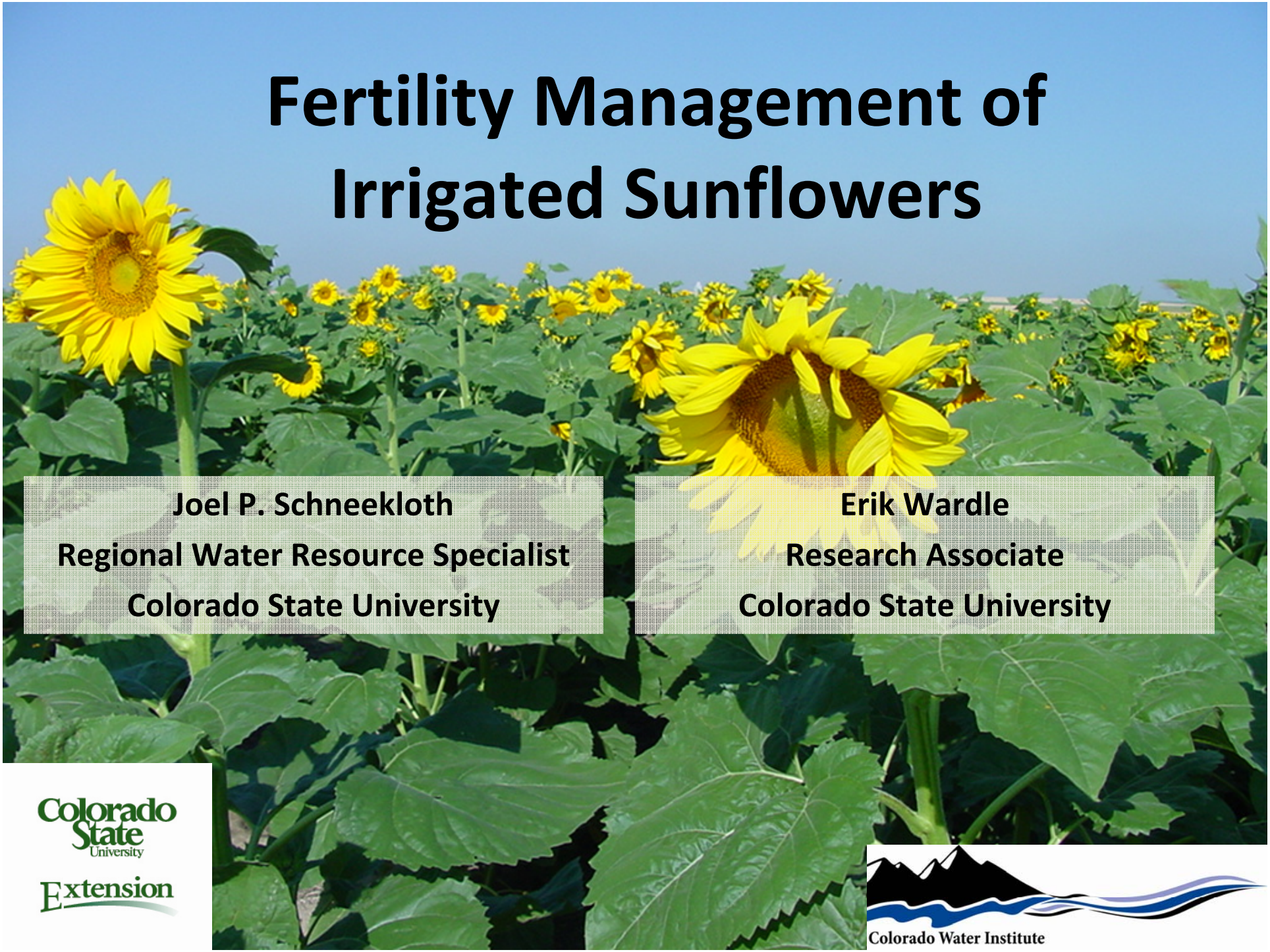
Fertility Management of Irrigated Sunflowers



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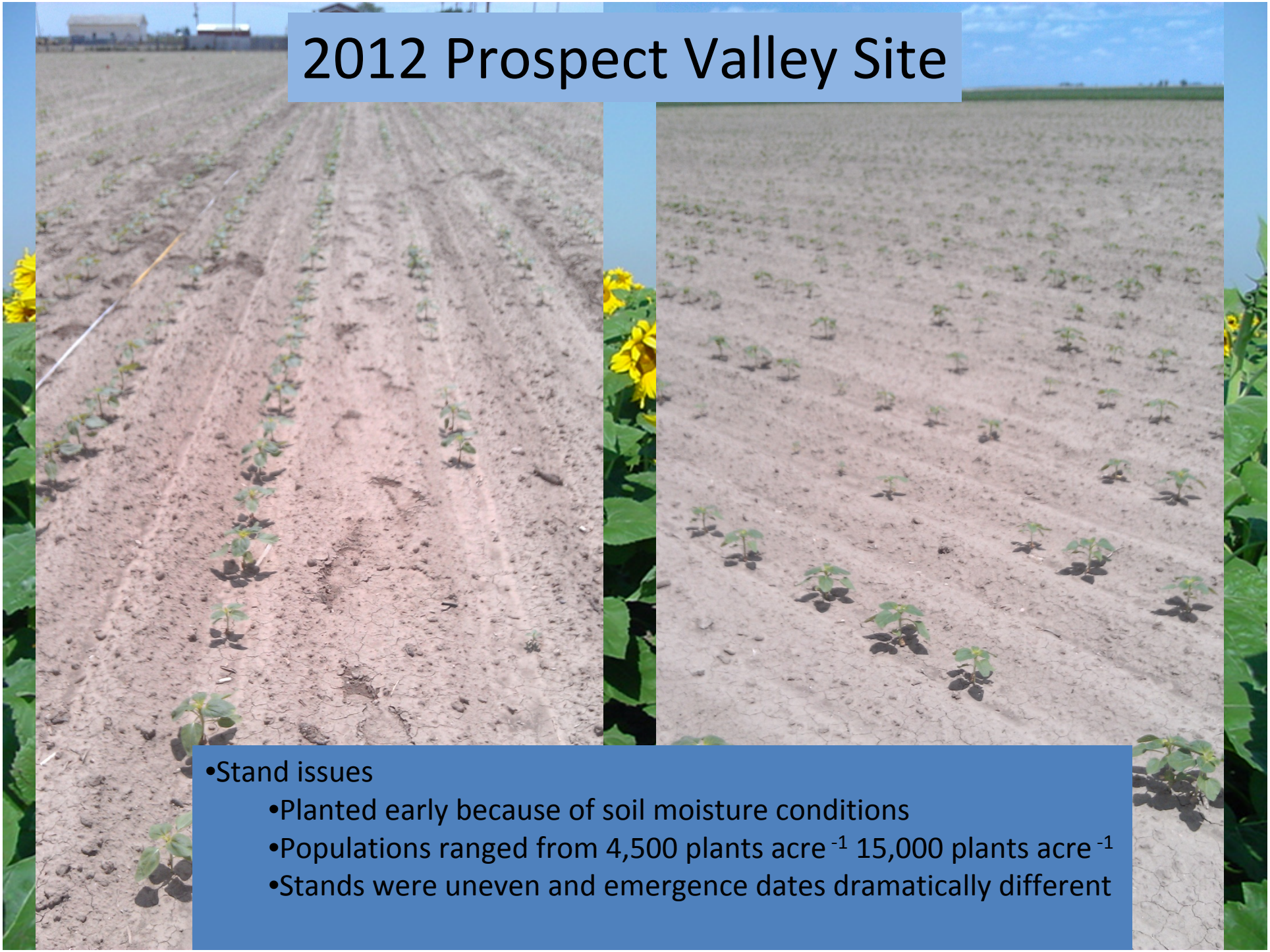
Fertility Management

