# NCCPI

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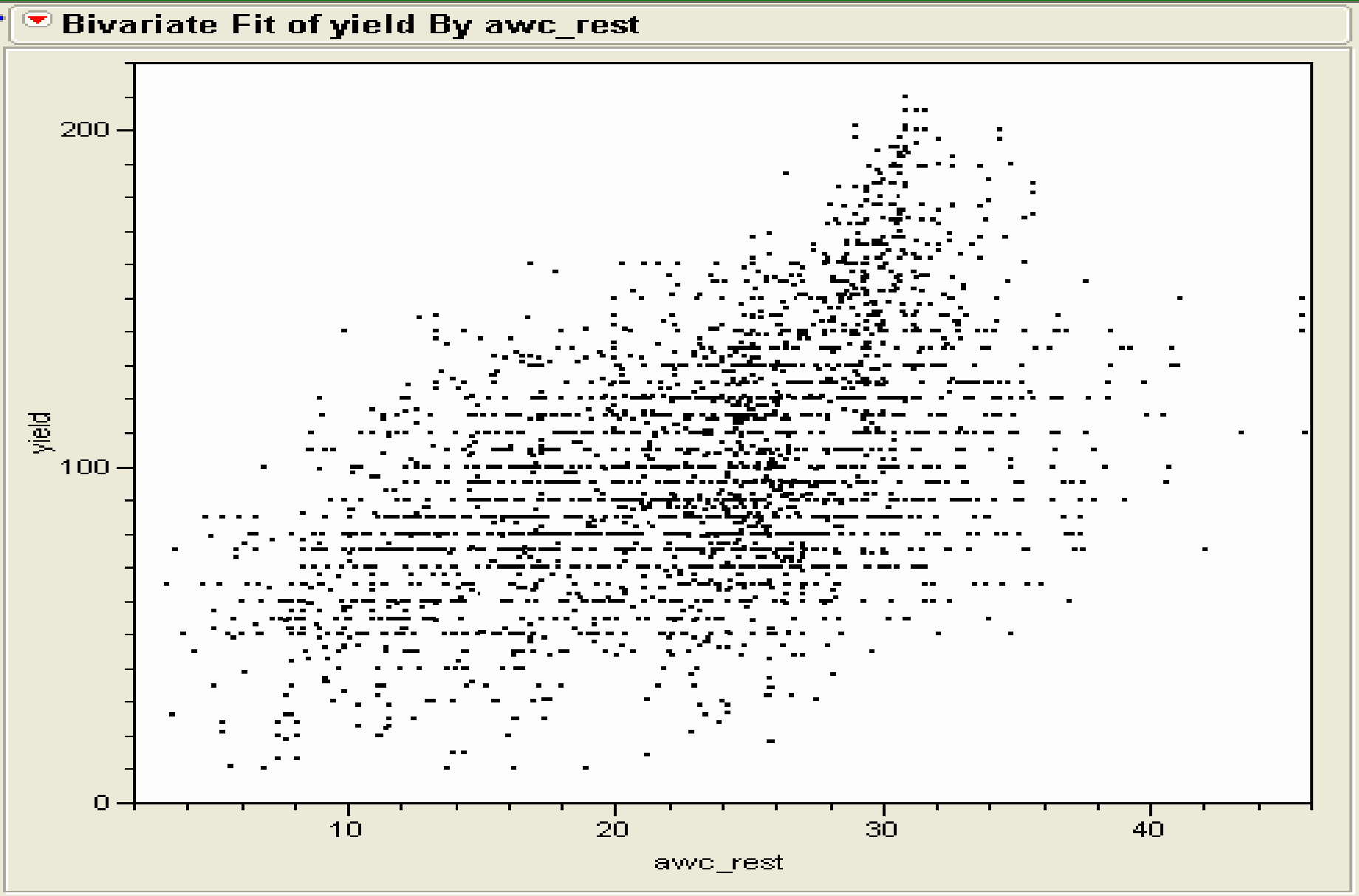
# NCCPI

- A need exists to be able to array soils nationwide on the basis of their inherent productivity.
- The National Commodity Crop Productivity Index under development uses soil survey data to assess relative soil productivity.
- The heart of the model is the use of fuzzy sets to relate the yield of commodity crops to soil, site, climate, and landscape characteristics.

