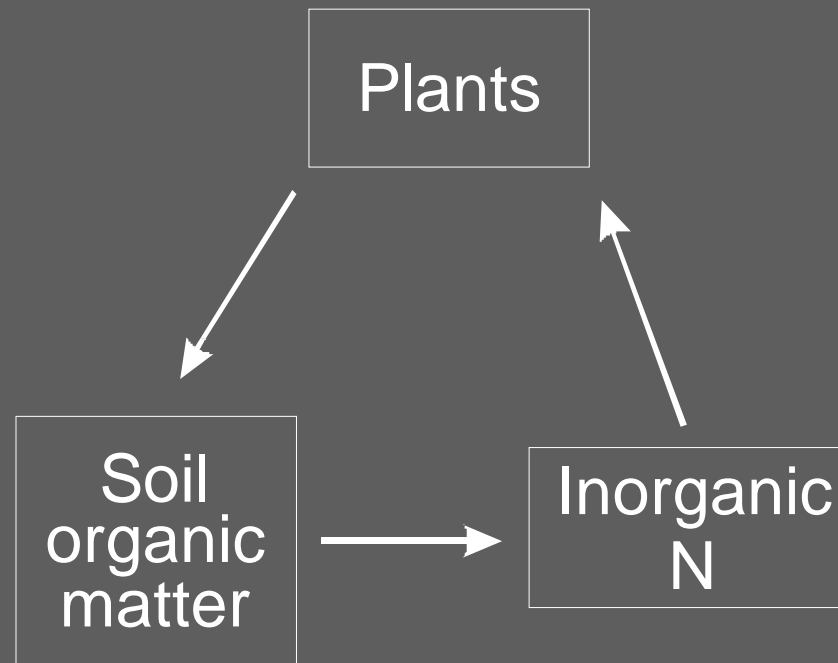




Does *Eriophorum vaginatum* take up organic
Nitrogen?

Josh Schimel



Plants only use inorganic N

BUT:

Giblin et al. 1991: Arctic tundra shows net immobilization over the entire growing season.

How do tundra plants get N?

Maybe they don't use inorganic N:

Chapin et al. 1993. Nature. *Tundra plants use and can grow on amino acids in hydroponics.*

The Challenge:

Can plants successfully compete for amino acids in the face of microbial competition?

Intact core injections

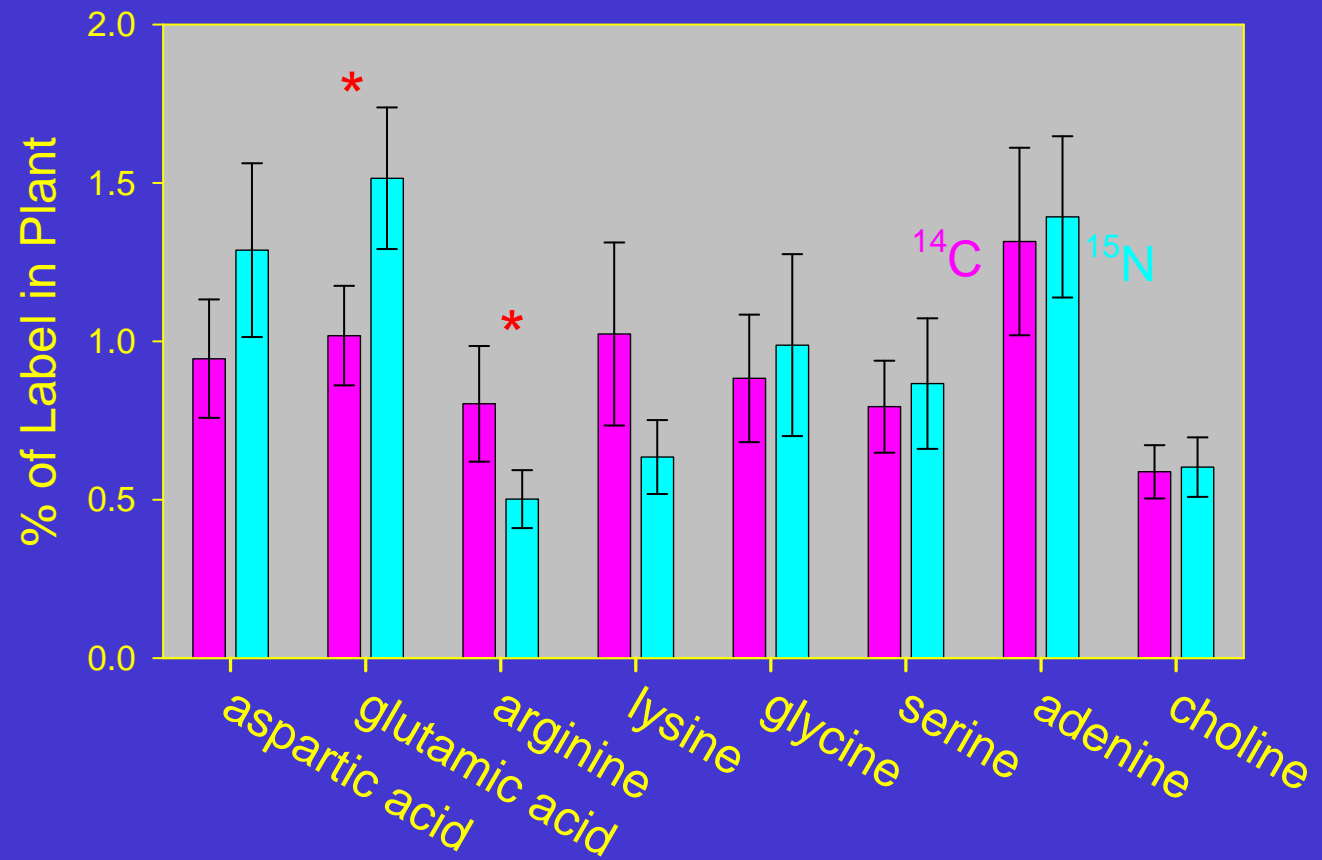
$^{14}\text{C}/^{15}\text{N}$ Compounds:

