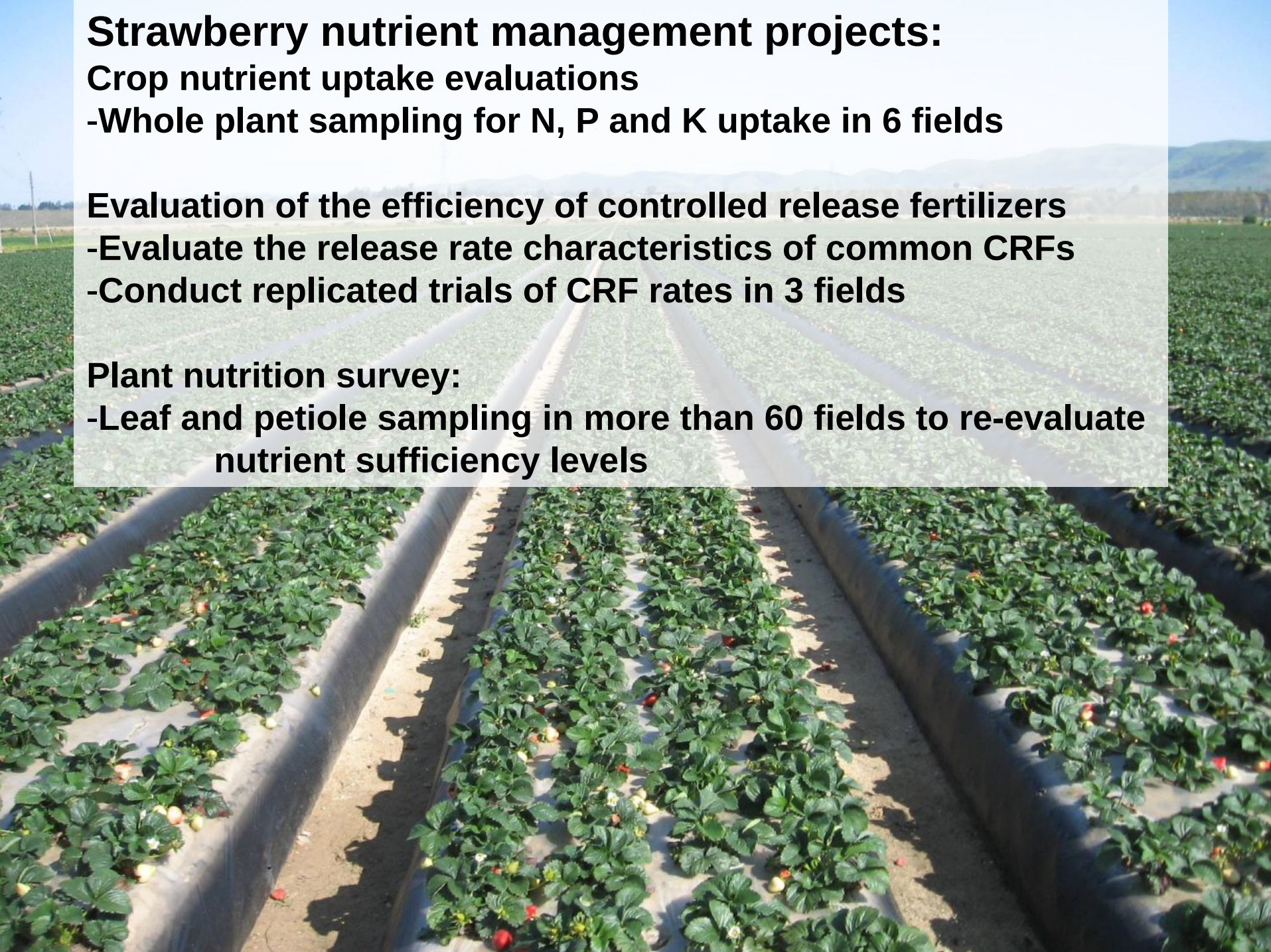
Strawberry nutrient management

Thanks to:
Tom Bottoms
Mark Bolda
Mike Cahn
Cooperating growers



Strawberry nutrient management projects:

Crop nutrient uptake evaluations

-Whole plant sampling for N, P and K uptake in 6 fields

Evaluation of the efficiency of controlled release fertilizers

-Evaluate the release rate characteristics of common CRFs

-Conduct replicated trials of CRF rates in 3 fields

Plant nutrition survey:

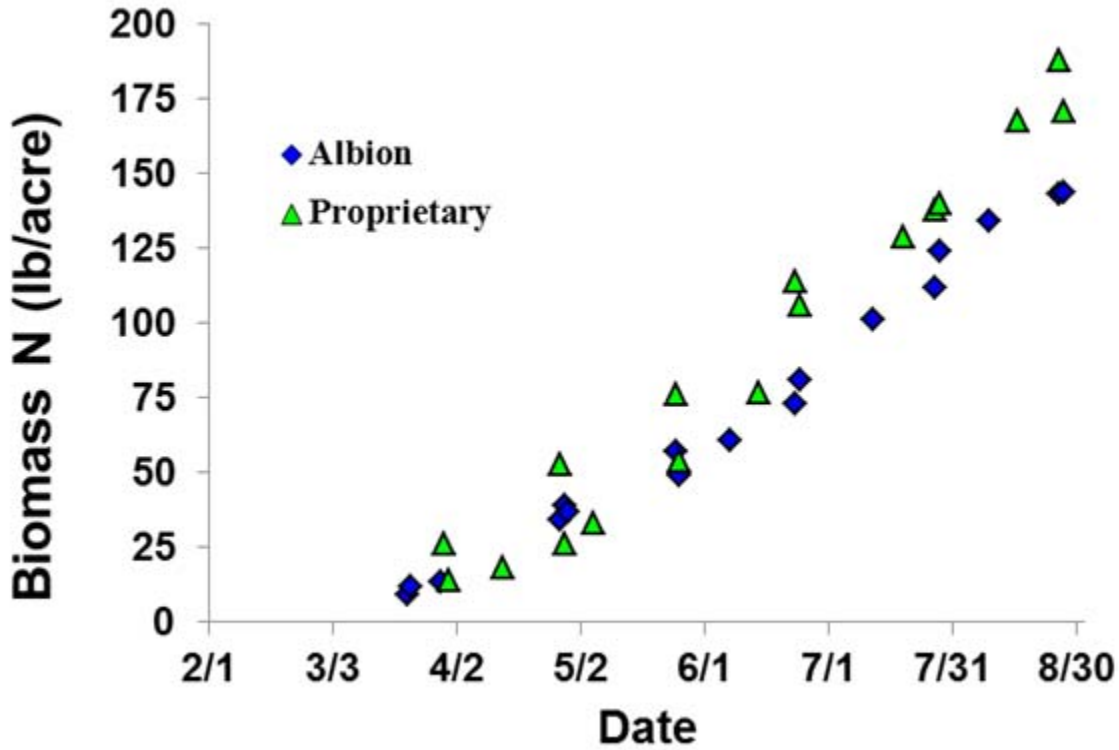
-Leaf and petiole sampling in more than 60 fields to re-evaluate nutrient sufficiency levels

Measuring strawberry nutrient uptake

- **Monthly whole plant sampling for N, P, K content of both plant and fruit**

Strawberry N uptake is constant over the summer :

Total crop N uptake (plant and fruit), average of 3 fields per variety :



- about 20 lb N/acre taken up from planting until late March
- about 1 lb N/acre/day for the rest of the season

What about roots ?

- **Root growth *approximately* proportional to top growth**
- **Roots have low N concentration, and represent only 10-15% of crop N uptake**

What about P and K :

- A higher proportion of P and K end up in fruit, so the seasonal uptake pattern is similar to N, but slightly later

- Assuming a good yield, through September the seasonal nutrient uptake per acre would be approximately :

