# Bio Strip Till
# One Hit, One Miss

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Farm Manager

Conservation Cropping Systems Project


Located 2 miles south of Forman ND

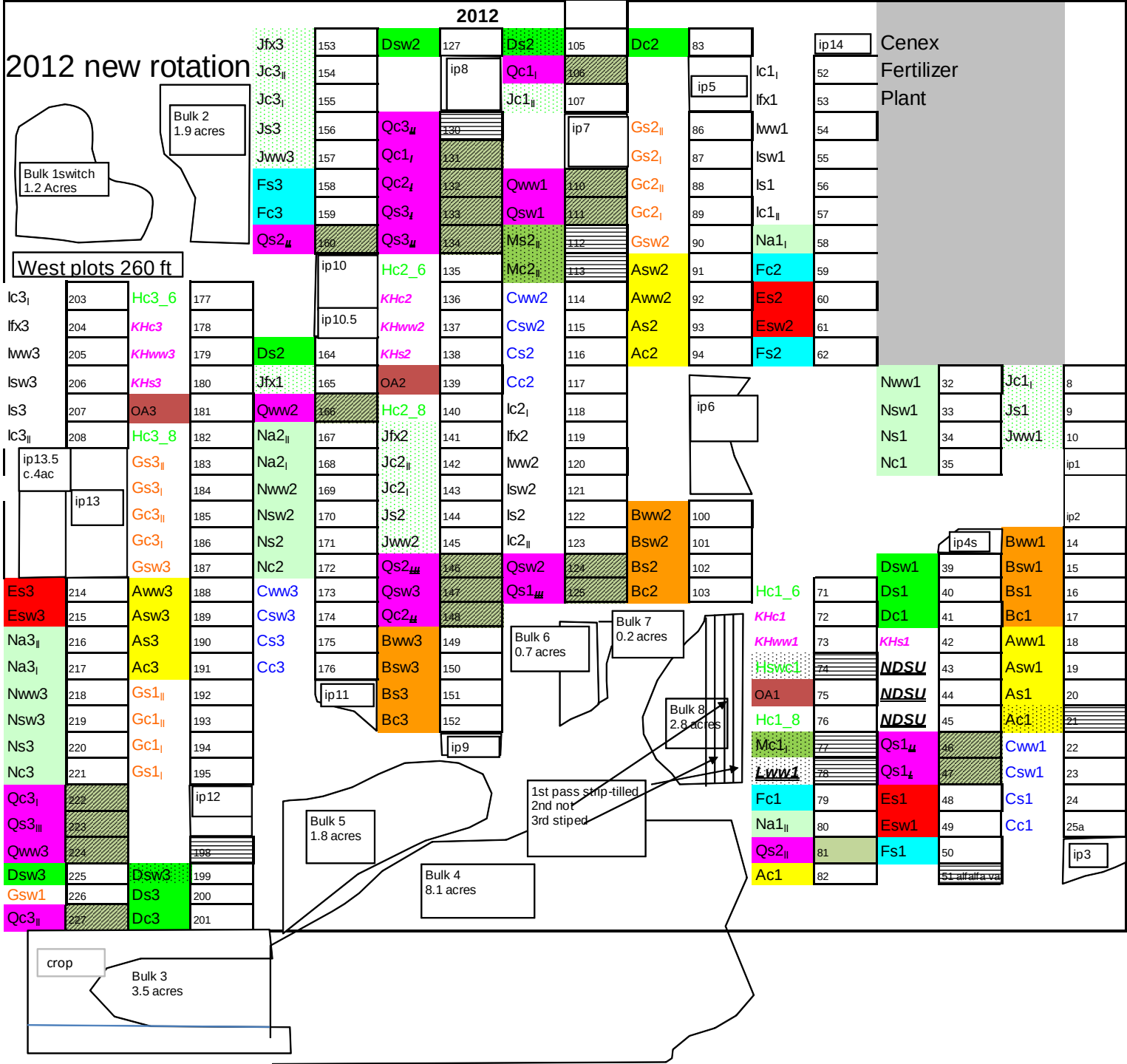
# What is CCSP

- A soil conservation and water quality research and demonstration project using no-till and strip till farming methods.
- Overseen by a local farmer board of directors from 6 SCD's in Richland, Ransom, Sargent, Dickey in ND - Day and Marshall in SD.
- Aggressively managed project of 200 large plots of 15 rotations.
- Cooperative effort with Universities, NRCS, Local SCDs, conservation groups and agribusiness but is Independent.
- 10 years of History.
- Diverse combinations of rotations, cover crops, equipment, and philosophies.
- Long and short term research and demonstration.