<i>Acidic</i>	<i>Basic</i>	<i>Neutral</i>	<i>Other</i>
Aspartic	Arginine	Glycine	$^{15}\text{NH}_4^+$
Glutamic	Lysine	Serine	Adenine
			Choline

Cores incubated for 4 hours at 5°C

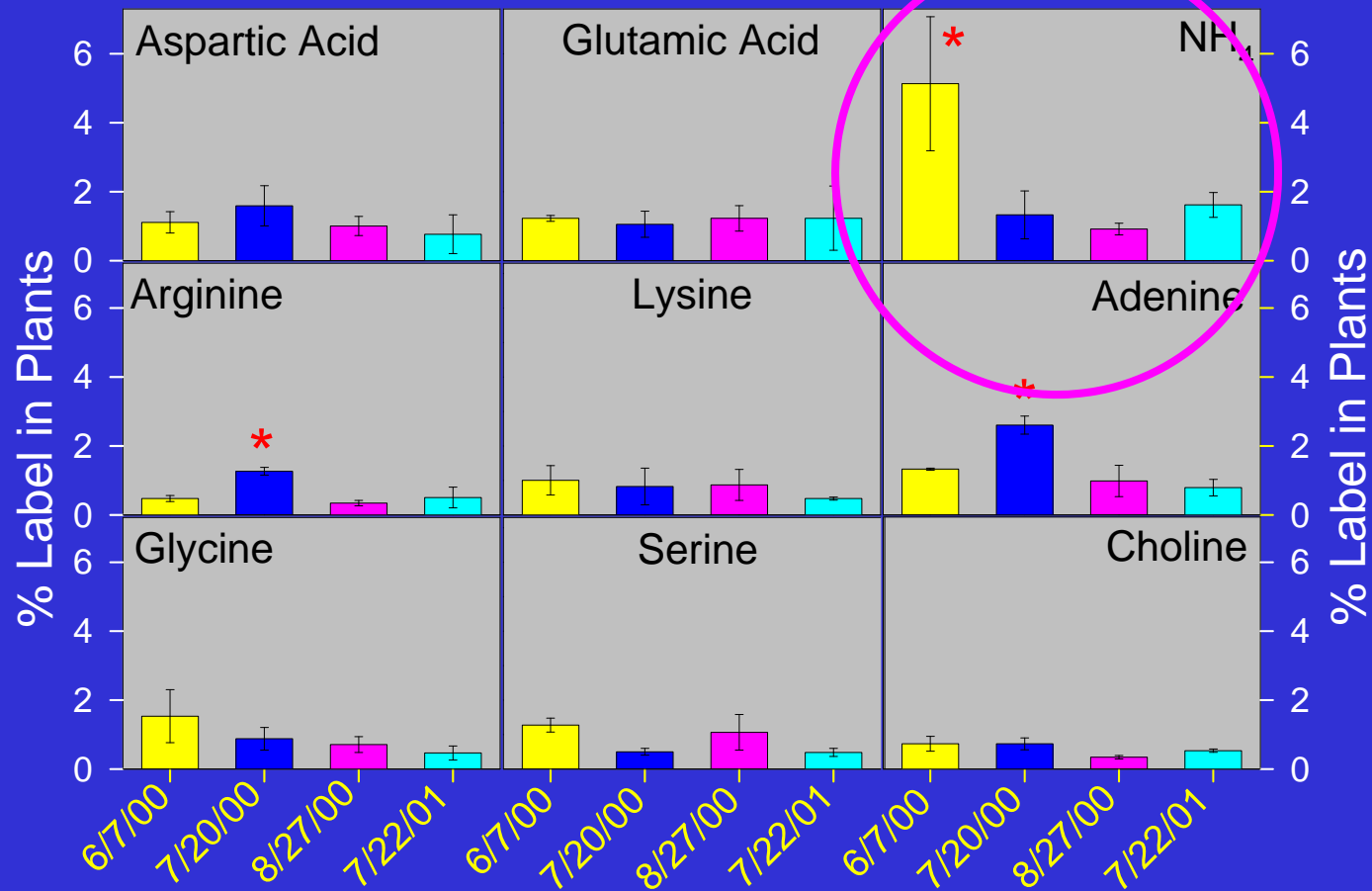


Average Recovery of ^{14}C and ^{15}N in *E. vaginatum*



Organic N forms taken up intact