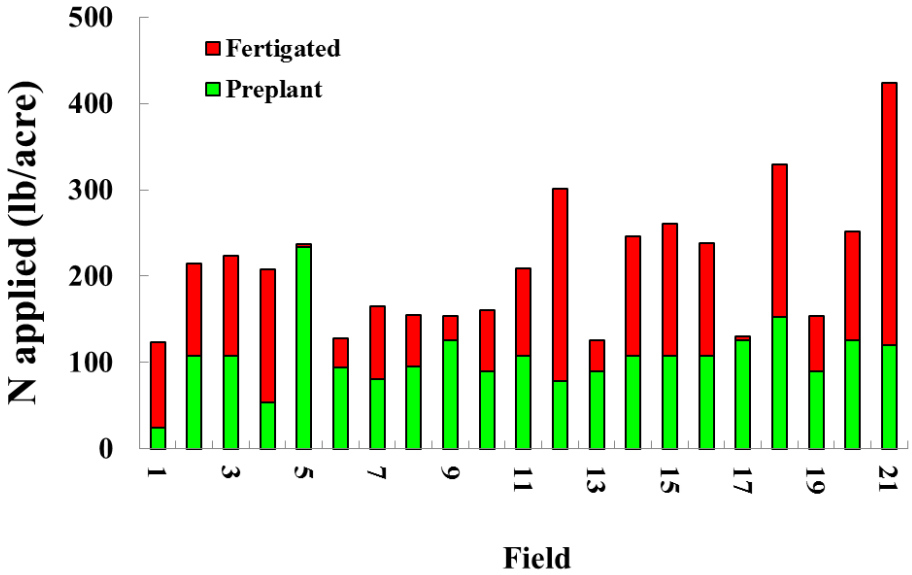
180 – 220 lb N

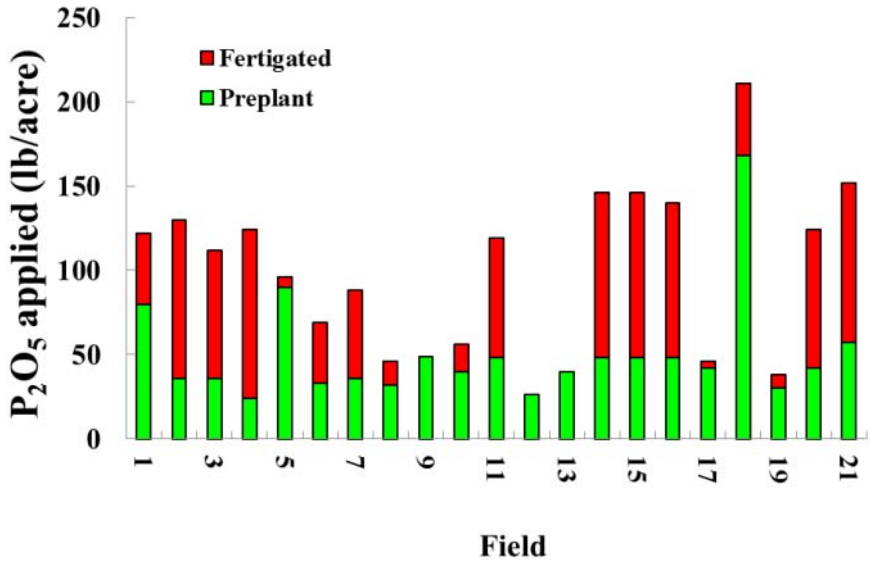
90 – 110 lb P_2O_5

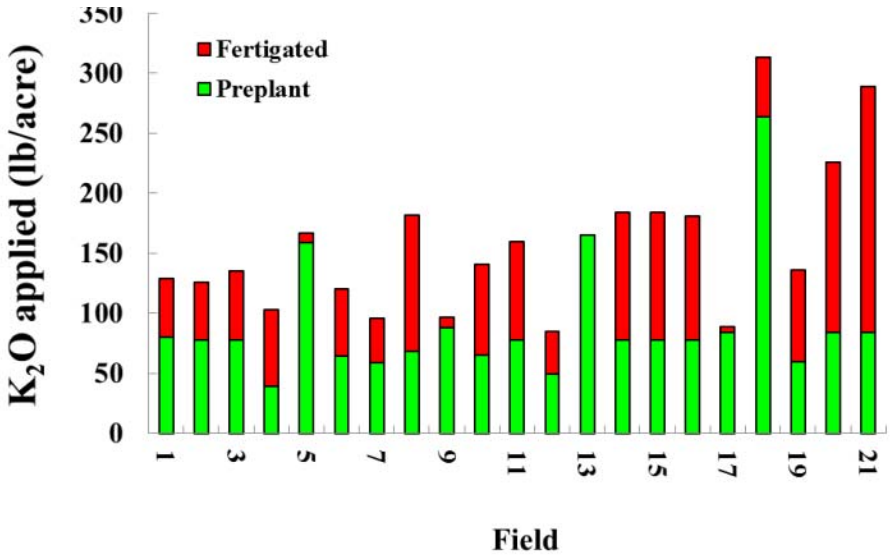
270 – 330 lb K_2O

Given that pattern of uptake, how are strawberries fertilized ?

Watsonville fields, 2010 and 2011 :

