FERTILIZER MATERIALS AND CALCULATIONS

- A FERTILIZER IS ANY AMENDMENT APPLIED TO PLANTS OR SOILS THAT PROVIDES ESSENTIAL PLANT NUTRIENTS

LEGAL DEFINITIONS - WDATCP

COMMERCIAL/ARTIFICIAL/SYNTHETIC vs. ORGANIC

MOST FERTILIZERS ARE HIGHLY SOLUBLE SALTS. COMBINATION OF POSITIVE AND NEGATIVE IONS THAT DISSOCIATED IN WATER

- FERTILIZER GRADE vs. ANALYSIS

FERTILIZERS ARE CLASSIFIED ACCORDING THE PERCENT BY WEIGHT OF PLANT NUTRIENT

ANALYSIS=% WEIGHT OF ANY ELEMENT
GRADE=% WEIGHT OF N-P$_2$O$_5$-K$_2$O

ALL EXCEPT P AND K ARE BASED ON ELEMENTAL CONTENT
P IS BASED ON P$_2$O$_5$ (PHOSPHATE)
K IS BASED ON K$_2$O (POTASH)

- SHOW GRADE OR ANALYSIS AS follows

6-24-24 (COMPLETE FERTILIZER)
0-14-42 2B (MIXED FERTILIZER)
46-0-0 (SINGLE NUTRIENT CARRIER)

- 100 lb of 0-14-42 2B

0 lb N
14 lb P$_2$O$_5$
42 lb K$_2$O
2 lb B
• WHY IS A FERTILIZER THAT CONTAINS JUST N (46-0-0) NOT 100% N
 46-0-0 = UREA OR CO(NH₂)₂

  ATOMIC WEIGTHS
  C = 12
  O = 16
  2N = 28
  4H = 4
  TOTAL = 60  

  28/60 = 0.46666

  WHY NOT ROUND TO 47 ?

  CONVERT BETWEEN ELEMENTAL AND OXIDE

  P X 2.29 = P₂O₅  
  K X 1.2 = K₂O

  P₂O₅ X 0.44 = P  
  K₂O X 0.83 = K

  FERTILIZERS ARE EITHER DRY OR LIQUID

  • TWO TYPES OF DRY MIXED FERTILIZER

    MANUFACTURED = ALL FERTILIZERS ARE BOUND IN
    THE SAME PELLET

    MORE EXPENSIVE
    LESS FLEXIBILITY ON GRADE
    EACH PELLET HAS THE SAME GRADE

    BLENDED = INDIVIDUAL FERTILIZER MATERIALS ARE
    MIXED TOGETHER

    CHEAPER
    UNLIMITED FLEXIBILITY ON GRADE
    SEGREGATES ON HANDLING
    POTENTIAL SPREADING PROBLEMS

• LIQUIDS

  DENSITY OF LIQUID MATERIALS (lb/gal) IS
  NEEDED TO CONVERT

  EXAMPLE:  gal/ACRE TO lb/ACRE

  \[
  \frac{40 \text{ gal fert}}{\text{acre}} \times \frac{10.8 \text{ lb fert}}{\text{gal}} \times \frac{0.28 \text{ lb N}}{1 \text{ gal fert}} = 121 \text{ lb N/acre}
  \]
RULE OF THUMB FOR 28% (3 lb N/gal)

- CALCULATE COST PER POUND OF PLANT NUTRIENT BASED ON UNIT COST

\[
28\% \text{ UAN} \quad \text{COST} = \frac{\$180}{\text{TON UAN}}
\]

\[
= \frac{\$180}{\text{TON UAN}} \times \frac{\text{TON UAN}}{2000 \text{ lb UAN}} \times \frac{1 \text{ lb UAN}}{.28 \text{ lb N}}
\]

= $0.32/lb N

MEETING FERTILIZER RECOMMENDATIONS

APPLICATION RATES EXPRESSED AS lb/a

1 ACRE=43,560 sq. ft.

1 ACRE PLOW LAYER (ACRE AREA x 6’)

MTS WEIGHS ~2 MILLION POUNDS

CTS WEIGHS ~2.5 MILLION POUNDS

EXAMPLE:

RECOMMENDATION = 120 lb N/a

CARRIER IS AMMONIUM SULFATE (21-0-0 24S)

\[
\frac{120 \text{ lb N}}{\text{a}} \times \frac{\text{lb fert.}}{0.21 \text{ lb N}} = \frac{571 \text{ lb fert.}}{\text{a}}
\]

HOW MUCH S WILL BE APPLIED

\[
\frac{571 \text{ lb fert.}}{\text{a}} \times \frac{.24 \text{ lb S}}{1 \text{ lb fert.}} = \frac{137 \text{ lb S}}{\text{a}}
\]

- MAKING BLENDED FERTILIZERS

MIX -- 200 lb 46-0-0, 200 lb 0-14-42 (400 lb TOTAL MATERIAL)
0.46 \times 200 = 92 \text{ lb N} \quad 92/400 = 23 \% \text{ N}
0.14 \times 200 = 28 \text{ lb P}_2\text{O}_5 \quad 28/400 = 7 \% \text{ P}_2\text{O}_5
0.42 \times 200 = 84 \text{ lb K}_2\text{O} \quad 84/400 = 21 \% \text{ K}_2\text{O}

FINAL GRADE: 23-7-21

- ADJUSTING CORRECTIVE FERTILIZER APPLICATION FOR SOIL BUFFERING

(THIS SHOULD BE DONE AUTOMATICALLY BY SOIL TEST RECOMMENDATION PROGRAM)

SOIL TEST = 85 ppm K; WANT TO HAVE 130 ppm K
(130-85) = 45 ppm K \times \frac{7 \text{ lb K}_2\text{O}}{1 \text{ ppm K}} = 315 \text{ lb K}_2\text{O}