# How it is made

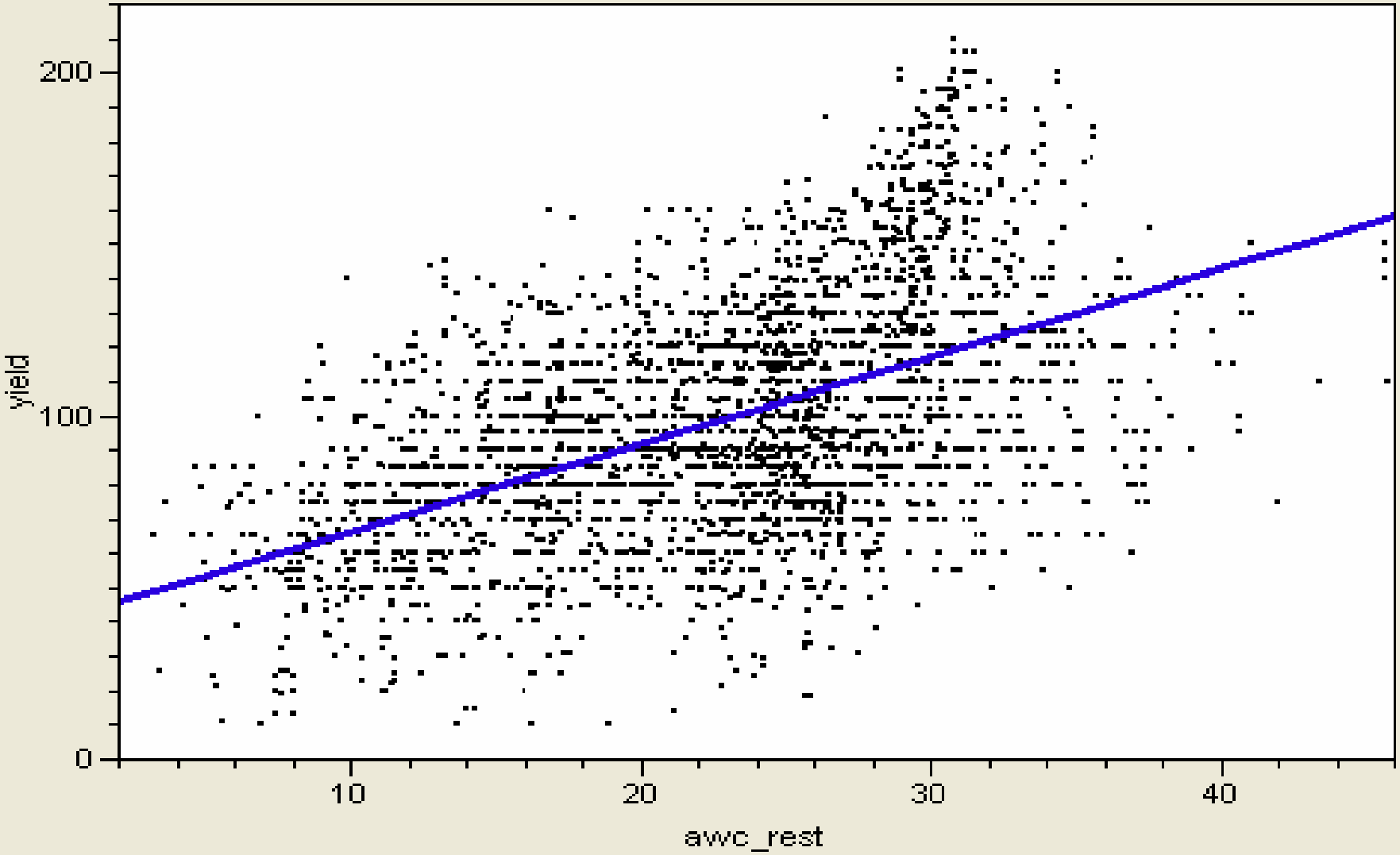
- Select test dataset
- Query for properties and yield
- Plot properties vs yield
- Develop fuzzy sets in NASIS
- Develop rules in NASIS
- Integrate rules
- Test NCCPI vs yield
- Field test