- Site Location
  - Prospect Valley, CO 2011
  - Akron, CO 2012
- Soil Type
  - Clay Loam
- Irrigation management
  - Prospect Valley -Full irrigation – as needed
    - Furrow Irrigation
  - Akron – Limited Irrigation
    - Sprinkler
- Fertilizer Management
  - Pre-plant
  - Combination of pre-plant and fertigation

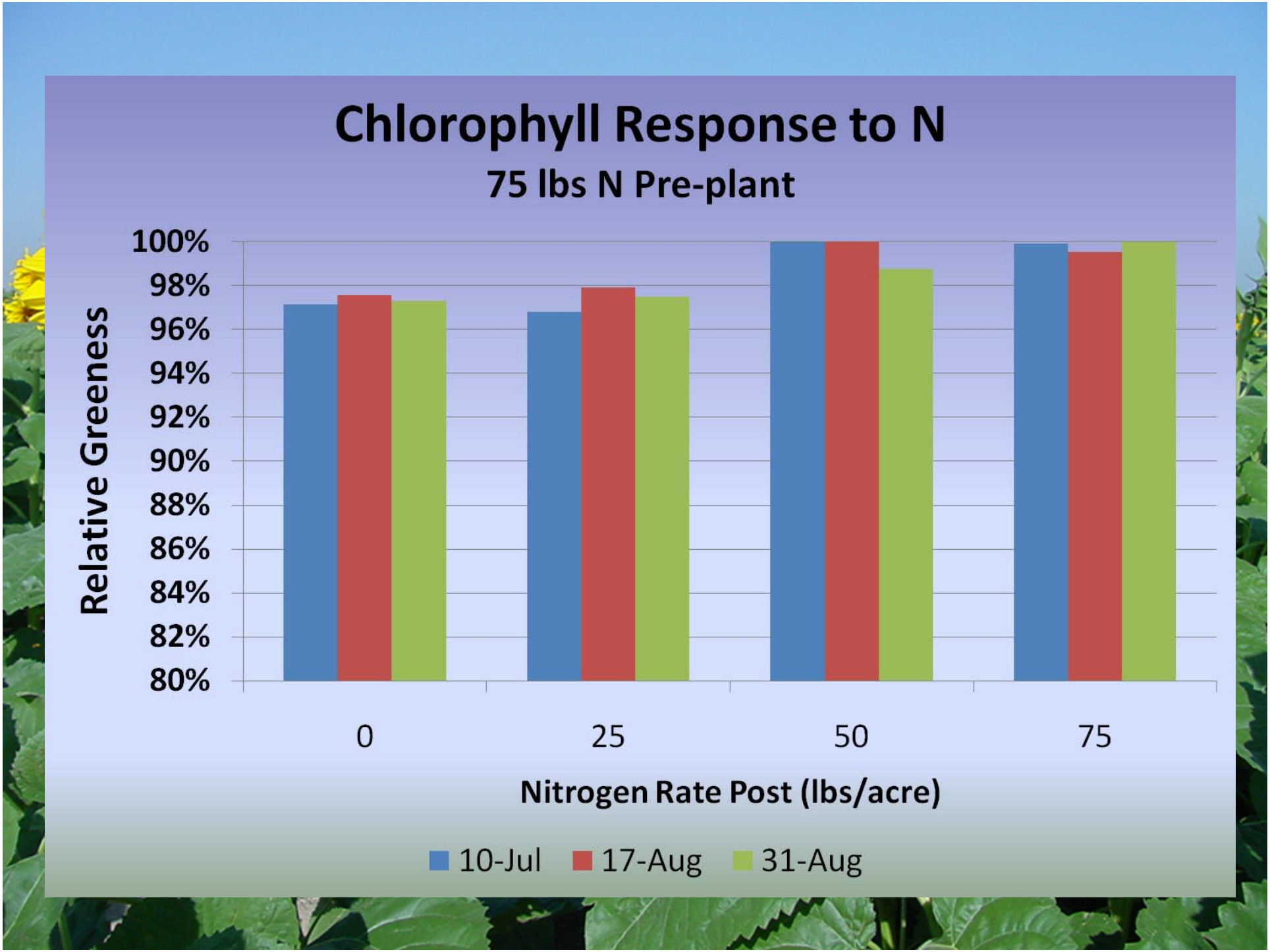
Fertility Management

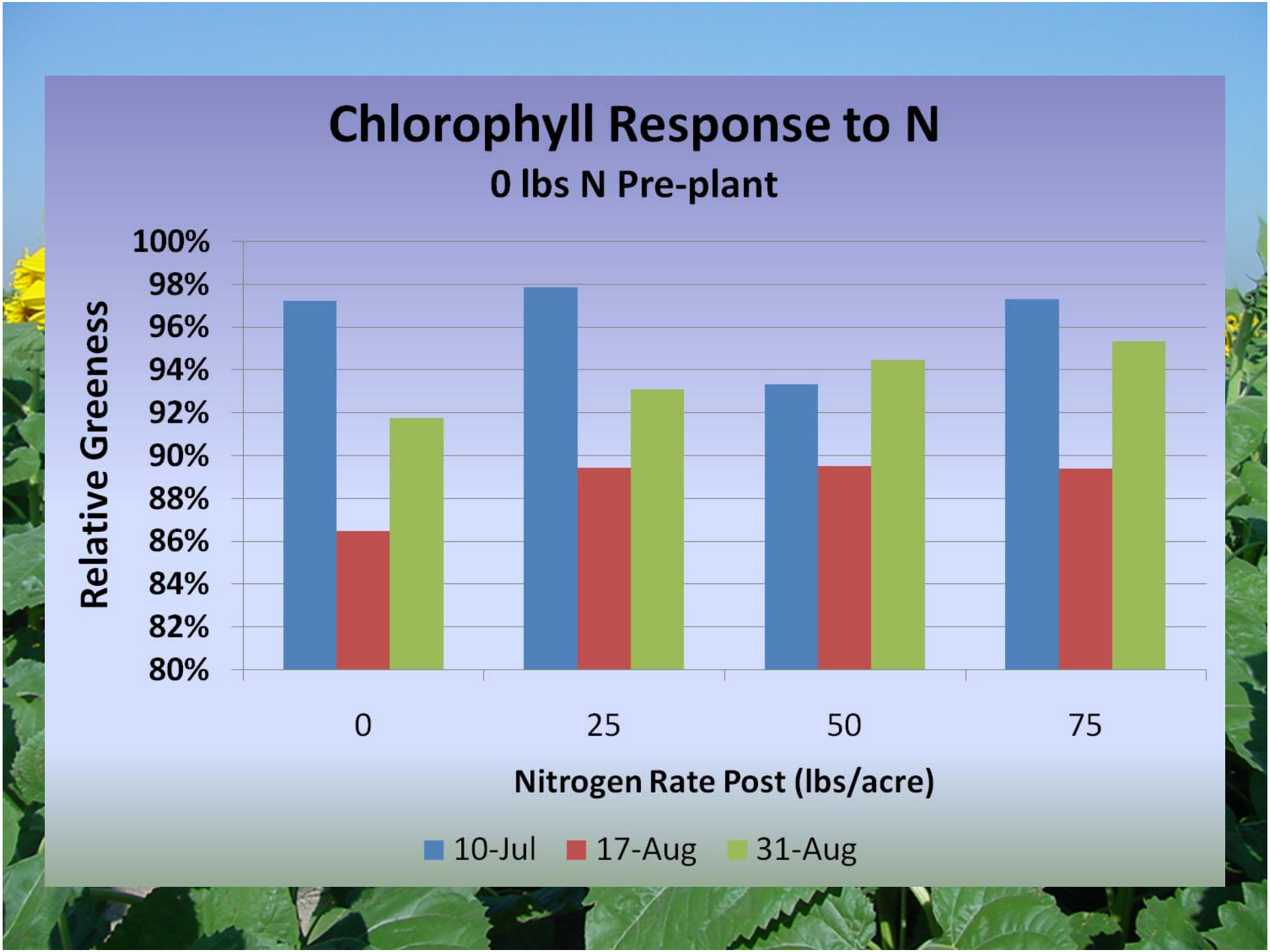
- Measurements
  - Grain Yield
  - Soil Nitrogen
  - Chlorophyll Readings (SPAD)
    - Hand measurement
    - Relative greenness of crop
    - Indication of nitrogen stress
    - Used in corn production
- Economics

