University of California

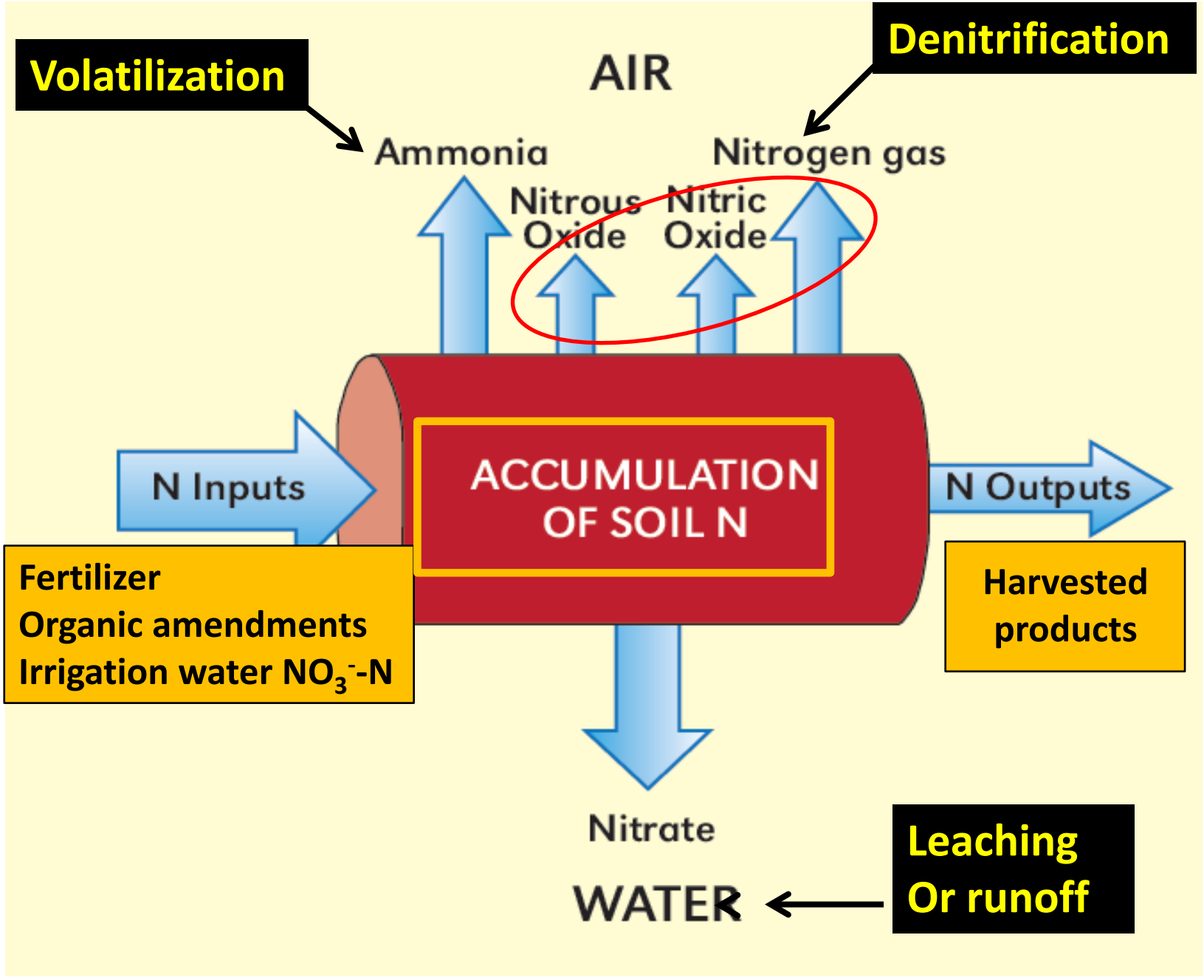
Nitrogen Management Training

for Certified Crop Advisers

Nitrogen Management in Tomatoes and Melons