# A Scattergram of Yield vs AWC



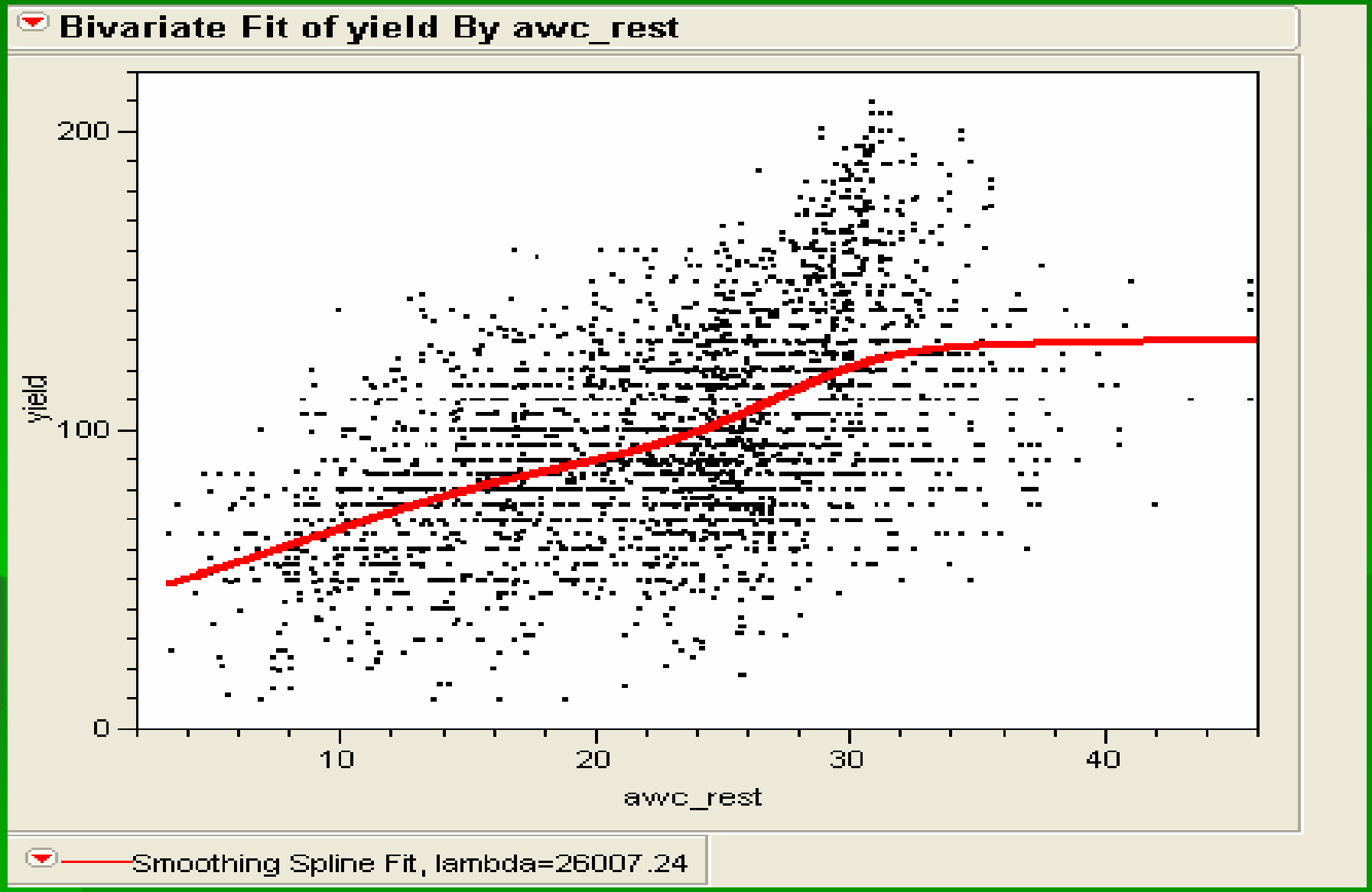
# Add a Linear Fit

Bivariate Fit of yield By awc_rest