2012 Prospect Valley Site



- Stand issues
  - Planted early because of soil moisture conditions
  - Populations ranged from 4,500 plants acre $^{-1}$ 15,000 plants acre $^{-1}$
  - Stands were uneven and emergence dates dramatically different


Chlorophyll Response to N
75 lbs N Pre-plant
Relative Greeness
100%
98%
96%
94%
92%
90%
88%
86%
84%
82%
80%
0
25
50
75
Nitrogen Rate Post (lbs/acre)
10-Jul
17-Aug
31-Aug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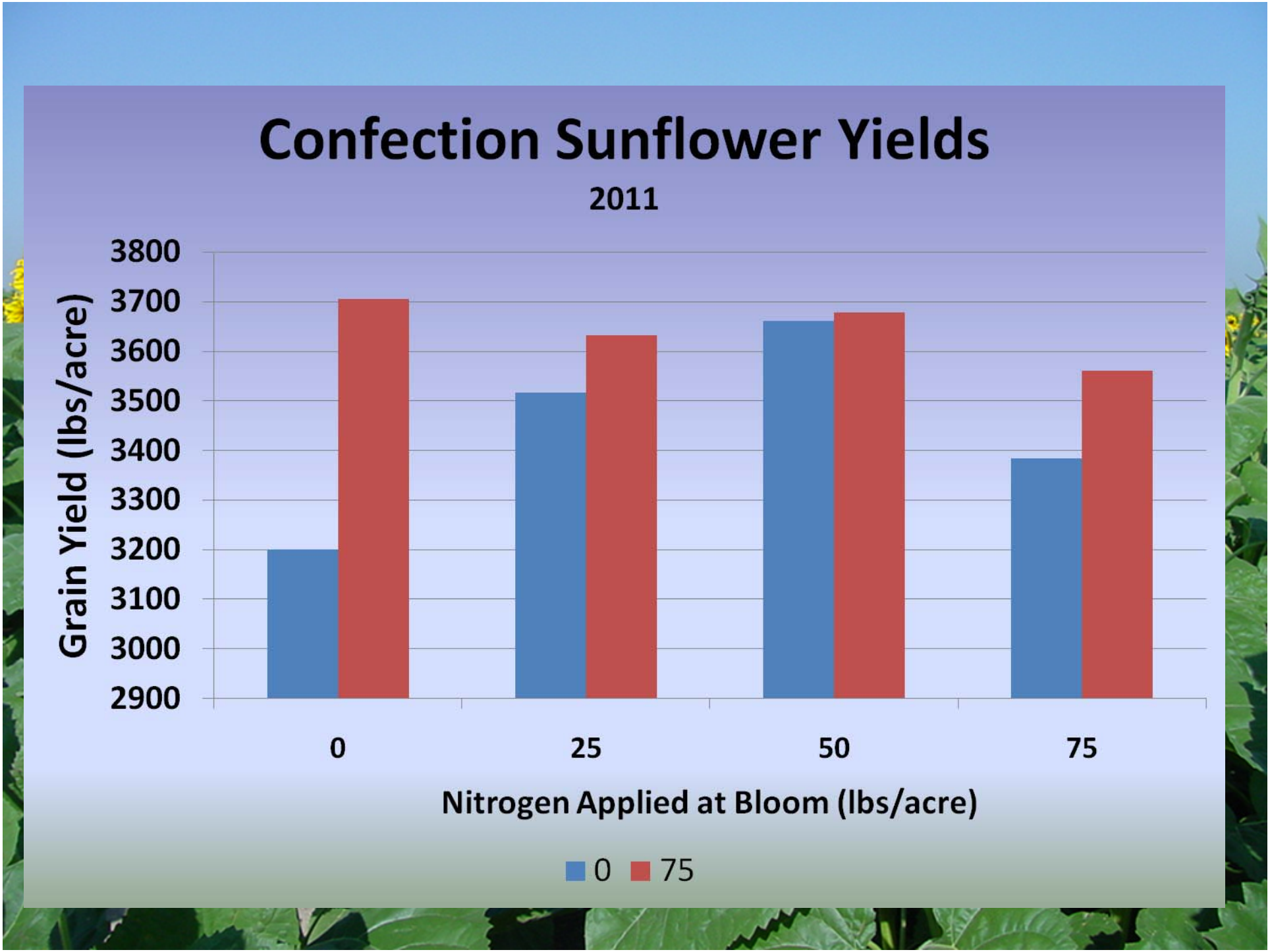