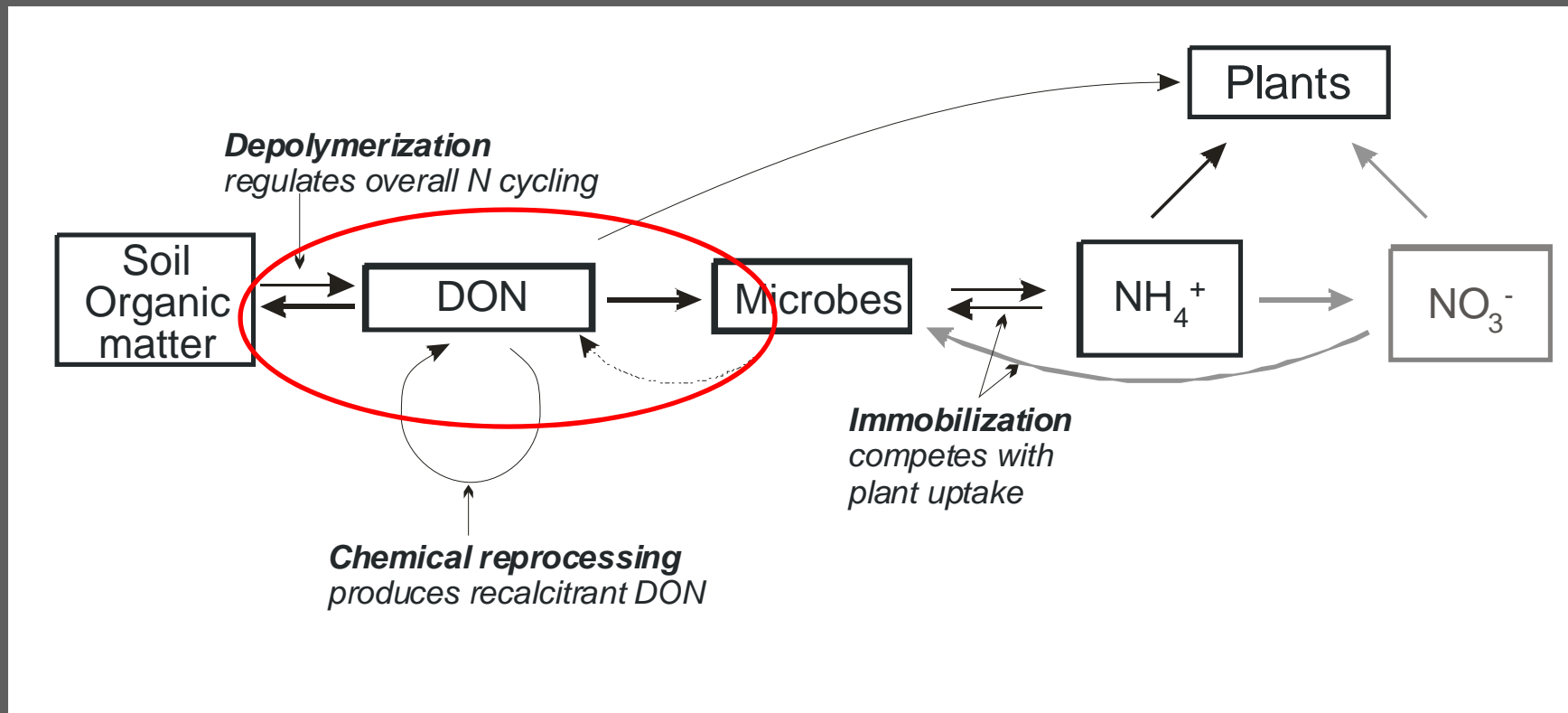
N Partitioning in *E. vaginatum*



Plants get 1-2% of **added** N

Except: early season- NH_4^+

New conceptual model of N cycle:



“Short-circuiting the N cycle”

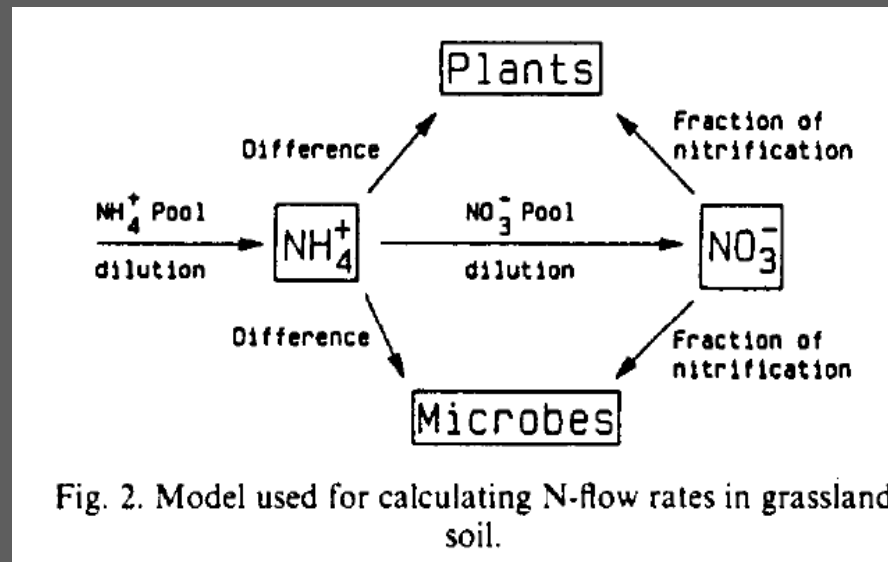
The New Big Question:

How much N do plants actually get from organic sources?