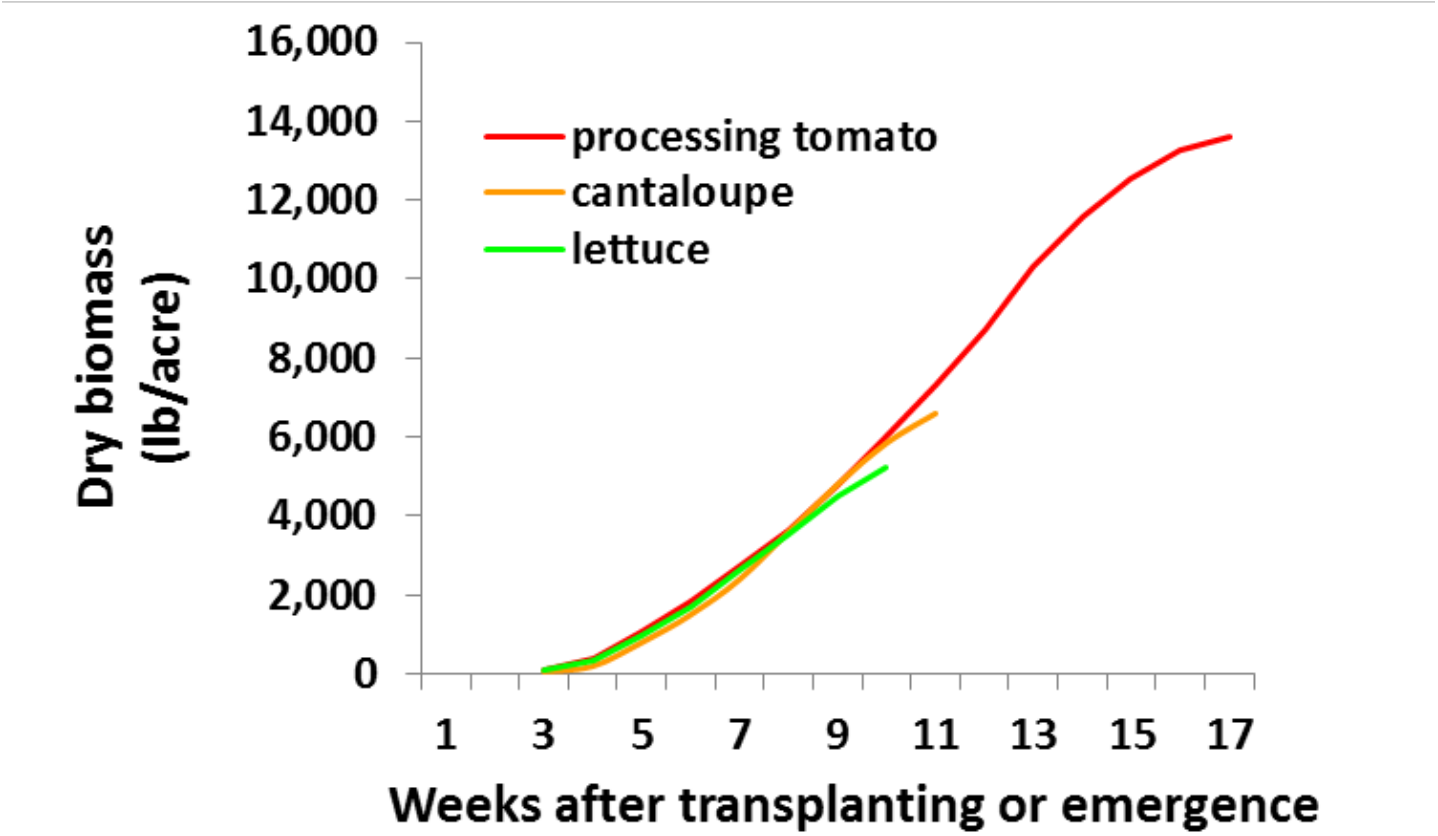
UC Cooperative Extension | University of California Agriculture and Natural Resources

N Loss Pathways in Agricultural Systems:



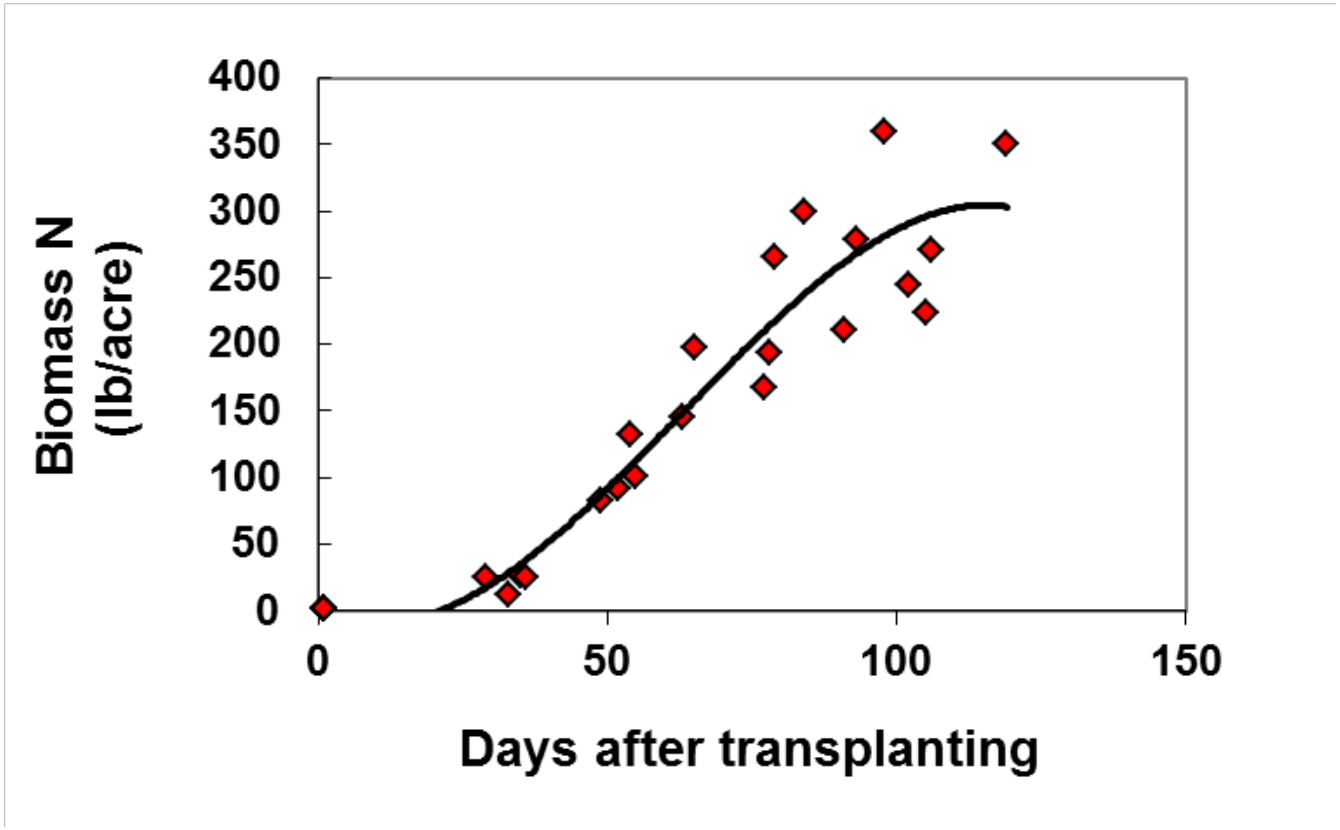
Growth and N Demand Rates in Tomatoes and Melons