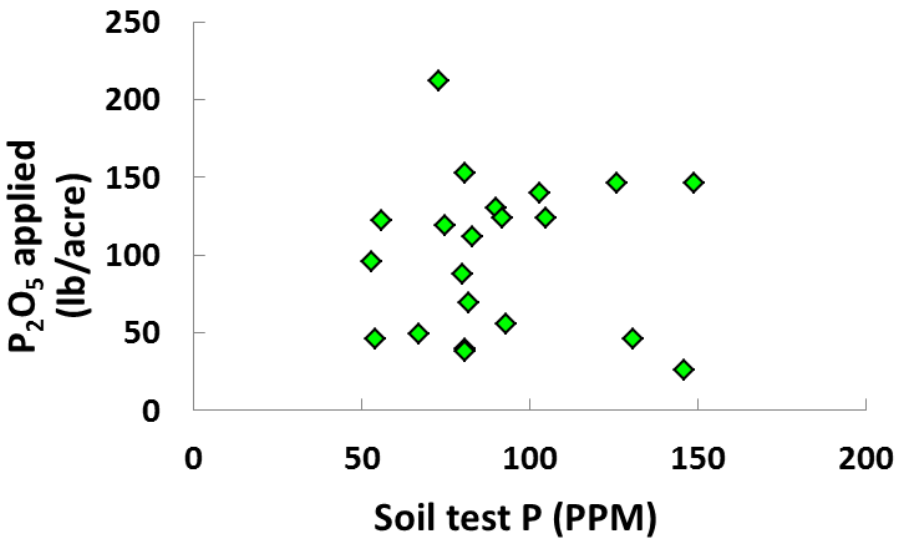


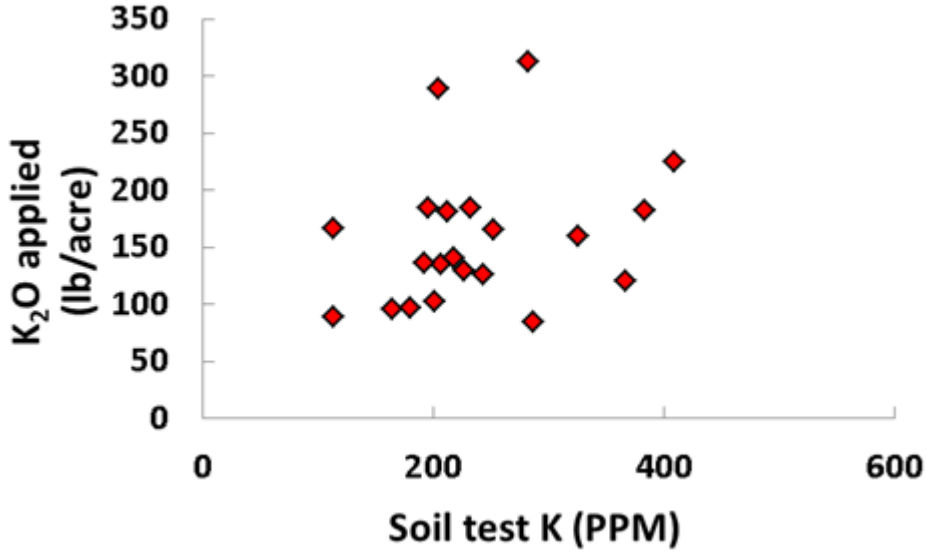




	Average lb/acre		
	preplant	fertigated	total
N	106	105	211
P_2O_5	50	49	99
K_2O	90	68	158

P and K fertilization appears to be unrelated to soil test level:



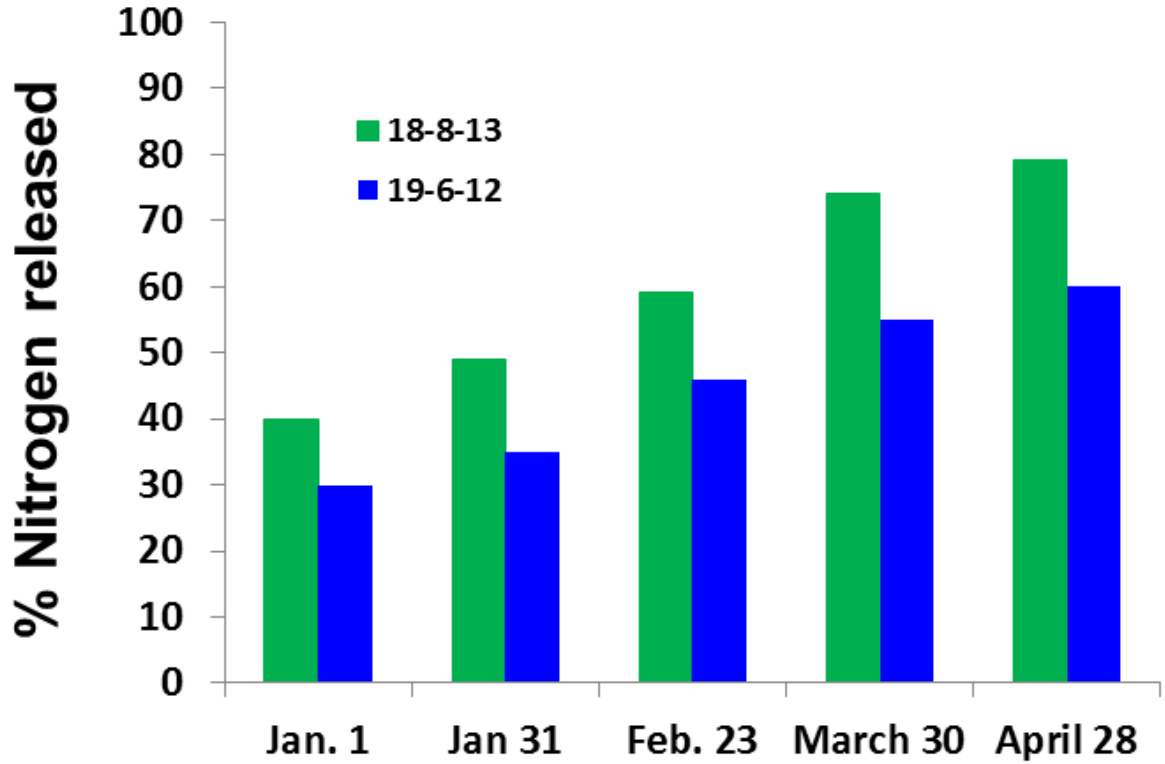


- **Fertilization unlikely to be needed in soil greater than 50 PPM Olsen P, or 200 PPM exchangeable K**

How does crop uptake match the N release from preplant fertilizers ?