# Crops at CCSP

- 11 of our 15 rotations use spring or winter wheat.
- 14 Use Corn, 12 use soybeans, 2 flax, 1 alfalfa.
- NDSU has located their spring and winter wheat variety trials at our site.
- Unique demonstrations
  - Bio-strip till in winter wheat stubble in preparation for corn.
  - Bird Repellant trial in winter wheat.
  - Growing winter wheat after early maturing soybeans.
  - Compost tea.
  - Winter wheat to recover prevent plant acres.
  - Radish trade name trial.
  - Cover crop demonstrations.
  - Strip till/variety trial.
  - Corn nematode seed treatment trial.
- Typical demonstrations:
  - Varieties.
  - Seed Treatment.
  - Different drills used for seeding.
  - Herbicides.

# Plot Map


2012
2012 new rotation
Cenex
Fertilizer
Plant
Bulk 2
1.9 acres
Bulk 1switch
1.2 Acres
West plots 260 ft
ip5
ip6
ip7
ip8
ip9
ip10
ip10.5
ip11
ip12
ip13
ip13.5
c.4ac
ip14
ip4s
Bulk 3
3.5 acres
Bulk 4
8.1 acres
Bulk 5
1.8 acres
Bulk 6
0.7 acres
Bulk 7
0.2 acres
Bulk 8
2.8 acres
1st pass strip-tilled
2nd not
3rd stiped
crop
Jfx3 153
Jc3II 154
Jc3I 155
Js3 156
Jww3 157
Fs3 158
Fc3 159
Qs2III 160
Dsw2 127
Qc3III 130
Qc1I 131
Qc2I 132
Qs3I 133
Qs3III 134
Hc2_6 135
KHc2 136
KHww2 137
KHs2 138
OA2 139
Hc2_8 140
Jfx2 141
Jc2II 142
Jc2I 143
Js2 144
Jww2 145
Qs2III 146
Qsw3 147
Qc2III 148
Bww3 149
Bsw3 150
Bs3 151
Bc3 152
Ds2 105
Qc1I 106
Jc1II 107
Qww1 110
Qsw1 111
Ms2II 112
Mc2II 113
Cww2 114
Csw2 115
Cs2 116
Cc2 117
Ic2I 118
Ifx2 119
Iww2 120
Isw2 121
Is2 122
Ic2II 123
Qsw2 124
Qs1III 125
Dc2 83
Gs2II 86
Gs2I 87
Gc2II 88
Gc2I 89
Gsw2 90
Asw2 91
Aww2 92
As2 93
Ac2 94
Bww2 100
Bsw2 101
Bs2 102
Bc2 103
Ic1I 52
Ifx1 53
Iww1 54
Isw1 55
Is1 56
Ic1II 57
Na1I 58
Fc2 59
Es2 60
Esw2 61
Fs2 62
Hc1_6 71
KHc1 72
KHww1 73
Hsw1 74
OA1 75
Hc1_8 76
Mc1I 77
Lww1 78
Fc1 79
Na1II 80
Qs2II 81
Ac1 82
Nww1 32
Nsw1 33
Ns1 34
Nc1 35
Dsw1 39
Ds1 40
Dc1 41
KHs1 42
NDSU 43
NDSU 44
NDSU 45
Qs1II 46
Qs1I 47
Es1 48
Esw1 49
Fs1 50
51 alfalfa ya
Jc1I 8
Js1 9
Jww1 10
ip1
ip2
Bww1 14
Bsw1 15
Bs1 16
Bc1 17
Aww1 18
Asw1 19
As1 20
Ac1 21
Cww1 22
Csw1 23
Cs1 24
Cc1 25a
ip3
Ic3I 203
Ifx3 204
Iww3 205
Isw3 206
Is3 207
Ic3II 208
Es3 214
Esw3 215
Na3II 216
Na3I 217
Nww3 218
Nsw3 219
Ns3 220
Nc3 221
Qc3I 222
Qs3III 223
Qww3 224
Dsw3 225
Gsw1 226
Qc3II 227
Hc3_6 177
KHc3 178
KHww3 179
KHs3 180
OA3 181
Hc3_8 182
Gs3II 183
Gs3I 184
Gc3II 185
Gc3I 186
Gsw3 187
Aww3 188
Asw3 189
As3 190
Ac3 191
Gs1II 192
Gc1II 193
Gc1I 194
Gs1I 195
198
Dsw3 199
Ds3 200
Dc3 201
Ds2 164
Jfx1 165
Qww2 166
Na2II 167
Na2I 168
Nww2 169
Nsw2 170
Ns2 171
Nc2 172
Cww3 173
Csw3 174
Cs3 175
Cc3 176

