LINWOOD SUPPLY, INC.

Fertilizer selection for re-vegetation and erosion control.

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The optimum nutritional needs of a single growing plant or group of plantings should be based on the "Crop" needs. For revegetation and erosion control, our "crop" consists of the forbs, grasses, trees, shrubs and other plants we determine are best suited to repair or restore a site or to control erosion. Unlike agriculture, where most plant fertility recommendations are, with exceptions like orchard trees, based on relatively short periods of time, our "cropping season" can be measured in months, years, decades and for some plants, centuries, depending on the site and selection of desired vegetation. There are many types, kinds and brands of fertilizer to choose from for erosion control and site restoration. There are several factors to consider when recommending a fertilizer to be used in conjunction with hydromulching, also known as hydroseeding. These include release rates, mode of release, the potential of ground water contamination and surface runoff, environmental degradation of product, soil type and ease of handling, and the plant responses to the nutrition provided.

The choice of fertilizer begins with the actual needs at the site and the plant material being seeded. You should have a basic soil test performed to determine existing levels of nitrogen, phosphorous, potassium, and consider testing for calcium, iron and sulfur. The other micronutrients are normally present in sufficient quantities to ensure adequate growth for erosion control purposes. Nitrogen levels will fluctuate depending on temperature and rainfall, so a test for nitrogen in October will no longer be accurate in April.

Plants require nitrogen (N) for vegetative growth; phosphorous (P) to stimulate early growth and root development; potassium (K) is essential for the translocation of sugars and starch formation; and iron (Fe) to assist with photosynthesis. Calcium (Ca) is utilized for cell wall construction and is required for new cell growth in all plant structures. Because available phosphorous, potassium, iron and calcium are not greatly affected by short term environmental factors, the selection of fertilizing material focuses on nitrogen.

Most of the nitrogen taken up by plant roots is in the nitrate form (NO-3); a very small portion is taken up in the ammoniacal form (NH-4). Any nitrogen based material (except nitrates) must be changed or modified to the nitrate form before it can be utilized by the plant. This is true regardless as to "natural" vs. man made, or "fast release" vs. "slow release" nitrogens - all must be broken down to the nitrate form. This process is known as nitrification and is accomplished by soil bacteria (nitrosomonas and nitrobactor bacteria). The soil factors which influence nitrification include: a healthy population of soil bacteria, organic matter, aeration or the presence of oxygen, a soil pH range between 5.5-10.0, soil temperatures between 60° - 95° F, and soil moisture. During periods of hot temperature, such a summers in California's Central Valley, nitrogen can be lost from the soil when ammoniacal nitrogen is volatilized and released to the atmosphere in gaseous form.

Based on soils testing or on known crop needs, the selection of the type of nitrogen to be applied, usually as a pre-plant, is generally the single most important factor in considering which fertilizer to utilize for erosion control. The other nutrients are also important, particularly in regards to long term nutritional planning. The environmental conditions during time of year the application is made are the primary influencing factors which will determine the nitrogen source to be selected.

Some terms and definitions:

Nitrate fertilizers: These include Calcium Nitrate (15.5-0-0), Potassium nitrate (13-0-44), and fertilizers containing nitrates such Hydro-Prills 15-16-16 and 21-7-14. Nitrates are not commercially be blended with other fertilizers due to production problems.

Ammoniacal fertilizers: These include ammonium sulfate (21-0-0), ammonium phosphate (16-20-0 & 11-52-0), and complete fertilizers such as 16-6-8 or 15-15-15. Ammoniacal fertilizers are usually fast acting in warm temperatures and will work well in the spring. A liquid form is AN 20.

Combination Fertilizers contain both ammoniac and nitrate nitrogen in the same prill. Hyrdo-Prills and Turf Royale are good examples of these products. If you are seeding for erosion control in the fall, these products are an excellent choice.

Synthetic Urea is 46% nitrogen (46-0-0) and is made available to plants by rapid microbial action. Urea is the base molecule for most of the slow release fertilizers. As a stand alone fertilizer it is usually too "hot" (fast release) for hydroseeding because the emerging seedlings can be injured or "burned" by this product. Urea is safe to use in during cool temperatures or if irrigated. Chemically synthetic, urea and man made urea are identical..