- two common fertilizers
  - 18-8-13, 6 month release
  - 19-6-12, 8 month release
- bags buried in two strawberry fields in mid-November, 2010
- 3 bags of each type recovered from each field each month, and analyzed for the amount of N remaining

Rate of N release from controlled release fertilizers :



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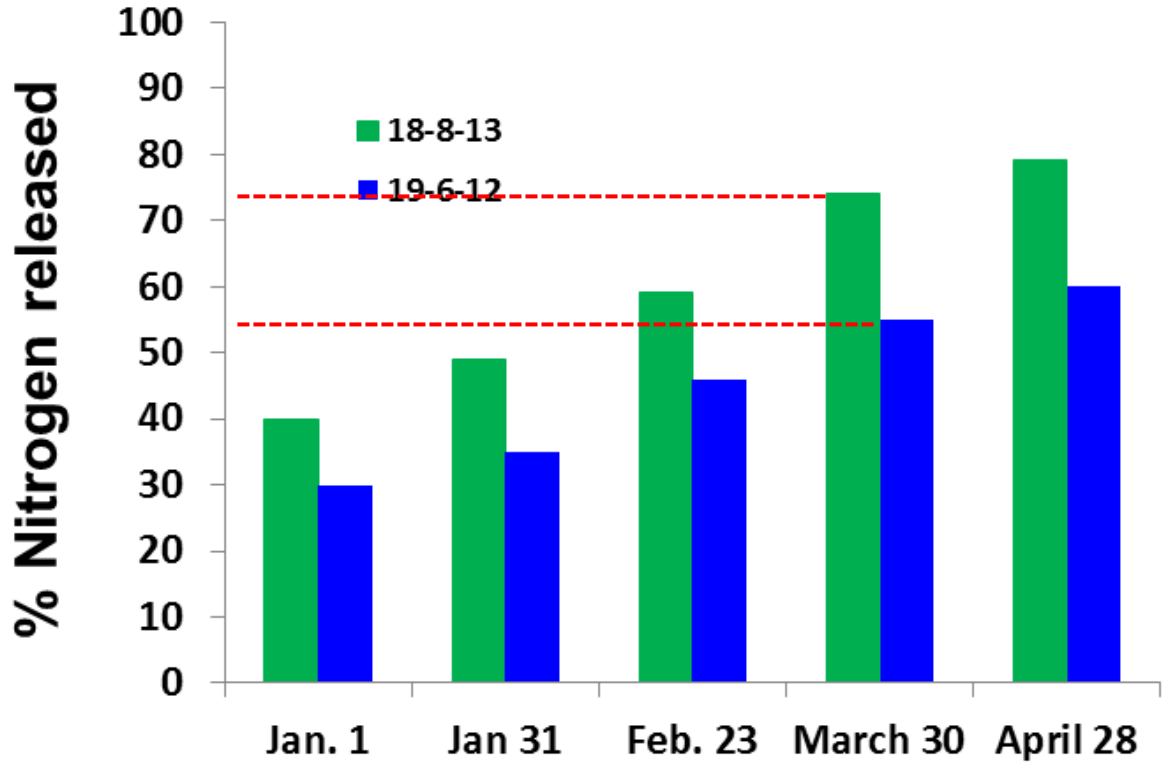
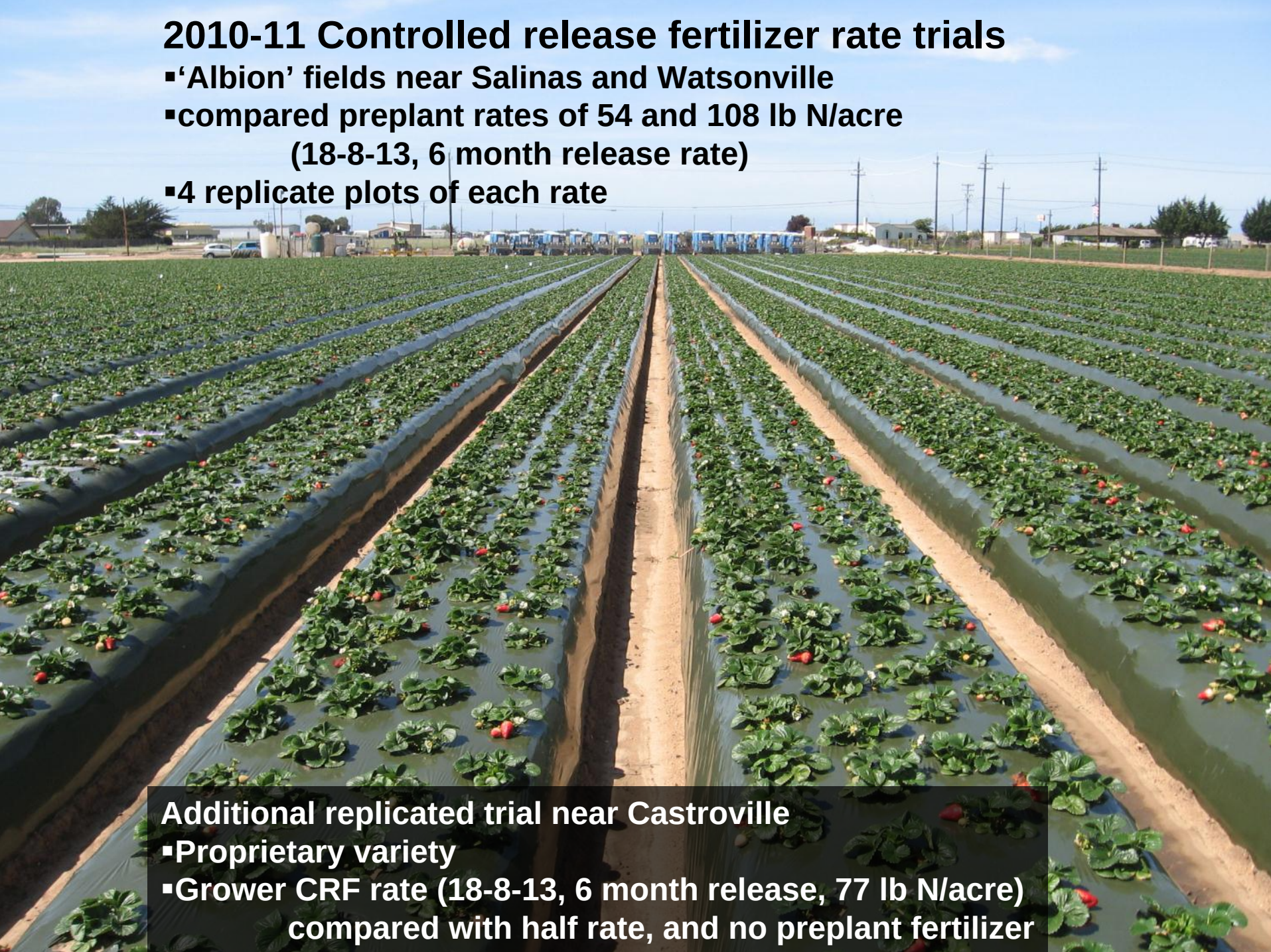