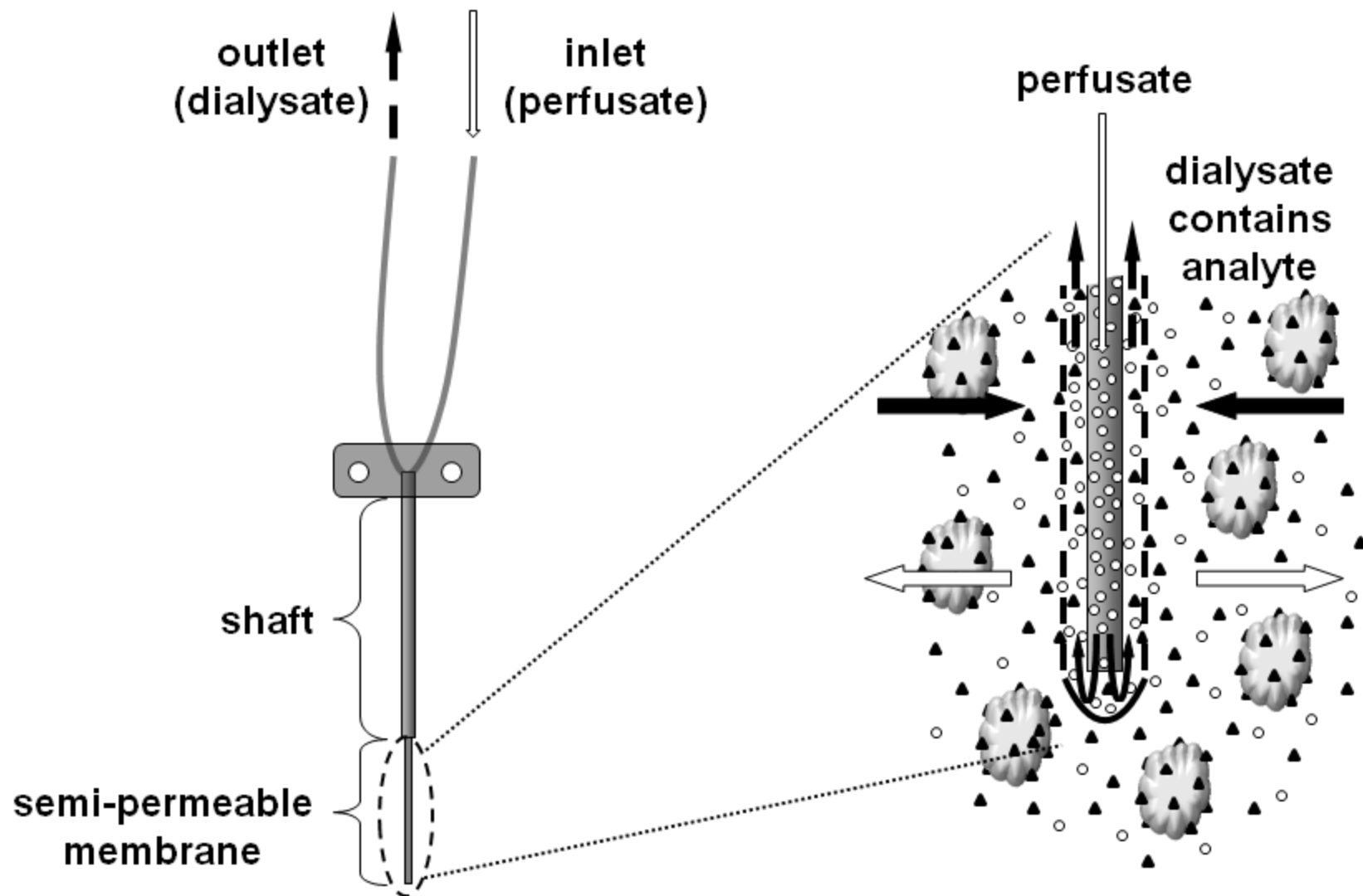
The New Big Challenge:

How much N do plants actually get from organic sources?

