Organic Strawberry Production

In-season nutrient management challenges

***Mark Gaskell**, Farm Advisor*

University of California Cooperative Extension
San Luis Obispo and Santa Barbara counties

Strawberry Production

Long standing , well established industry

Basic elements of cropping system

> implications for organic production ?

Nitrogen is critical limiting nutrient

- *Often primary nutrient limiting plant growth*
- *Does not accumulate in soil except as organic matter*
- *Most common form for plants – nitrate - is water soluble*

Nitrogen sources

- *Organic matter decomposition*
- *Cycling of N in soil organic fraction, microbial activity*

  - dynamic, depends on environmental conditions
- *Fertilizers*

Organic strawberry fertility management

- *Soil organic matter averages 2.5-3% >Watsonville*

  ~ 1% in Santa Maria Valley

- *Low S.O.M creates special problems for organic management*

- *Rotation cropping cycle feasible?*

Nitrogen applied pre- plant followed by fertigation

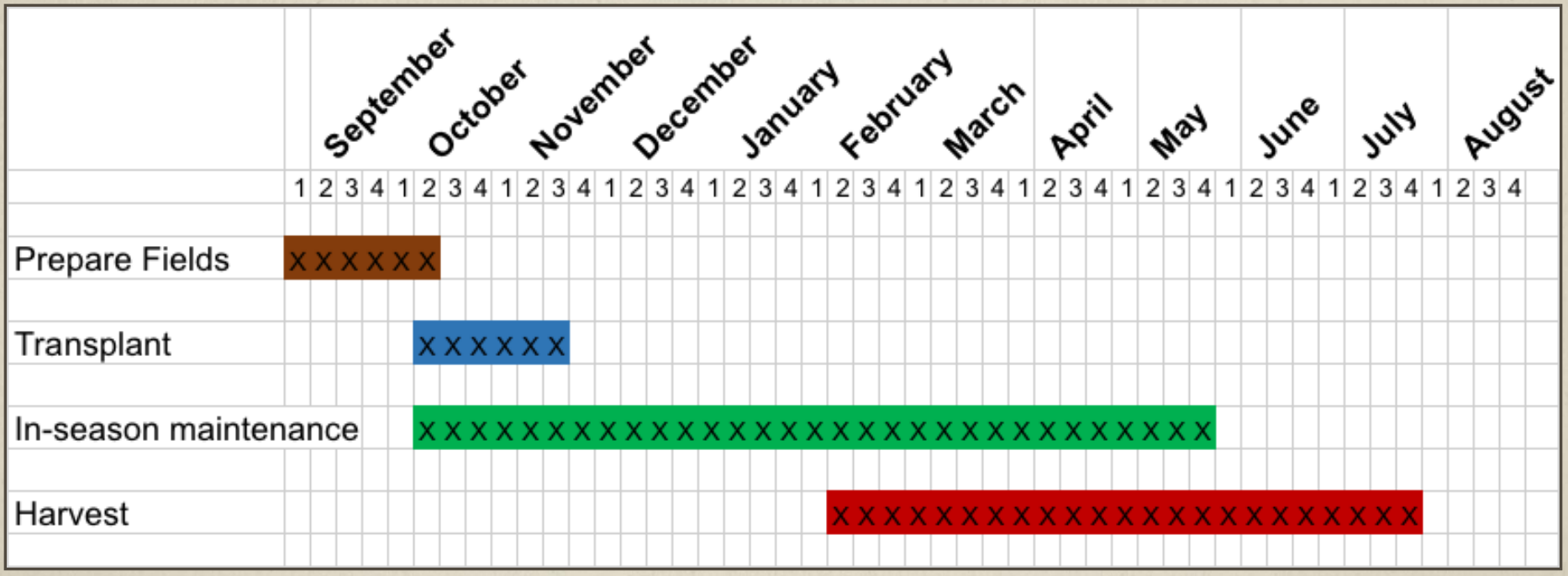
- *Pre-plant applied, incorporated compost, mixed organic blends / pellets, green manure crops*