# *CCSP Rotation Key*

| | |
|---|---|
| spring wheat/winter wheat/corn/soybeans - | A |
| spring wheat/winter wheat-st/corn/soybeans - | B |
| spring wheat/winter wheat-biost/corn/soybeans | C |
| spring wheat-st/corn/soybeans | D |
| spring wheat/soybeans | E |
| corn/soybeans-st | F |
| spring wheat-st/corn/soybeans/corn/soybeans | G |
| continues corn since 2006-st | H6 |
| continues corn since 2008-st | H8 |
| spring wheat/winter wheat/flax-st/corn-st/corn/soybeans | I |
| winter wheat/soybeans/corn-st/corn/flax | J |
| winter wheat-bio-strip-*biost*/corn/soybeans | KH |
| spring wheat/winter wheat/alfalfa/alfalfa/corn/soybeans | N |
| corn/cover crop | **O** |
| spr wht/win wht/soy/corn/soy/corn/soy | ***Q*** |

note-st denotes strip till operation, cc-denotes cover crop

# Radish and Peas

The Bio Strip Till Dynamic Duo Today……


What is “Right” with this Picture??

# What is “Wrong” with this Picture??

# The Radish you Want!!


1 year old Radish

1 year old Radish


Bio-Strip Fall 2009
Radish
Pea

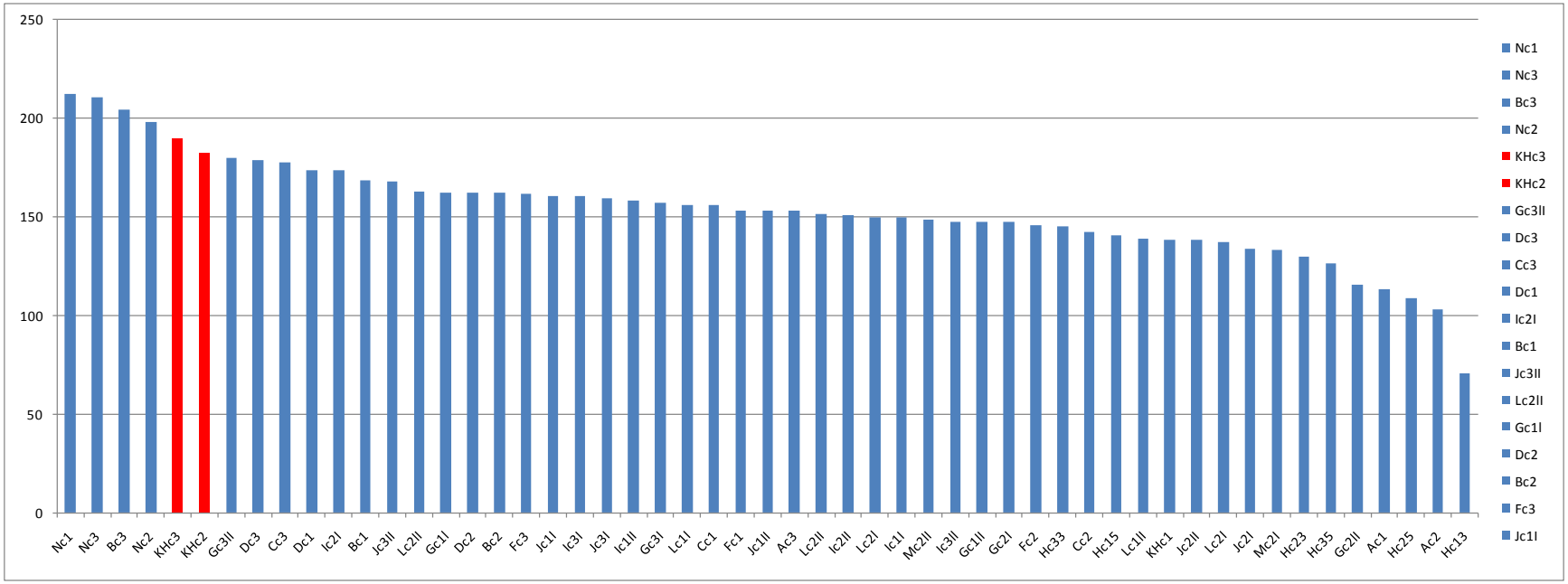

Bio-Strip Fall 2010


Bio-Strip till fall 2011

# Materials and methods

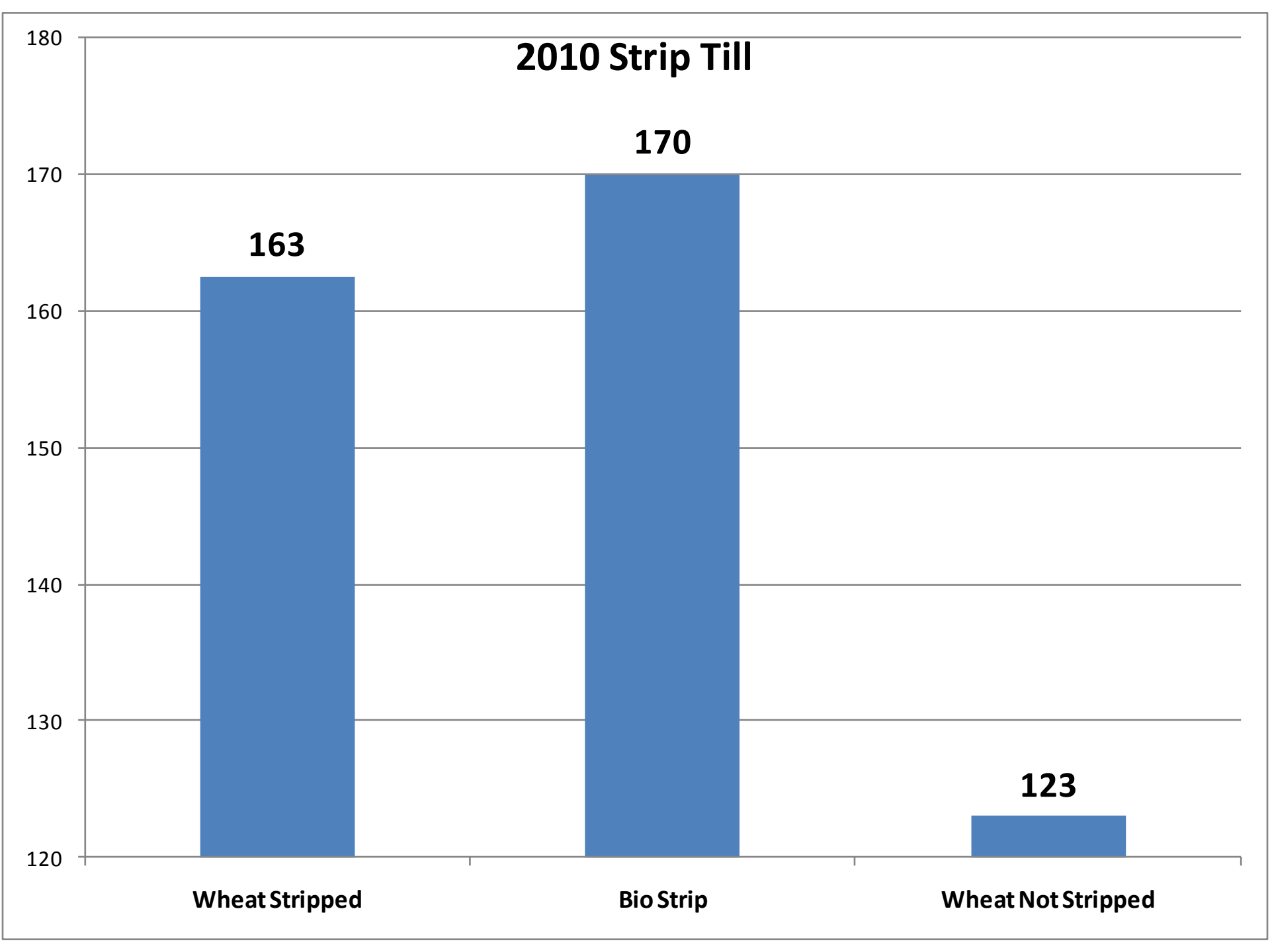
- 7200 John Deere planter with Kinze units.
  - 2009-used soybean plates.
    - Good for peas, high pop on radish.
  - 2010-11 used sorghum plates.
    - Good population control on radish, 60K/ acre or 1 ¼ lb.
    - Peas seeded at soybean population of 180K about ½ of normal 300,000 used for peas.
  - 2011 Also used 1590 John Deere, with some mods.

