Strawberry nutrient management

Participants:

- Mark Bolda
- Mike Cahn
- Tom Bottoms
- Barry Farrara
- strawberry growers

2010 strawberry nutrient management projects :

- Survey of 26 ‘Albion’ fields in the Watsonville-Salinas and Santa Maria areas to revise tissue sampling nutrient standards
- Monitoring of irrigation and fertility practices in 14 additional fields in the Watsonville-Salinas area

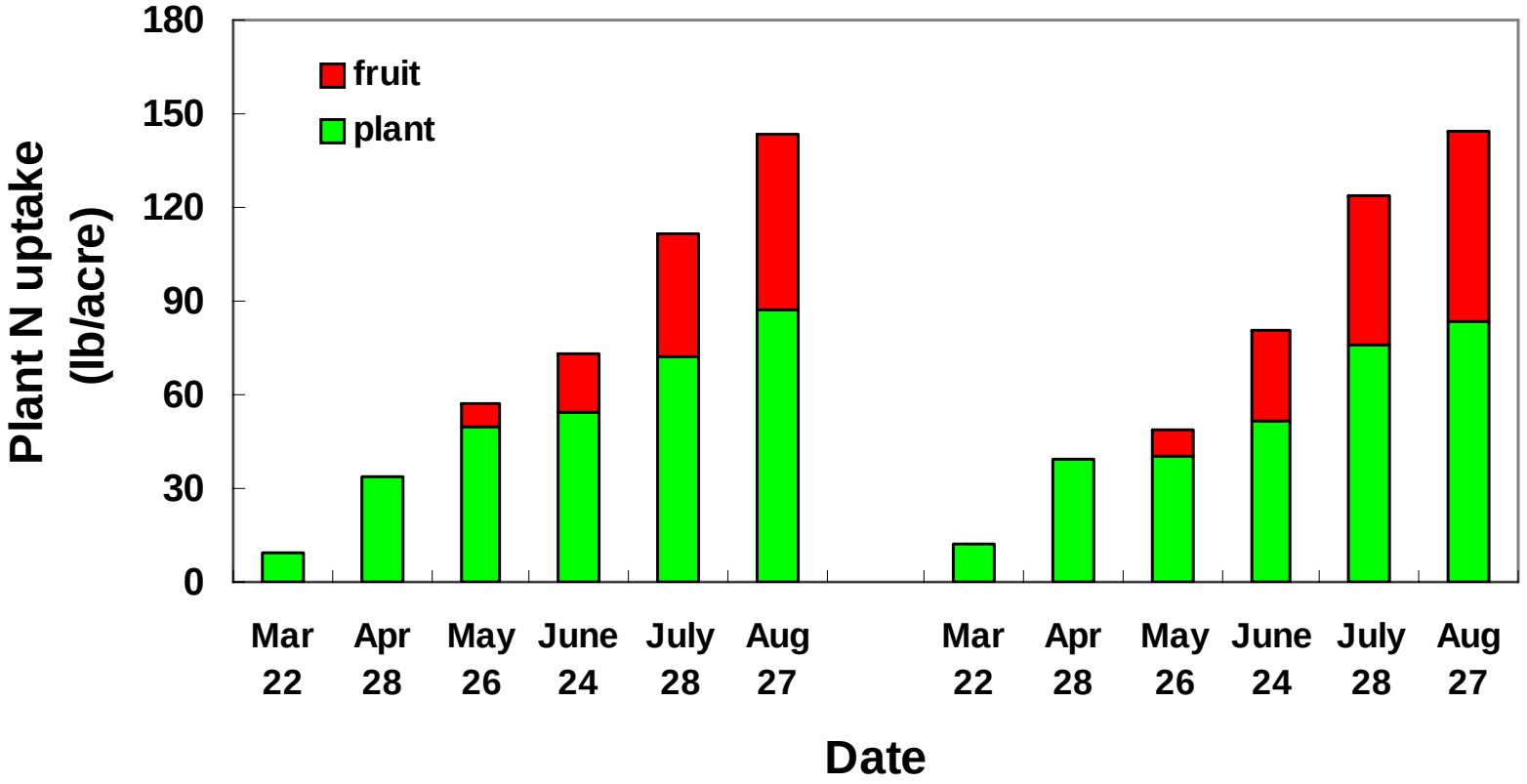
Determination of nutrient uptake by strawberry :

