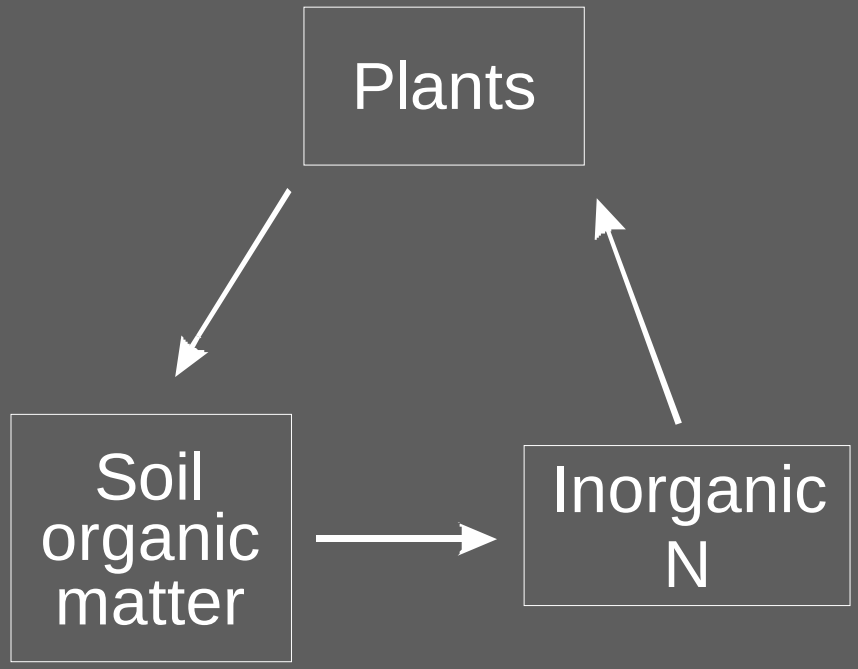


Plants only use inorganic N

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.

The Challenge:

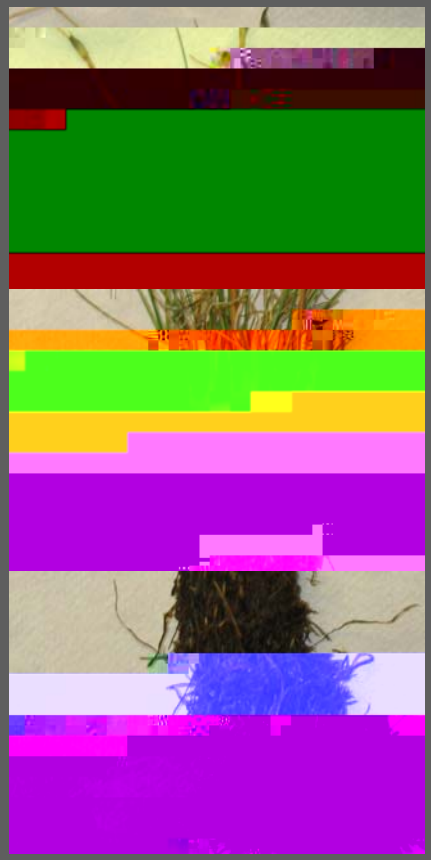
Can plants successfully compete for amino acids in the face of microbial competition?