# Bio Strip till was near top of Corn Yields in 2010



# 2010 Corn Yields

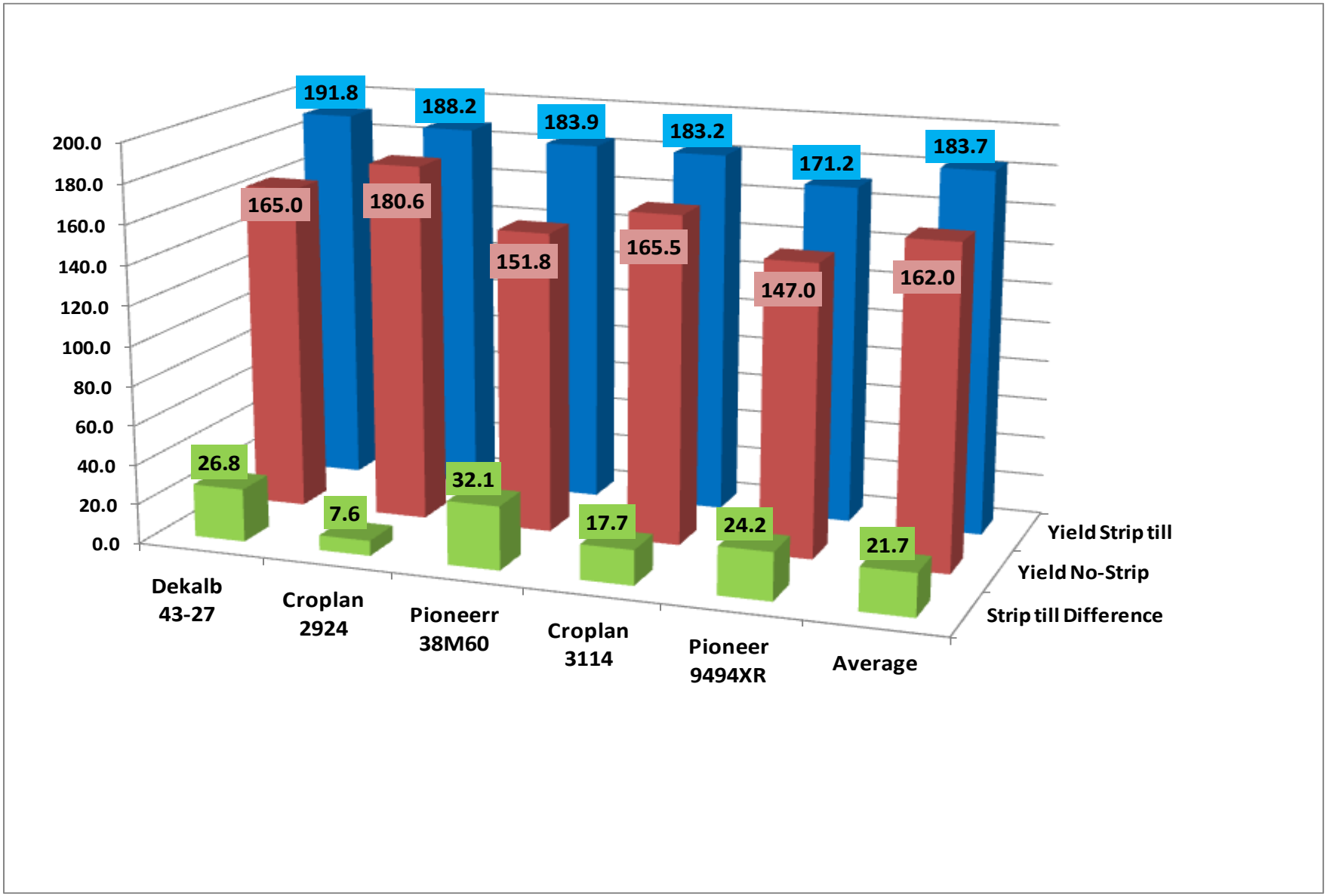
| | Yield bu/ac Plots | moisture | Test Wgh | Rotation | Rotation Yield Average | Rotation Key |
|---|---|---|---|---|---|---|
| 1 | 212.2 | 14.9 | 58.3 | Nc1 | | sw/ww/a/a/c/s |
| 4 | 198.0 | 15.9 | 60.0 | Nc2 | **206.9** | **No strip till** |
| 2 | 210.5 | 15.7 | 58.2 | Nc3 | | |
| | 168.4 | 16.6 | 57.8 | Bc1 | | sw/ww/c/s - shank drill |
| | 162.1 | 17.4 | 57.5 | Bc2 | **178.4** | **Strip tilled** |
| 3 | 204.6 | 15.3 | 58.4 | Bc3 | | |
| | 173.9 | 16.0 | 56.9 | Dc1 | | sw/c/s |
| | 162.2 | 16.2 | 57.6 | Dc2 | **171.6** | **Strip tilled** |
| | 178.7 | 15.6 | 57.1 | Dc3 | | |
| | 138.4 | 16.0 | 51.7 | *KHc1* | | ww-cc/corn/s |
| 5 | 182.1 | 18.0 | 56.8 | *KHc2* | **170.1** | ***Bio-Strip till*** |
| 6 | 189.7 | 16.8 | 57.9 | *KHc3* | | |