Organic fertilizers: These are derived from composted plant material and manures. Organics should be used in areas where the soil is sterile or has low bacterial populations. Because of the high volume required, organics are usually blended in the hydroseeder with inorganics such as ammonium phosphate. Manure is frequently mixed with green waste during composting.

Compost: Not usually considered to be a fertilizer in the traditional sense. Compost does have some nutrient value and is often applied through a hydromulcher. An analysis of the nutrient values should be available from your supplier. Applications of compost through a hydroseeder will not significantly change a soil's structure or composition. To make a significant change in a soils structure, compost, should be applied in large volume, bulk quantities and tilled into the top six inches of soil or deeper. Calculate the quantity of compost required by volume not by weight, moisture content will affect the weight, reputable suppliers sell compost by volume (ie cubic feet, yards or meters).

Micronutrients are available as single nutrients such as manganese sulfate (MnSO4), and as chelated products. Multi nutrient "packages" are available that contain several of these nutrients. Micronutrients are available as both liquids and dry forms; the liquids can be impregnated on to dry fertilizers. These nutrients are an essential part of a successful, long term nutrient recommendation.

Slow Release fertilizers: There are two primary forms of slow release nitrogen: coated and molecular. Coated materials include fertilizers such as Sulfur Coated Urea (SCU) or polymer coated granules (Osmocote, Polyon). Many brands of SCU now have a thin polymer coating to allow a thinner coat and higher nitrogen content such as "polymer coated sulfur coated urea". In some brands the polymer coating is layered and contains one or more micro nutrients. Many of the coated products can be damaged and broken due to impact with pumps, paddles and nozzles during the hydroseeding process, however, most polymer coated products will survive intact. All of the molecular-based fertilizers can be used when soil conditions support the bacteria required for nitrifaction: spring, late summer and fall. Molecular slow release nitrogen fertilizers include products such as Ureaform (38-0-0), Methylene Urea (40-0-0) and lsobutlyene-diurea or IBDU (31-0-0). Because these products are crystalline structures, they will perform as expected even if broken by mechanical impact .

Liquid Fertilizers are not commonly used for hydroseeding at present. These products have similar release and chemical characteristics to the dry fertilizers and can be blended to your specifications. Note that these products include AN 20 and CAN 17, which are normally delivered in bulk, by the truckload. Liquid fertilizers can be injected into irrigation water or applied as a drench or spray.

BioStimulants: These products include, kelp, humic acids and other stimulants. Beware there are many reputable suppliers and many of these products provide phenomenal results but at the same time many of these products have no value whatsoever. Kelp based products also offer a wide range of micro nutrients and include active growth regulators, amino acids and other plant stimulants. Many of the elements contained in kelp have no nutritional value to plants but are essential to healthy and viable (beneficial) bacteria and fungi. We recommend the use of kelp (liquid) for thee purposes. Humic acids function in several ways, one of which is, to bind to anionic clay particles then provide additional "sites" for cationic exchange.

Beneficial micro organisms. These are not fertilizers or nutrients however are mentioned here because of the functions they are involved in. Mycorrhizae are beneficial fungi which form symbiotic relationships with most plant species and essentially aid the root hairs in their functions of water and nutrient assimilation. Other Fungi such as the Trichoderma utilize plant pathogens nematods as a food source. Soil bacteria are essential in the nitrifaction process and also in the breakdown of other minerals and elements. These beneficial organisms can be added to fertilizers and compost.

Blends: Two or more fertilizers can be blended or mixed together like a mixture of salt and pepper. A blend could be made to include two or more sources of nitrogen (except for nitrates). For example, if you are seeding an irrigated site in June, you may want to combine the effects of a quick release of ammoniacal nitrogen with the long term benefits of a slow release fertilizer. Within limits, you can also specify the N,P,K analysis and additional micronutrients. Non-nutrient materials can also be blended with the fertilizers such as compost, surfactants, and microbials or innoculants.