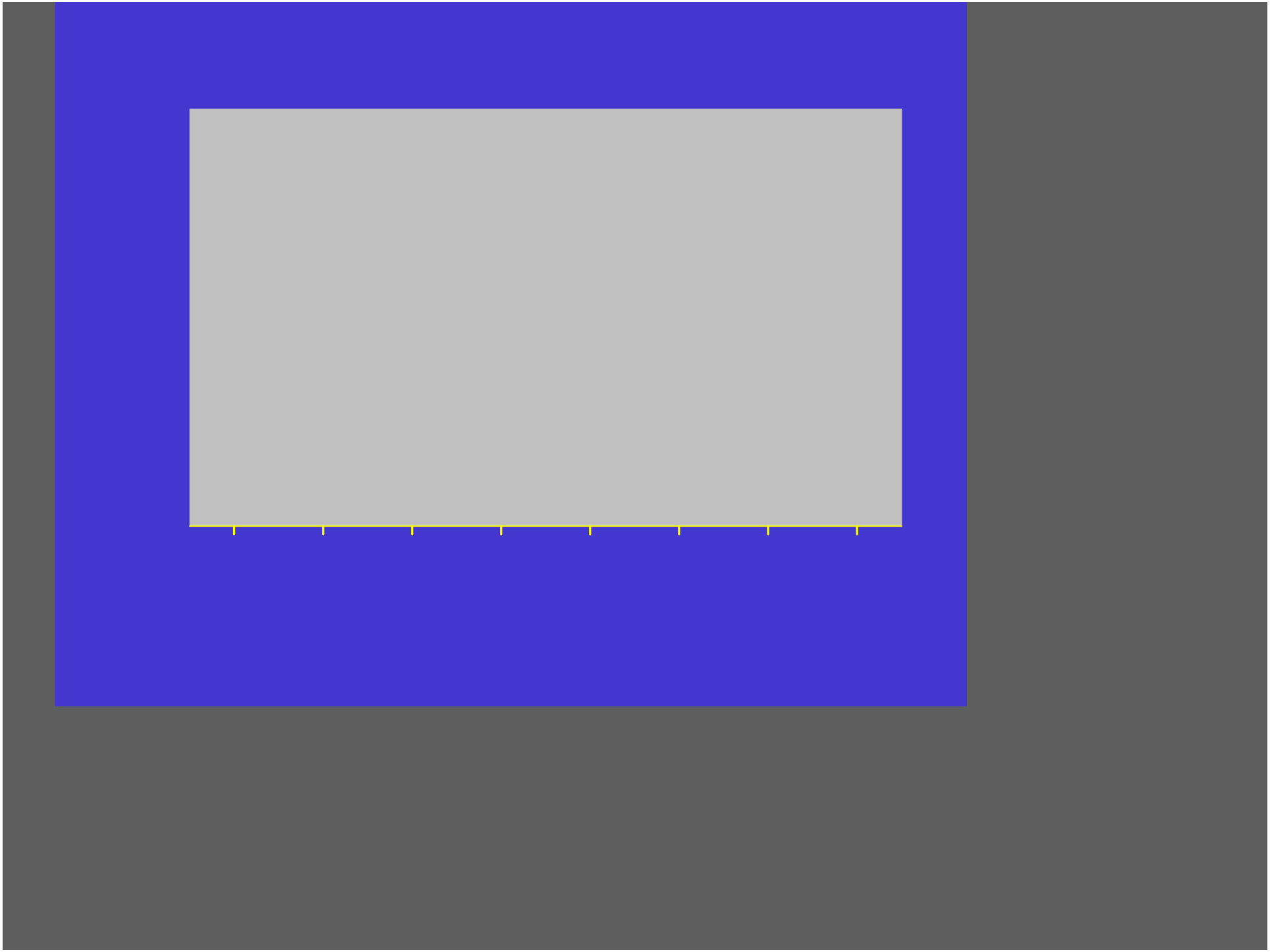
Intact core injections

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

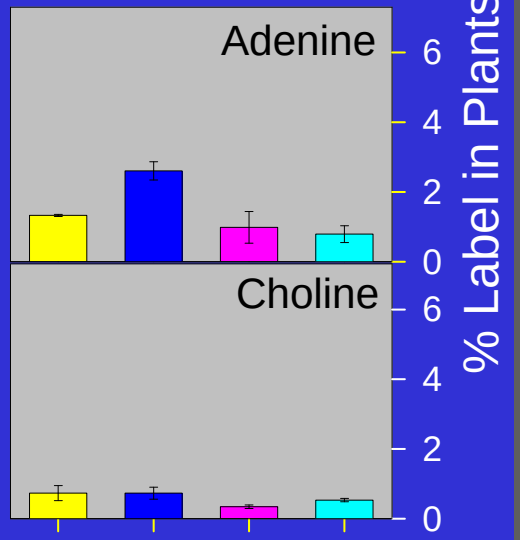
Acidic	***Basic***	***Neutral***	***Other***
Aspartic	Arginine	Glycine	$^{15}NH_4^+$
Glutamic	Lysine	Serine	Adenine
			Choline