- *In-season fertigation*
  - *plastic mulch, drip, etc*

Organic soil fertility

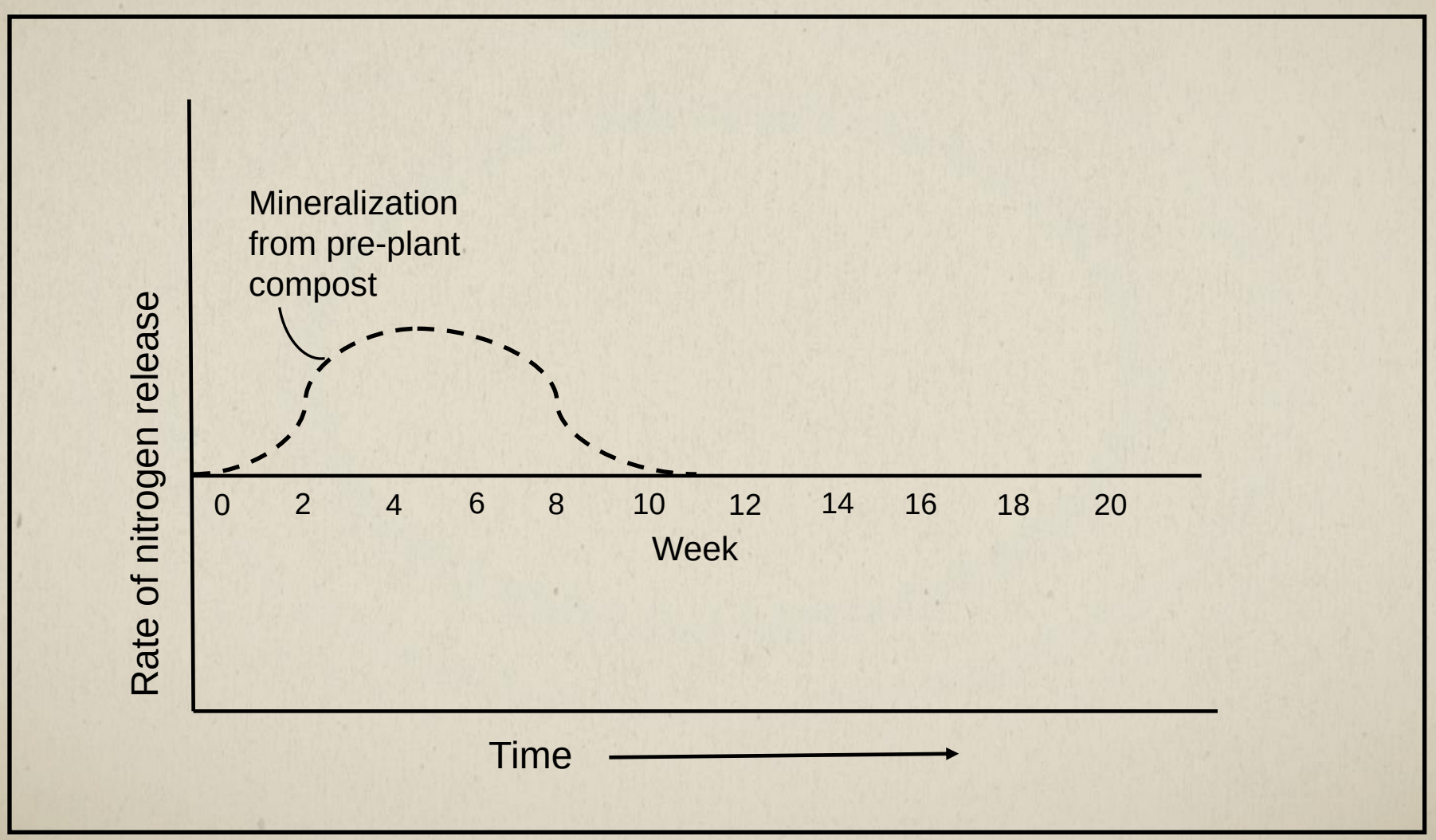
- *Soil organic matter > big effect on nutrient availability*
- *Difficult to increase long-term S.O.M. more than 1%*
- *Much of applied S.O.M. decomposes quickly;*
  - *subsequent N availability uncertain*
- *Complement S.O.M. with pre-plant and in-season fertilization*