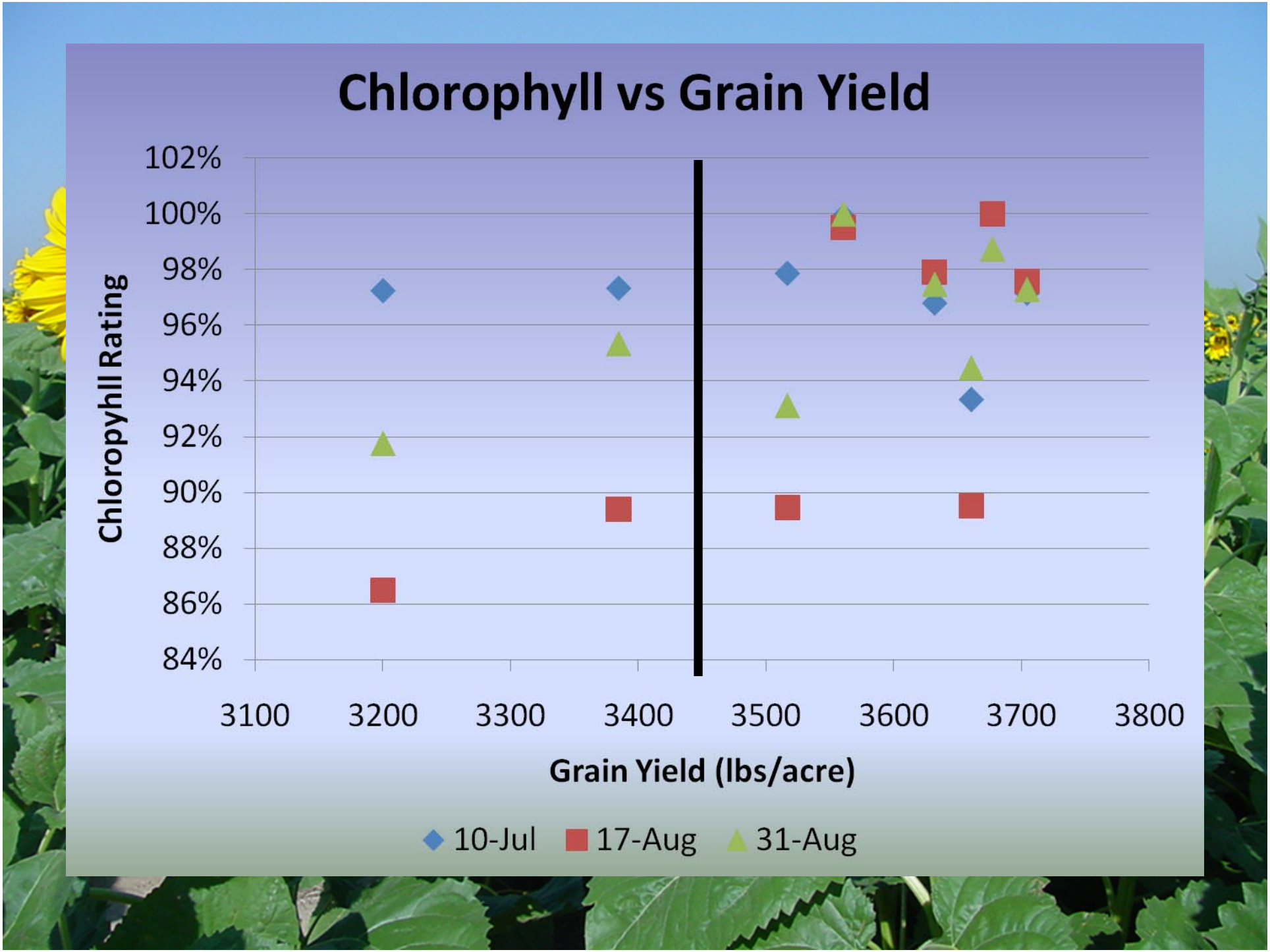
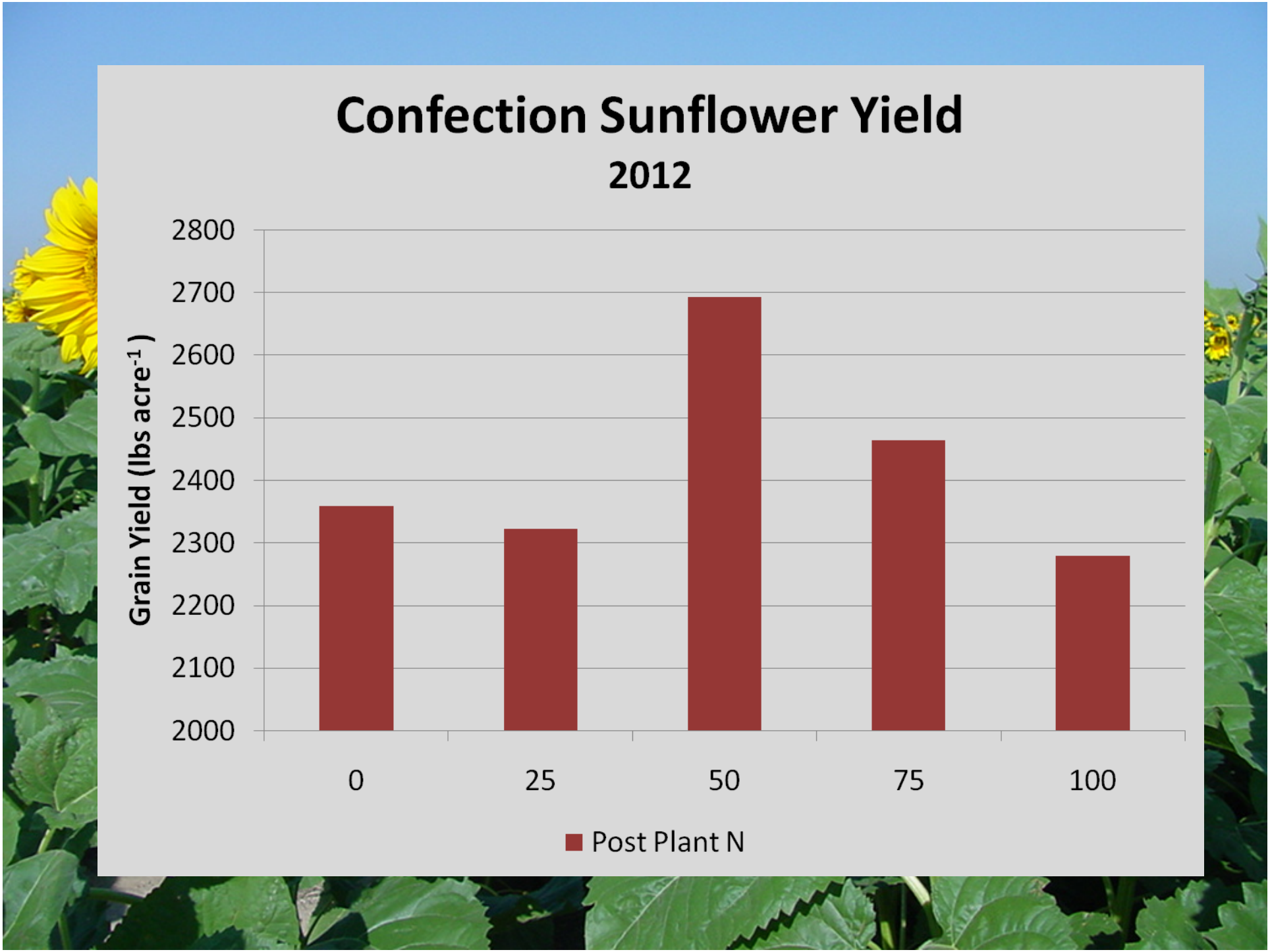
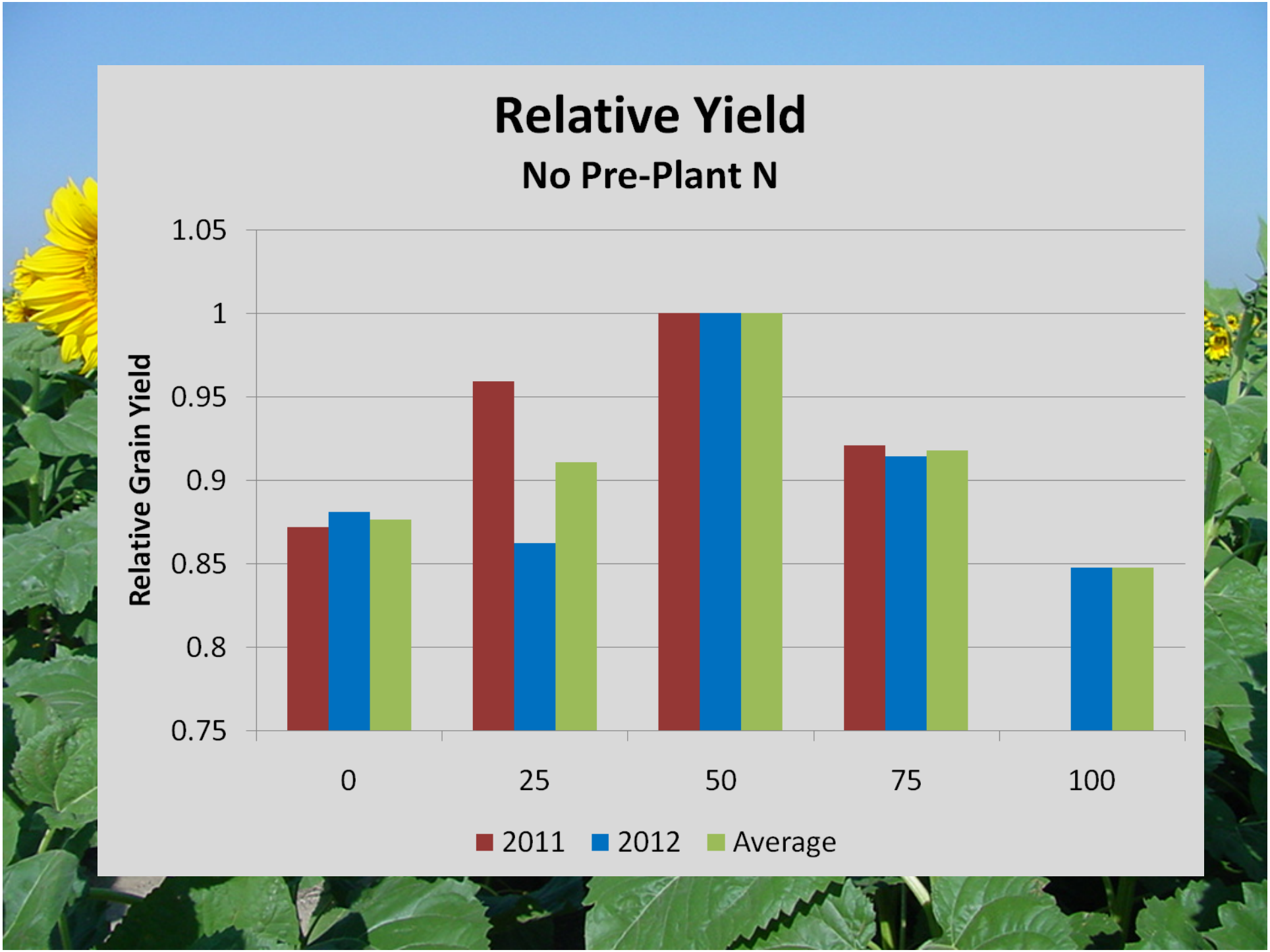
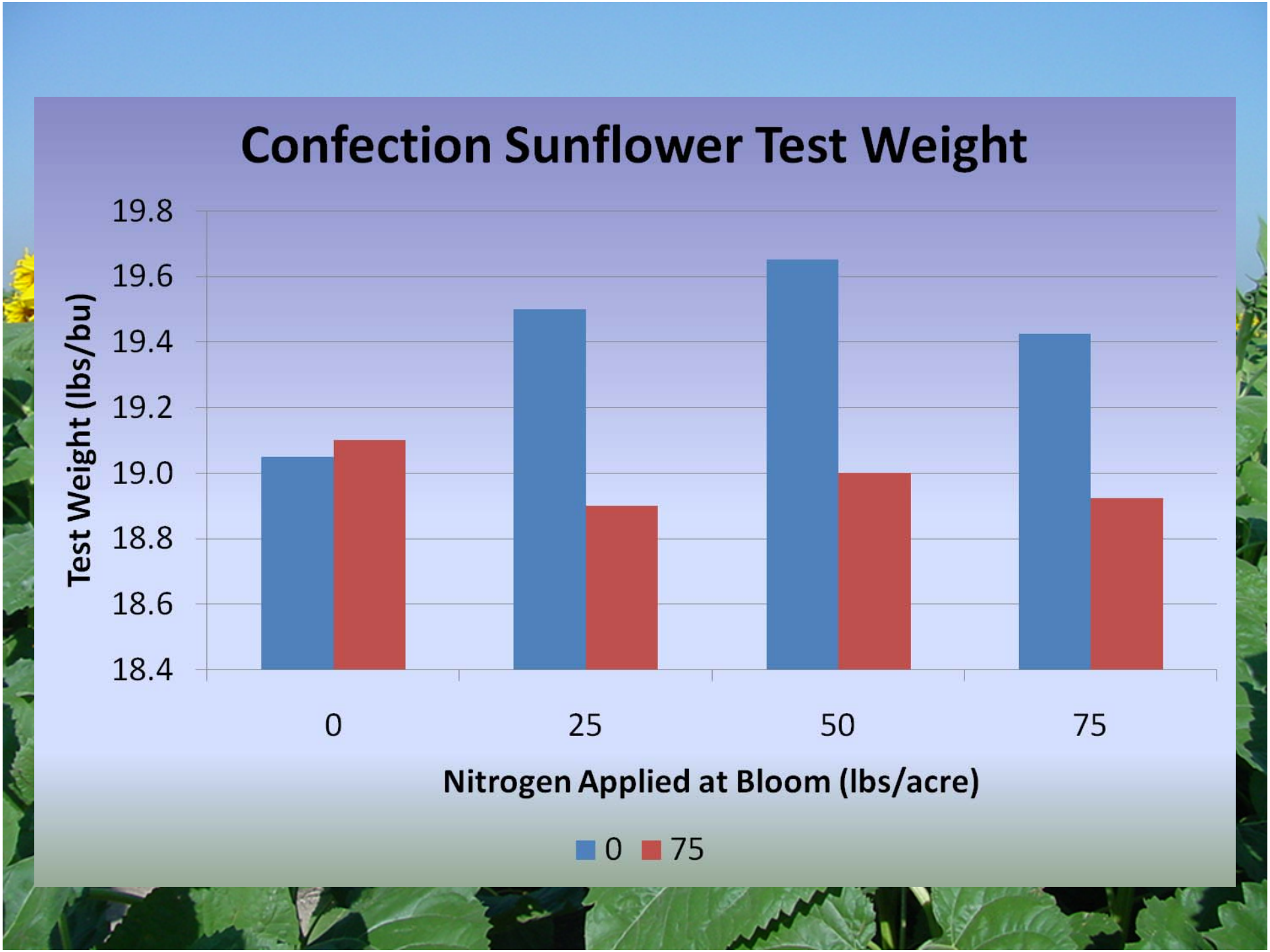
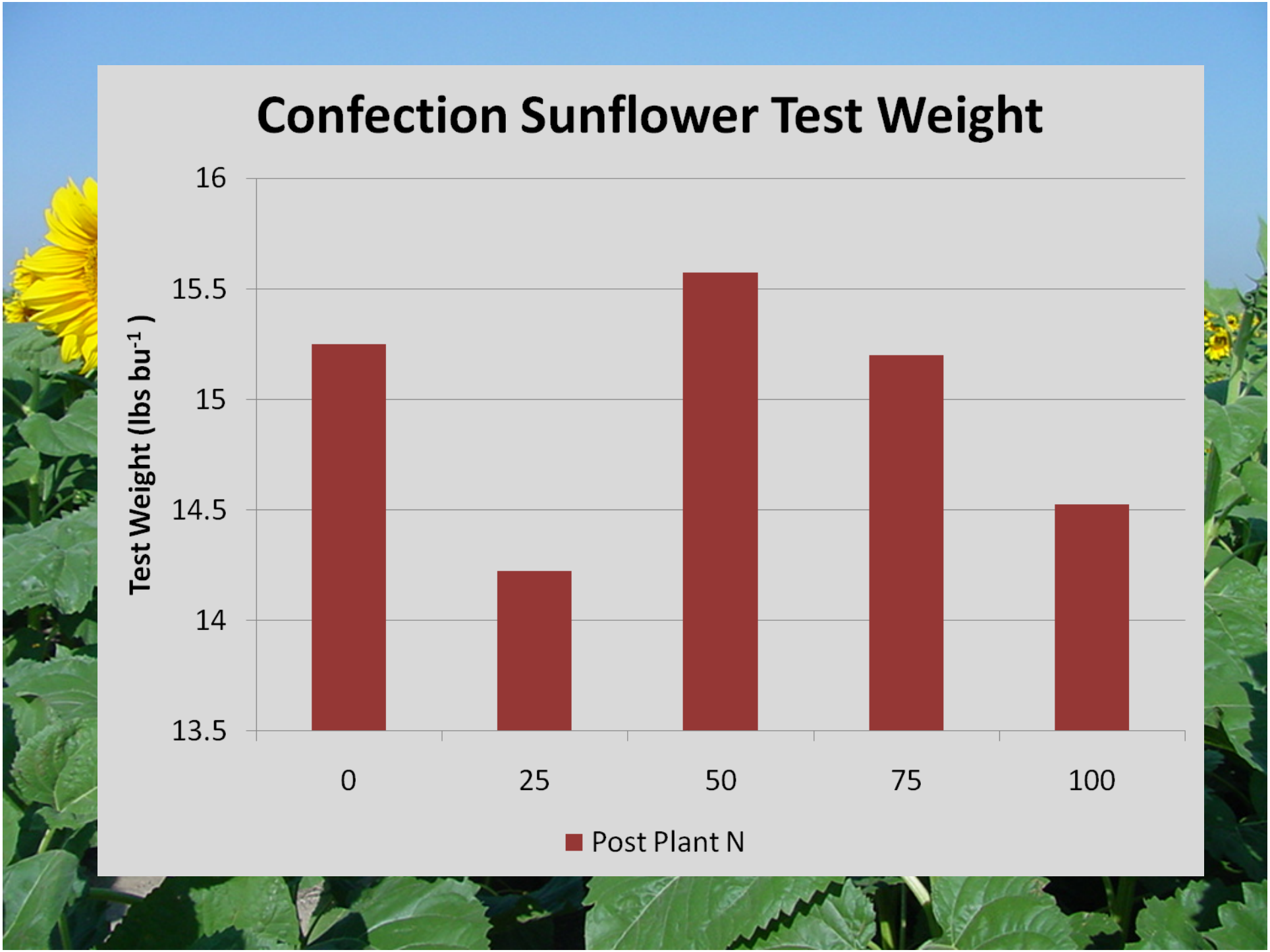