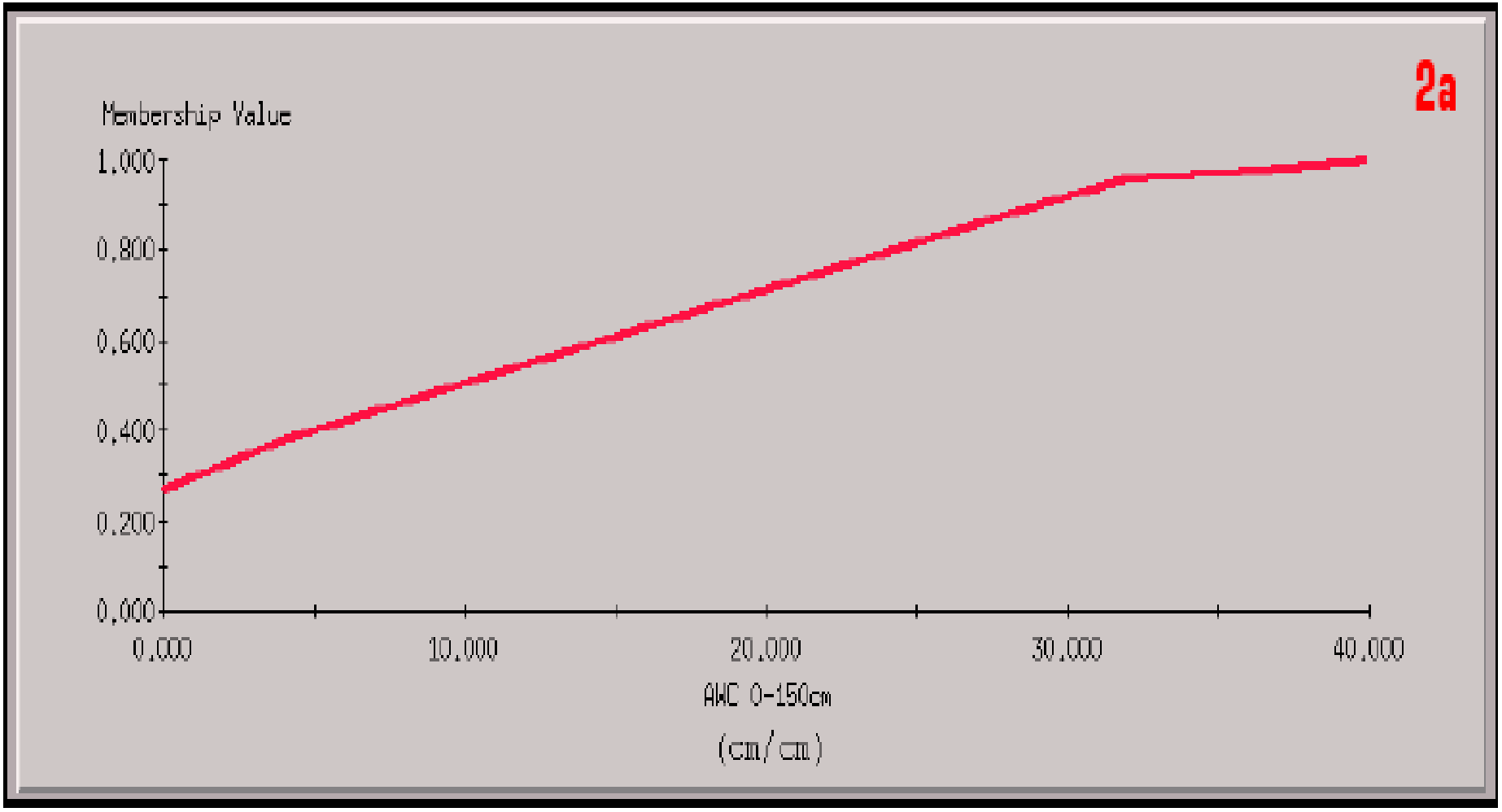


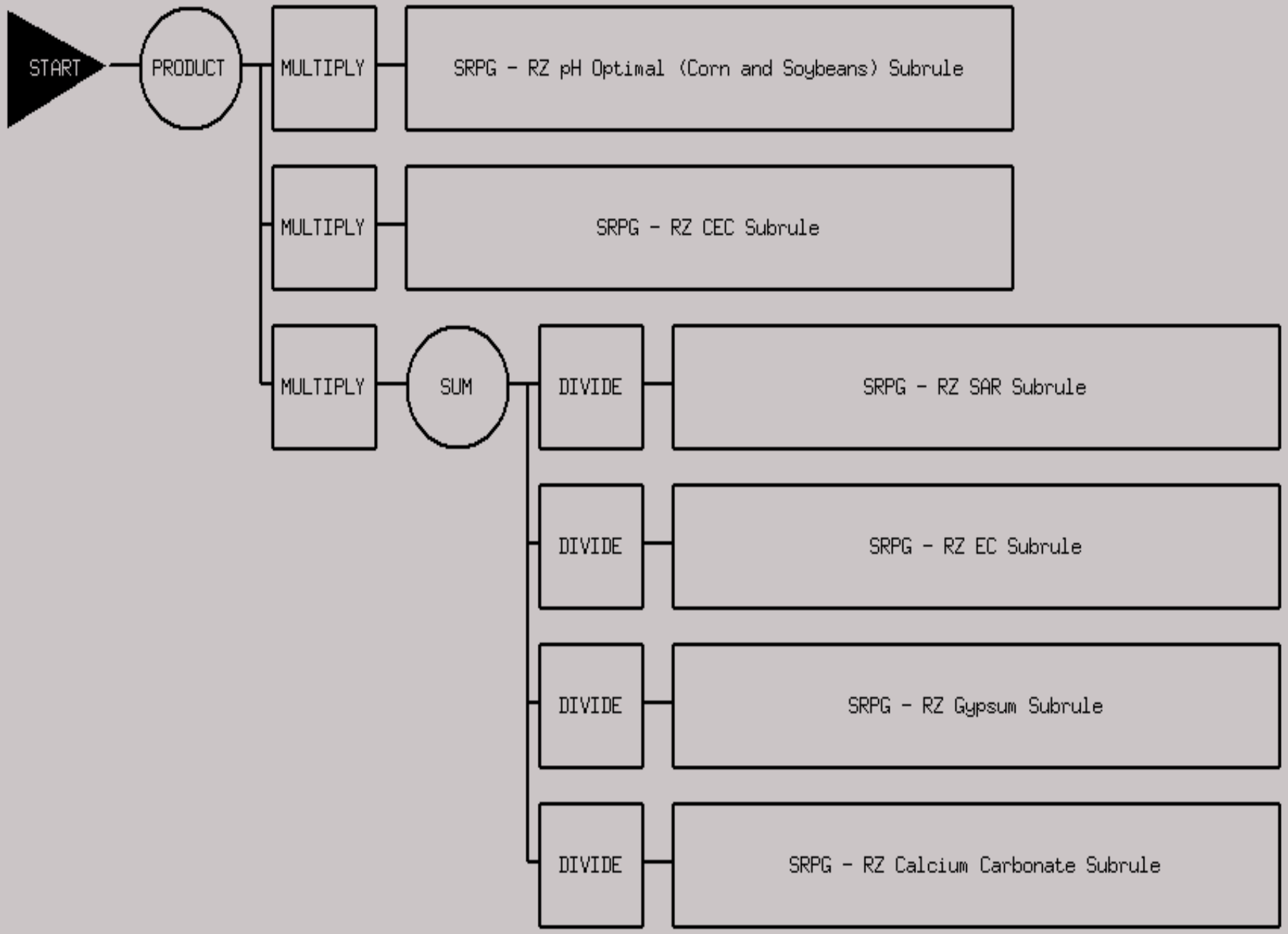

Linear Fit

# Add a Smoothing Spline

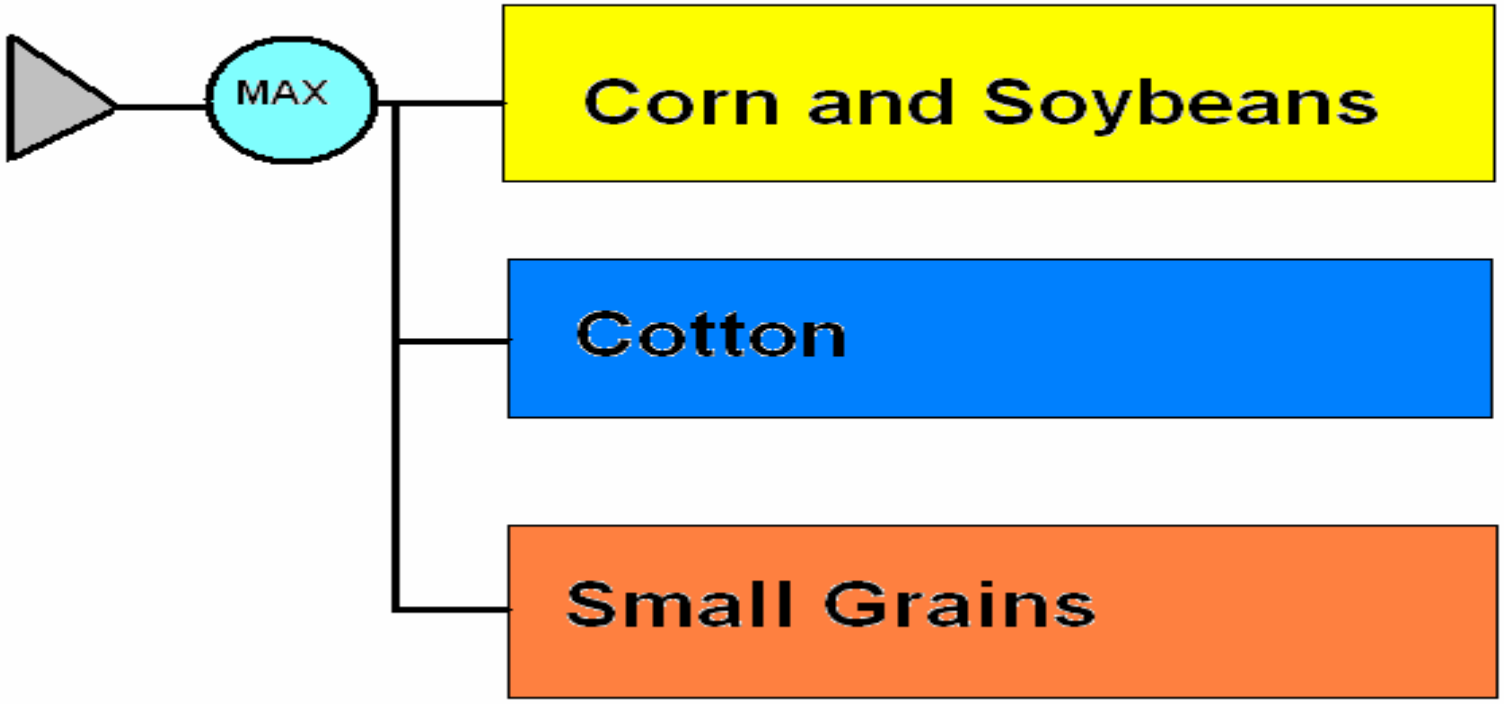