Cores incubated for 4 hours at 5^oC

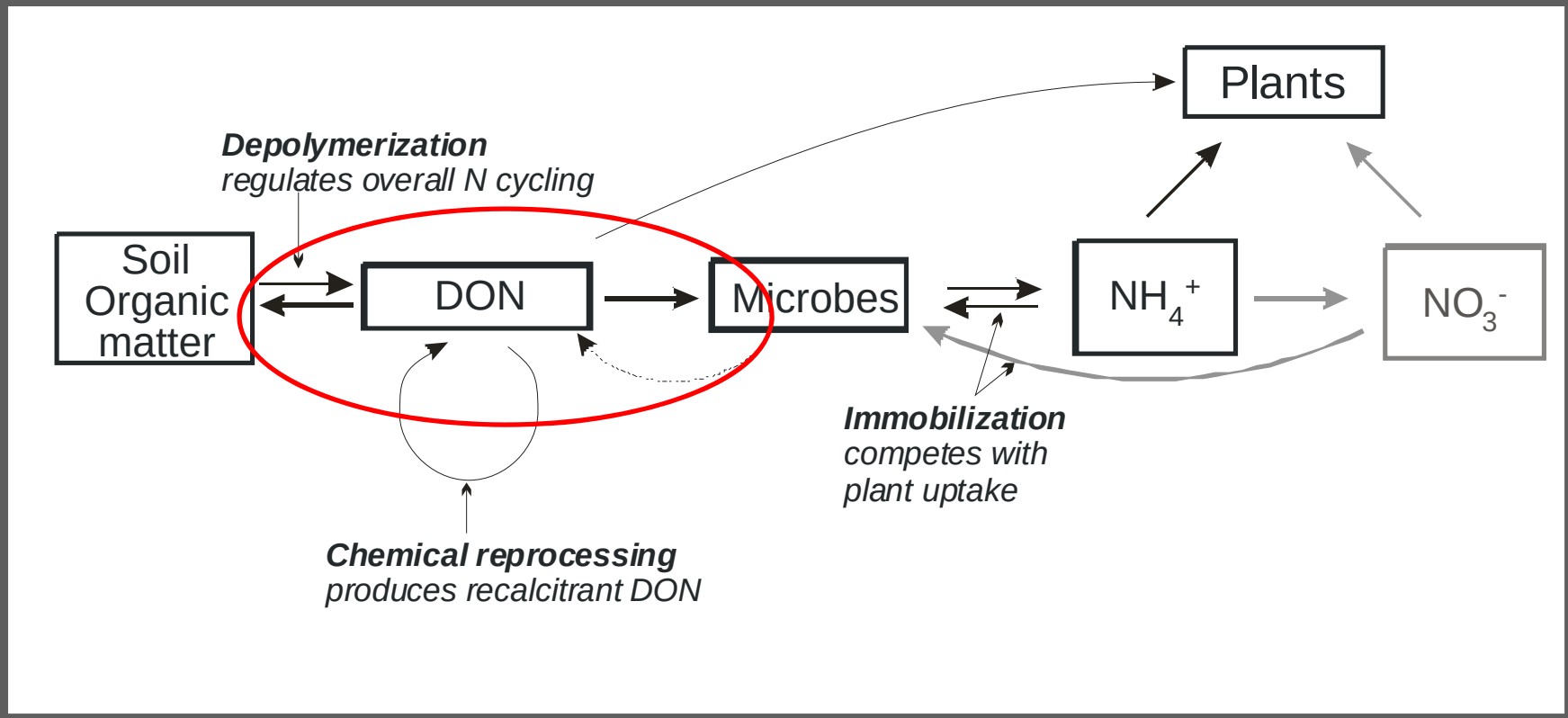




Glycine



New conceptual model of N cycle:



"Short-circuiting the N cycle"

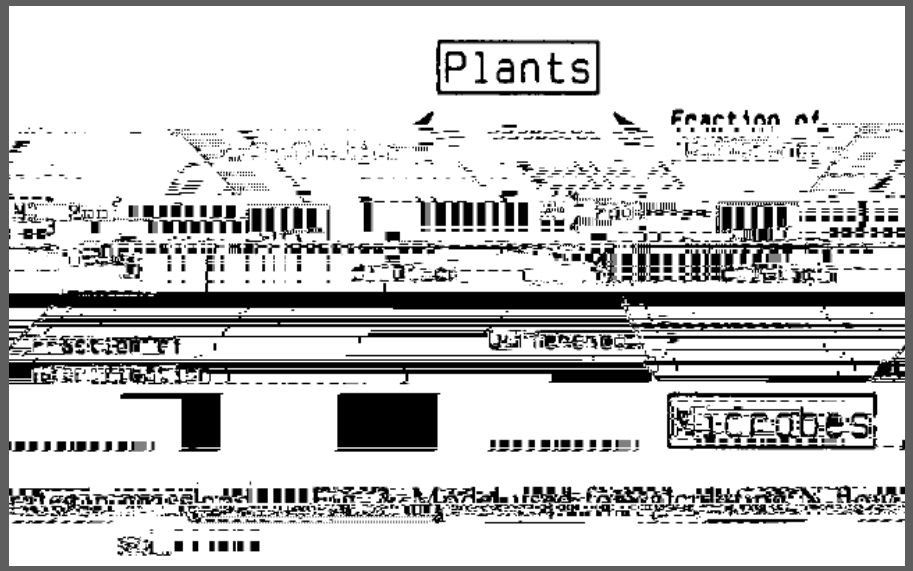
The New Big Question:

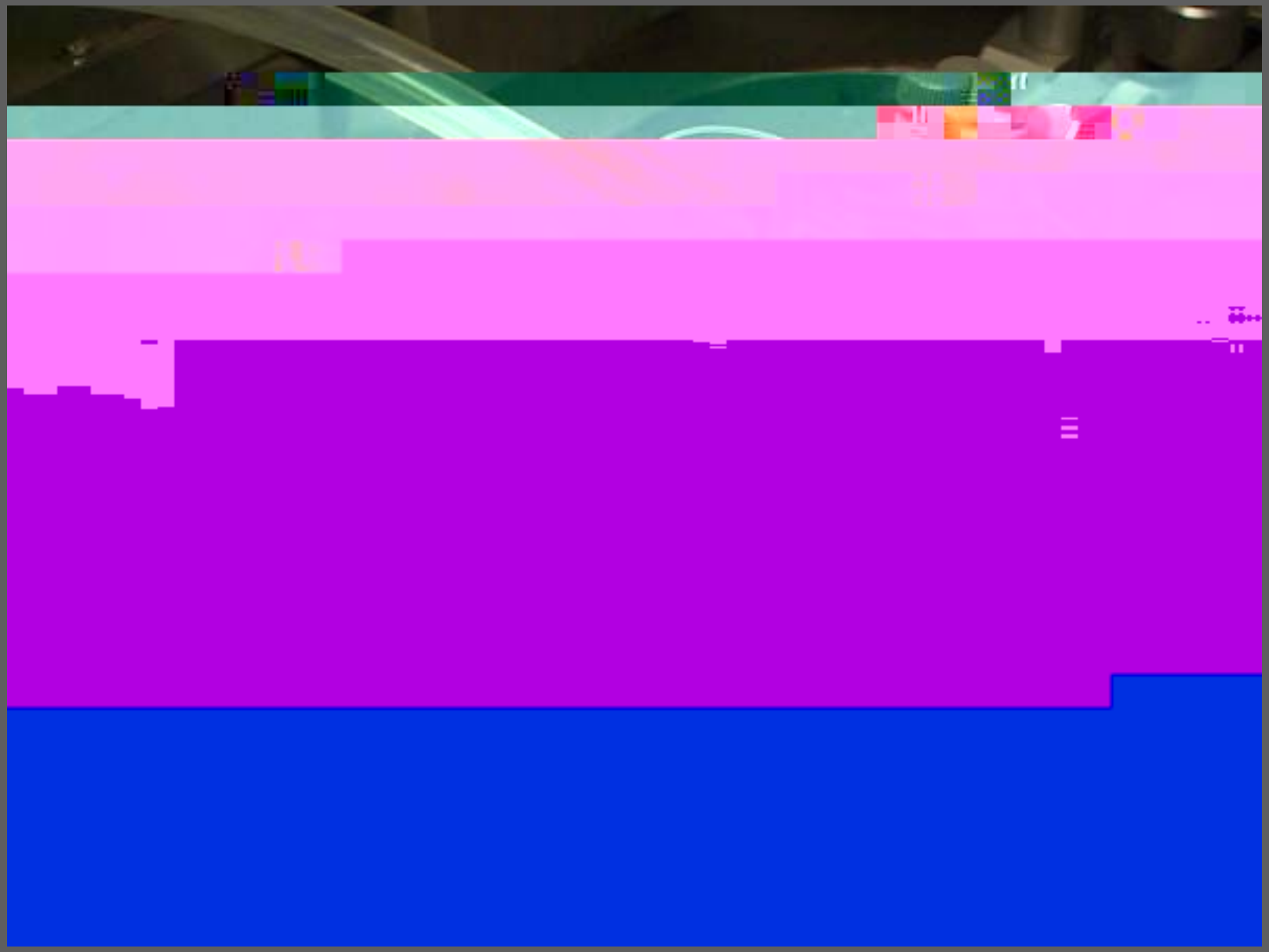
How much N do plants actually get from organic sources?

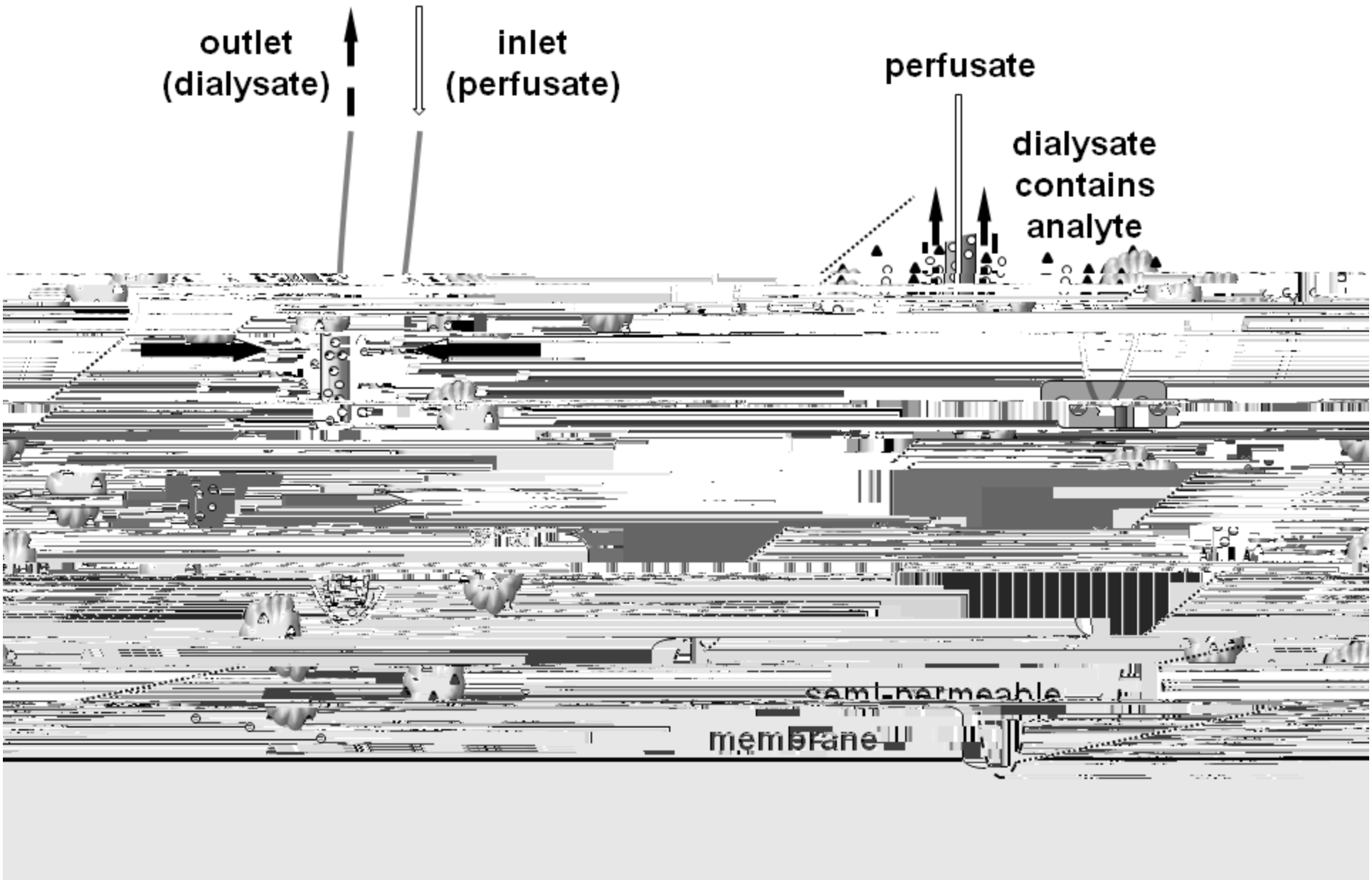
The New Big Challenge:

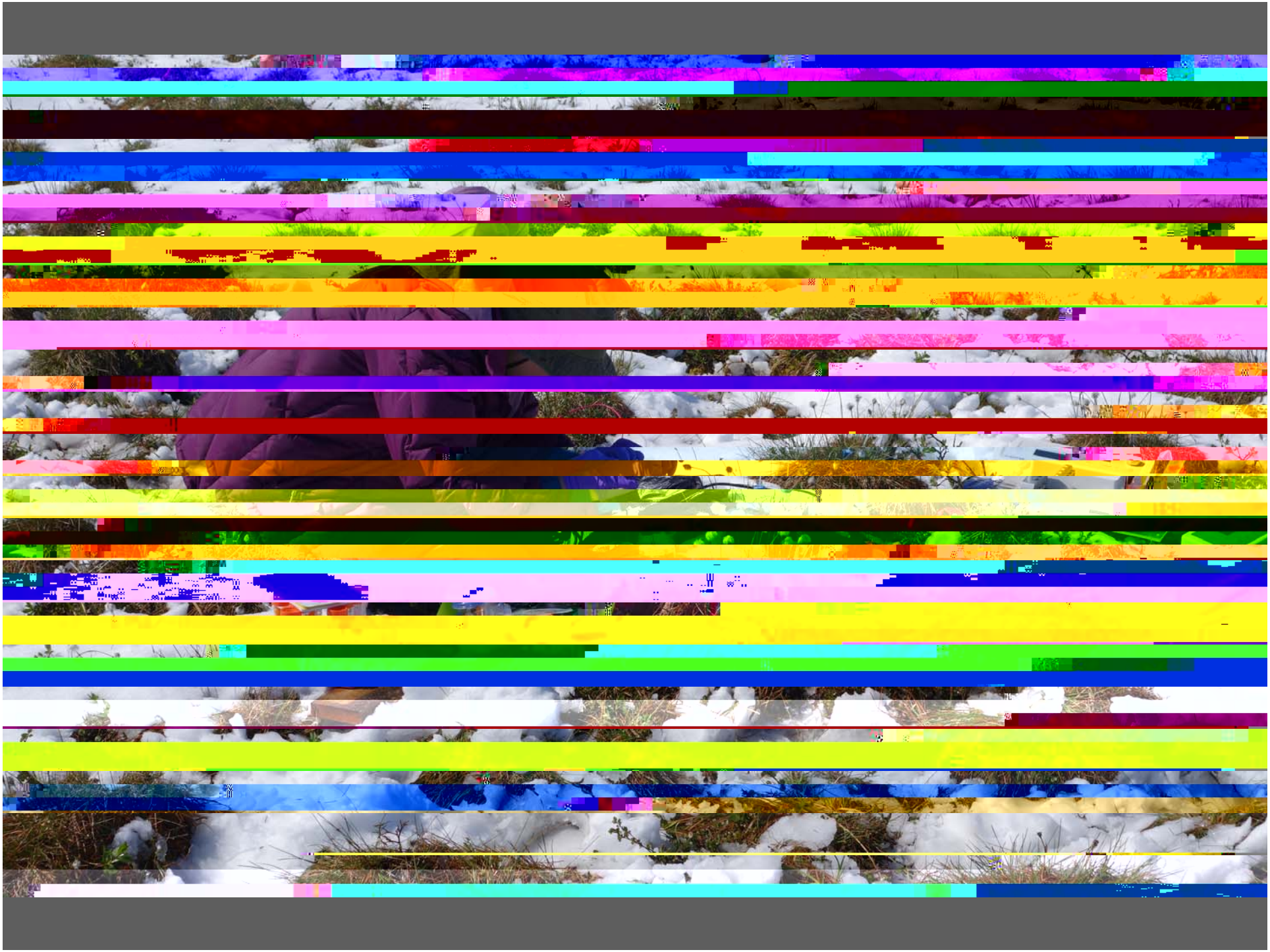
How much N do plants actually get from organic sources?