By the end of March :

- typical crop N uptake no more than 20 lb N/acre
- between 55 - 75% of fertilizer N had been released; would have been even higher if fertilizer had been applied before mid-November

2010-11 Controlled release fertilizer rate trials

- ‘Albion’ fields near Salinas and Watsonville
- compared preplant rates of 54 and 108 lb N/acre
  (18-8-13, 6 month release rate)
- 4 replicate plots of each rate



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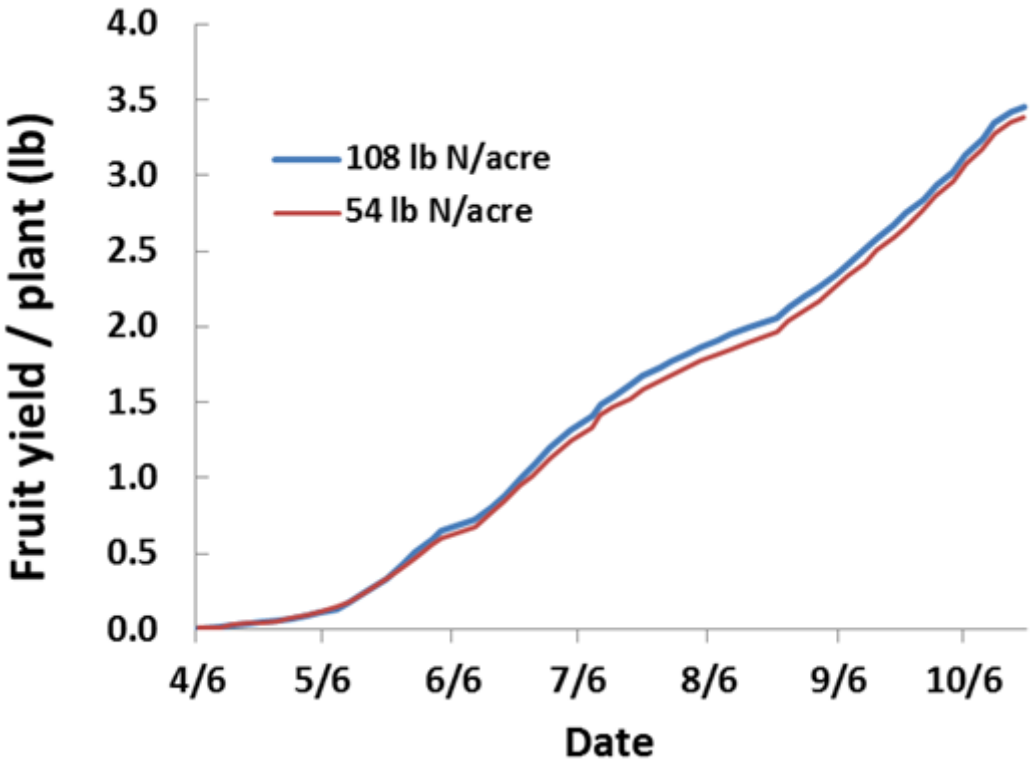
- 4 replicate plots of each rate

