

University of California

Nitrogen Management Training

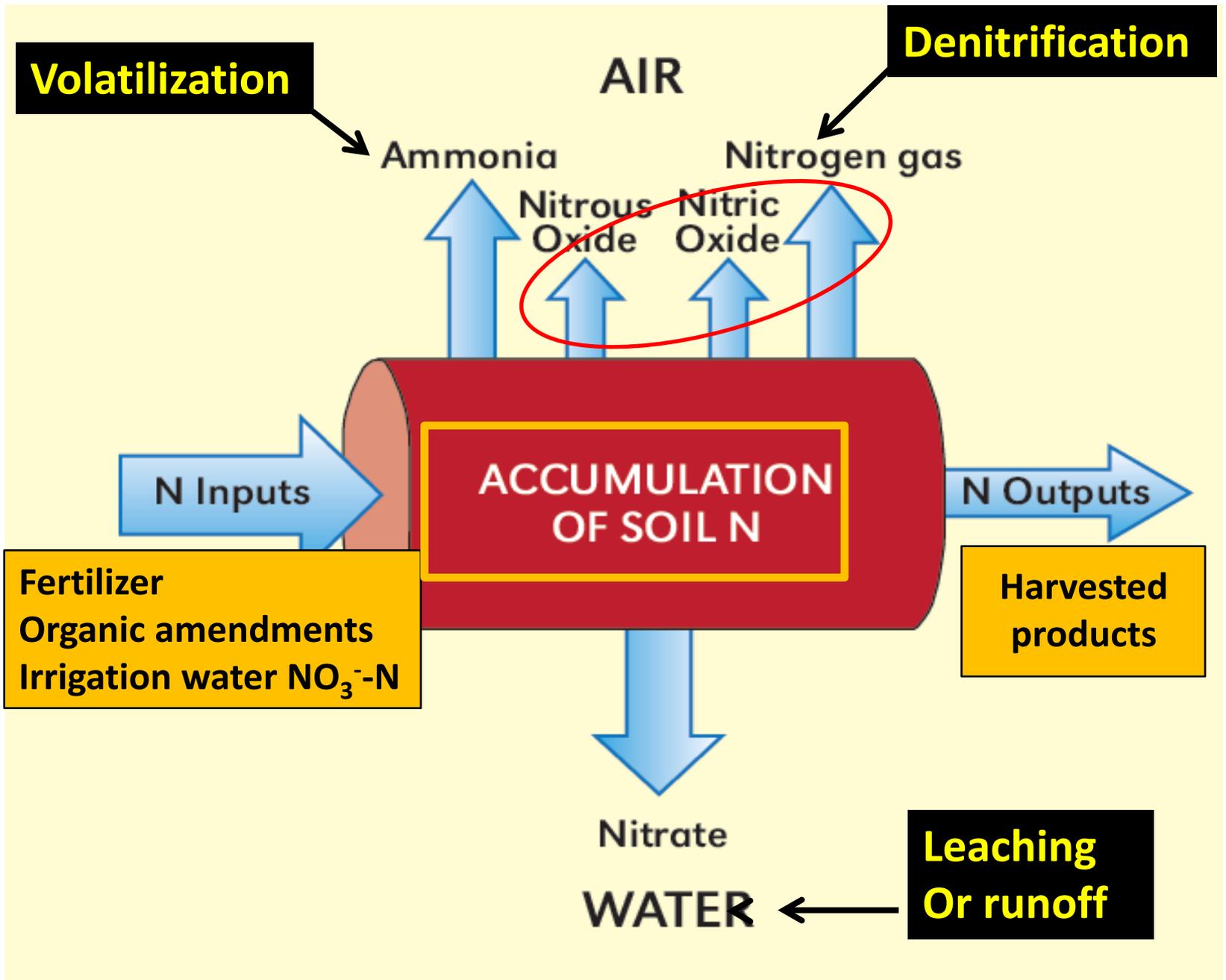
for Certified Crop Advisers

Nitrogen Management in Strawberries



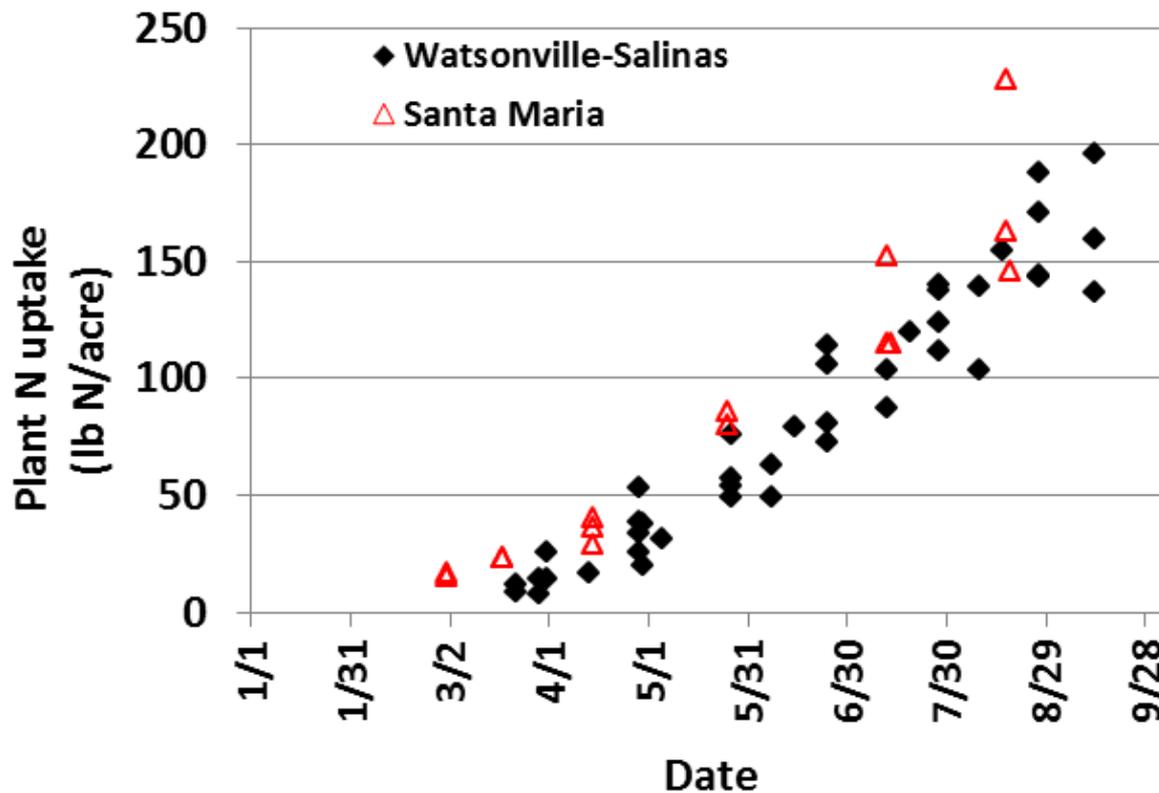
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Agriculture and Natural Resources

N Loss Pathways in Agricultural Systems:



Nitrogen Uptake Rates In Strawberries

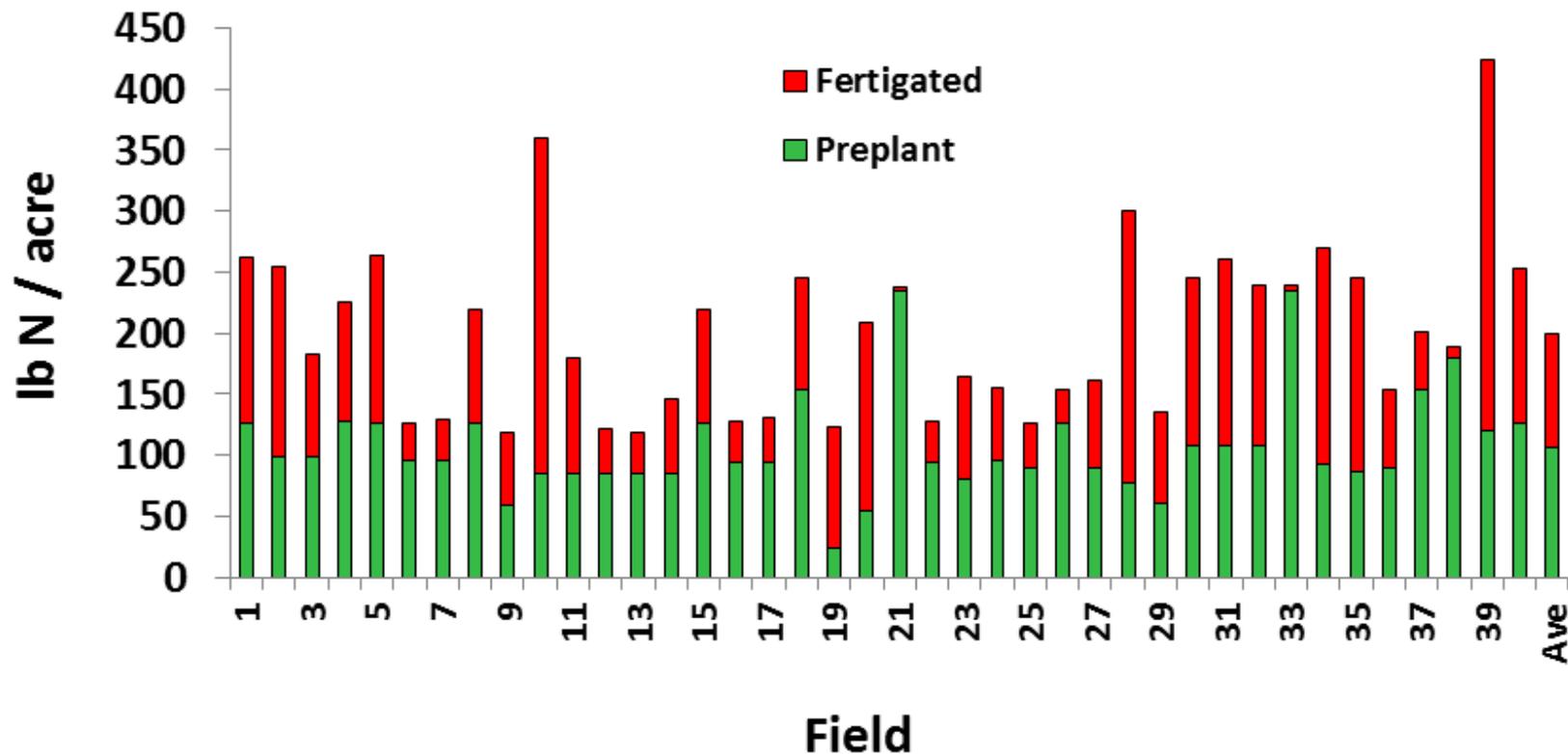
Nitrogen Demand and Uptake



- Limited N uptake until fruiting; by 1st harvest, cumulative crop uptake <30 lb/acre
- After that, N uptake averages 1 lb/acre/day
- Over the season, total crop N uptake approximately 180-240 lb/acre (including runners, roots and cull fruit); fields kept in production
- Beyond Sept/Oct, uptake continues at a slower rate

Nitrogen Demand and Uptake

Fertilization practices :



	Ave	Min	Max
Preplant	106	24	234
Fertigated	93	3	304
Total	200	118	424

Use of Preplant Controlled Release Fertilizers in Strawberries

Are P and K Needs Driving N Application?

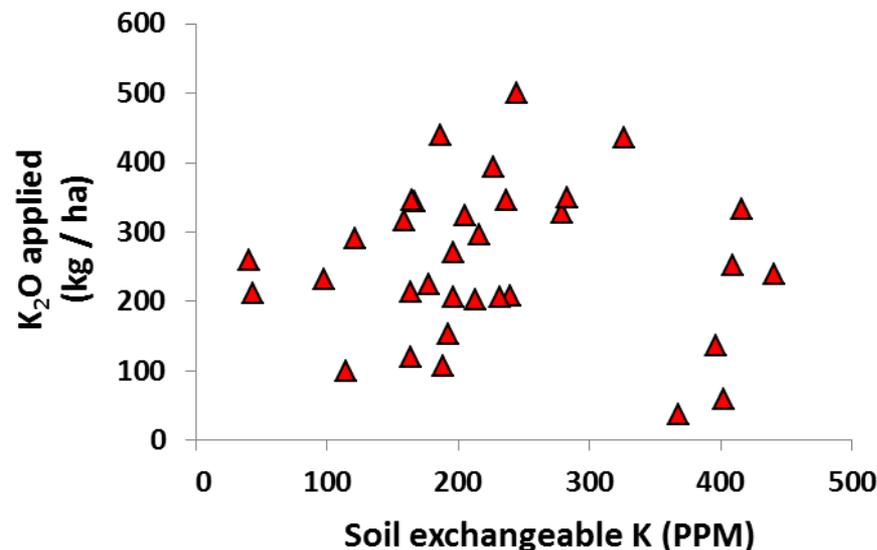
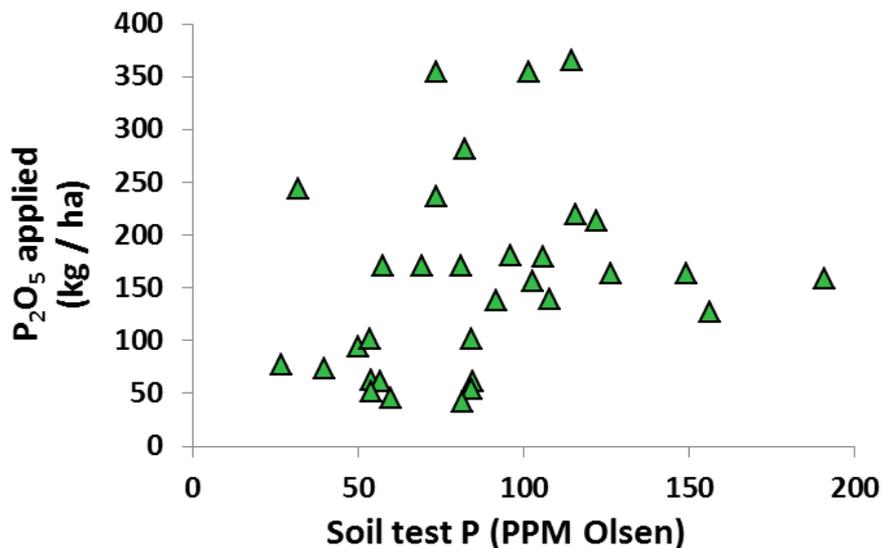