Strawberry cropping systems

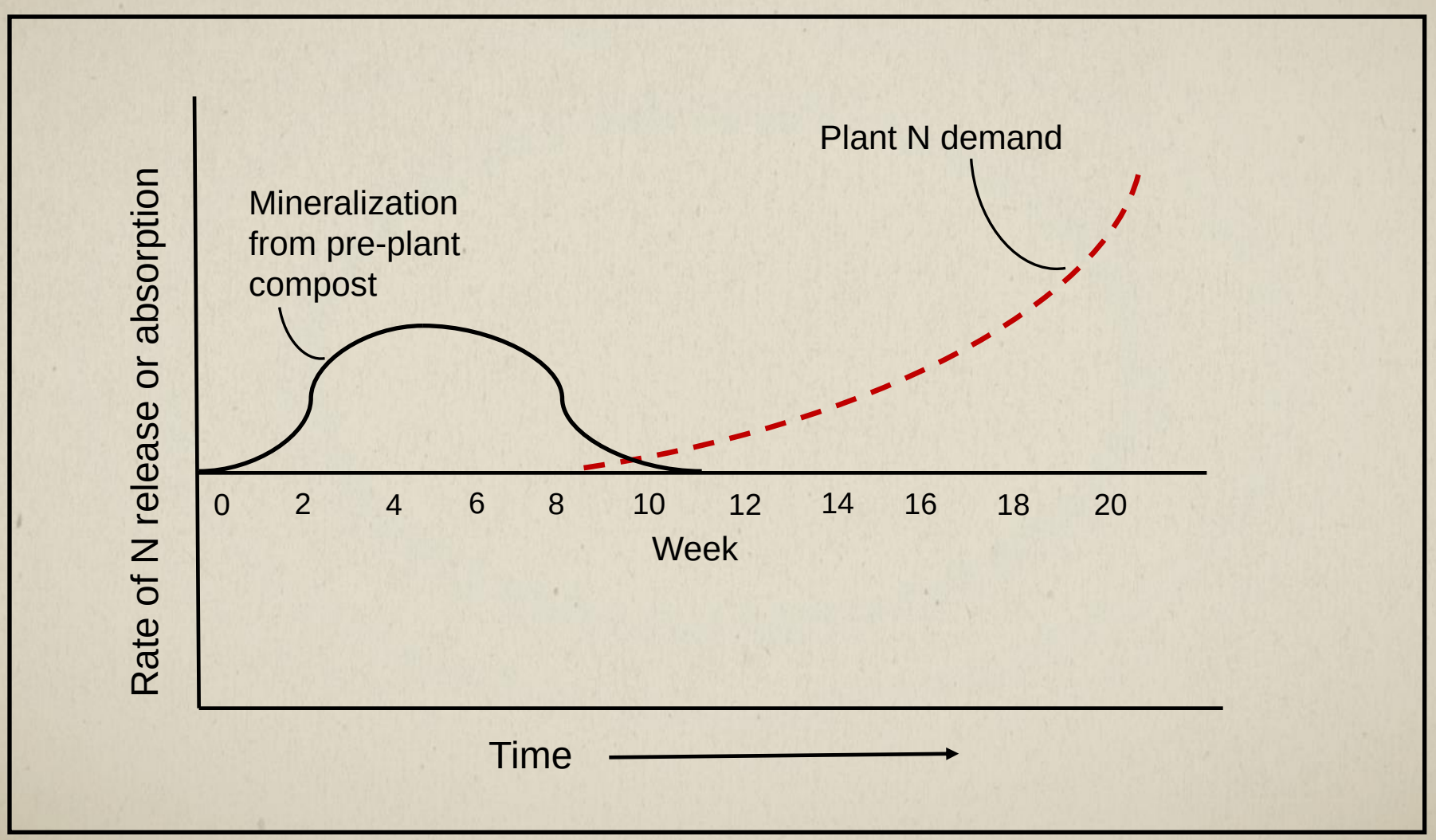


Timing of N release?