Additional replicated trial near Castroville

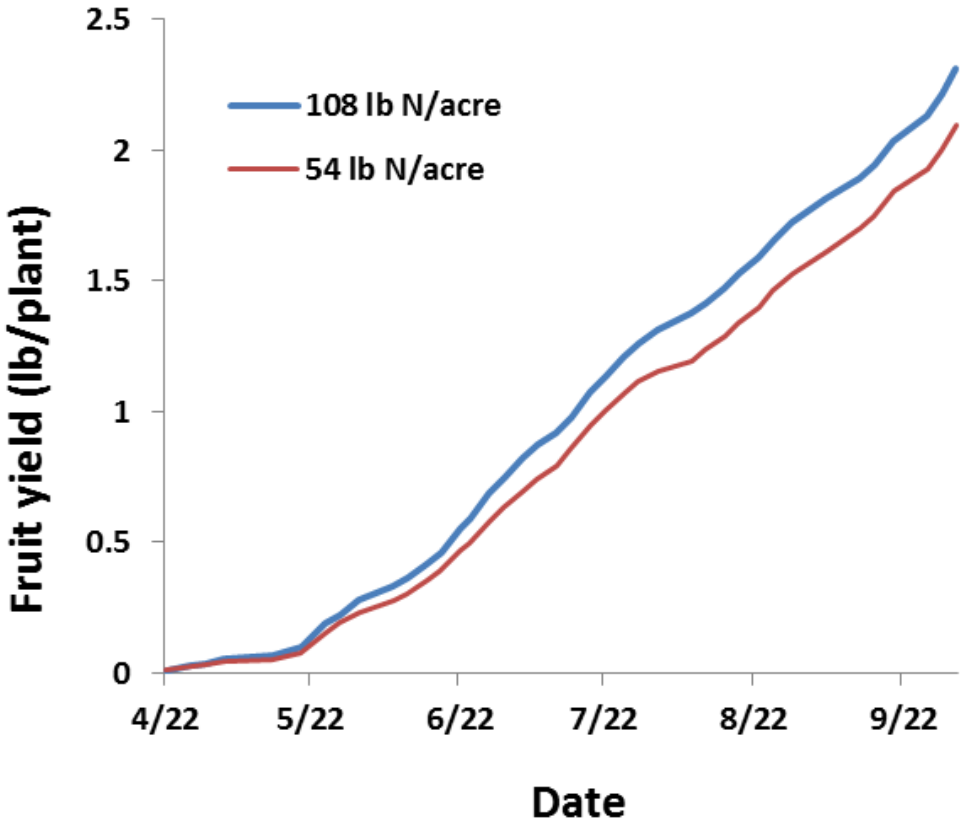
- Proprietary variety
- Grower CRF rate (18-8-13, 6 month release, 77 lb N/acre)
  compared with half rate, and no preplant fertilizer

Salinas ‘Albion’ trial :



- **No difference in fruit production throughout the season**

Watsonville ‘Albion’ trial :