2010 Strip Till
180
170
160
150
140
130
120
163
170
123
Wheat Stripped
Bio Strip
Wheat Not Stripped

# 2011

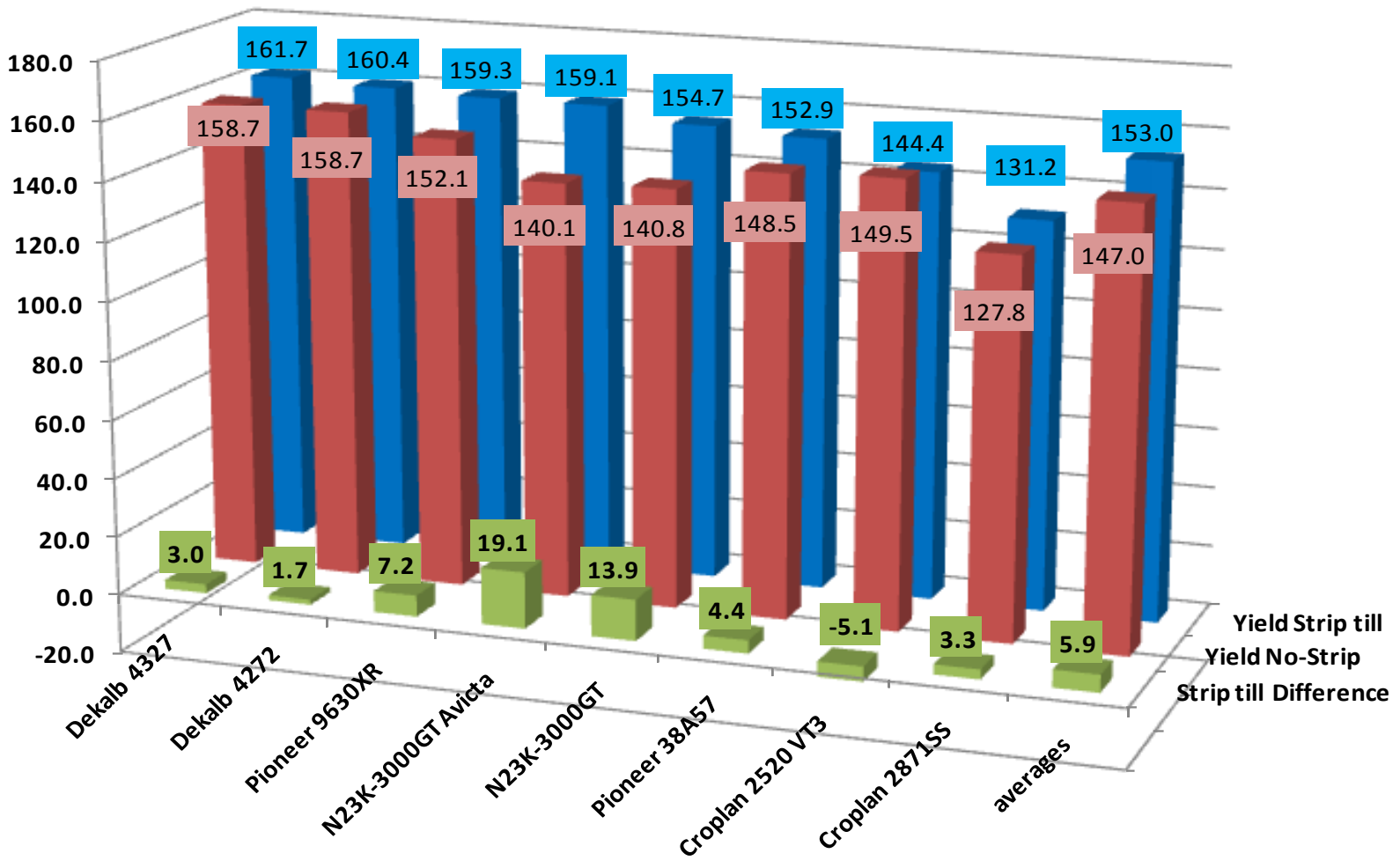
- Hail and wind wrecked havoc on the plots, but……
  - Things did not look good right from the start.
  - Poor germination, seed rot, and slow growth.
- Why??
  - My best guess.
    - The “wrong” radish left behind either organisms or chemistry that was not friendly to the sprouting corn.

