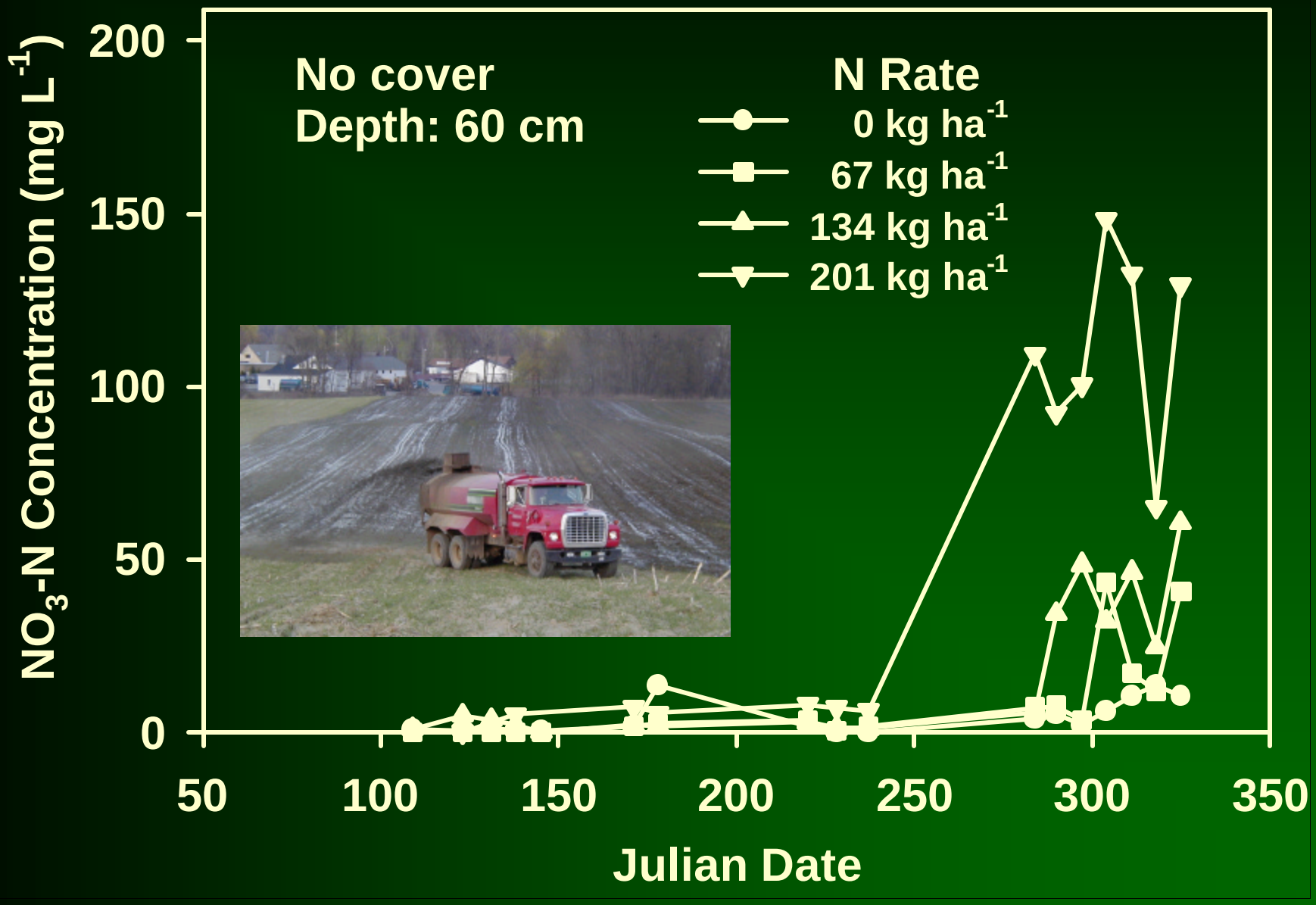
Establishing Effective Cover Crops for End-of-Season Nitrogen Recovery

Stephen J. Herbert
Dept. Plant, Soil, and Insect Sciences
University of Massachusetts Amherst