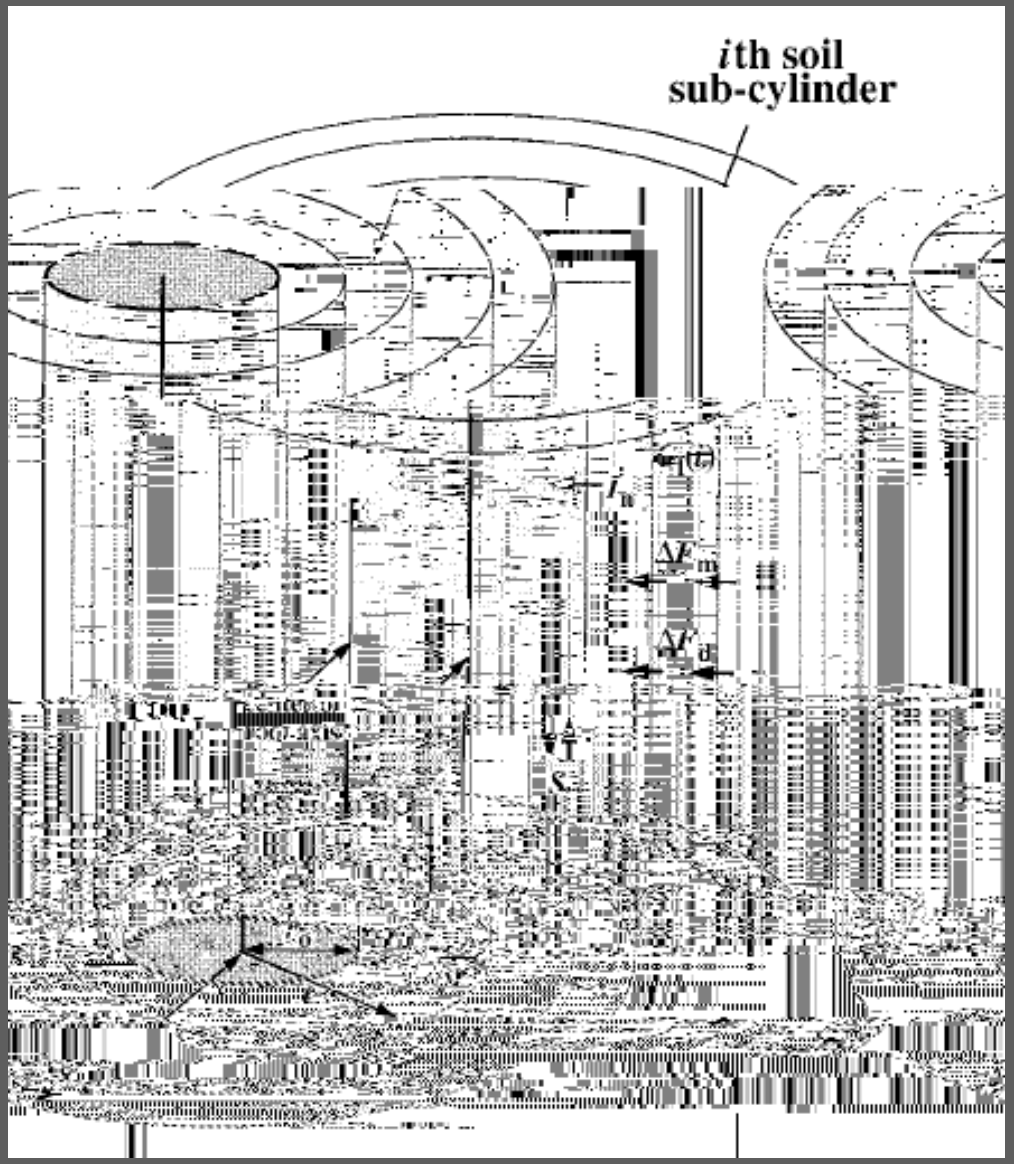
What is the supply rate of each N form?