Confection Sunflower Yields
2011
Grain Yield (lbs/acre)
3800
3700
3600
3500
3400
3300
3200
3100
3000
2900
0
25
50
75
Nitrogen Applied at Bloom (lbs/acre)
0
75

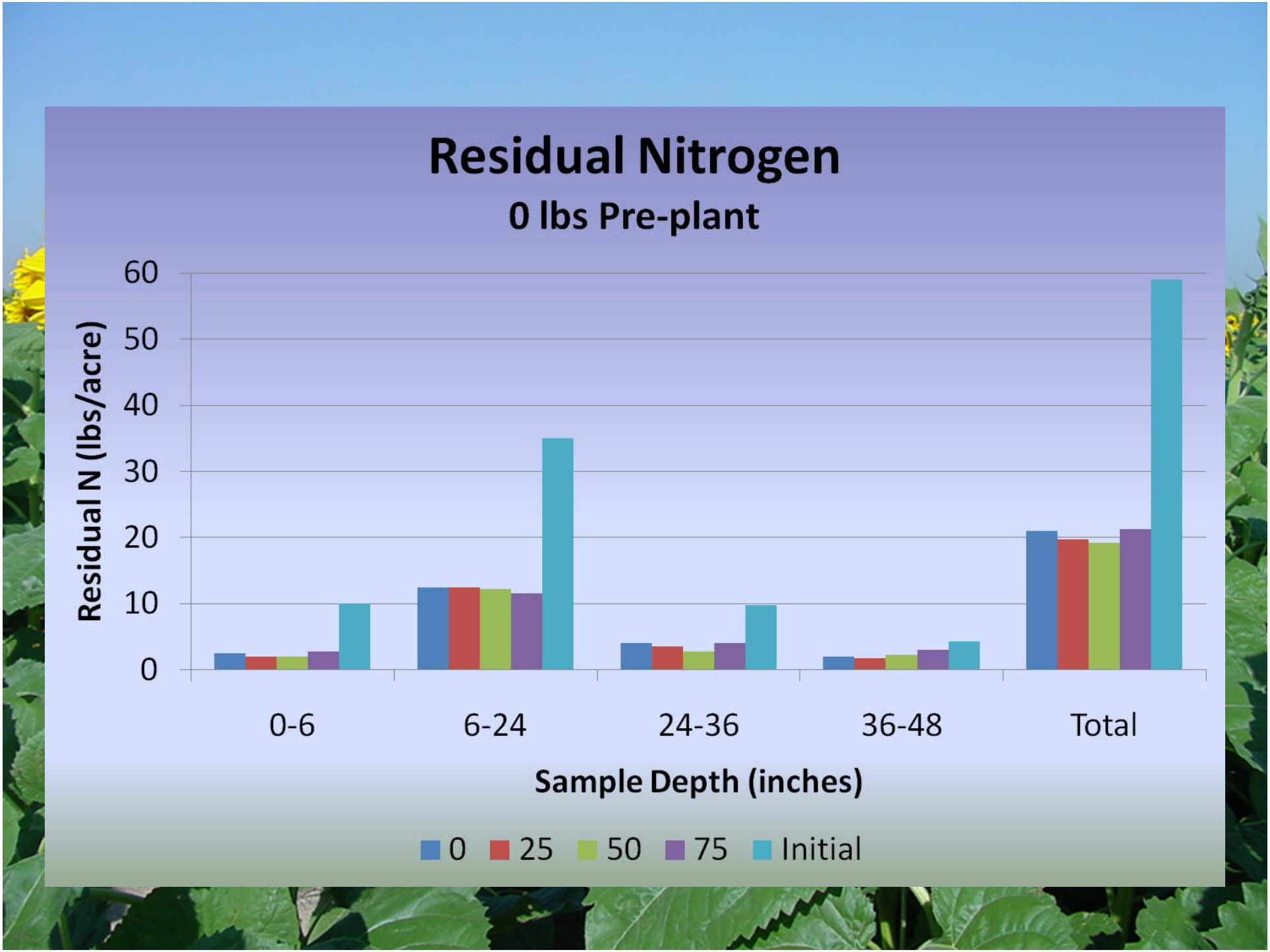

Chlorophyll vs Grain Yield
Chloropyhll Rating
102%
100%
98%
96%
94%
92%
90%
88%
86%
84%
3100
3200
3300
3400
3500
3600
3700
3800
Grain Yield (lbs/acre)
10-Jul
17-Aug
31-Aug