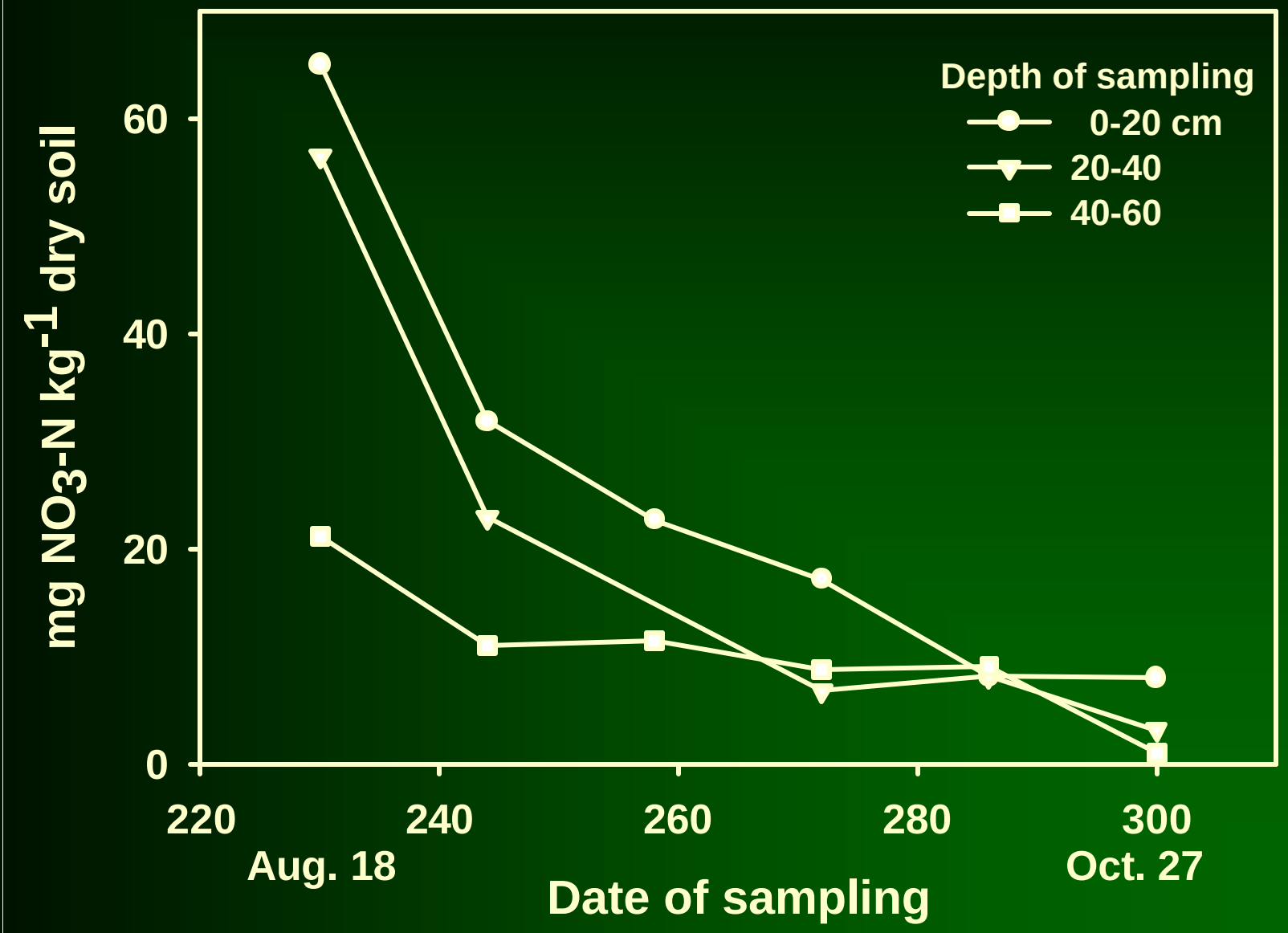
Multiple Uses of Cover Crops

- Erosion control
- Emergency feed
- Weed suppression
- N contribution
- End-of-season nutrient uptake