# A fuzzy set

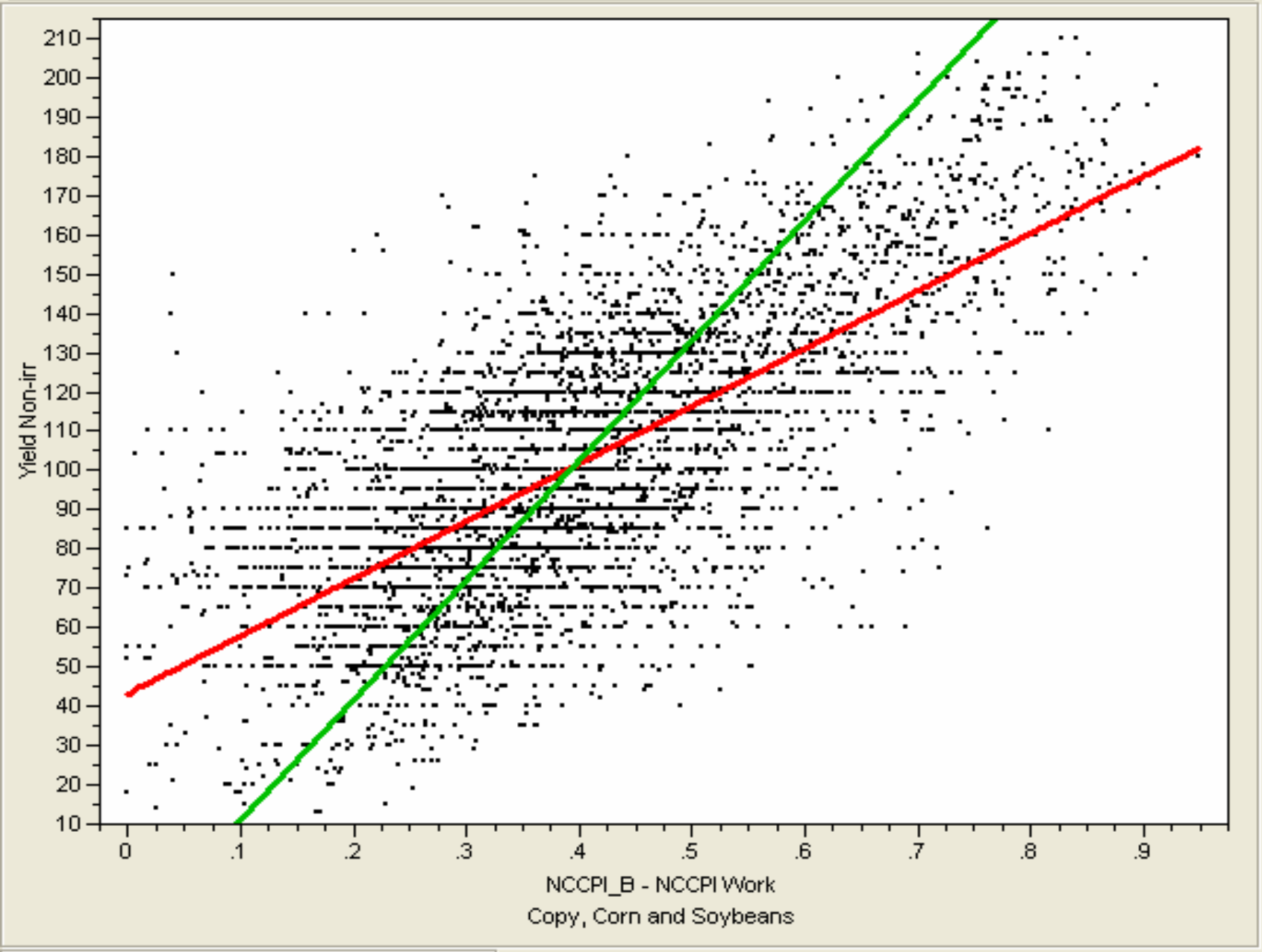

2a
Membership Value
1.000
0.800
0.600
0.400
0.200
0.000
0.000
10.000
20.000
30.000
40.000
AWC 0-150cm
(cm/cm)


START
PRODUCT
MULTIPLY
SRPG - RZ pH Optimal (Corn and Soybeans) Subrule
MULTIPLY
SRPG - RZ CEC Subrule
MULTIPLY
SUM
DIVIDE
SRPG - RZ SAR Subrule
DIVIDE
SRPG - RZ EC Subrule
DIVIDE
SRPG - RZ Gypsum Subrule
DIVIDE
SRPG - RZ Calcium Carbonate Subrule