# Strip Till/Variety Trial 2009 CCSP



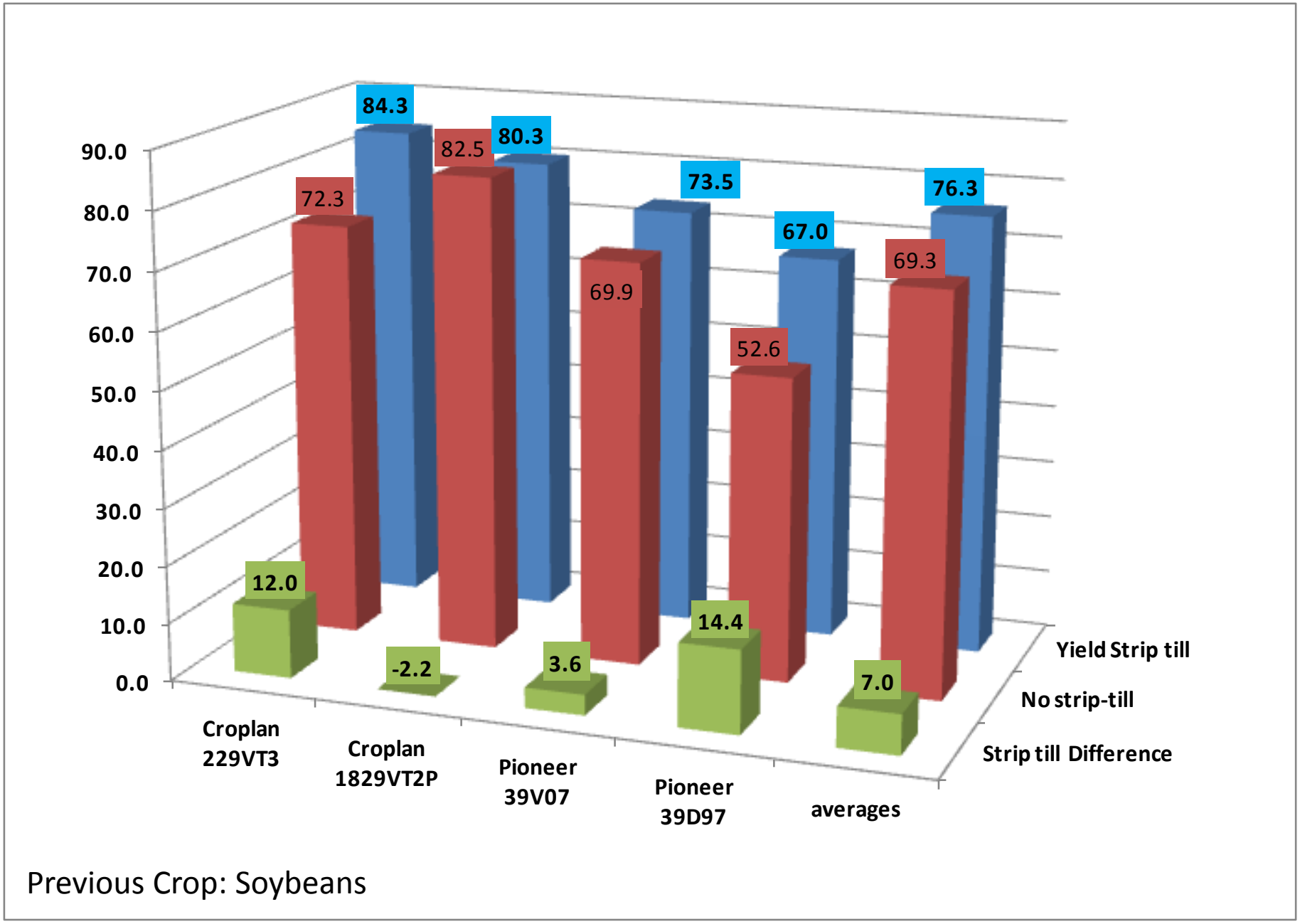

Previous Crop: Soybeans

# Strip Till/Variety Trial 2010 CCSP




Previous Crop: Soybeans

# Strip Till/Variety Trial 2011 CCSP




Previous Crop: Soybeans

# Why would bio Strip till work?


2010 Planting Corn on Strip till


Strip till water erosion

# Why would bio Strip till work?

## Pros:

Open up channels for fast root proliferation.
Provide organic matter for symbiotic organisms to become established on and increase population.
Separation of legumes and fertilizer.
Concentration of low C/N material for rapid decomposition of straw.

## Cons:

Alleopathy.
Cost.
Special equipment may be required.

# Innovations

- What other species would work?
  - Flax-intense colonizer of micorrhiza.
  - Suggestions?
- Other Considerations.
  - Could use system for soybeans.
  - Select bio-strip planting for soybean cyst nematode suppression.
  - Radish and rye effective for cyst egg reduction.
  - Both can induce hatching in the fall, 80-90% reduction in parasitic nematodes. (Ohio State Fact sheet SAG-15-11)

# Innovations

- What would happen if:
  - You did conventional strip till in wheat with fertilizer right after harvest, then planted bio-strip?
    - Stabilize nitrogen.
    - Enhance growth of radish.
    - By keeping nitrogen away from pea, maintain rhizobia nitrogen production.


Fertilizing Cover Crops
Yes
No Nitrogen