Nitrate Leaching in our Long-Term Corn Study



Soil NO_3 No Cover Crop - 2004



End-of-Season N Uptake

- Nutrient management planning gap
- Environmental benefit
- Farmer benefit

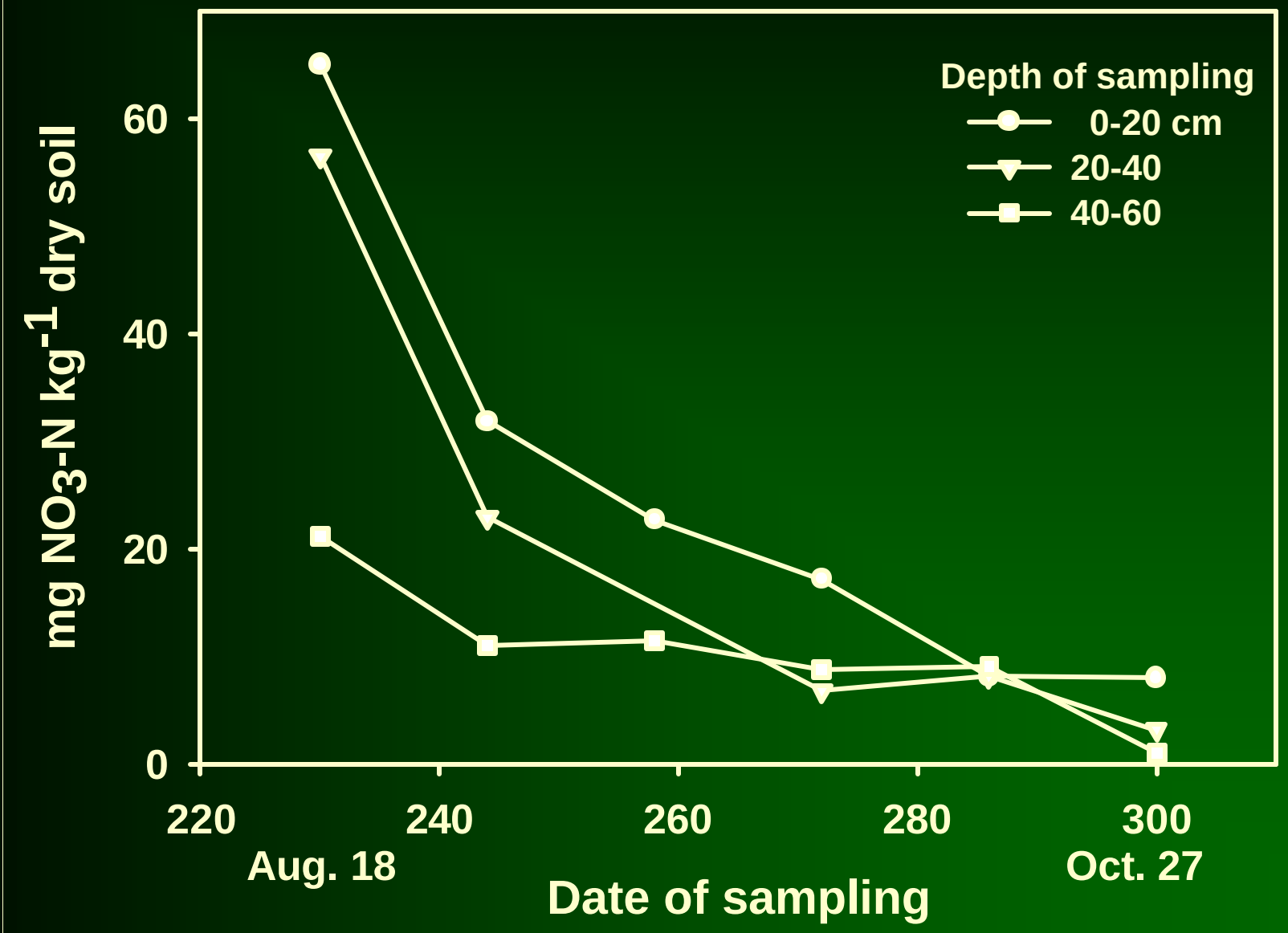
Effective Planting Date?

- Erosion control
  - Canopy cover
  - Stabilizing roots
- Nutrient uptake
  - Root depth and distribution

2004 Cover Crop Study

- Rye and Oat cover crops.
- 6 Seeding dates (Aug. 18 to Oct. 27).
- UMass Crops Research and Education Center, Deerfield MA (42°30’ N).
- Fall 2004 slightly warmer than norm.
- Study continued in Fall 2005 and 2006.