- monthly whole plant samples from 2 local ‘Albion’ fields

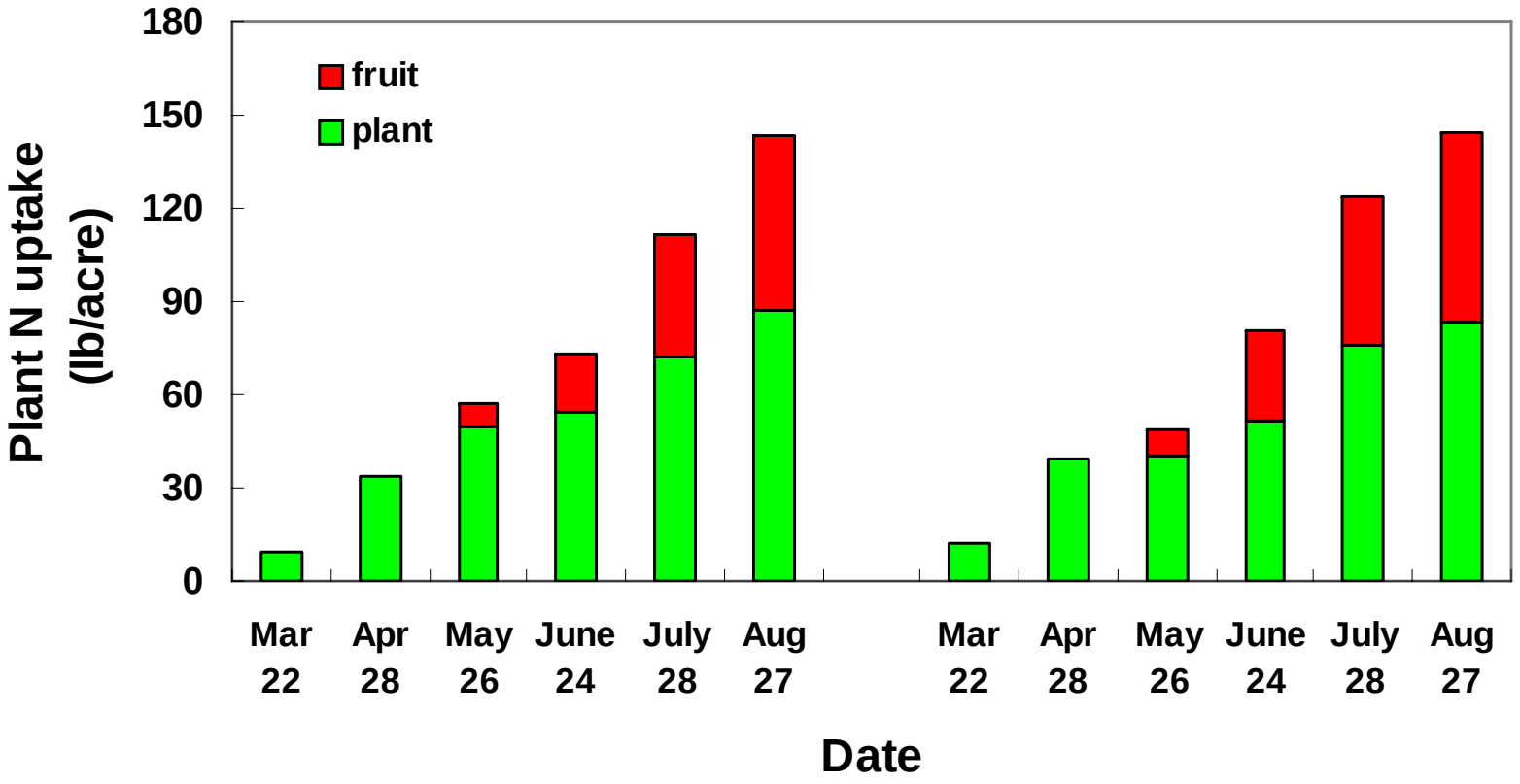


- plant and fruit measured separately

Nutrient uptake by strawberry :



