

FERTILIZER GRADES: DETERMINING APPLICATION RATES OF DRY AND LIQUID FERTILIZER MATERIALS

Larry Bundy
Department of Soil Science
University of Wisconsin-Madison

- A. Fertilizer analysis--Method of indicating the amount of plant nutrients a fertilizer material contains.
- B. Fertilizer grade--The minimum guaranteed amounts of available nitrogen, P_2O_5 and K_2O in fertilizer material (in that order).

example: 5-10-30
 N- P_2O_5 - K_2O
 5% N, 10% P_2O_5 , 30% K_2O (by weight)

1. Fertilizer grades for phosphorus and potassium are expressed on an oxide basis rather than an elemental basis.
2. Fertilizer recommendations for phosphorus and potassium are also usually given on the oxide basis (eg., lbs. P_2O_5 and lbs. K_2O per acre required).
3. There have been attempts to convert the method of reporting fertilizer grades from oxide to elemental basis, but there has been little progress in this direction.
4. Because there is potential confusion between elemental and oxide methods of expressing the amounts of phosphorus and potassium in fertilizer materials, the relationships between these forms are shown below.

Elemental Name	Elemental symbol	Oxide name	Oxide symbol	Plants use
Phosphorus	P	phosphate	P_2O_5	$H_2P O_4^-$
Potassium	K	potash	K_2O	K^+

Conversions:

1 lb. of P_2O_5 = 0.44 lbs. P
1 lb. of P = 2.29 lbs. P_2O_5

1 lb. of K_2O = 0.83 lbs K
1 lb. of K = 1.20 lbs. K_2O

5. Remember that fertilizer materials do not actually contain P and K as P_2O_5 and K_2O , and plants do not take up P_2O_5 and K_2O . The forms are only used to indicate the amounts of phosphorus and potassium in fertilizers.
6. Fertilizer terminology
- Fertilizer ratio--The relative proportion of nitrogen (N), phosphate (P_2O_5), and potash (K_2O) in a fertilizer material.
- | <u>Grade</u> | <u>Ratio</u> |
|--------------|--------------|
| 6-24-24 | 1:4:4 |
| 5-10-30 | 1:2:6 |
| 9-9-9 | 1:1:1 |
- Mixed fertilizer--Contains more than one of the three major nutrients: N, P_2O_5 , K_2O . (eg. 18-46-0)
 - Complete fertilizer--Contains all three of the major nutrients. (eg. 6-24-24)
 - Straight fertilizer--Contains only one of the three major nutrients. (eg. 46-0-0)
7. Calculation of the amounts of N, P_2O_5 and K_2O in liquid fertilizer materials requires information on weight per gallon of the liquid fertilizer.

Weights per gallon of some liquid fertilizers

<u>Material</u>	<u>Weight</u>
10-34-0	11.7
28-0-0	10.7
12-0-0-26	11.1
7-21-7	11.2
9-18-9	11.7