Soil NO_3 No Cover Crop



Rye Cover Crops

Seeding dates 2004

Aug. 18 to Oct. 27

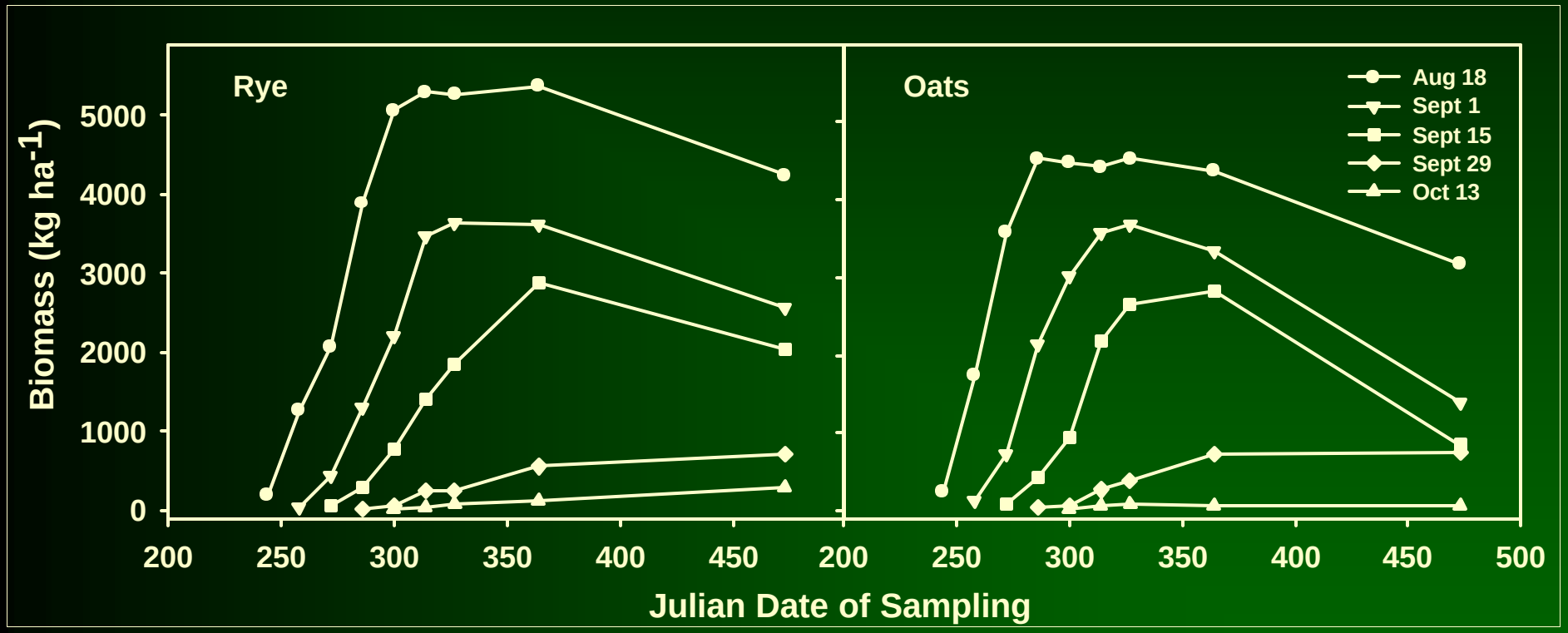
Oat Cover Crops

Seeding dates 2004

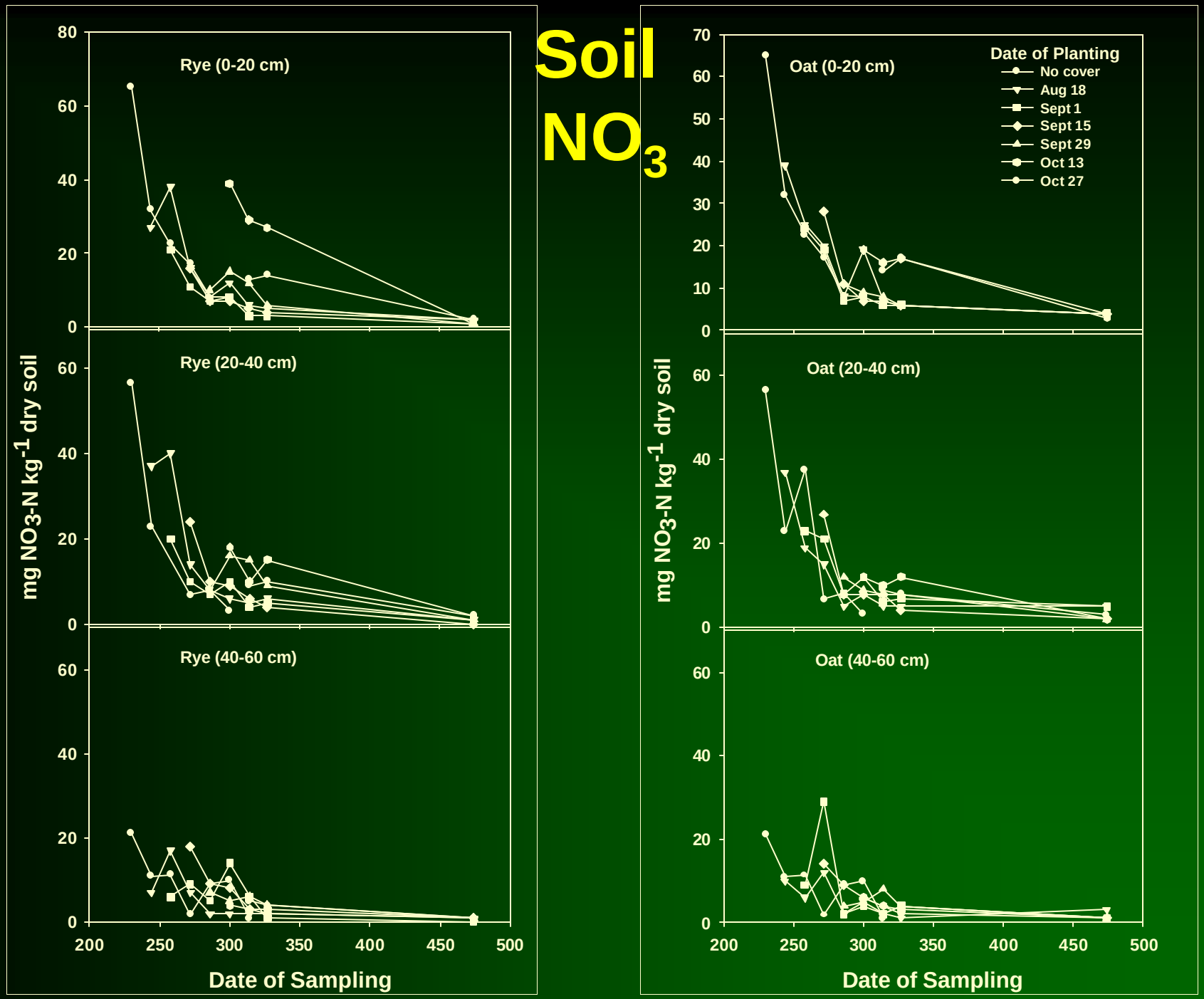
Aug. 18 to Oct. 27

Cover Crop Growth on Dec. 31, 2004

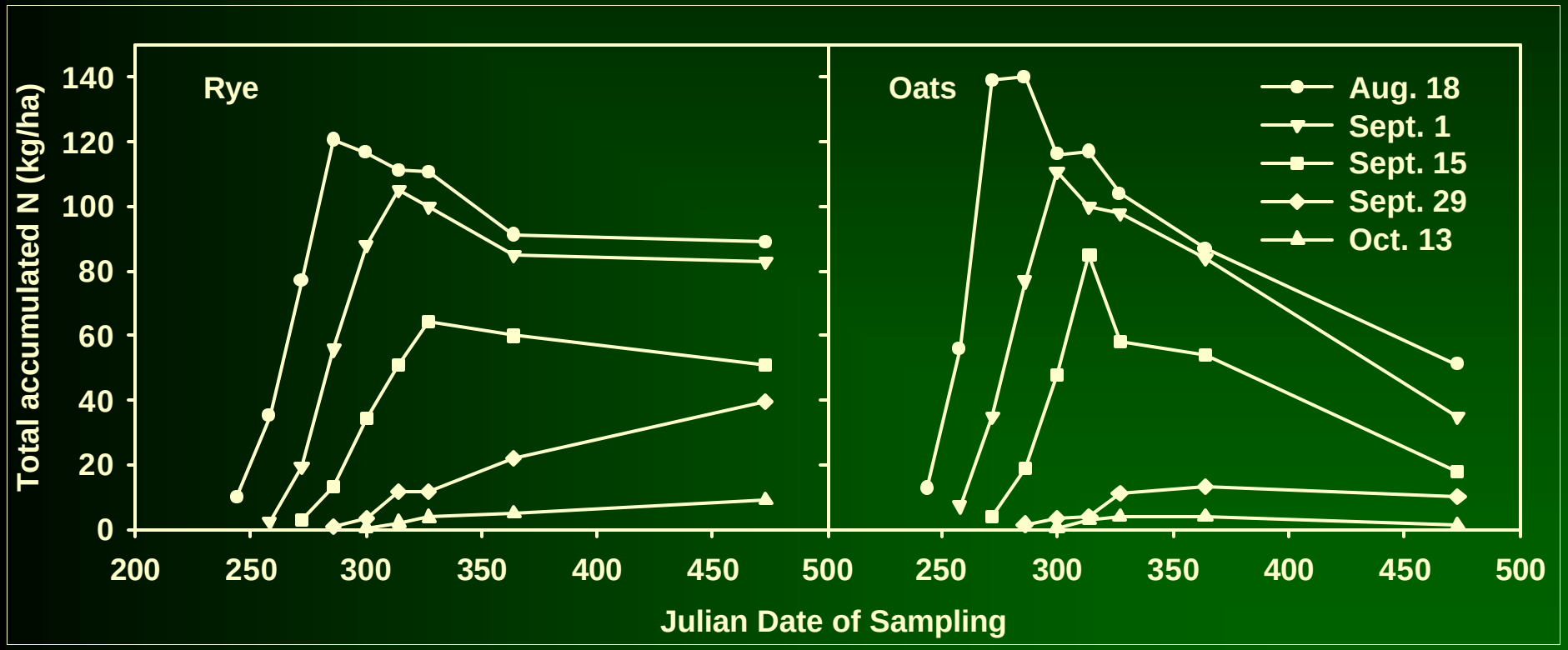