Homogeneous fertilizers: These contain more than one nutrient within a single pellet and each pellet is identical. If a fertilizer has pellets or prills with two or more different colors (salt & pepper) it is not homogeneous. Many manufacturers offer homogeneous pellets. The Hydro-Prills 21-7-14 (Yara) is an example of a homogeneous fertilizer.

Complete Fertilizer: A complete fertilizer contains Nitrogen, Phosphorous, Potassium and may be either a blend or homogeneous; micronutrients can be included or not depending on the usage.

Simple Fertilizer: A fertilizer that has only a single macro nutrient (N,P or K) and is derived from one component such as 21-0-0 ammonium sulfate (21 % nitrogen and no phosphorus or potash, sulfur is present as a secondary).

Regulations

Analysis. Each bag of fertilizer will have an analysis stating the contents of the fertilizer on a percentage basis, the weight of the bag and the source of the nutrient. These regulations vary by state.

Oxidizers/HazMat: Some fertilizers such as Potassium nitrate and Ammonium nitrate are oxidizers, and are classified as hazardous material by the US DOT. (Calcium nitrate is not an oxidizer). Others are considered hazardous for other reasons, such as copper sulfate, which is potentially lethal to aquatic organisms including fish.

Heavy Metal Content: Some of the states (California, Oregon, Washington & others) have passed legislation requiring fertilizer manufacturers to certify their products meet certain standards regarding the contents. including heavy metals; consult with your appropriate state agency for more information.

Storm Water Runoff and NPDES. These regulations vary slightly from state to state and by county but basically, in relation to fertilization, all can be summed up by stating: "*Do Not allow off site movement of nutrients, including water eroded and sediment borne nutrients, to run off into any body of water*". This has become a tremendous problem throughout the United States especially in the Mississippi Valley causing the destruction of habitat in the gulf of Mexico. Take care to apply fertilizers to the soil, don't over apply, keep fertilizer off streets and sidewalks, clean up spills, do not "wash it off down the gutter. Some agencies will fine the contractor and the landowner for allowing storm water runoff to remove nutrients and silt, these fines are typically based on the total gallons of dirty water which have flowed off site.

Our product guides are written to be technically correct and detailed but are always directed to the end user and are intended to be understood at all levels of expertise. No site specific recommendation is made or implied; always consult with local and knowledgeable advisors such as your Pest Control Advisor, Agronomist, University, Certified Crop Advisor or Ag Commissioner for site or crop specific rates or for more detailed information. Always read the fertilizer label and MSDS before buying the product, if there are any questions get them answered before opening the container.

For More Information:

Contact Linwood Supply, Inc by phone at 707 678-5087 or visit our website at www.LinwoodSuply.com

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Table 1. Characteristics of various sources of Nitrogen.

CHARACTERISTICS OF NITROGEN SOURCES					
	Urea formaldehyde	Methylene urea	Isobutylidene diurea	Ammonaical	Nitrate
Abbreviation	*UF*	*MU*	*IBDU*	*NH_4*	*NO_3*
Percent N	38% N	40% N	31% N	11-21%	15-25%
Immediately available N	11% N	25.6% N	3.1% N	100%	100%
Measurement of slow release	W.I.N (CWIN & HWIN)	W.I.N (CWIN & HWIN)	W.I.N (CWIN & HWIN)	Rapidly available	Rapidly available
Release time	12 – 24 weeks	8-16 weeks	12-16 weeks	1-8 weeks depending on environmental factors	1-4 weeks, root activity is important
Release mechanism	Microbial only	Primarily Microbial	Microbial and water hydrolysis	Microbial,	Immediacy available
Release requirements	Moisture soil temperature	Moisture, soil temperature	Moisture	Moisture, soil temperature	Moisture
Best response for hydroseeding	Summer	Summer	Spring & fall	Spring & fall	Winter, cold soil temps
Initial response	Medium-slow	Medium	Medium-slow	Medium-rapid	Rapid
Residual effect	Extended	Extended	Extended	Low	Low
Water solubility	Medium-low	Medium	Medium-low	Medium	High
Soil temperature release dependence	High	Medium	Low	Medium	Low

The above responses will vary between sites, season and other factors.

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