Nutrient uptake by strawberry :



- N uptake averaged about 1 lb / acre / day from April through August
- uptake would be slightly higher in field with better yield or higher plant population

Nutrients in strawberry fruit :

Each ton of fruit contains approximately:

- **2.5 lb N**
- **4.0 lb K**
- **0.6 lb P**

In a 30 ton/acre average yield, with a 15% cull rate, that equals:

- **90 lb N**
- **140 lb K**
- **20 lb P**

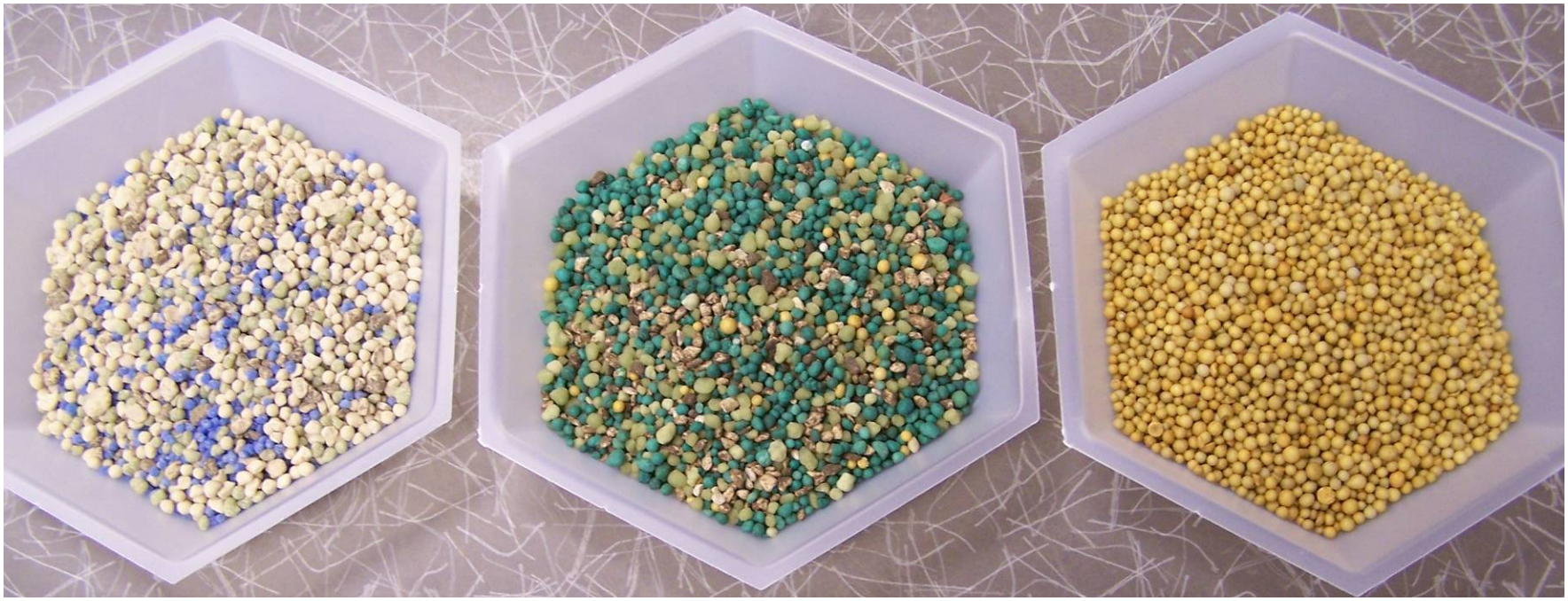
By early October, seasonal crop nutrient uptake would be :

	Crop uptake (lb/acre)		
	N	P	K
Plant	100	20	90
Fruit	90	20	140
Total	190	40	230

Daily uptake (lb/acre) during active growth is approximately :