Cover Crop Biomass



Soil NO_3


Rye (0-20 cm)
Rye (20-40 cm)
Rye (40-60 cm)
Oat (0-20 cm)
Oat (20-40 cm)
Oat (40-60 cm)
Date of Planting
No cover
Aug 18
Sept 1
Sept 15
Sept 29
Oct 13
Oct 27
mg NO3-N kg-1 dry soil
Date of Sampling
0
20
40
60
80
10
30
50
70
200
250
300
350
400
450
500

Cover Crop N Accumulation



Early Seeding Strategies

- Corn hybrid selection
- Planting corn early
- Under seeding cover crops

Corn Silage Yields*

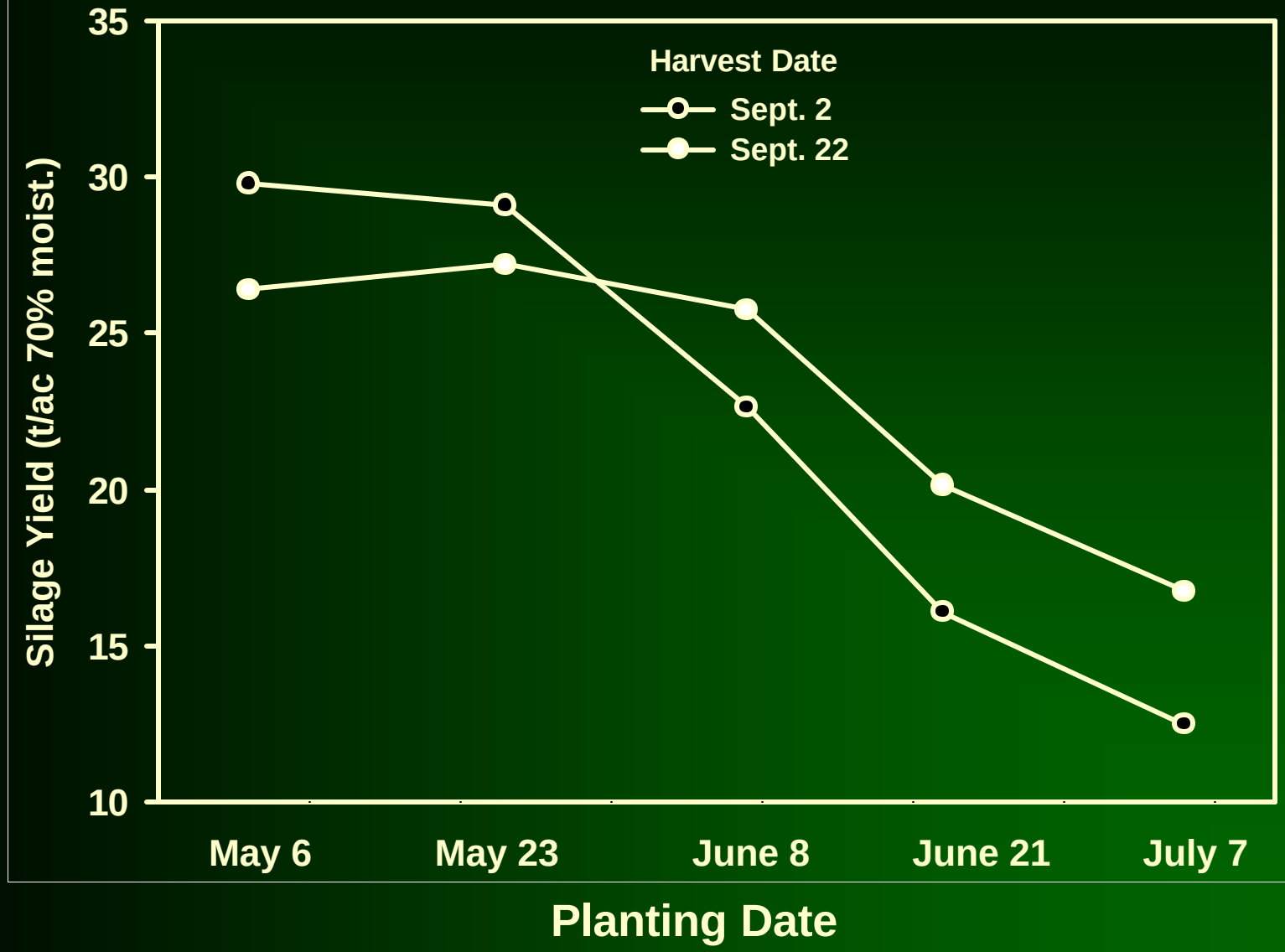
Year	Early Hybrids	Late Hybrids
2002	26.0 (10)¶	26.6 (19)
2003	30.4 (18)	29.4 (7)
2004	21.8 (11)	22.8 (14)
2005	29.1 (6)	27.9 (12)