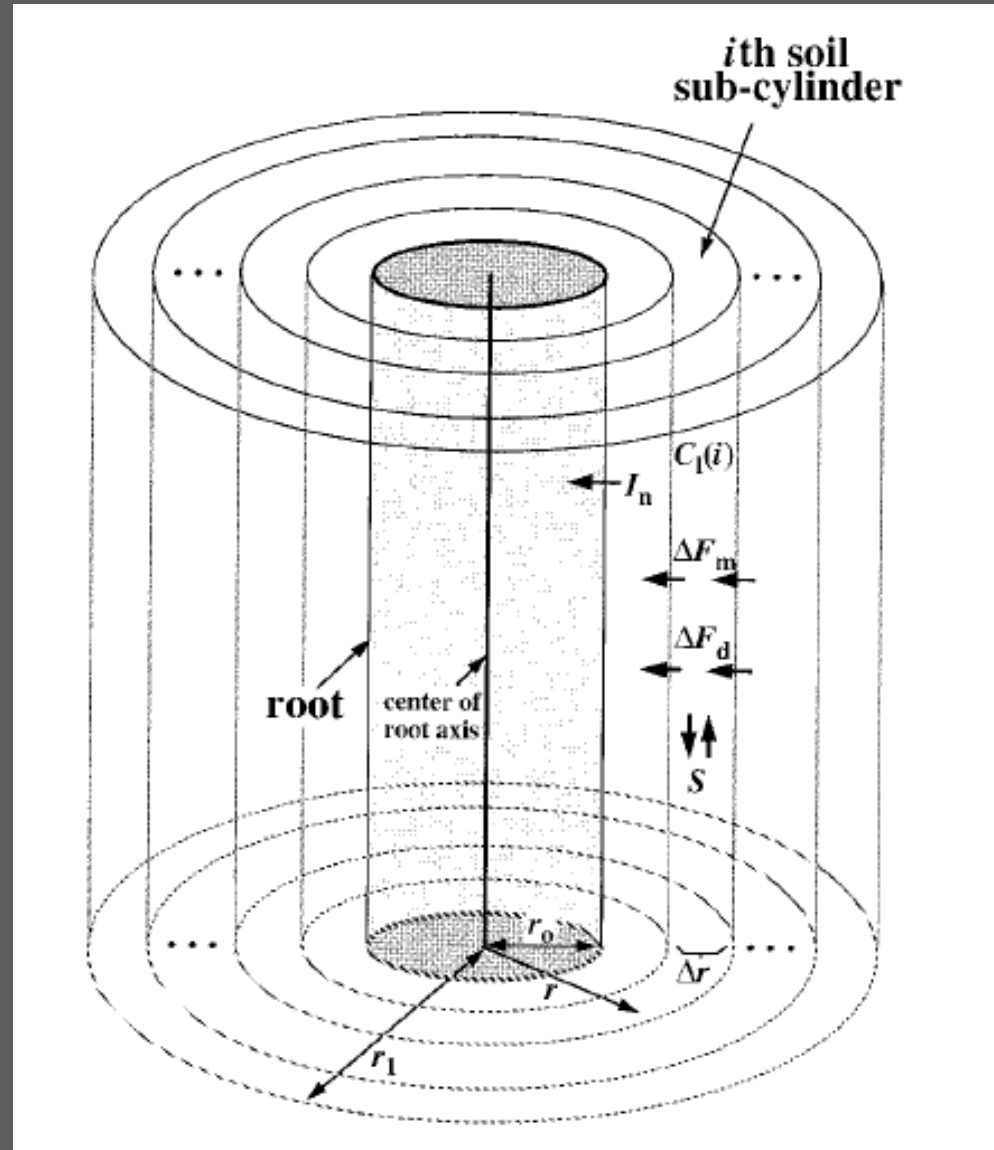
What is the supply rate of each N form?