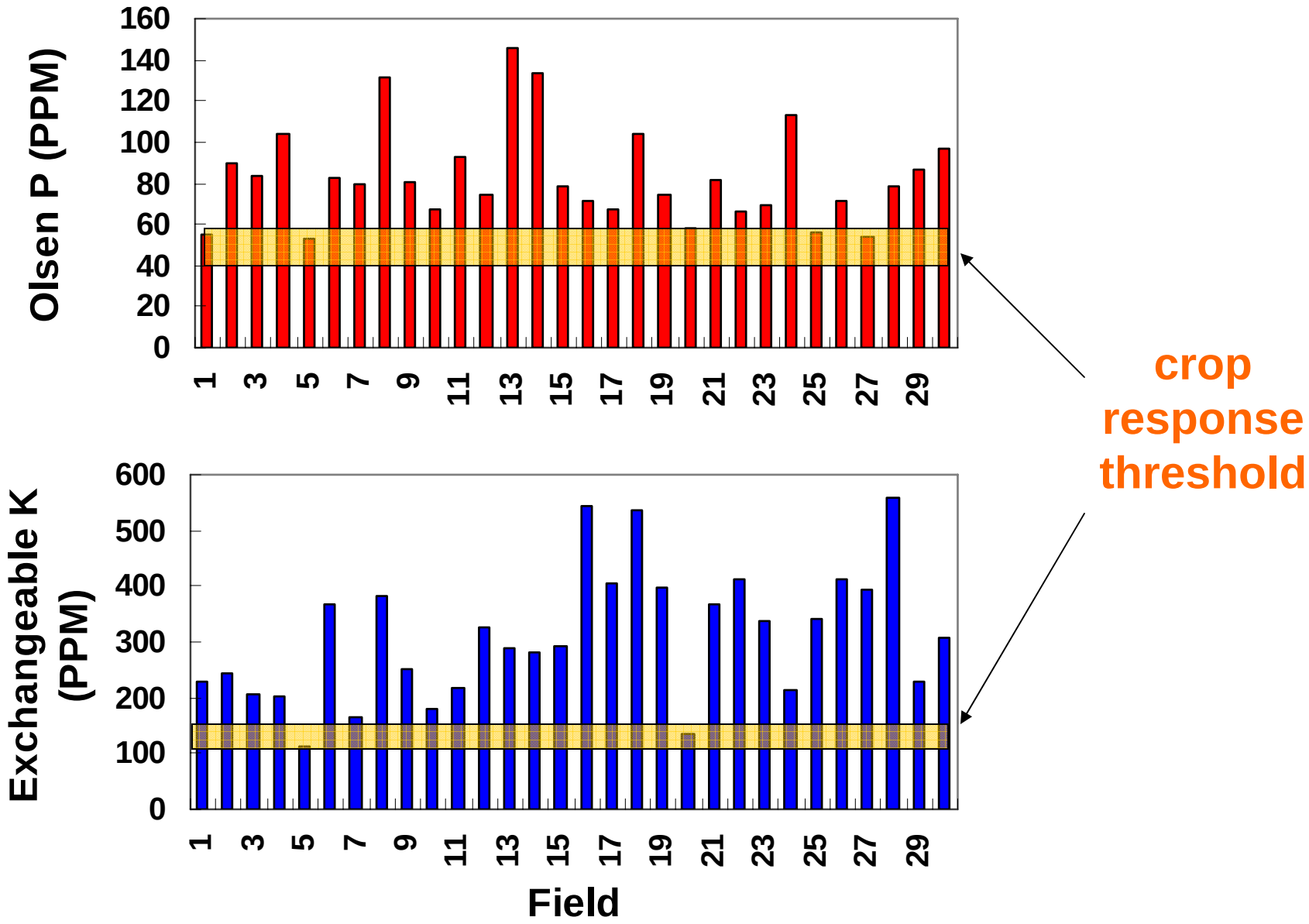
- **1 to 1.2 lb N**
- **1.1 to 1.3 lb K**
- **0.2 lb P**