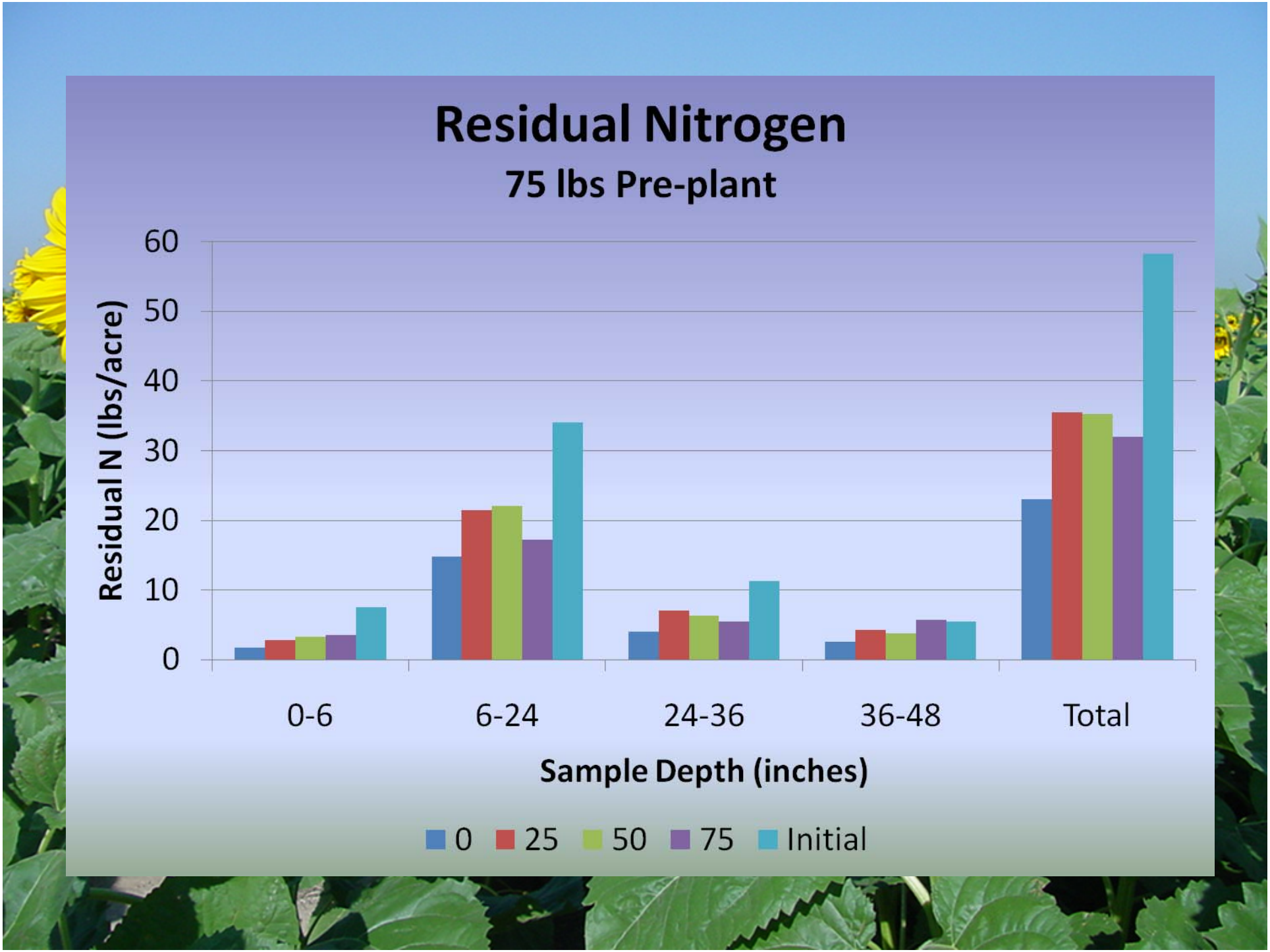

Confection Sunflower Yield
2012
Grain Yield (lbs acre-1)
2800
2700
2600
2500
2400
2300
2200
2100
2000
0
25
50
75
100
Post Plant N

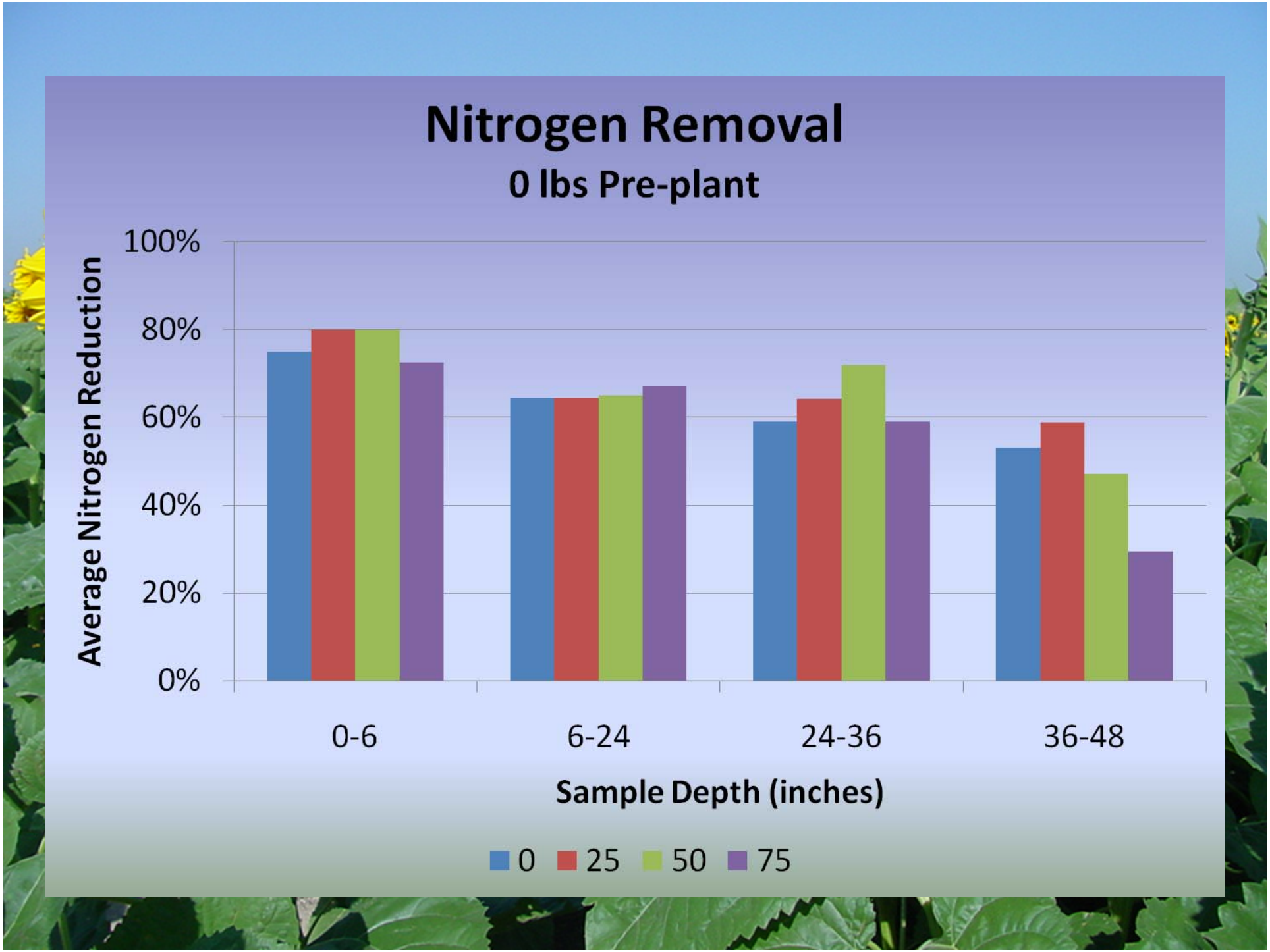

Relative Yield
No Pre-Plant N
Relative Grain Yield
1.05
1
0.95
0.9
0.85
0.8
0.75
0
25
50
75
100
2011
2012
Average