# *Considerations of the Bio Chemical Factory*

**Egyptian Journal of Horticulture (1989)**
**Volume: 16, Issue: 2, Pages: 165-172**
**Find this paper at:**
**openurl.ac.ukWorldCat®Google ScholarEdit library access links Abstract**

**Root exudates of the crops of family cruciferae, i.e. cabbage, radish and cauliflower decreased the percentage of tomato seed germination. The highest value of tomato seed germination was reported with the control plants (92.2%). On the other hand, the lowest one was occurred with radish exudates (85.6%). Also, root exudates of these crops showed a significant depressing effect on germination rate index (GRI). The germination rate index (GRI) of tomato seeds can be arranged in the following descending order, cabbage (0.55) gt cauliflower (0.53) gt Radish (0.51). The averages of tomato fresh seedling weight decreased significantly when tomato seeds were treated with the different crops of family cruciferae in comparison with that of the control. The growth values of seedlings 45 days old was decreased significantly when tomato seeds were treated with cabbage, cauliflower and radish root exudates.**

# *Considerations of Bio Tillage*

From an article in “Strip till Farmer”

“Including a few pounds of oilseed radish with legumes can substantially improve the benefits of cover crops, says Ohio State University cover crops researcher Rafiq Islam.
"The roots of oilseed radish can reach deep into the soil — as much as 30 inches — breaking up compacted soils and acting as natural strip-till," Islam says. "The roots are supporting microbial diversity, facilitating drainage and improving soil structure.
"If you grow a legume cover crop along with oilseed radish, you don't need to subsoil or deep plow. The crops work together as a natural biological plow.“”

Fall 2011


Spring 2012


Next field day July 12, 2012

# David, Wally, and Turk

# *Thank You!*


Questions????