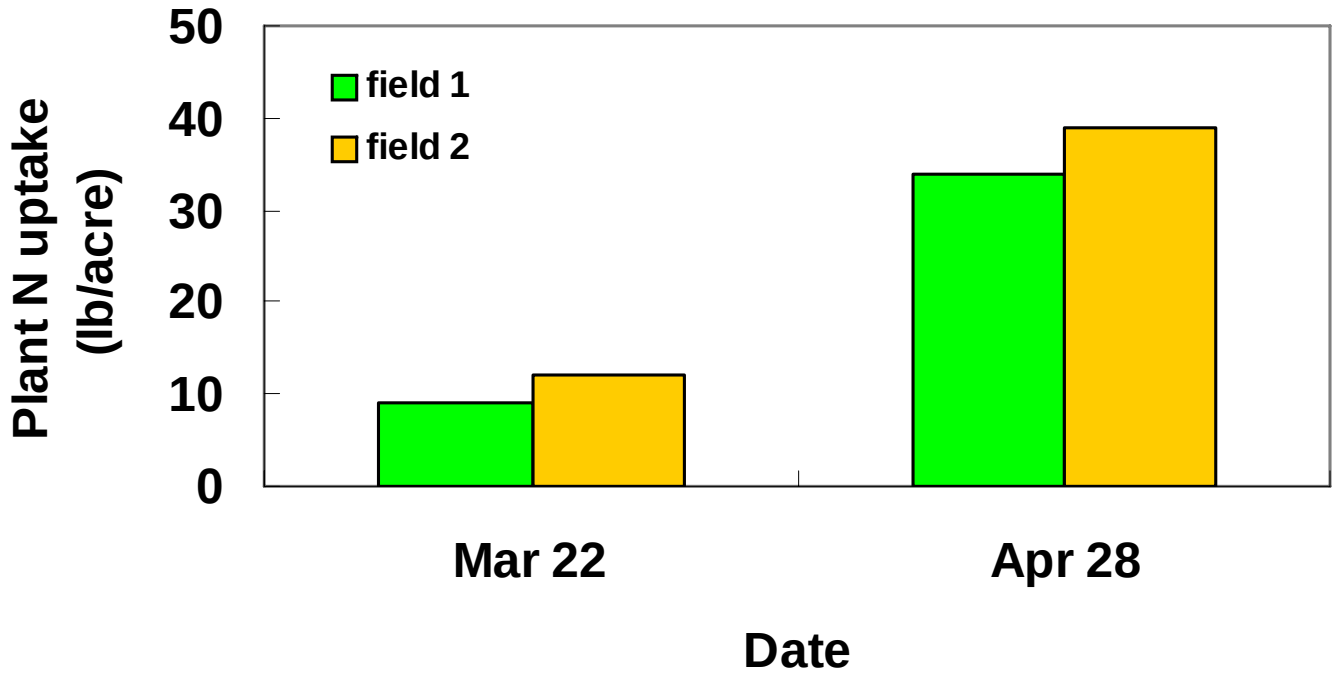
Preplant fertilization :



- be sure why you are applying preplant fertilizer
- choose a fertilizer that fits your need

Strawberry fields tend to have high soil P and K availability :





Winter nutrient uptake is slow !

Fields coming out of vegetables tend to have high residual soil nitrate :

- 2010 pre-fertilization sampling of new strawberry fields

Field	Previous crop	Soil NO_3-N (lb/acre in top foot)
1	vegetables	80
2	vegetables	75
3	vegetables	80
4	vegetables	95
5	vegetables	95
6	vegetables	160
7	vegetables	140
8	vegetables	195
9	strawberry	10

How fast does Controlled Release Fertilizer (CRF) release N ?

- product ratings are typically 6-9 month release
- release somewhat slower in cool winter months,
  but substantial release still occurs

By early January about 25% of CRF already released

So, is fall-applied Controlled Release Fertilizer a good idea ?