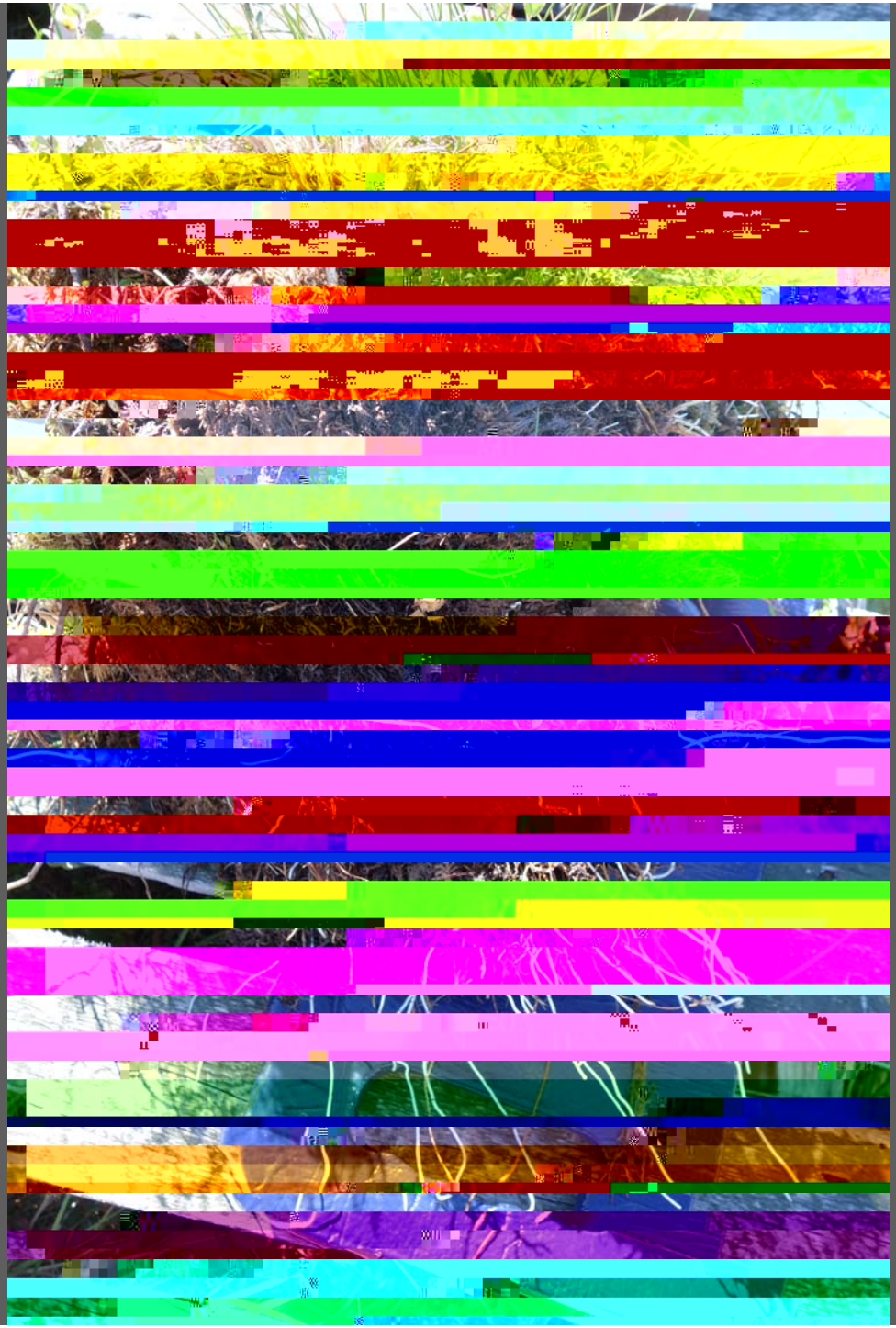



outlet
(dialysate)
inlet
(perfusate)
perfusate
dialysate
contains
analyte
membrane





Model structure from Leadley et al. (1997)



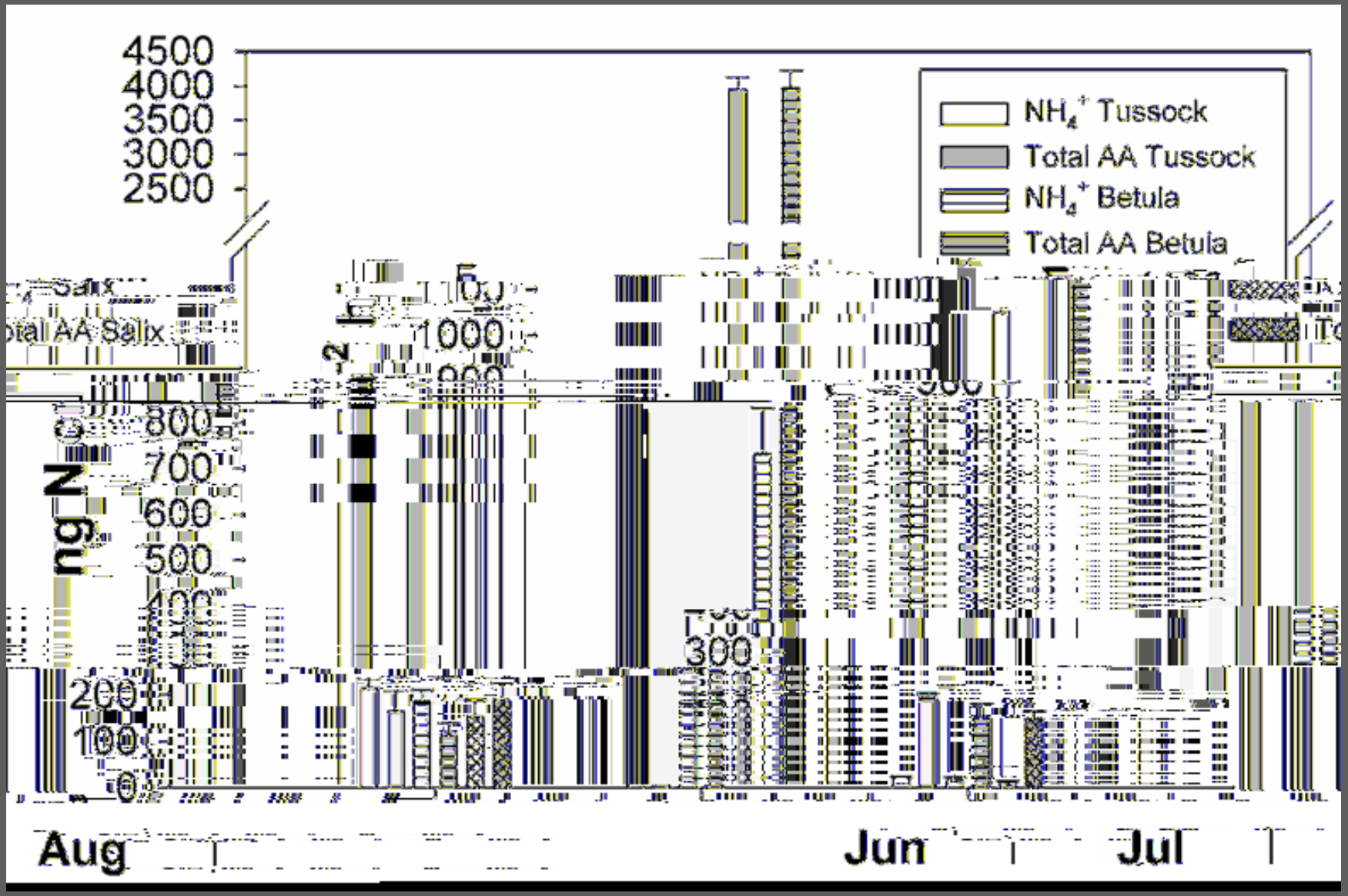
Measure the pieces in the model:

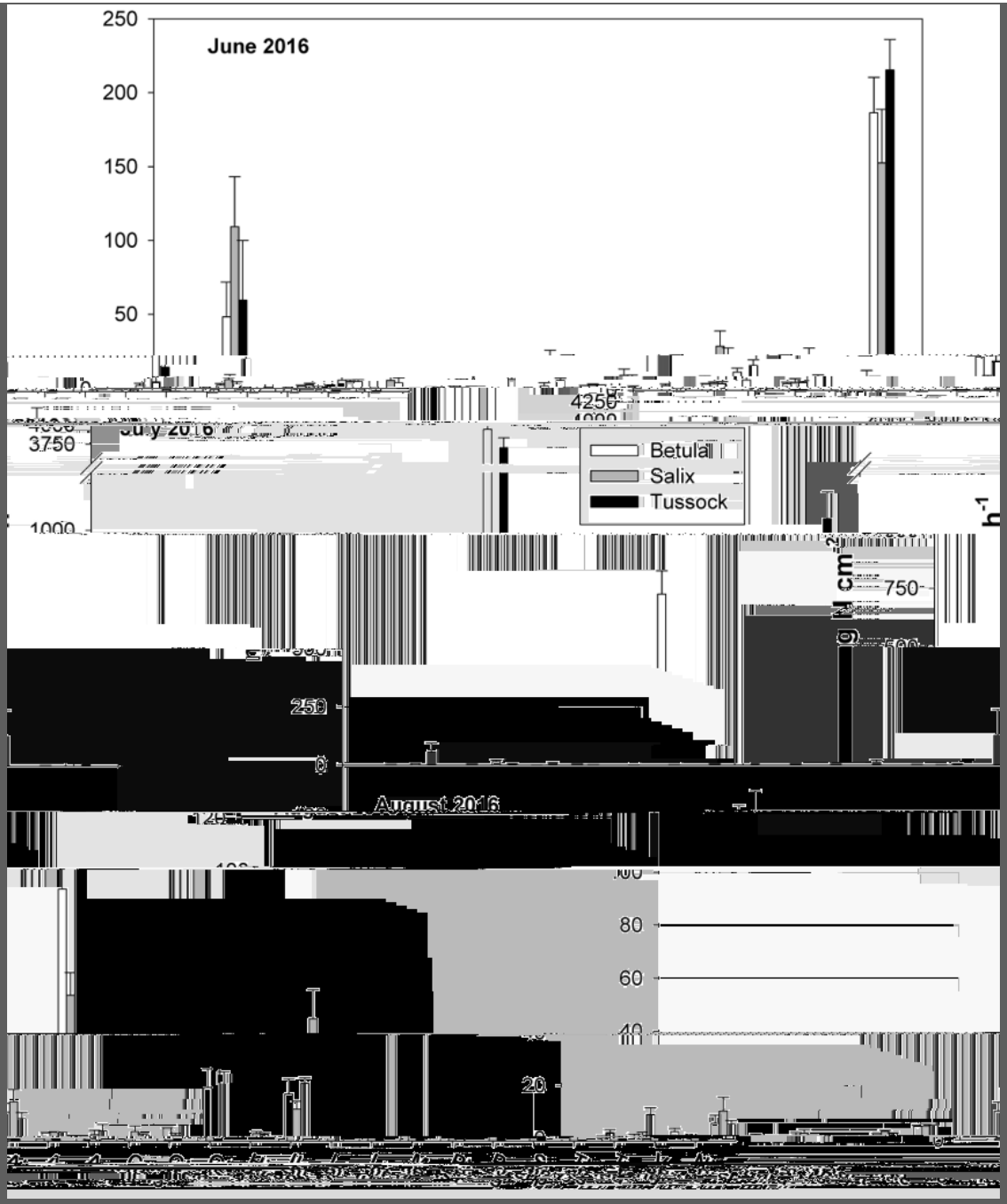
use the model to integrate

Diffusion kinetics

Root uptake kinetics

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


4500
4000
3500
3000
2500
1000
800
700
600
500
400
300
200
100
0
ng N
NH_4^+ Tussock
Total AA Tussock
NH_4^+ Betula
Total AA Betula
Aug
Jun
Jul


June 2016
250
200
150
100
50
Betula
Salix
Tussock
750
August 2016
80
60
40
20

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