How effective is preplant Controlled Release Fertilizer?

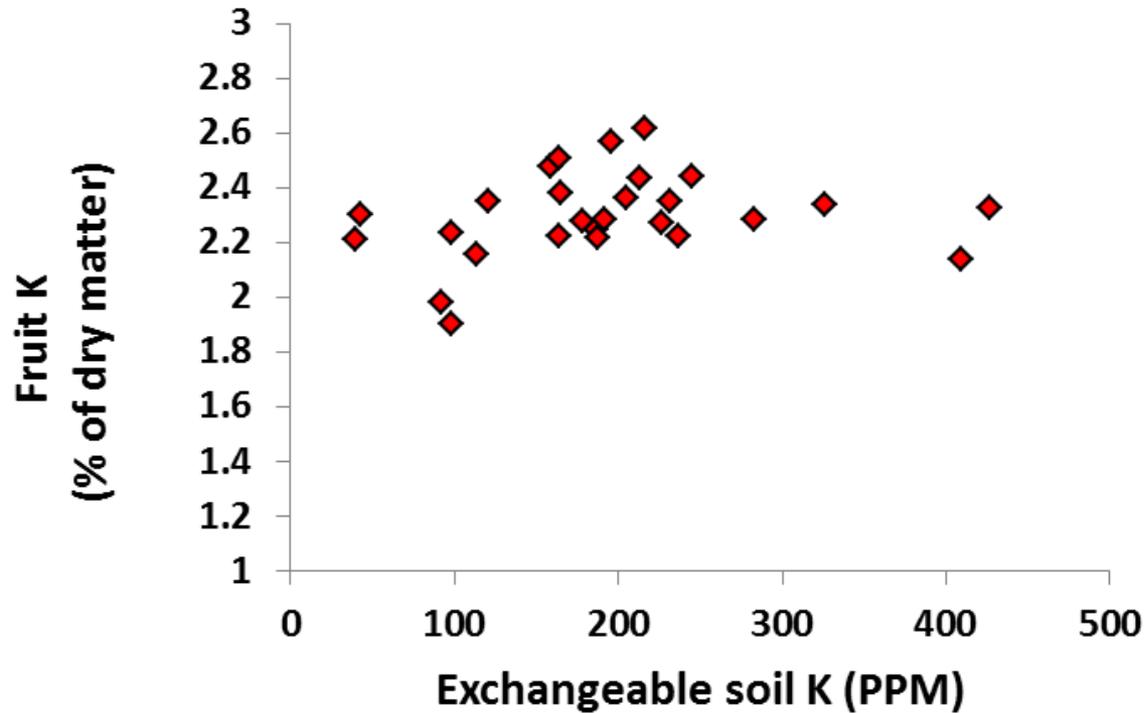
- Most common product is 18-8-13, 6-8 month release

Issue 1: Is the P and K needed?

- Fertilization unlikely to be needed in soil greater than 50 PPM Olsen P, or 200 PPM exchangeable K