- P and K may or may not be necessary
- immediately available N is unlikely to be needed
- a moderate amount of CRF nitrogen provides insurance in case of nitrate loss during crown establishment, or winter rain
- a high rate of CRF will be inefficient, especially in a wet winter


What is a reasonable N fertigation approach ?
Crop uptake is about 1 lb N/acre/day
N can come from:
- controlled release fertilizer
- irrigation water NO_3-N
- mineralization of soil organic N
- fertigated N

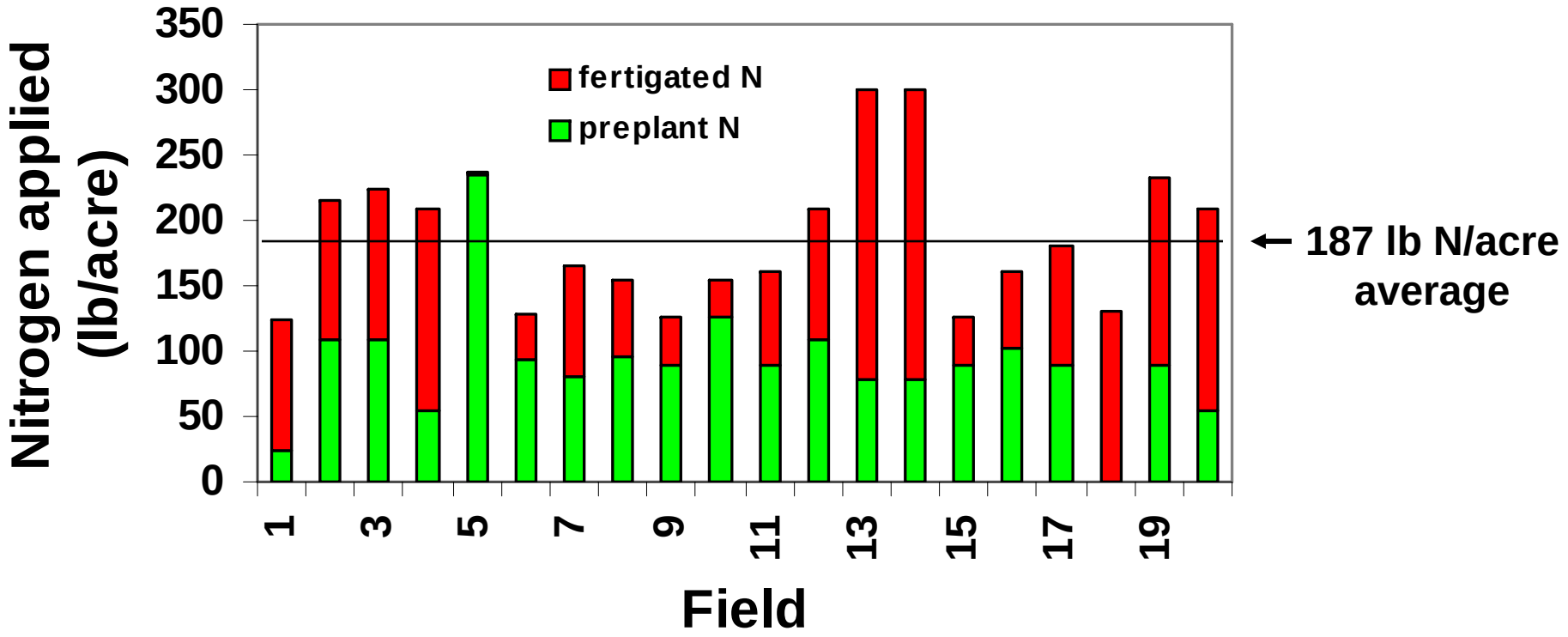
Controlled Release Fertilizer :

- diminishing contribution after April or May

Irrigation water NO_3-N :