# Overall Rule Structure, NCCPI_B



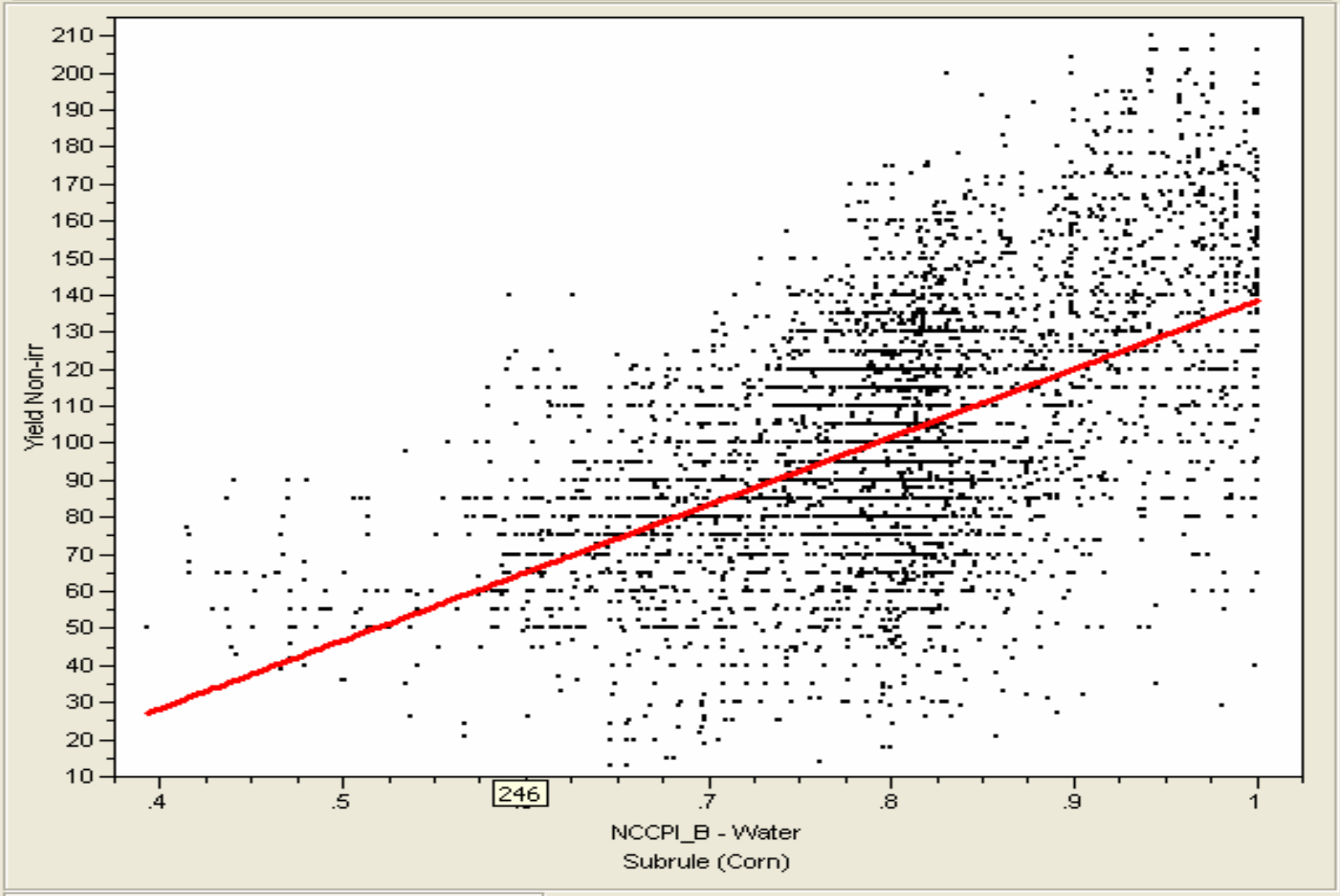
## Bivariate Fit of Yield Non-irr By NCCPI_B - NCCPI Work Copy, Corn and Soybeans




Smoothing Spline Fit, lambda=2836810

Orthogonal Fit Ratio=0.000

## Bivariate Fit of Yield Non-irr By NCCPI_B - Water Subrule (Corn)




Smoothing Spline Fit, lambda=100000

### Smoothing Spline Fit, lambda=100000

| | |
|---|---|
| R-Square | 0.300095 |
| Sum of Squares Error | 4505222 |

Change Lambda: 100000

# What is Next?

- Balancing effects of properties
- Indexing scores between crops
- Build a report structure to allow selection of irrigated or non-irrigated
- Adding crop modules as needed
- Data quality will limit NCCPI, particularly flooding, ponding, and water tables