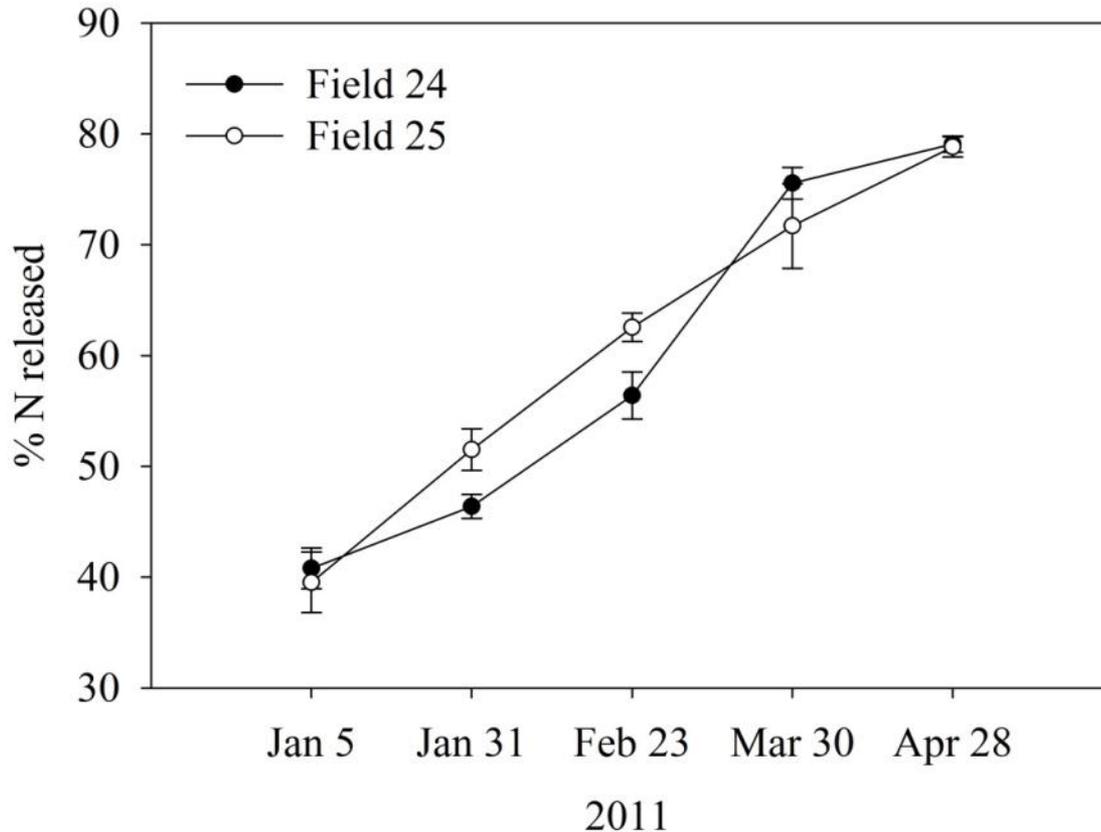
Does Excess K Improve Fruit Quality?



Fruit quality is not enhanced by excessive soil K

Effectiveness of CRF for Strawberries:

N release was nearly linear over time:

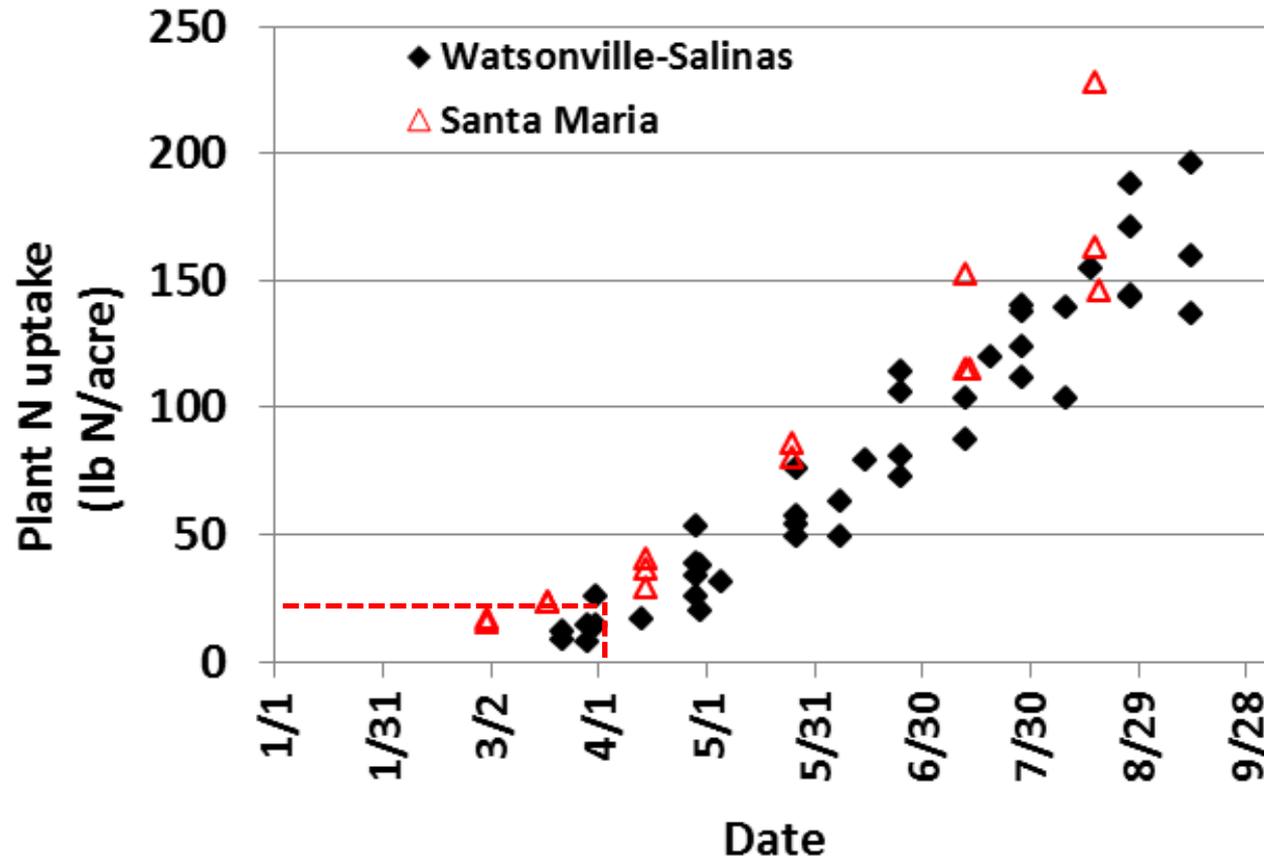


- When CRF was applied in November, 70-80% N release by April 1
- Most commercial CRF applied even earlier

Effectiveness of CRF for Strawberries:

Controlled Release Fertilizer release