

## NUTRIENT UPTAKE MECHANISMS

### Root Interception:

Nutrients encountered by the root as it grows through the soil

- Small amount of nutrient uptake, roots contact approximately 1% of soil volume

### Mass Flow:

Nutrients transported to the root in the convective flow of water

- Associated with more mobile nutrients, bulk of most nutrient uptake

### Diffusion:

Nutrients that move along a concentration gradient from areas of high concentration to areas of low concentration

- Associated with immobile nutrient forms
- As roots take up nutrients, the concentration of the nutrient becomes less around the root. Diffusion acts to even that out and move nutrients to replace those taken up.

## Significance Of Root Interception, Mass Flow, And Diffusion In Ion Transport To Corn Roots

NUTRIENT	NUTRIENTS REQUIRED FOR 200 BU/A CORN	PERCENT SUPPLIED BY		
		ROOT INTERCEPTION	MASS FLOW	DIFFUSION
Nitrogen (N)	225	1	99	0
Phosphorus (P)	45	2	4	94
Potassium (K)	200	2	20	78
Calcium (Ca)	50	120	440	0
Magnesium (Mg)	55	27	280	0
Sulfur (S)	25	4	94	2
Copper (Cu)	0.12	8	400	0
Zinc (Zn)	0.4	25	30	45
Boron (B)	0.25	8	350	0
Iron (Fe)	2.5	8	40	52
Manganese (Mn)	10.4	25	130	0
Molybdenum (Mo)	0.012	8	200	0

*Note: The contribution of diffusion was estimated by the difference between total nutrient needs and the amounts supplied by interception and mass flow. If root interception + mass flow  $\geq$  100% then diffusion = 0*