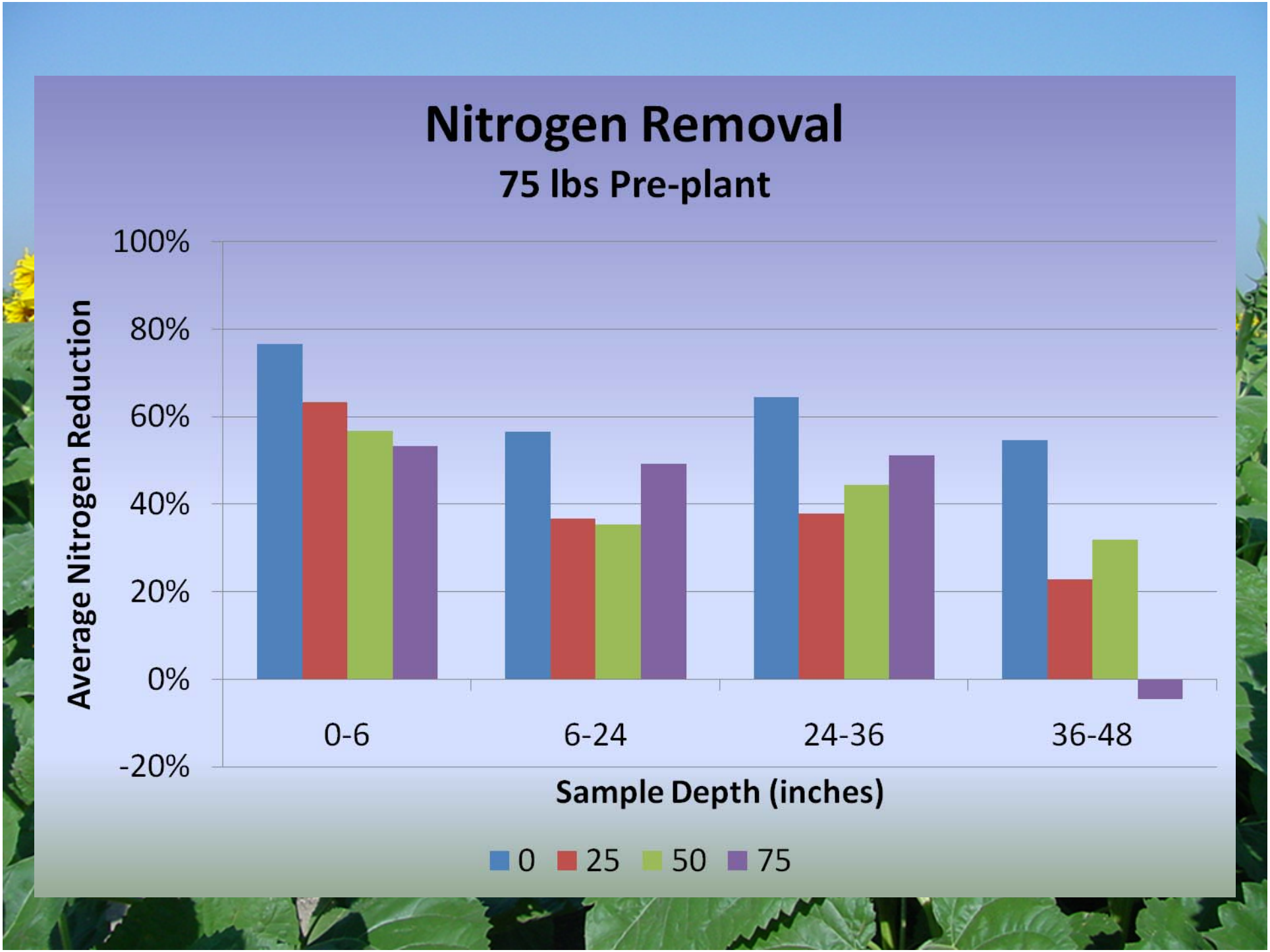

Confection Sunflower Test Weight
Test Weight (lbs/bu)
19.8
19.6
19.4
19.2
19.0
18.8
18.6
18.4
0
25
50
75
Nitrogen Applied at Bloom (lbs/acre)
0
75

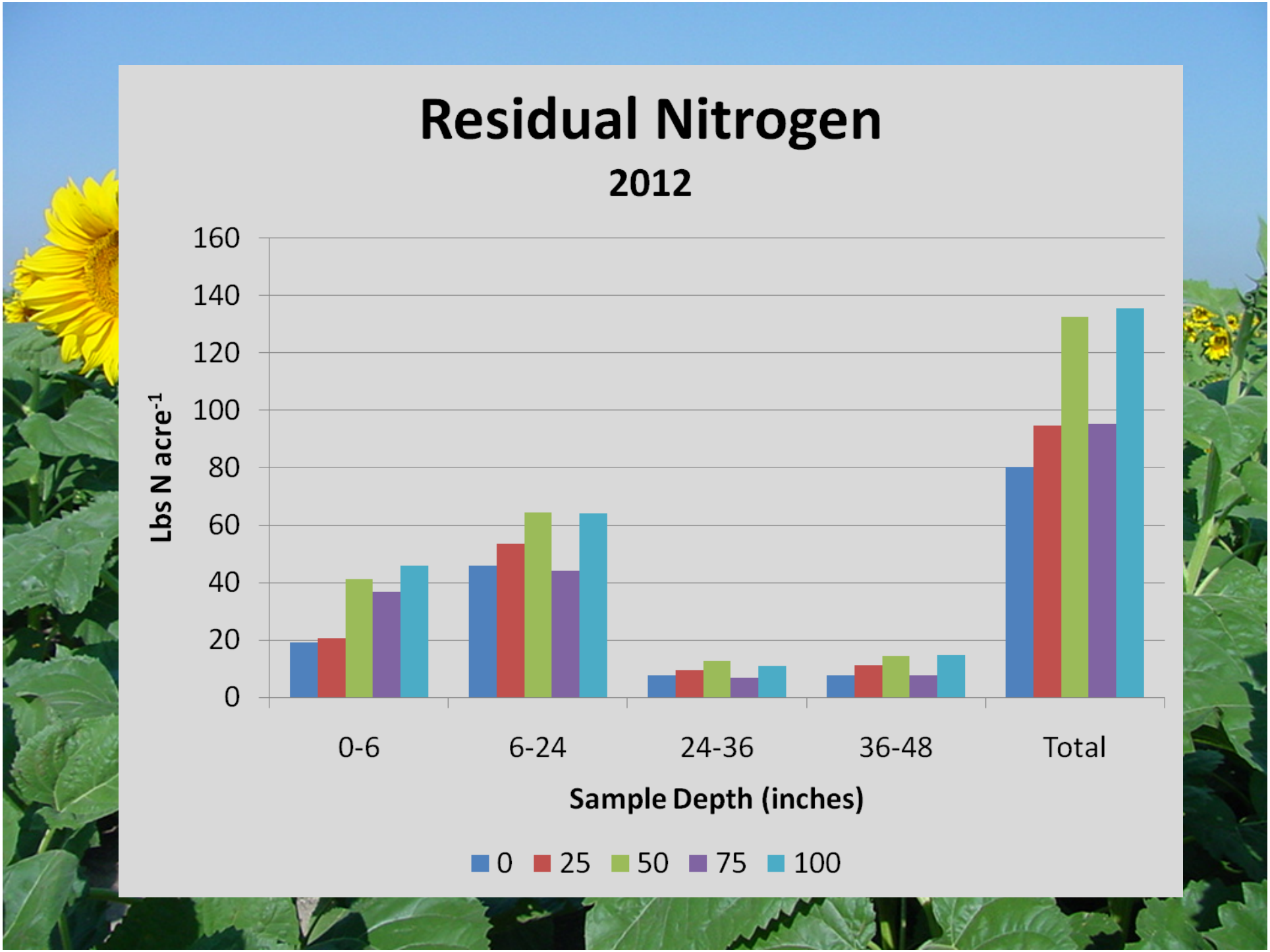

Confection Sunflower Test Weight
Test Weight (lbs bu-1)
16
15.5
15
14.5
14
13.5
0
25
50
75
100
Post Plant N


Residual Nitrogen
0 lbs Pre-plant
Residual N (lbs/acre)
60
50
40
30
20
10
0
0-6
6-24
24-36
36-48
Total
Sample Depth (inches)
0
25
50
75
Initial


Residual Nitrogen
75 lbs Pre-plant
Residual N (lbs/acre)
60
50
40
30
20
10
0
0-6
6-24
24-36
36-48
Total
Sample Depth (inches)
0
25
50
75
Initial


Nitrogen Removal
0 lbs Pre-plant
Average Nitrogen Reduction
100%
80%
60%
40%
20%
0%
0-6
6-24
24-36
36-48
Sample Depth (inches)
0
25
50
75


Nitrogen Removal
75 lbs Pre-plant
Average Nitrogen Reduction
100%
80%
60%
40%
20%
0%
-20%
0-6
6-24
24-36
36-48
Sample Depth (inches)
0
25
50
75


Residual Nitrogen
2012
160
140
120
100
80
60
40
20
0
Lbs N acre-1
0-6
6-24
24-36
36-48
Total
Sample Depth (inches)
0
25
50
75
100

Conclusion

- **Application of 75 lbs pre-plant N was better than no pre-plant N.**
- **An application of 50 lbs/acre N at bloom increased yields similar to that of 75 lbs N pre-plant.**
- **Sunflowers reduced residual N by 50% or more with proper N rates.**
- **Are nitrogen recommendations high for irrigated sunflowers?**
- **Can Chlorophyll Ratings be utilized in fertility management?**