poorly matched with crop N uptake:

- Average 18-8-13 application was ≈ 106 lb N/acre
- By April 1, >80 lb N released, with <30 lb crop N uptake

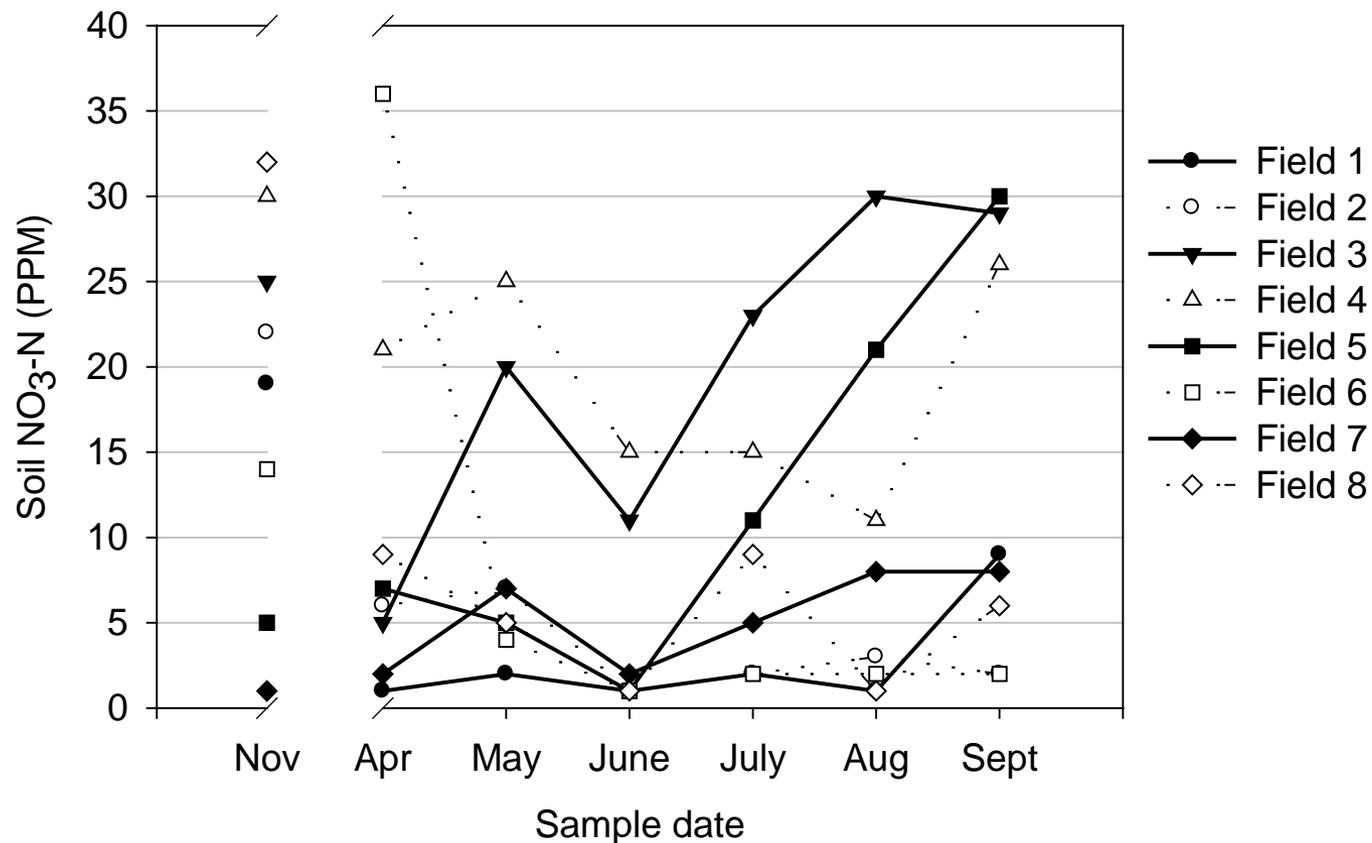




Effectiveness of CRF for Strawberries:

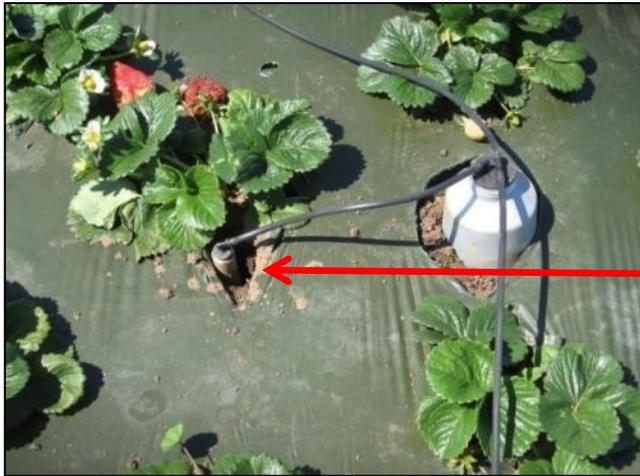
Is released CRF N still available for spring uptake?

Soil NO₃-N in top 30 cm of soil:



PPM NO₃⁻-N x 3.8 = approximate lb N/acre in the top foot of soil

Measuring NO₃⁻-N leaching:



Suction lysimeters
at 60 cm depth



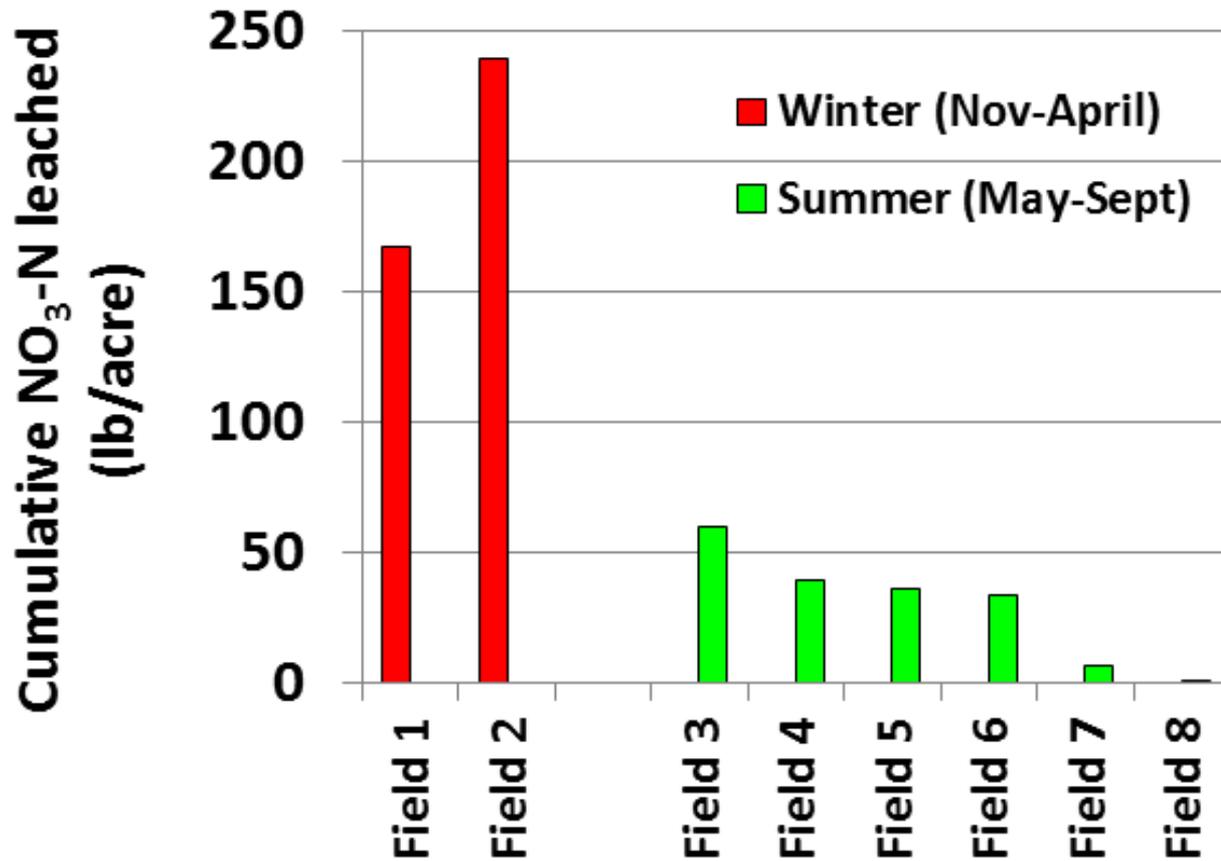
Controlled vacuum held
throughout one irrigation
cycle per week



