fertilizer as an example, if you needed to apply 2 lbs. of actual N simply divide the 2 lbs. needed by 20 percent or .20 (the fertilizer's N content). The answer is 10. So to get the recommended 2 lbs. of N. apply 10 lbs. of the fertilizer. This is only an example.

Fertilizer Application

Fertilizer can be applied in a variety of ways, including:

- Surface application
- Soil incorporation
- Foliage spraying

The appropriate method for any application depends on the nutrient, the slope of the soil surface, the fertilizer type, the equipment available, and plants to be fertilized.

- Surface Application is efficient and just as effective as any other method for N fertilizers. It is less effective for applying P due to its slow movement through the soil. Fertilizer spreaders, either hand-held or push-type models, are fast surface applicators and give even coverage. If applying fertilizer to bare soil, lightly rake it into the soild surface following application. Organic fertilizers should also be incorporated into the soil following broadcasting on the soils surface.
- Soil Incorporation is the best method for applying low solubility nutrients like P and K. The fertilizer can be placed in holes or in a trench dug around the plant to be fertilized. Incorporation will not be possible with established turf and beds and surface application will be necessary. If fertilizers can not be raked or tilled into the soil, then irrigate following surface application to incorporate the fertilizer into the soil.
- Foliage spraying is an effective way to apply iron, zinc, and other less important nutrients to plants. However, it is difficult to measure the amount applied and it is not a recommended method for applying P or K.

Proper Irrigation

Irrigating properly following fertilizer application is as important as using the right fertilizer, at the right time in the right amount. Overwatering fertilized areas can cause nutrients to leave the site by way of surface runoff or subsurface leaching. Such overwatering wastes money and pollutes Lake Tahoe. Be careful to apply water slowly and in the right amount so it soaks into the soil and wets only the area of the soil occupied by plant roots. To determine how much water this will take, refer to the companion fact sheets on turf, and tree and shrub fertilization.

Tips for Protecting Water Quality

- Avoid using fertilizers near stream zones, shorelines or on saturated soils.
- More is not better with fertilizers - **do not overfertilize.**
- Use only the nutrients necessary - get a soil test.
- Do not put fertilizers over snow.
- Fertilize only in spring and fall when plants need it.
- Do not overwater after fertilization - nutrients are lost in surface runoff and leaching.
- Landscape with Sierra Nevada natives. These plants are adapted to local conditions and need little, if any, fertilizers or irrigation once they are established.
- Sweep all fertilizers, soil and plant clippings off paved surfaces to prevent the nutrients they contain from washing into Lake Tahoe.
- A good fertilization program promotes healthy plants that are resistant to insects and diseases. However, improper use of fertilizers can damage plants and pollute lakes and streams. By understanding and following the information in this fact sheet, you can keep your landscape in good condition and protect Lake Tahoe's world renowned clarity at the same time. For more information on soil testing, fertilization and plant recommendations, call University of Nevada Cooperative Extension at 832-4150 or 784-4848, or the USDA Soil Conservation Service.

**BMP stands for Best Management Practice. BMPs are land use practices designed to prevent or minimize water quality problems.*