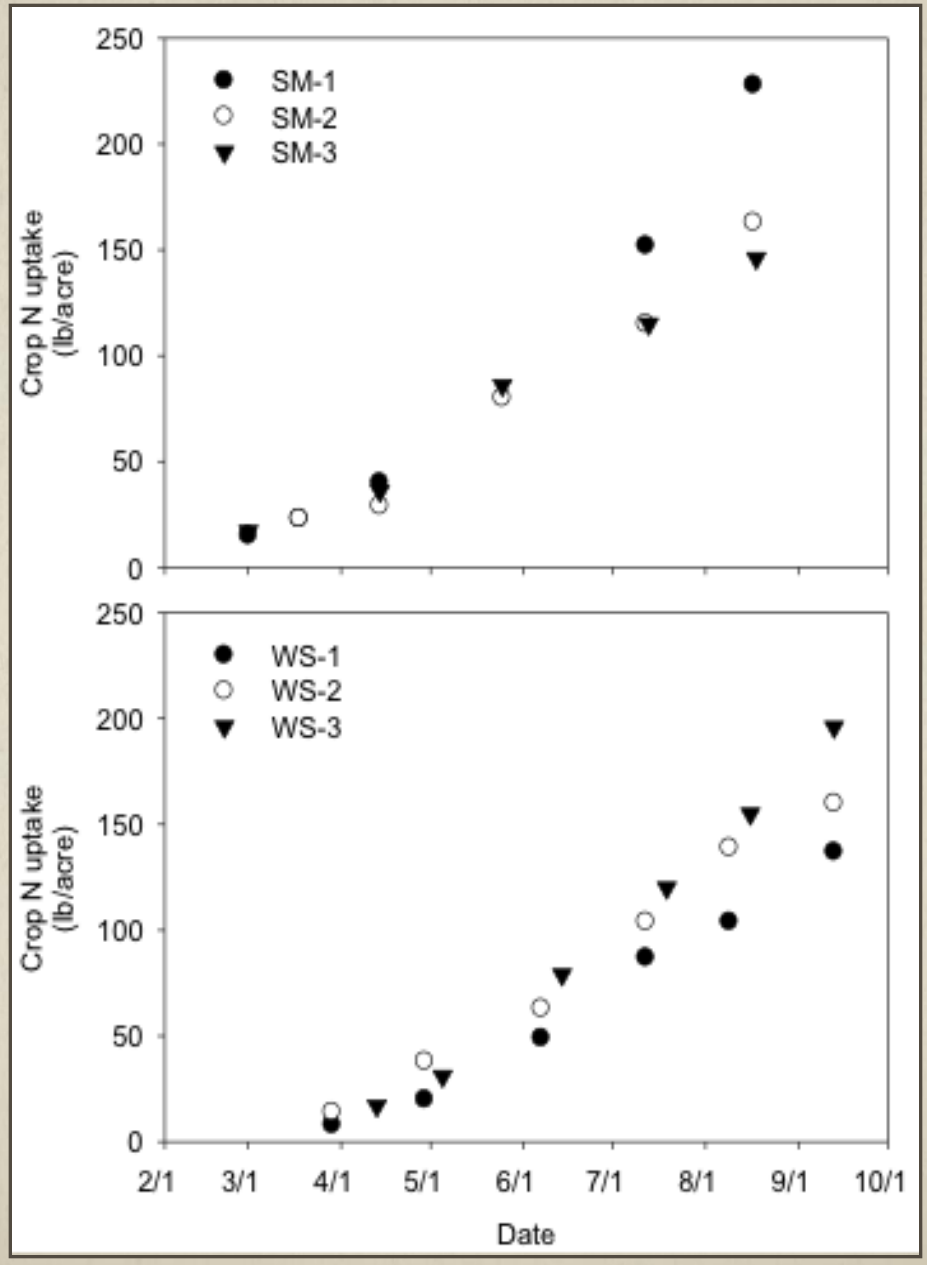
Nitrogen applied pre-plant

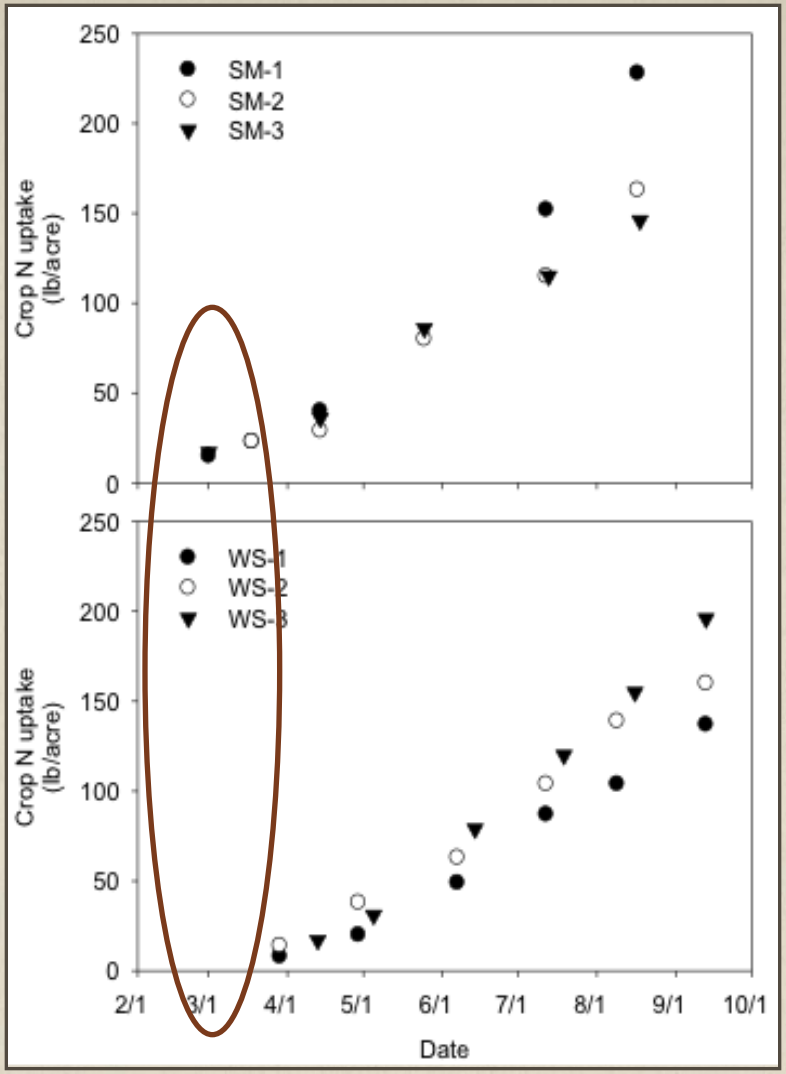


Nitrogen applied pre-plant VS plant N uptake



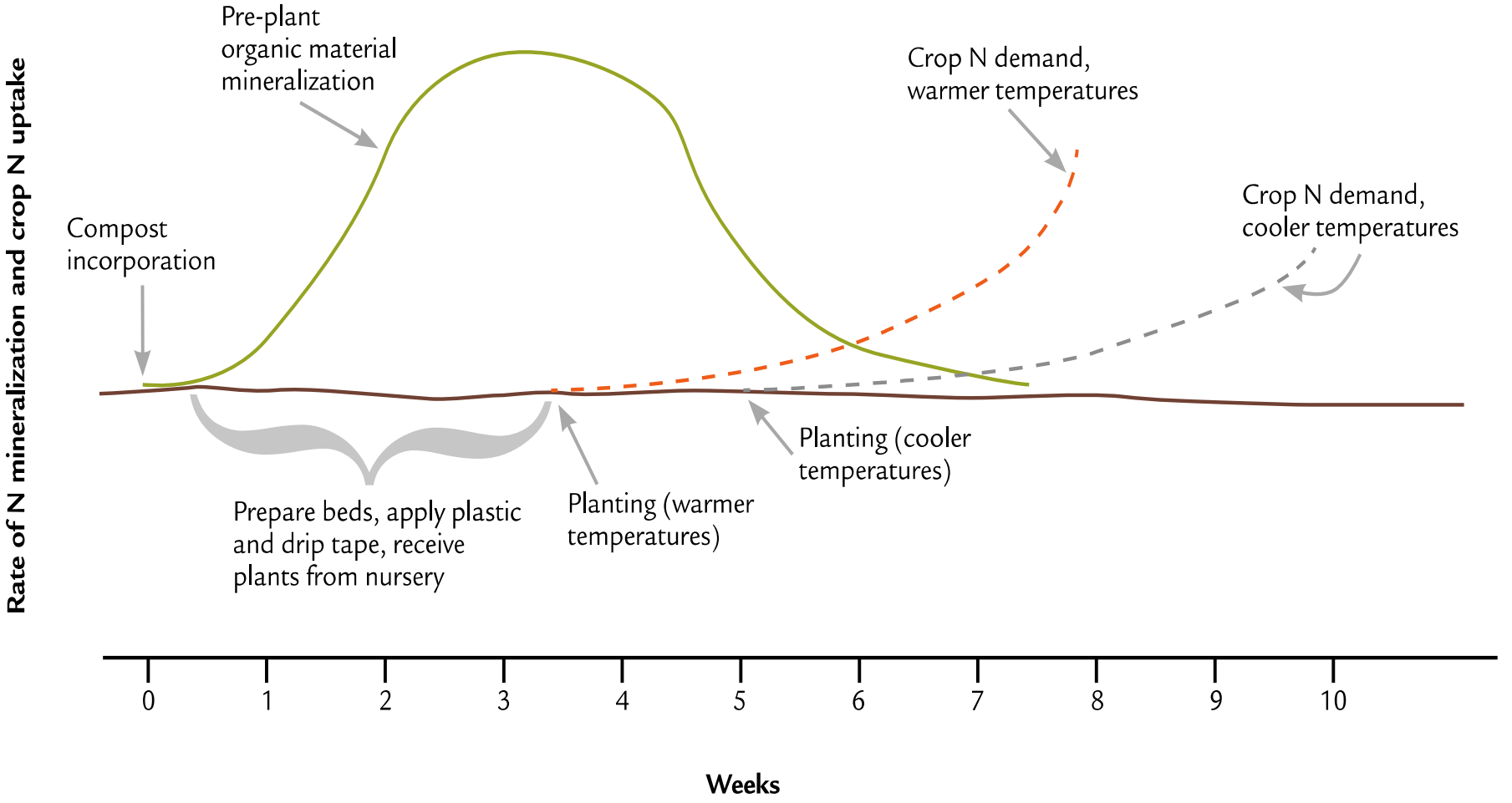
Strawberry nitrogen uptake



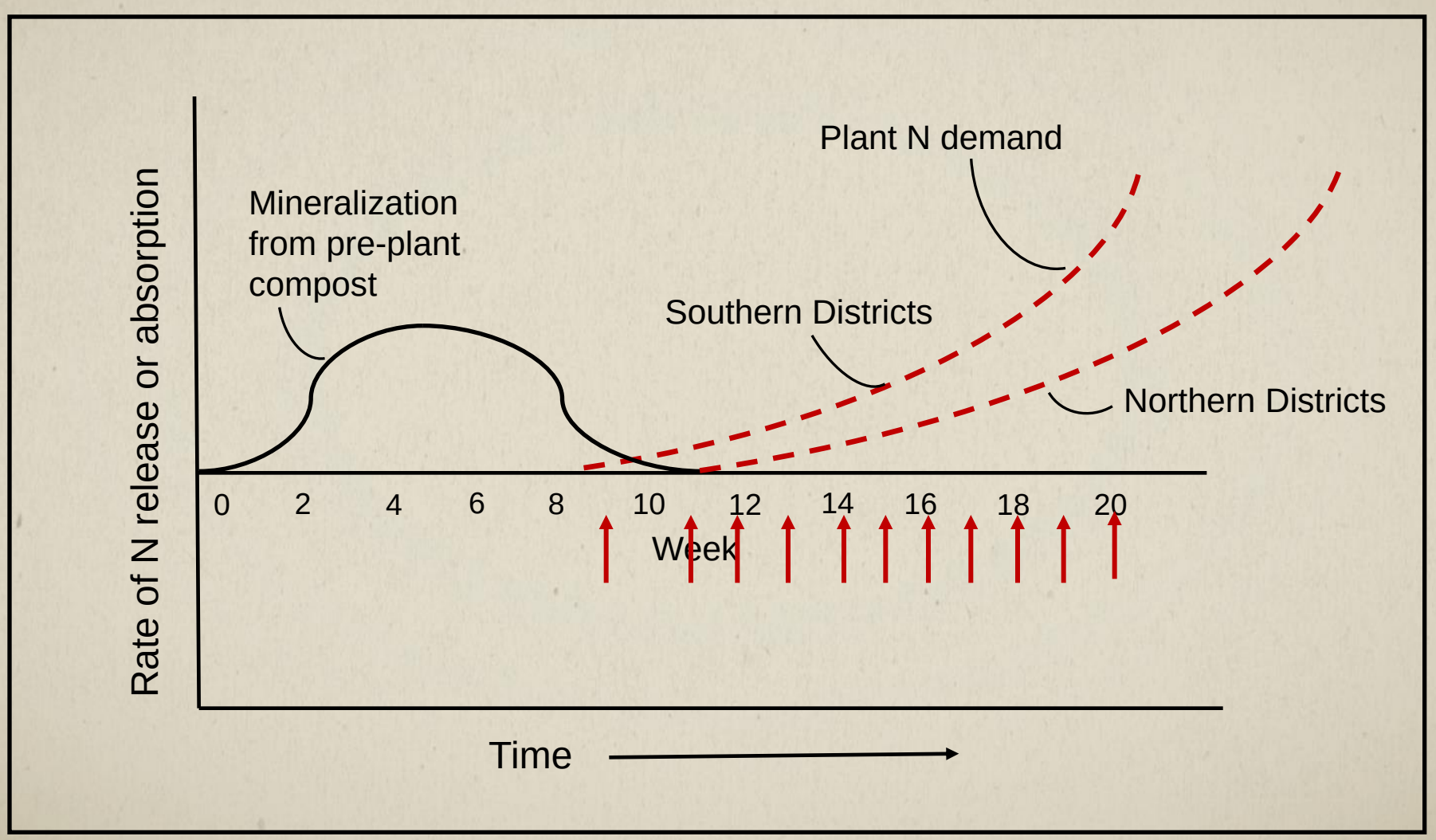


- Little N uptake > October to Feb
- Early-mid March > 1 / lb. N / acre / day