*Ton/acre ¶Number of hybrids

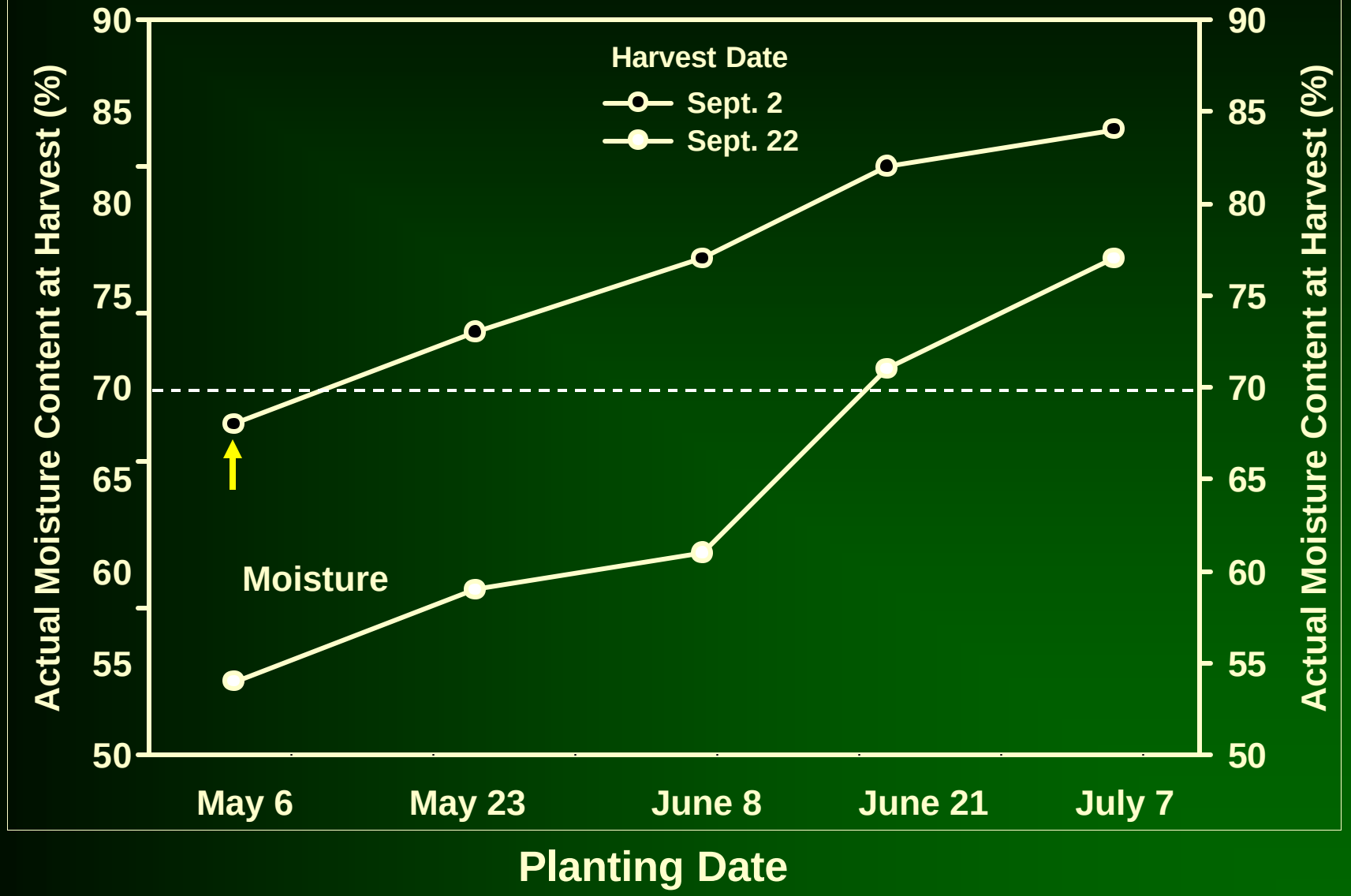
Planting Date

May 6 May 23 June 8 June 21

Silage Yield



Moisture Content



Under Seeding

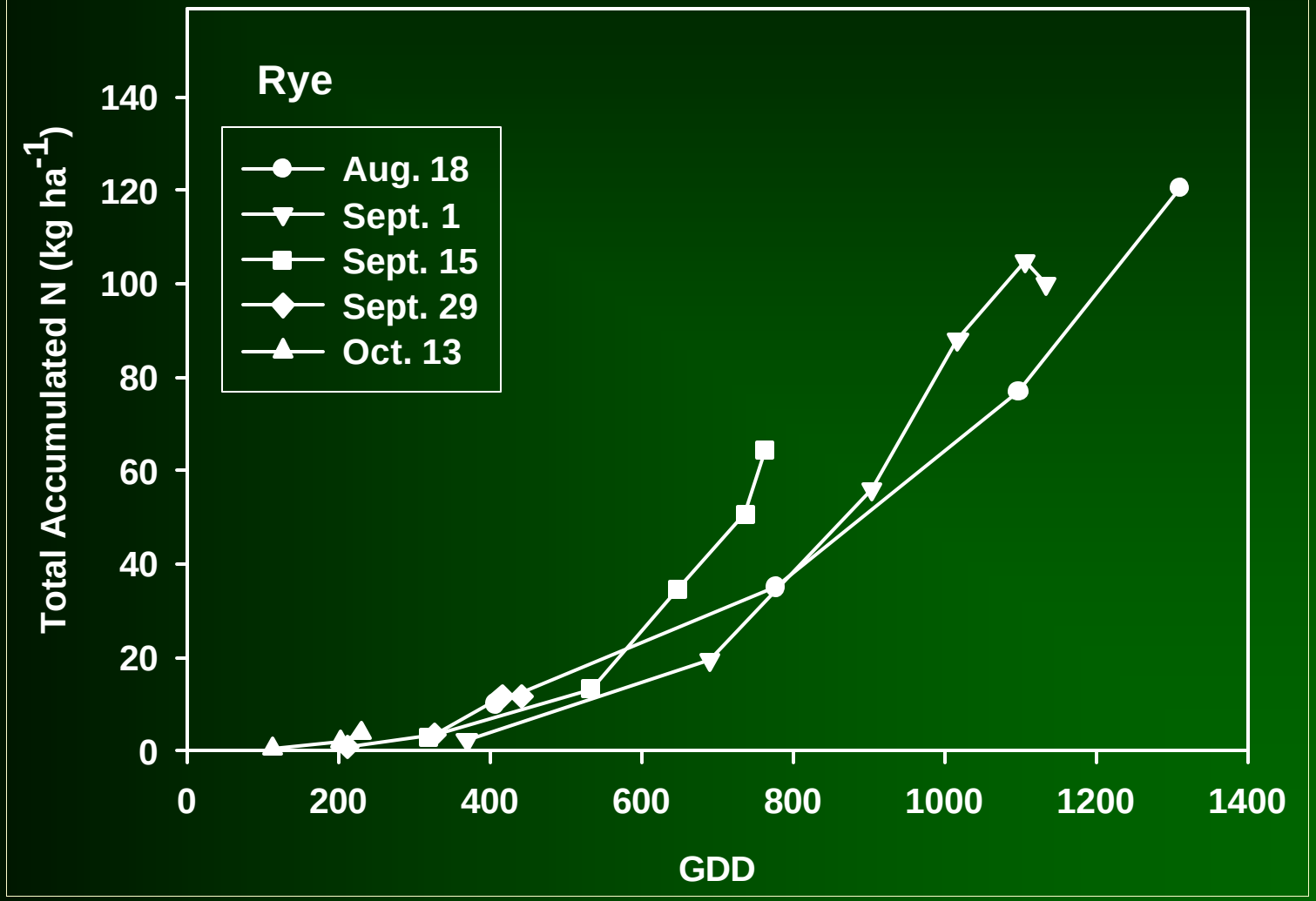
- Rye, ryegrass and smooth bromegrass seeded at time of top-dressing or last cultivation.

Smooth Bromegrass - early July

Smooth Bromegrass - mid Aug.

Are Cover Crops Effective in Reducing Nutrient Loss in Corn Cropping Systems?

Yes!

But only if you plant corn and cover crops early!

Applying Growing Degree Days