

PSES 3411 Quiz 9 Key

List the soil-supplied, essential macronutrients. (6 points)

*There are two key words in this question: Soil and macronutrients. Carbon, H, and O are macronutrients, but they are supplied by air and water, not by the soil. These nutrients are provided by the soil (Fe, Mn, Cu, Zn, Ni, Mo, B, Cl), but are micronutrients.*

*N, P, K, Ca, Mg, S (No points lost for including Fe)*

If you purchase a bag of weed and feed at the local retail outlet with these numbers on it, 10-4-6, what have you purchased? (Interpret each of the numbers. 6 points)

*The grade of this fertilizer is 10-4-6, which means it has 10% N (elemental basis), 4% phosphate (phosphorus pentoxide,  $P_2O_5$ ), and 6% potash (dipotassium oxide,  $K_2O$ ). This labeling is misleading, because there is no  $P_2O_5$  or  $K_2O$  in the fertilizer. The phosphate is present as a simple phosphate or orthophosphate ( $H_2PO_4^-$ ,  $HPO_4^{2-}$ , or  $PO_4^{3-}$ ), while the potassium is present as a simple cation ( $K^+$ ).*

10     *10% N*

4     *4%  $P_2O_5$ , which is 0.44 P, so  $4\% \times 0.44 = 1.8\% P$*

6     *6%  $K_2O$ , which is 0.83 K, so  $6\% \times 0.83 = 5\% K$*

You added some residues with 1% N and 45% C to the soil.

How will this effect decomposition rate? (4 points)

*Decomposition rate of residues is determined by the carbon to nitrogen ratio (C/N). The C/N of this material is  $45\%C / 1\%N = 45$ . When C/N is greater than about 30, decomposition is slowed because N is limiting for microbial growth and development.*

How will this effect N availability to plants? (Think mineralization/immobilization. 4 points)

*Nitrogen availability will be diminished because the N in the residues will be immobilized (used by the organisms rather than released into the soil solution to be available to plants.)*