Leaching volume estimated from crop ET_c ,
irrigation applied and change in soil
moisture



Measuring NO₃⁻-N leaching:





So, how to handle preplant CRF ?

- A modest amount of CRF is reasonable protection against loss of soil nitrate by irrigation for crown establishment, or winter rain; *however, individual field conditions should be considered*
- The faster the CRF release rating, the greater the mismatch between N release and crop uptake

Field-Specific N Management In Strawberries

Crediting Organic N:

Contribution of soil N mineralization:

- Between 5 - 6% of soil organic matter is organic N
- You can generally count on net mineralization of *at least* 1-2% of soil organic N content during a vegetable crop season, **more for a strawberry season**

Example:

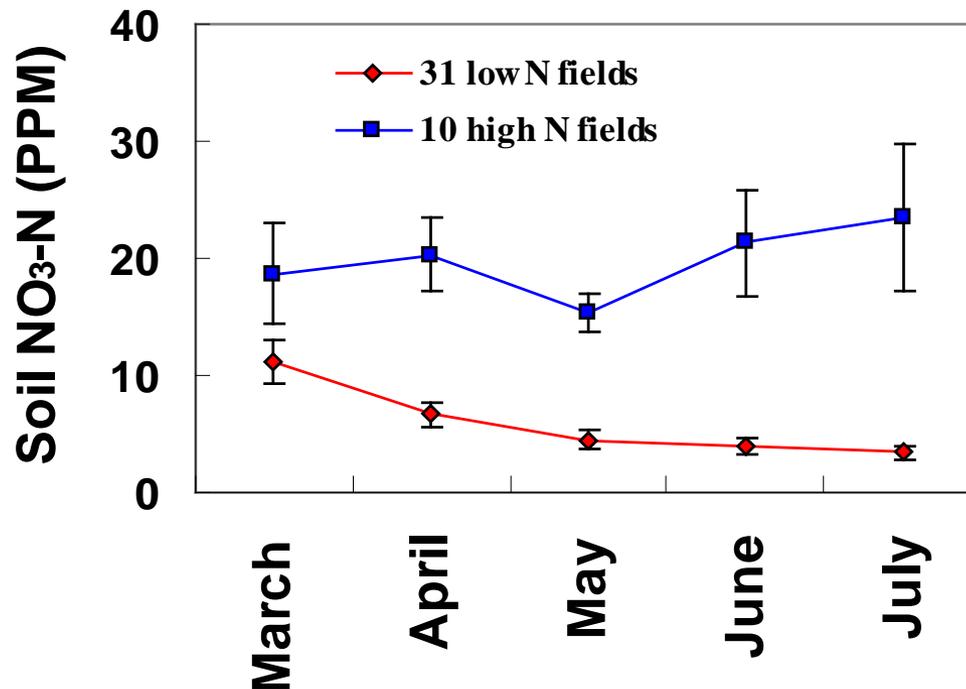
Top 12 inches of soil weighs $\approx 3,800,000$ lb/acre

$\approx 2,000$ lb organic N per % organic matter

$\approx 20-40$ lb N/acre per % soil organic matter

Managing fertigation:

- Once fruit harvest begins, crop N uptake is quite consistent, so fertigation should be as well
- Strawberry N uptake is slow, so large soil nitrate reserves are not needed; a majority of berry fields monitored were maintained at <10 PPM soil NO_3^- -N during the harvest season. There were high yield fields in both N management categories



Monitoring Tools:

Soil NO₃⁻-N testing:

- Must avoid direct sampling of CRF band
- Winter/early spring sampling may indicate when fertigation should commence
 - action threshold of 10 PPM suggested
- Fertigation season soil sampling of limited value, except as a guide to reducing fertigation

Tissue testing:

- Leaf total N provides useful indication of overall N status
- Petiole NO₃⁻-N gives highly variable results, of little utility



Monitoring Tools:



<http://www.calstrawberry.com>

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Current strawberry tissue nutrient guidelines available at the California Strawberry Commission website



to check out our new website:
www.californiastrawberries.com

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