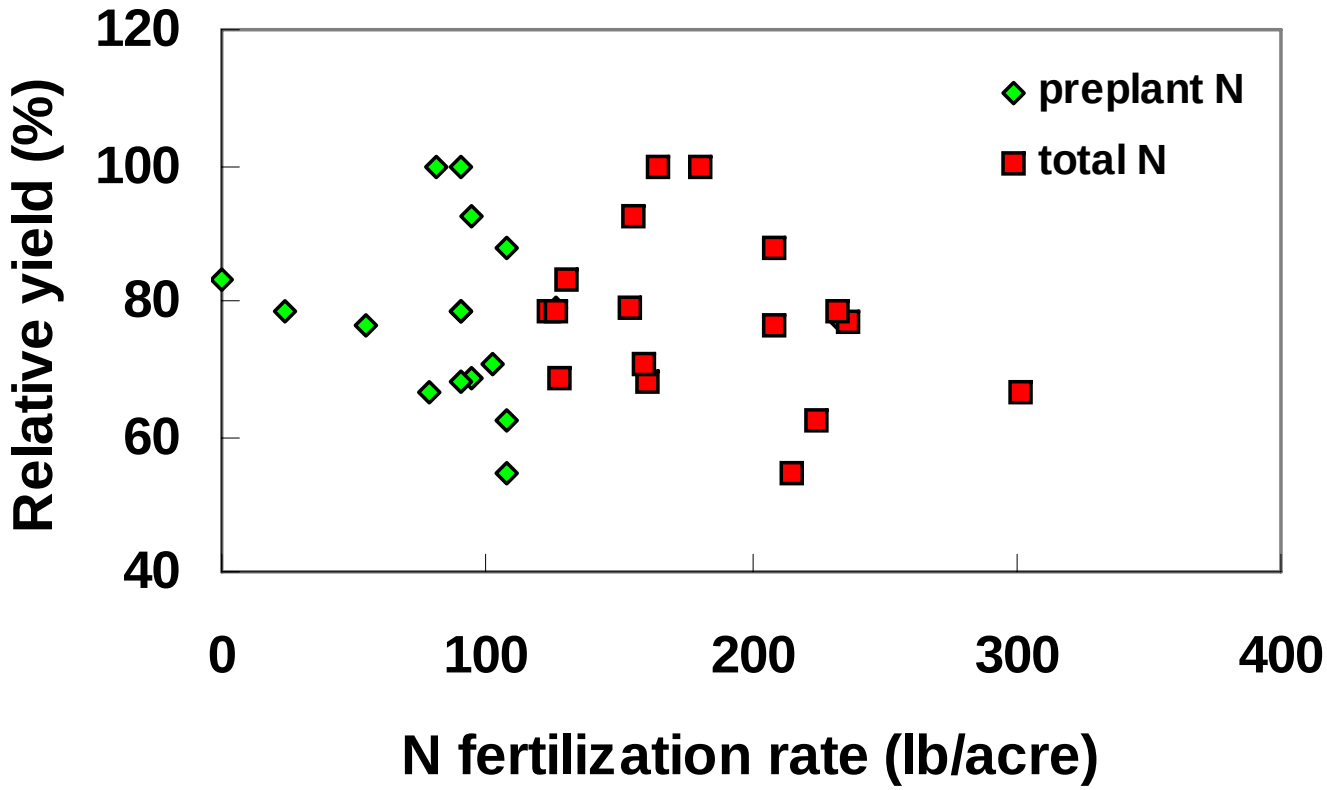
- water @ 10 PPM delivers about 30 lb N/acre over the season
- water @ 20 PPM delivers about 60 lb N/acre over the season

How do growers manage N fertilization ?