Model structure from
Leadley et al. (1997)

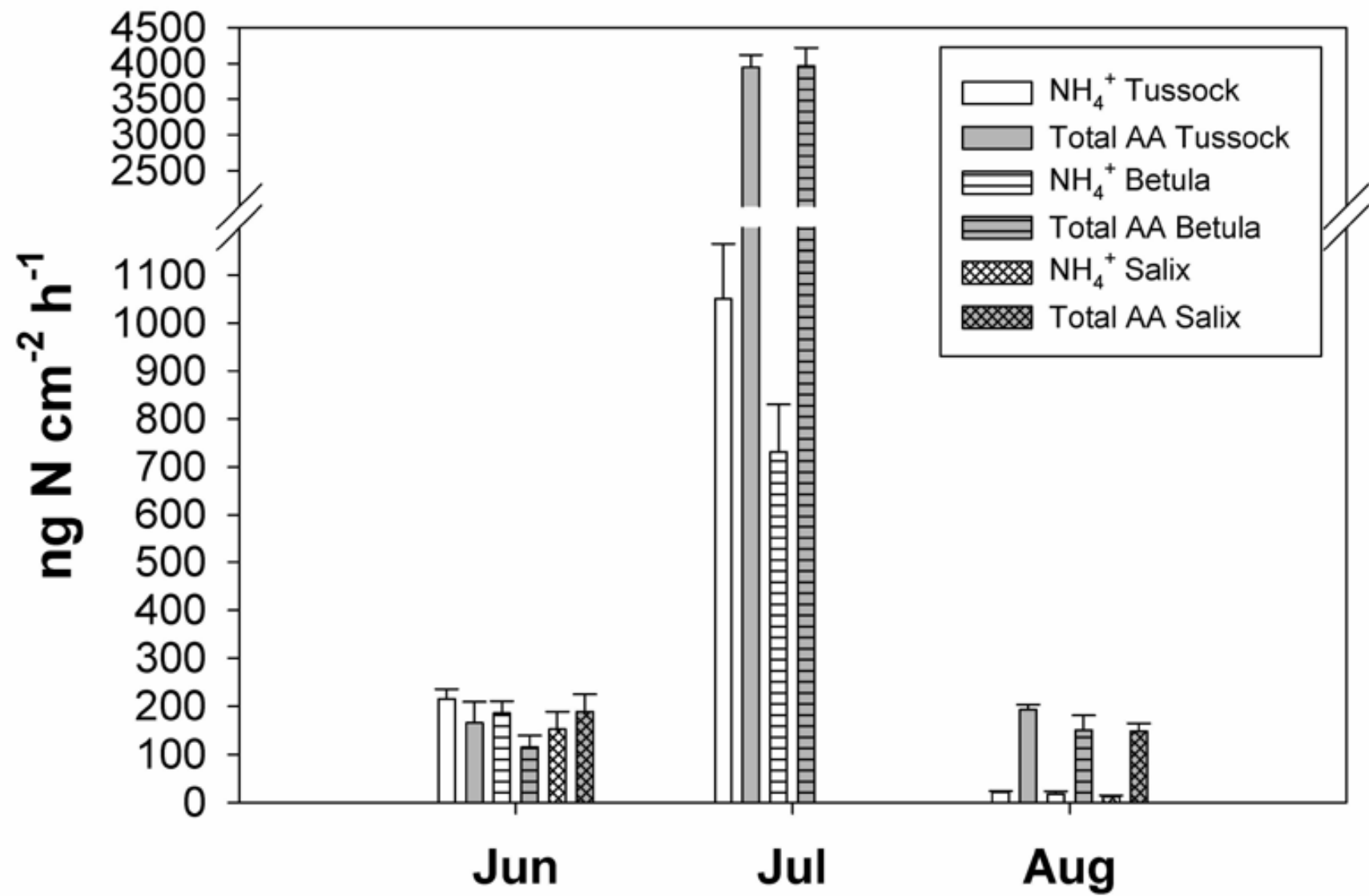