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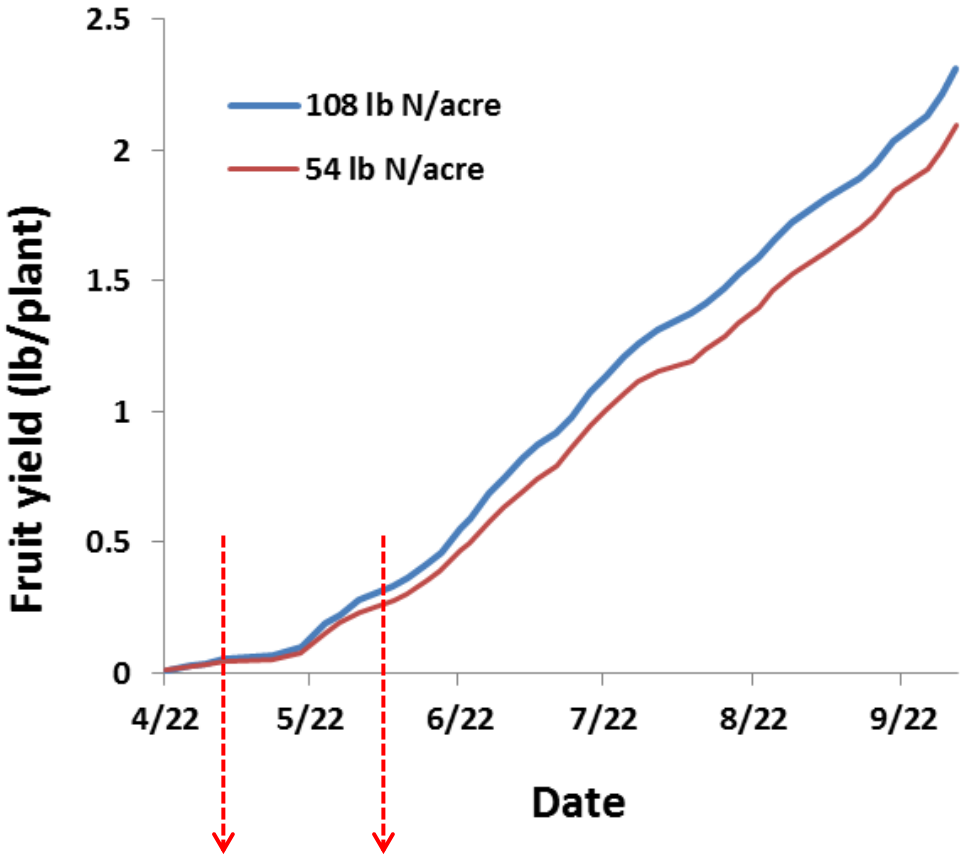
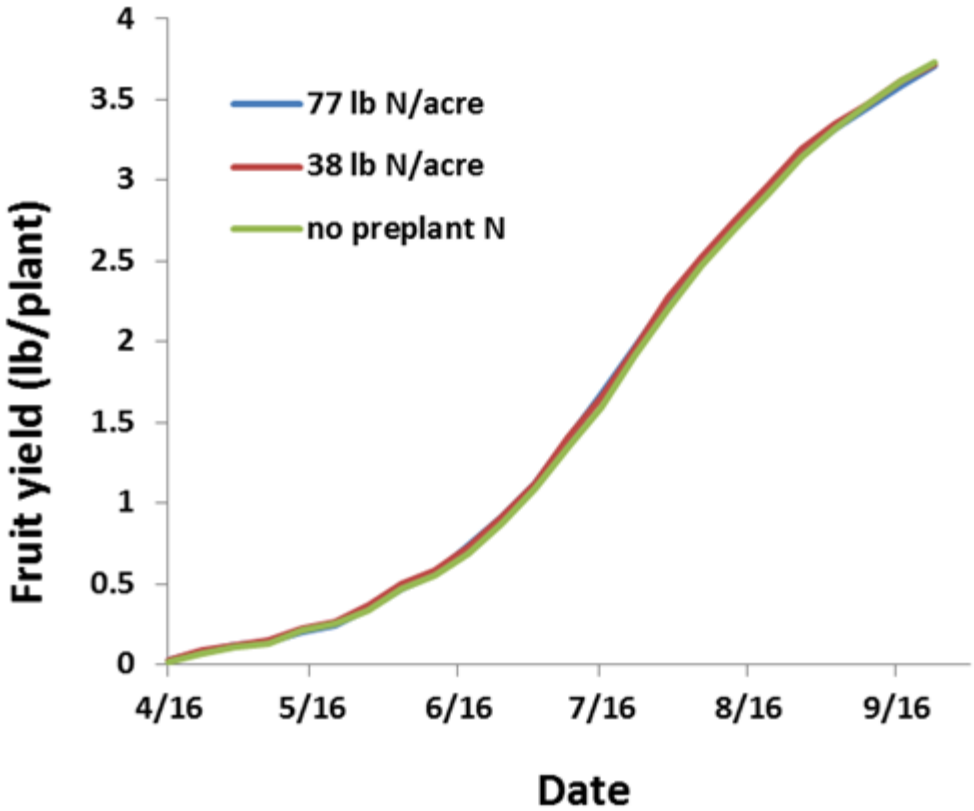


Soil nitrate during this period was less than 2 PPM NO_3-N

Soil NO_3-N can be tested with an on-farm ‘quick test’ :

Castroville ‘Proprietary’ trial :



Why no response to CRF ?

-heavy soil (hard to leach)

-high organic matter soil, following vegetable crops

-high initial soil NO_3-N

What about tissue nutrient standards ?

- Watch Mark Bolda's blog for full project summary

In summary :

- Preplant controlled release fertilization should be customized to match specific field conditions (application rate, P and K content)
- the controlled release fertilizer used should have a release characteristic appropriate for the northern district
- soil nitrate testing in spring as rapid growth begins can guide early fertigation
- the slow, steady crop uptake pattern suggests that a modest fertigation program should be sufficient