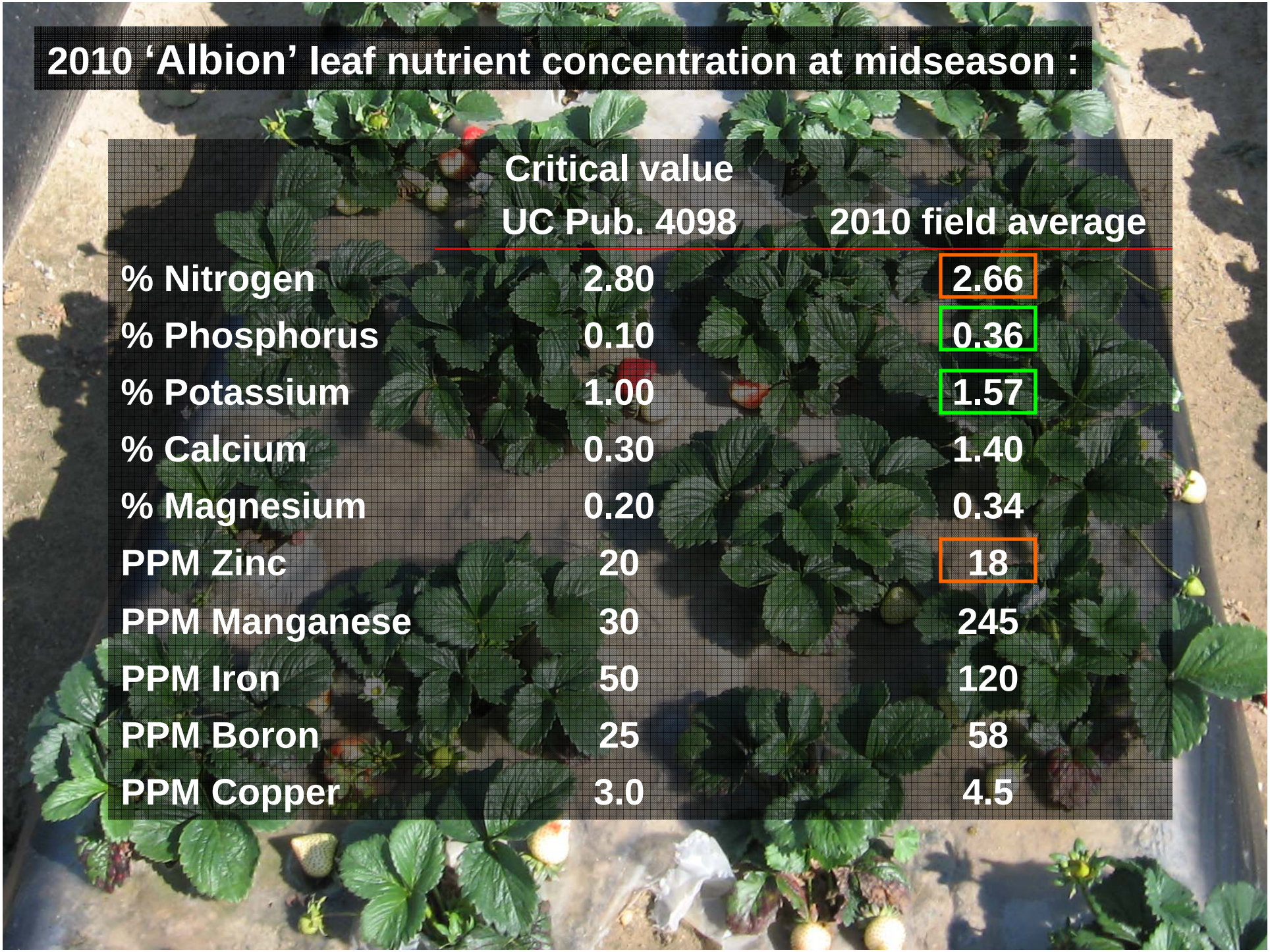


2009-10 Watsonville-Salinas fields

How does N fertilization rate affect yield ?




Tissue analysis :



2010 ‘Albion’ leaf nutrient concentration at midseason :

	Critical value UC Pub. 4098	2010 field average
% Nitrogen	2.80	2.66
% Phosphorus	0.10	0.36
% Potassium	1.00	1.57
% Calcium	0.30	1.40
% Magnesium	0.20	0.34
PPM Zinc	20	18
PPM Manganese	30	245
PPM Iron	50	120
PPM Boron	25	58
PPM Copper	3.0	4.5

In summary …

- strawberry nutrient uptake pattern is clear, with seasonal N uptake around 200 lb/acre in high yield fields
- current preplant fertilization practices can be made more efficient
- moderate seasonal N rates appear to be sufficient for high yield production
- current leaf nutrient sufficiency guidelines need revision