Pre-plant nitrogen release pattern vs strawberry crop uptake



Timing of N availability - fertigations



Nitrogen nutrition?

- *Total amount of N*
- *Timing of N availability*

Fertigated N is critical

- *Blends of organic sources*
  - fish, soy, feather, etc.
- *Finely ground suspensions?*
- *Fish emulsions with prior enzyme activity*
- *Low analyisis, expensive*

Organic liquid fertilizers

Filtered to pass 150 - 200 mesh drip tape

Organic matter + bacteria, fungi, algae

Once mixed, can settle, clump, etc

Usually not soluble – suspended solids?

sedimentation, damage to system?

Field trials with fertigated N

- *Multiple seasons, crops, materials*
- *Rarely see a response to N*
- *Yields remain 50% of conventional*

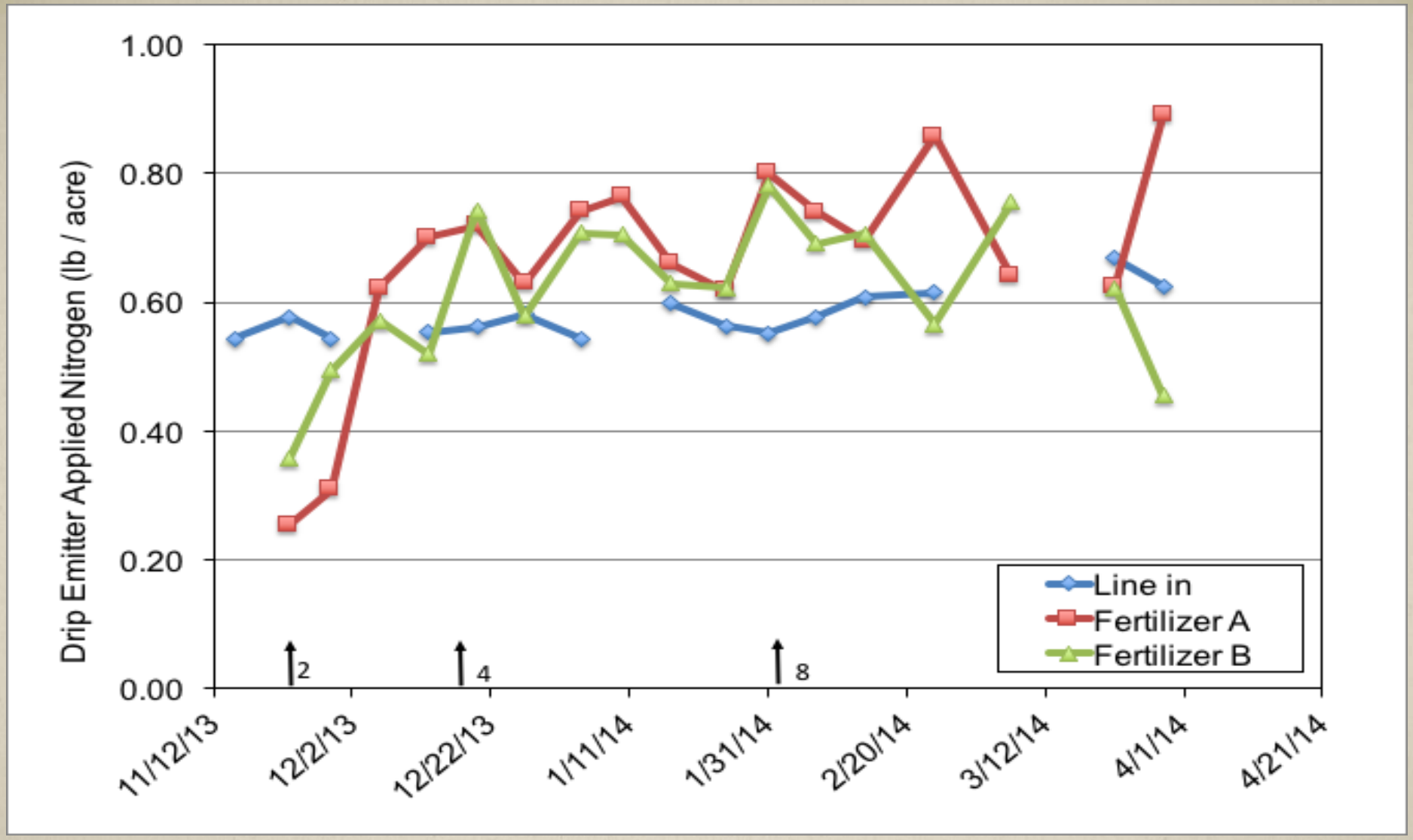
Rethink the situation?