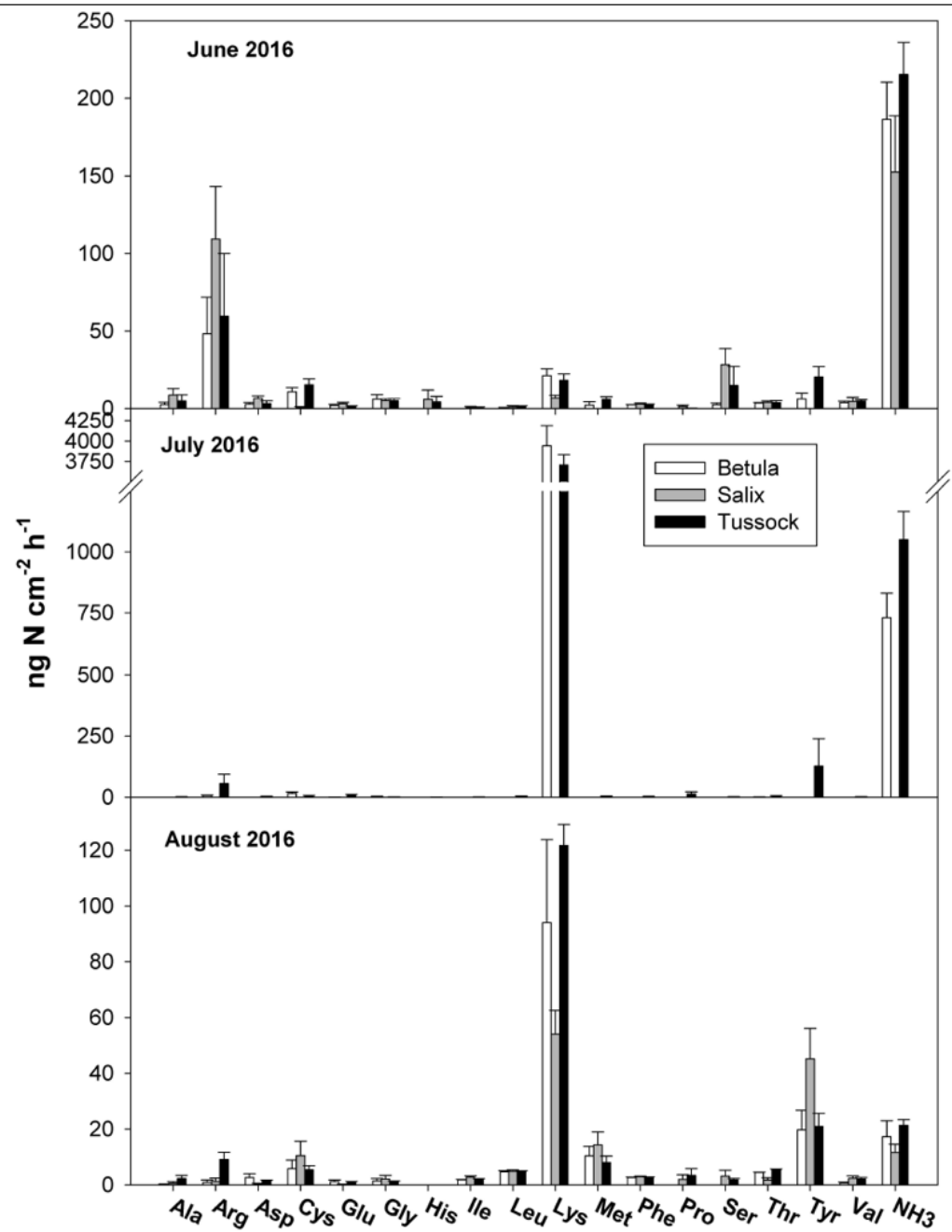
Measure the pieces in the model:
use the model to integrate

