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## **Using Wastes and By-Products As Fertilizers On Pastures**

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As landfills close and traditional options for disposal-of wastes decrease, many wastes and industrial by-product materials are viewed as possible resources for agronomic uses. Many materials termed wastes are rich sources of essential plant nutrients which would be vital to successful crop production. With the escalating costs of fertilizers, utilization of wastes and by-products offer economic advantages to ranchers.

There are numerous varieties and sources of by-products and wastes available as soil amendments in agriculture. These materials come either from industrial plants as by-products or from human municipal wastes. By-products and wastes may be either organic or inorganic.

**Organic Wastes:** The concept of using organic wastes in agriculture is not new. In fact, organic wastes have been used by people around the world for thousands of years to fertilize cropland. Prior to fertilizers being introduced in the 1940s, the major way of fertilizing crops was to mix organic materials (i.e., manure, crop residues and food wastes) with the soil. Organic wastes are a source of slow release nutrients and also help to increase the organic matter of soils which, in turn, improve the nutrient and water retention of sandy soils in Florida. Organic wastes available to growers include: manure, municipal sludge, biosolids (processed, dried municipal sludges), agricultural and urban plant debris, singly or in various combinations or as a compost. Nutrient content of these materials varies with their source (Table 1).

**Inorganic Wastes:** There are numerous industrial by-products that have the potential of improving soil properties and increasing crop production. Some examples include: phosphogypsum (by-product from the manufacture of phosphoric acid), gypsum (by-product from electric power plants burning coal), fly ash (by-product from electric power plants burning coal), lime (by-product from power plants, water treatment plants, etc.), iron humate (by-product from water treatment plants), ammonium sulfate (by-product

from production of nylon and more recently also from electric plants burning coal) and micronutrients (wastes from steel production, smelter dust, electric arc furnace dust, etc.).

Over the past 12 years research has been conducted at the Range Cattle Research and Education Center evaluating the potential uses of waste and by-products on pasture grasses as potential fertilizers and soil amendments to improve soil properties. Studies are also being carried out on the impact of these materials on the environment. Many of these products have had beneficial effects on Florida soils and led to increased yields and improved quality of grasses without having detrimental effects on water. There is no doubt that the future will bring increased use of these materials as soil amendments.

<b>Table 1. Plant nutrient composition of various wastes and by-products.</b>						
Product	N	P	K	Ca	Mg	S
	-----%-----					
Crop residues	1-1.5	0.1-0.2	1.0-1.5	0.2-0.5	0.1-0.3	0.1-0.2
Poultry manure	2-3	2-3	1-2	4.0-4.5	0.6-0.8	0.5-1.5
Livestock manure	2-3	0.4-1.0	1.5-2.0	0.5-2.0	0.3-0.4	0-5
Seafood residues	7-10	1-10	<1.0	7-35	0-0.2	0.5-1.5
Biosolids	3-5	1-4	0	0.2-1	1-8	2-7
Compost	0.5-3	0.1-2	0.2-1	1-4	8-28	10-20
Wood ash	0	0.3-1.5	1.5-7.5	8-28	0.8-2.2	0
Fly ash	0-0.3	0.1-0.5	2.0-7.0	10-20	1-8	2-6
Phosphogypsum	0	0.1-1.6	0-0.02	18-24	0-0.3	13-18
Power plant gypsum	0	0-0.02	0.01	23-24	0-0.3	17-19
Iron humate (16% Fe)	0	1-1.5	0.5-1	1.5-2.5	0.02	2-3
Ammonium sulfate	21	0	0	0	0	24