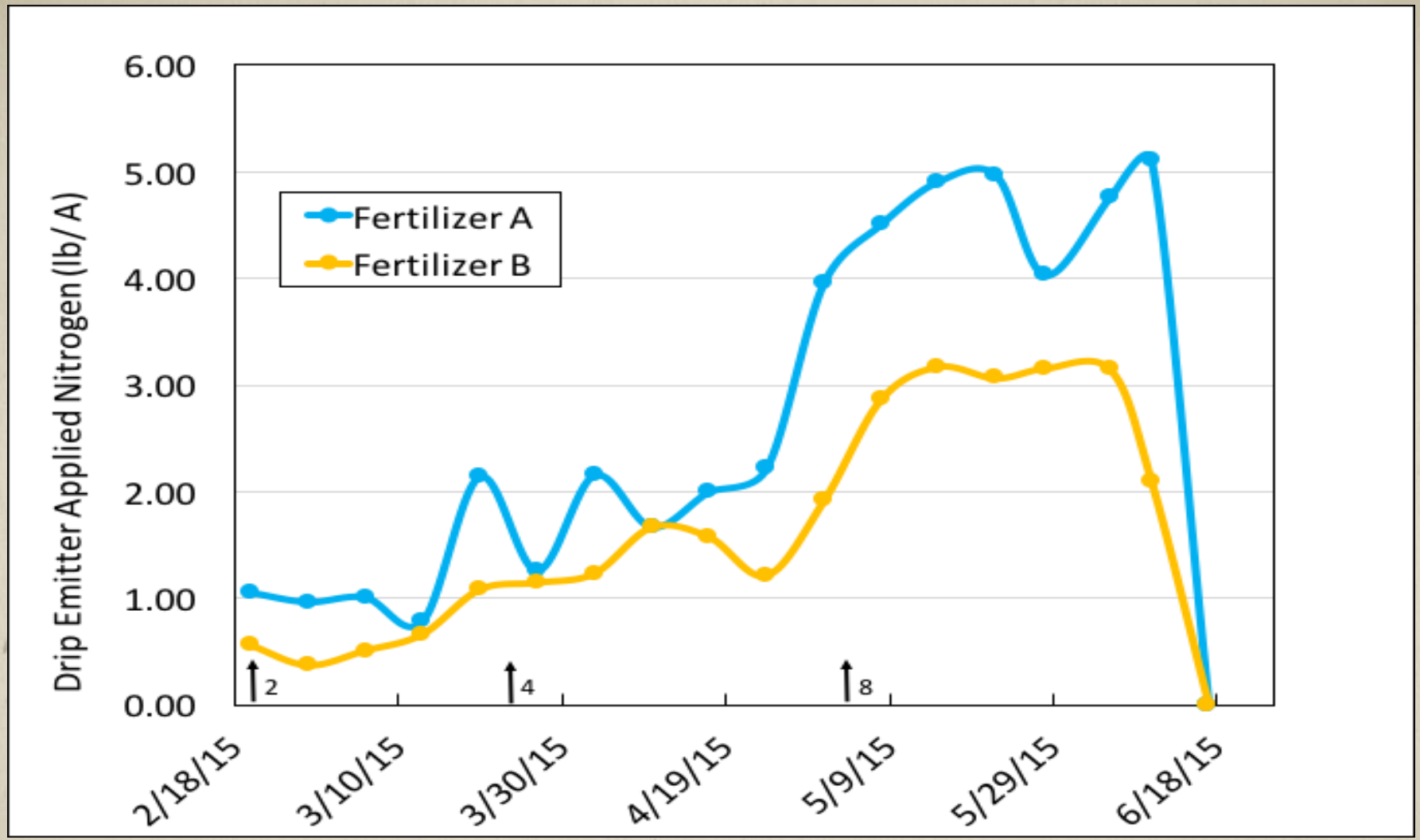
- *Organic strawberries yield 50% of conventional*
- *Small plants >> “always smaller”*
- *Lower DU by mid Jan 65%*
- *Plugging, double the tape!*

Other?

