All materials should be packaged securely. Plastic bags inside cardboard cartons or metal cans are satisfactory. Do not put moist soil or sand in a paper bag - it rarely arrives intact.

Where to Send?

Soil materials should be addressed to:

USGA Green Section
Southwestern Office
Texas A&M University
College Station, Texas

Time Required

Because the Green Section staff members are traveling during a considerable part of the year, please allow at least three weeks for a report on materials submitted for testing. Usually less time will be required, but the analytical procedures require a minimum of one week even when everything works properly the first time. Anticipate your need for analysis sufficiently to allow time for the testing work to be done completely and thoroughly, and for Green Section members to study the results before relaying them to you.

New Fertilizer Labels Coming

Courtesy ASA Farm Press News

Plant food users in several parts of the country noticed two sets of numbers explaining plant nutrient (plant food) guarantees on their fertilizer bags last spring. The system, called **Dual Labeling,** is aimed at a gradual change to a uniform method of expressing primary plant nutrients. The present system is a **Mixture** of elemental and oxide values ($N—P_2O_5—K_2O$). The new method will guarantee **all** nutrients in the elemental form (N—P—K), according to the American Society of Agronomy.

With dual labeling, a fertilizer tag with the numbers 5—20—20 may also have a set of numbers like 5—8.7—16.6. The latter refers to the actual percentage by weight of nitrogen, phosphorus, and potassium guaranteed in fertilizer material.

The present oxide system of labeling phosphorus and potassium makes percentages of these plant nutrients look higher than they really are, because it includes the weight of oxygen combined with the elements. The elemental system is more meaningful and accurate and will eliminate some confusion. It will make the method of reporting phosphorus and potassium conform to that of nitrogen, which has long been reported in the elemental form.

A number of universities have started or will soon start reporting soil test results in **both** elemental and oxide values for phosphorus and potassium. This is part of the educational program planned by several universities, and an example of a national approach needed from industry and colleges. Simple fertilizer scales will make it easy to convert elemental to oxide values and vice versa.

Currently, fertilizer is labeled as required by law in each state. All states require fertilizer manufacturers to print a guaranteed analysis or chemical composition on the fertilizer bag and/or attached tag. In all states the analysis of complete fertilizers is expressed in percentage by weight in the order of $N—P_2O_5—K_2O$.

Inaccuracies Of Present Form

Nitrogen is legally expressed on the elemental basis as "total nitrogen" (N). Phosphorus is legally expressed on the oxide basis as "available phosphoric acid." This term, phosphoric acid, designates the available "phosphorus pentoxide" (P_2O_5). Potassium also is legally expressed on the oxide basis as "soluble potash." The term potash designates the soluble "potassium oxide" (K_2O).

But, in reality, there is no P_2O_5 or K_2O in fertilizers. Phosphorus exists most commonly as monocalcium phosphate but also as dicalcium phosphate, tricalcium phosphate, calcium metaphosphate or one of the ammonium phosphates. Potassium ordinarily is in the form of potassium chloride or potassium sulfate.

The oxide is not the basic functional unit from either a physical or chemical standpoint. Furthermore, P_2O_5 and K_2O are not involved in plant nutrition. Plant roots absorb most of their phosphorus in the form of an orthophosphate ion, $H_2PO_4^-$, and most of their potassium as the elemental potassium ion, K^+.

Current oxide labeling of phosphorus and potassium makes percentages of these two plant nutrients look higher than they are. The chemical compound P_2O_5 contains 5 oxygen atoms for each 2 phosphorus atoms and has a molecular weight of 141.95 of which only 61.95 parts are actual P. The chemical compound K_2O contains 1 oxygen for each 2 potassium atoms and has a molecular weight of 94.2 of which only 78.2 parts are actual K. Oxygen's weight of 16 therefore makes up the difference in weight (see footnote below Table 1).

Nutrients cannot be put into fertilizers as N, P, and K elements, but as chemical compounds which are stable. That's why we do not and cannot have fertilizers containing 100 percent plant nutrients. But, with the current system of expressing P and K as oxides, high-analysis fertilizers of the future could have an analysis of more than 100 percent of plant nutrients (plant food).

The important information in a fertilizer guarantee is the actual amount of plant nutrient in the bag. For this purpose the elemental system is best.

CONVERSION MADE EASY

P_2O_5—K_2O conversion Table in Either Percent or Pounds*

This percent or pounds as the Oxide gives	This percent or pounds as P	and	This percent or pounds as K	This percent or pounds as the Element gives	This percent or pounds as P_2O_5	and	This percent or pounds as K_2O
1	0.44		.83	1	2.29		1.20
5	2.18		4.15	5	11.45		6.01
8	3.49		6.64	8	18.32		9.62
10	4.37		8.30	10	22.90		12.03
12	5.24		9.96	12	27.48		14.43
14	6.11		11.62	14	32.06		16.84
18	7.86		14.94	18	41.23		21.65
20	8.73		16.60	20	45.81		24.05

* Weight of 1 atom: Phosphorus (P) = 30.975; Potassium (K) = 39.1; Oxygen (O) = 16.0

Weight of 1 molecule of the compound:

P_2O_5		K_2O	
2 phosphorous atoms	= 61.95	2 potassium atoms	= 78.2
+5 oxygen atoms	= 80.00	+1 oxygen atom	= 16.0
	141.95		94.2