Characteristic Growth Pattern



N Accumulation: Tomato

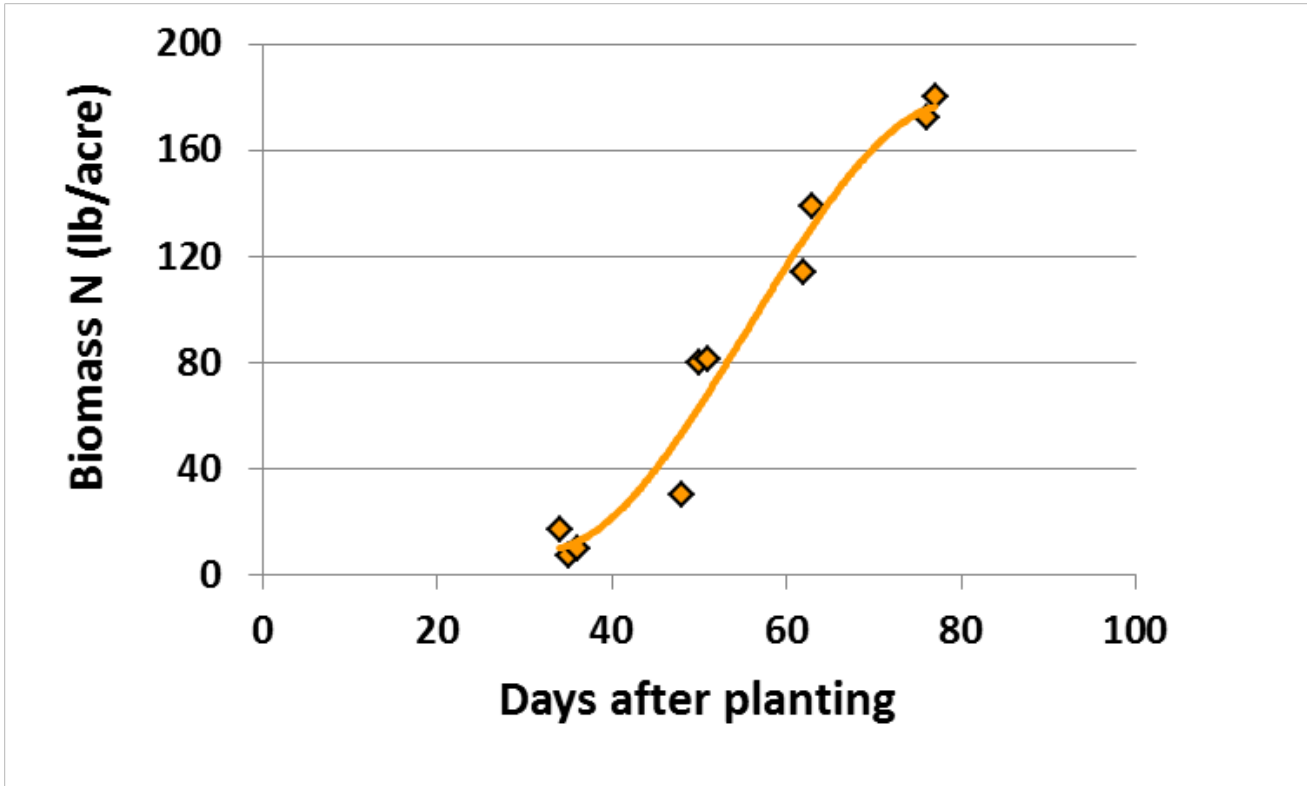
- N accumulation follows the same pattern as growth:



Data from four high-yield fields

N Uptake: Cantaloupe

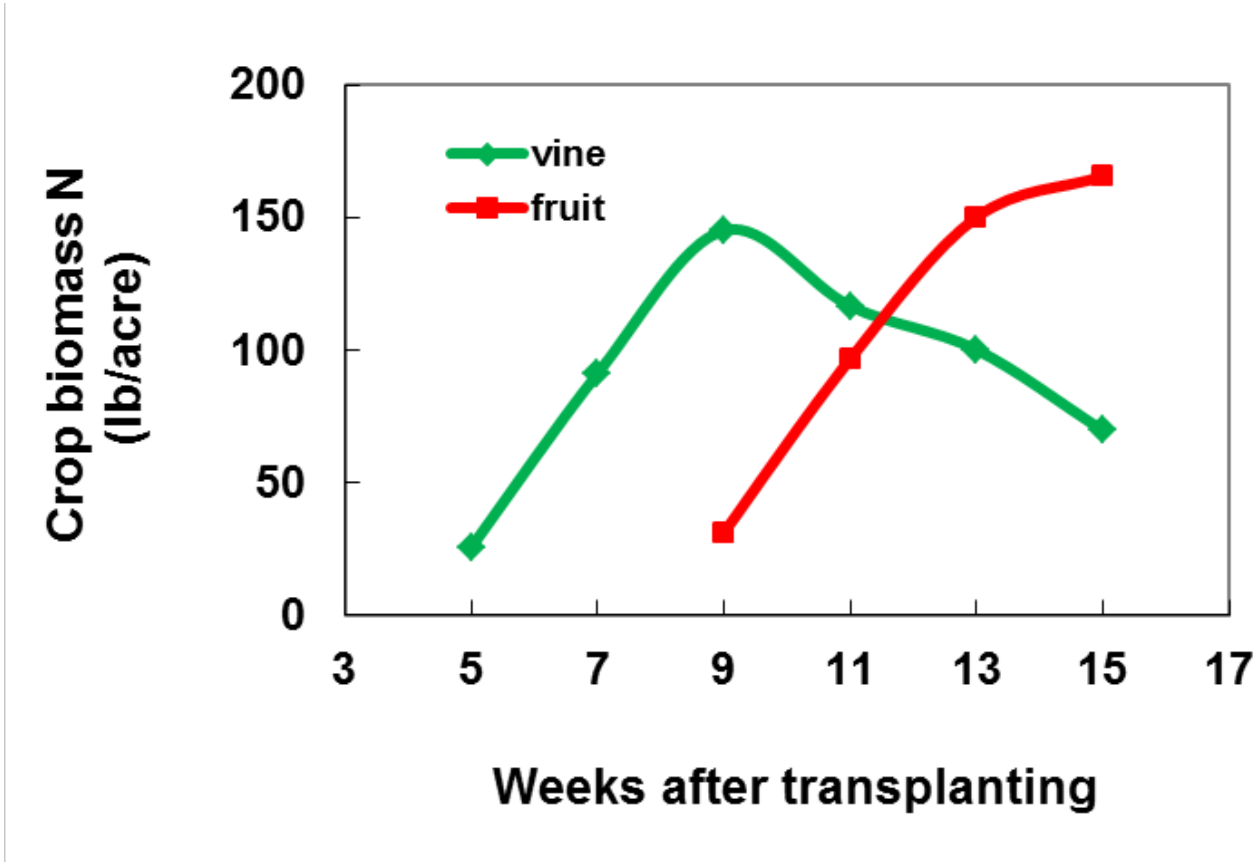
- N uptake follows the same pattern as growth:



Data from 3 high-yield hybrid cantaloupe fields

Nutrient Partitioning in Fruiting Crops:

- N partitioning by processing tomato:



General rule:

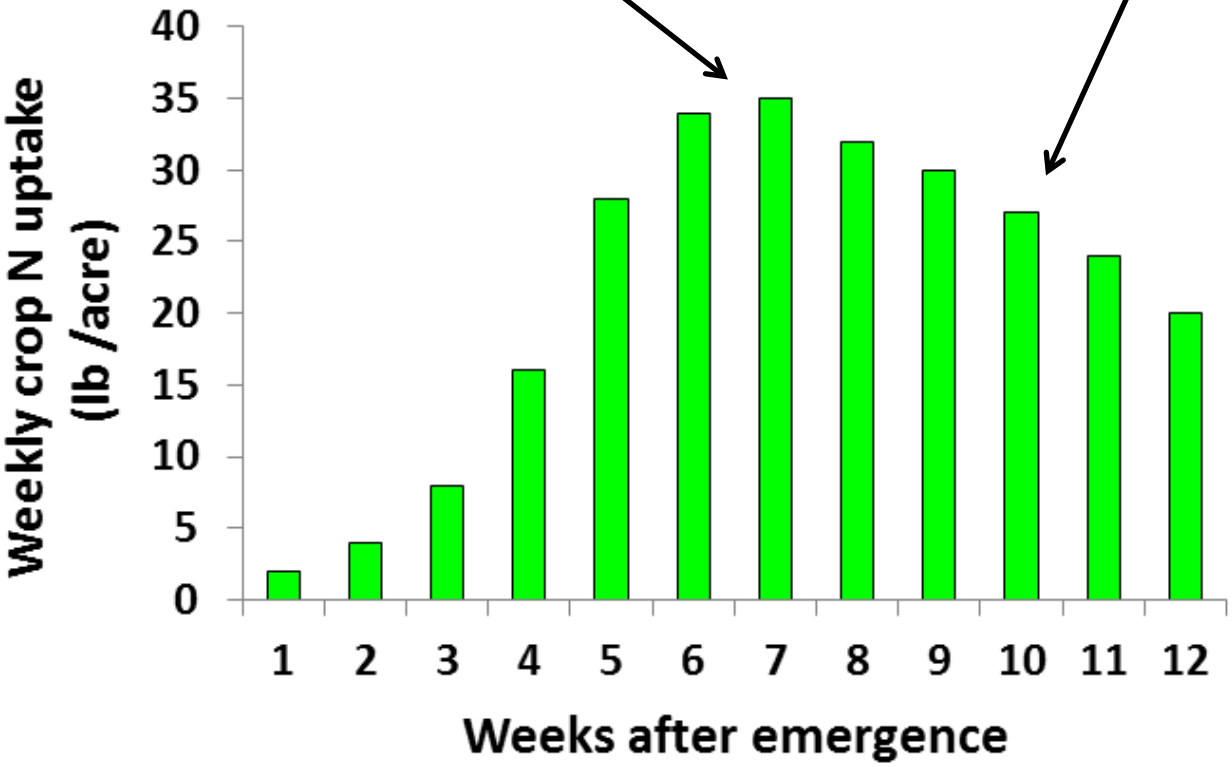
In fruiting crops, fruit typically represents 50-70% of total crop N uptake

N Uptake
in Tomatoes and Melons

N Uptake: Fruiting Crops

Vegetative crops typically harvest near peak N uptake rate

Fruiting crops typically harvest after peak N uptake rate



N Uptake Rates: Tomatoes

Individual fields can differ widely in nutrient uptake:

	Fruit yield	**Crop N uptake (lb/acre)**		
	Tons/acre	vine	fruit	total
Field 1	53	65	179	244
Field 2	56	168	198	366
Field 3	58	139	150	289
Field 4	58	145	148	293

‘Luxury uptake’

- nutrient uptake that neither increases yield nor product quality
- often 10-20% of the total crop N uptake, sometimes more

N Uptake Rates: Tomatoes

Crop type		lb N / ton of fresh weight
Fruiting	Cantaloupe	3.0
	Honeydew	2.1
	Pepper	3.2
	Tomato	3.1
	Watermelon	2.0
Vegetative	Broccoli	11.6
	Lettuce	4.0

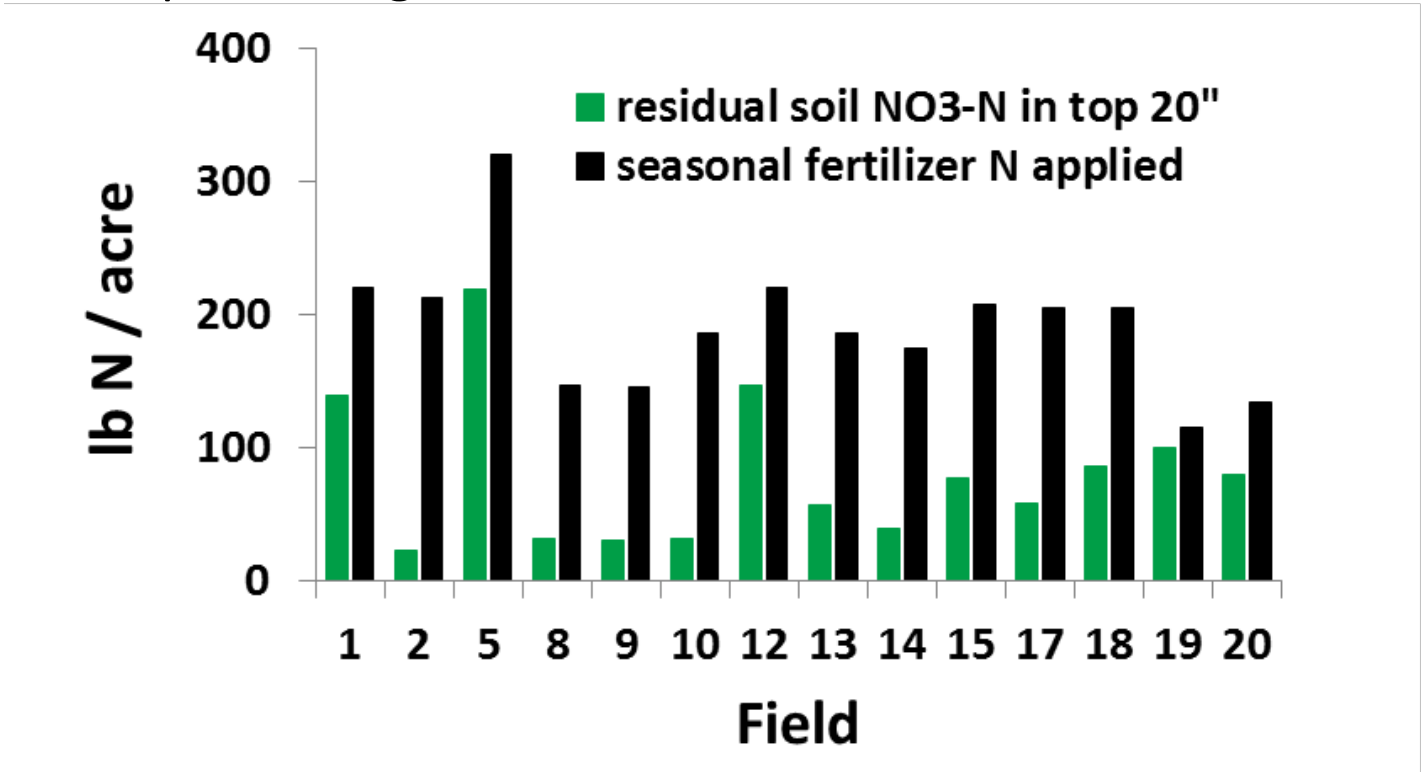
Field-Specific N Management In Tomatoes and Melons

- Other N Credits
- Tissue Testing

Field-Specific N Management:

Soil Nitrate Testing in Tomatoes

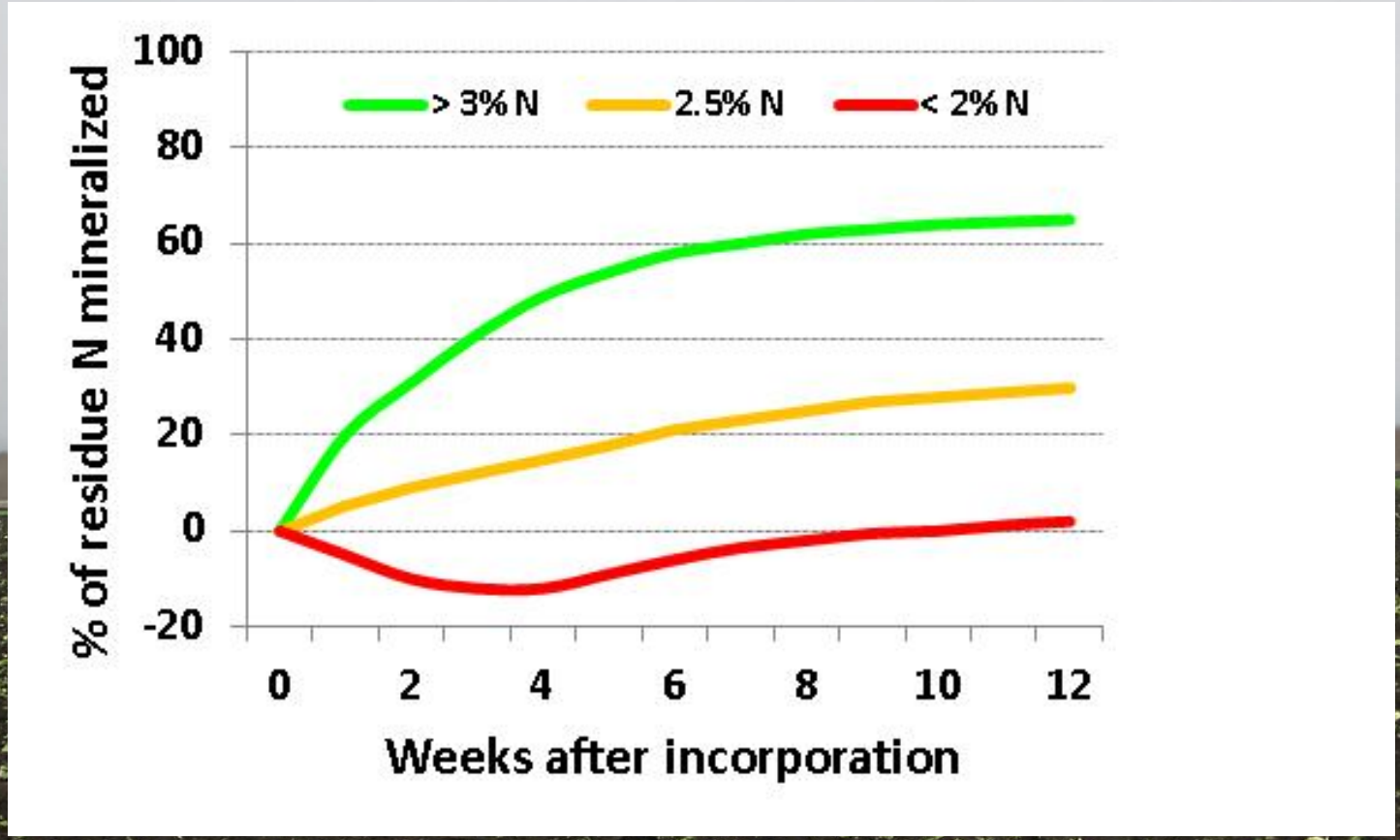
Commercial processing tomato fields:



- Soil residual NO_3-N varied from 23-219 lb/acre, averaged 80 lb/acre
- Grower N application did not reflect this difference; ranged from 115-320 lb/acre, averaged 190 lb/acre

Data from Horwath et al., 2013

Field-Specific N Management:
Contribution of Prior Crop Residue



In general, more than 90 days after soil incorporation, crop residue N behaves similarly to that of existing soil organic N

Plant Tissue Testing:

Leaf Total N Monitoring, Tomato Example

- Advantages of leaf total N: changes slowly

	lb N/acre		
Growth stage	Total plant N content	N uptake/day	Daily uptake as % of biomass N
Early bloom	25	1	4
Mid fruit set	80	3.5	4
First red fruit	160	4.5	3