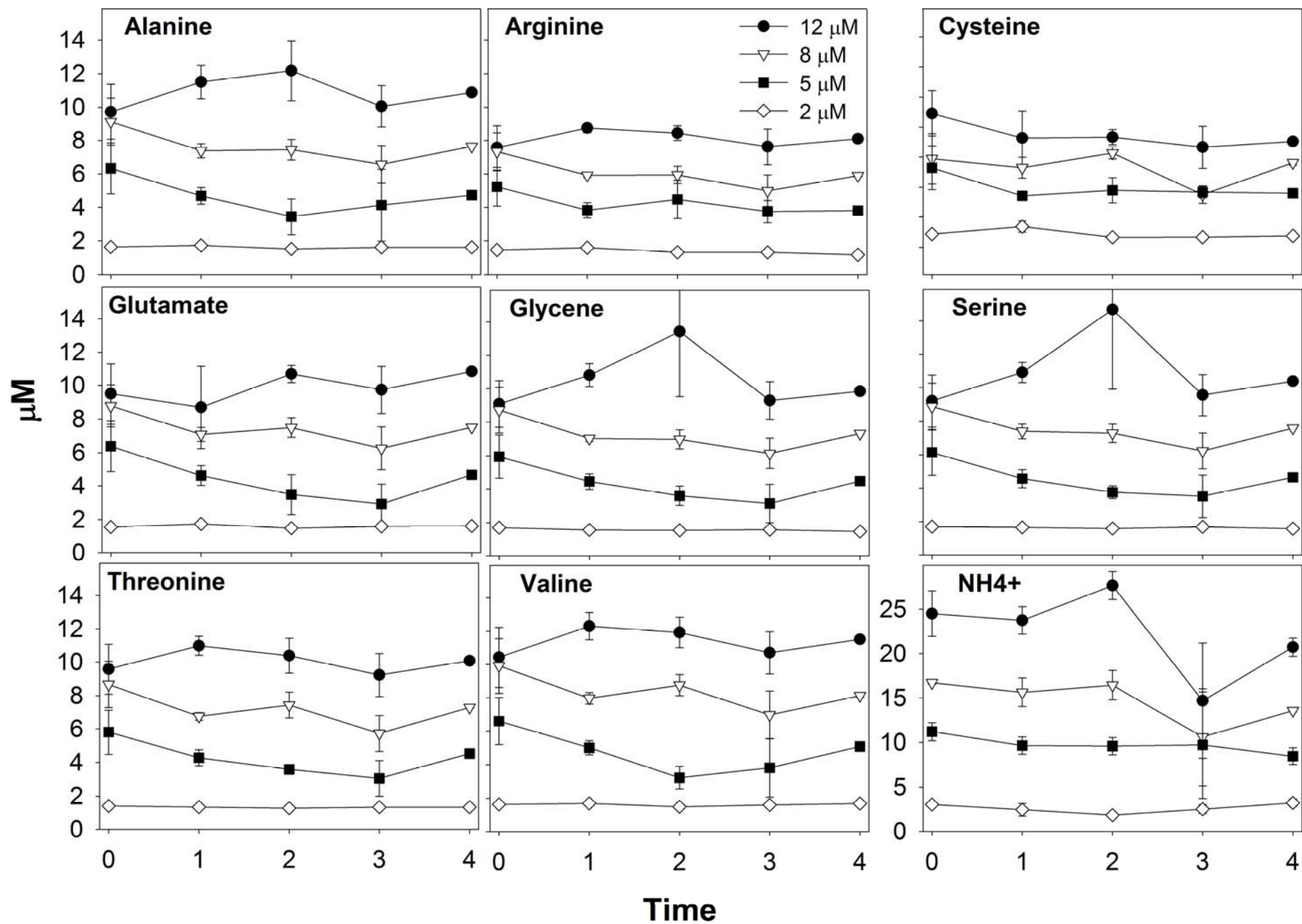
Diffusion kinetics

Root uptake kinetics

But the key: actual supply rates of NH_4^+ and
amino acids in situ.







So what do we know?

Tundra plants can take up organic N.

Particularly late in the season—organic sources appear to dominate the supply.

∴ Tundra plants are using amino acids