Drip system function deteriorates over the season

Plants small with low productivity


Drip Emitter Applied Nitrogen (lb / acre)
1.00
0.80
0.60
0.40
0.20
0.00
11/12/13
12/2/13
12/22/13
1/11/14
1/31/14
2/20/14
3/12/14
4/1/14
4/21/14
2
4
8
Line in
Fertilizer A
Fertilizer B


Drip Emitter Applied Nitrogen (lb/A)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Fertilizer A
Fertilizer B
2
4
8
2/18/15
3/10/15
3/30/15
4/19/15
5/9/15
5/29/15
6/18/15

Organic fertigation maintenance

Injection not recommended w/o filter

High cost / unit N

In practice, many growers inject below filter

Organic fertigation maintenance

Acid treatment to dissolve Ca / Mg ppts

NOP approved acids: acetic, citric, oxalic, para acetic

Use of chlorine to clean lines; limits on Cl conc.

Natural substances
- fish, animal, vegetable wastes, proteins

Usually hydrolyzed, ground, enzyme

Interaction between materials / microbes?

Summary - Organic nitrogen management

- *Nitrogen is key nutrient for most crops*
- *Management of organic matter in important part of organic production*
- *Increasing soil O.M. dependent on regular green manure and O.M. addition*
- *Amount of N and timing of N both important to crop production*
- *Crop growth habit, environment, cultural practices may interfere with efficient management of organic N*

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Title and content layout with chart

Two content layout with table

- *First bullet point here*
- *Second bullet point here*
- *Third bullet point here*

	Group 1	Group 2
Class 1	82	95
Class 2	76	88
Class 3	84	90

Two content layout with smartart

- *First bullet point here*
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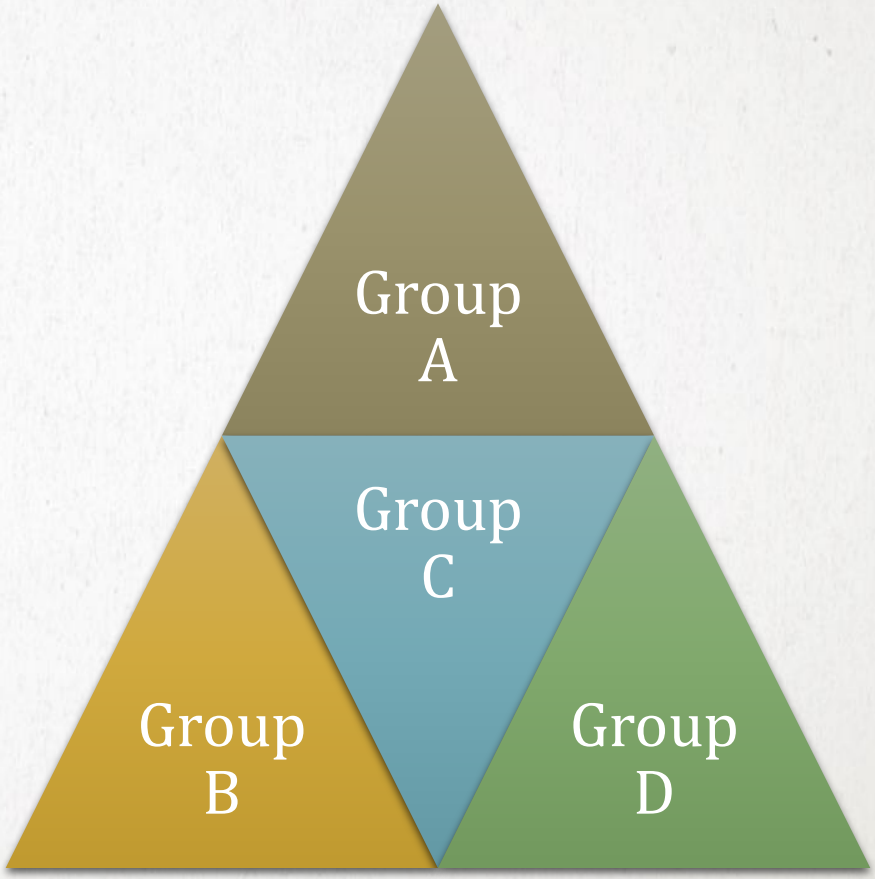

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Adapting conventional cropping systems to organic production realities.

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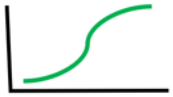
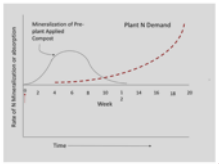


Nitrogen sources

- *Preplant*
  applied, incorporated compost, granular organic pellets, green manure crops
- *In-season fertigation*
  plastic mulch, drip, etc

Nitrogen applied preplant



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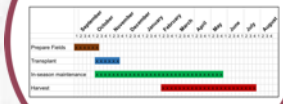

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