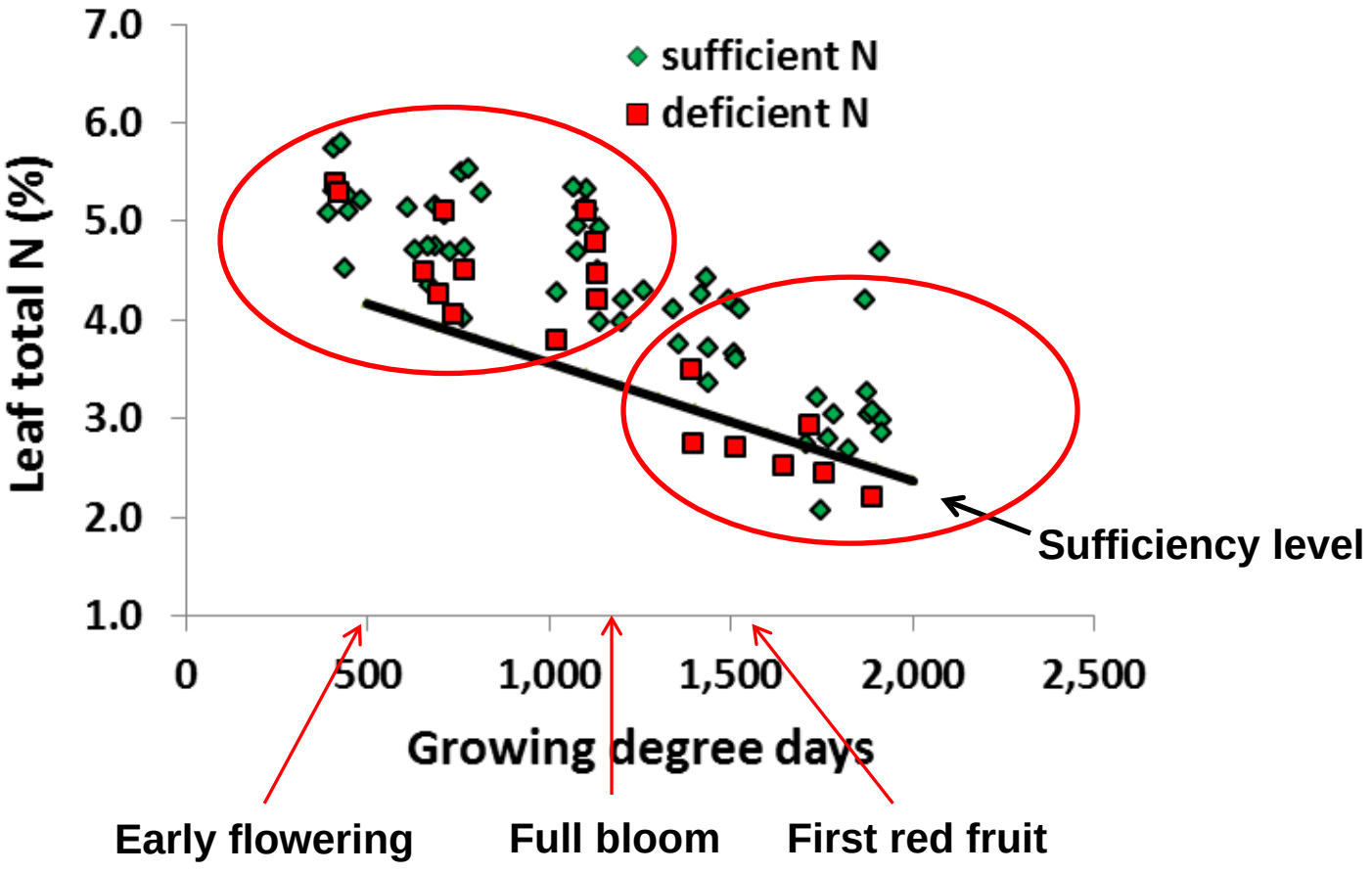
Leaf total N substantially above the sufficiency level indicates sufficient biomass N to accommodate 7+ days of crop growth

Plant Tissue Testing:

Leaf Total N Monitoring, Tomato Example

- Limitation of leaf total N: doesn't reflect soil N availability until the high N uptake period, *so it is a flawed guide to early season N fertilizer need*

- Red symbols from fields in which N availability limited yield
- Green symbols from fields with adequate N to maximize yield



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