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**Brief introduction of David & what he did in 2011:**

David is a candidate for a master’s of agronomy at UNL, and performed one year’s worth of field work at this site to evaluate the value of manure and hand-weeding on organic farms. THIS WAS SEPARATE RESEARCH FROM THE SARE GRANT, BUT THE GOALS OVERLAP. In particular, his thesis work includes searching for interactions between weed pressure and manuring. This is one site that he’s worked at. He works under Dr. Charles Shapiro, and got some statistical consulting help from a faculty statistician at UNL. Rob asked him to provide a few comments, as well as reports of the statistical analysis for some key variables using SAS 9.2. This trial had 4 reps, and was set up in a split-block RCBD with cover crop strips as the whole plot. Here I’ve included some analysis for grain yield, testweights, plant population at harvest, stover production, weed biomass production, and weediness ratings (split by broadleaf and grasses). For all the brief summaries following, alpha=0.05.

THESE COMMENTS ARE STRICTLY TO PROVIDE A 3RD PARTY AND OBJECTIVE OPINION.

**David’s comments on trial and some on data analysis of field managed by Rob & Dave Hrnchir**

**Manure Rate:**

25 tons/acre cattle beef feedlot manure. November 2010

Goal: Comparing corn yields, crop quality, and weed populations on manured soils versus non-manured soils in Hitchcock County, Nebraska under 74 acre center pivot.

**Summary:**

None of the treatments, whether cover crop, manuring, or hand weeding had a statistically-significant effect on grain yield in 2011 at this site:

| **Type III Tests of Fixed Effects for Grain Yield** | | | | |
| --- | --- | --- | --- | --- |
| **Effect** | **Num DF** | **Den DF** | **F Value** | **Pr > F** |
| **cover** | 1 | 5.85 | 3.32 | 0.1194 |
| **Manure** | 1 | 5.799 | 0.20 | 0.6695 |
| **HW** | 1 | 22.53 | 0.18 | 0.6793 |
| **Manure\*HW** | 1 | 22.53 | 0.87 | 0.3620 |
| **cover\*HW** | 1 | 22.53 | 0.13 | 0.7194 |

**Is manure advantageous in an organic system?**

Judging from the yields, in the first year following application, the manure was not statistically beneficial at this site, at least this year. I have done similar corn/manure research at multiple sites across the state during the 2011 growing season and the results appear varied so far. I’m guessing the differences are due largely to amendment type (especially the C:N ratio), soil type, and management history (how low the soil nutrients were before applying the manure). Longer-term benefits are more difficult to quantify, and remain to be seen. Several producers I’ve talked to claim more benefits to corn the second year after application of manure than in the first year based on their past experience.

Manuring didn’t seem to have an effect on any of the variables I analyzed for this short report.

**Did the cover crop benefit us?**

Not for yield, no. Actually, the grain yield estimates were generally slightly lower in the plots that had cover crops (but not a statistically significant difference). Plots with cover crops LSMEAN: 125.7 bu/ac. Plots without cover crops LSMEAN: 141.35 bu/ac. Keep in mind the variability of the yields kept this from being a statistically significant difference in LSMEAN yields (P=0.1194). Cover crops had no significant effect on the other variables analyzed for this report.

| **cover Least Squares Means** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **cover** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** |
| 0 | 141.35 | 6.4109 | 4.089 | 22.05 | <.0001 |
| 1 | 125.73 | 5.6336 | 8.725 | 22.32 | <.0001 |





**What differences in weed control practices were shown?**

The entire field was “background” weeded for broadleaves at least once during the growing season by a farmer-hired hand weeding crew. In addition, tractor cultivation was performed a couple of times to my knowledge. For our non-SARE research, the Handweeded plots were weeded again, with hand-hoeing, twice, at V5 and R1 corn growth stages.From a research standpoint, it would have been nice to get back out to the field a couple more times during the seasons. However, given the remote nature of this field, it was difficult for us to find time during the season.

There was no significant effect of hand-weeding on grain yields. (P=0.6793)

Oddly, it appears that stover Dry Matter production (lbs/ac) was significantly lower in the hand-weeded plots (5,330 lbs/ac vs 4560lbs/ac). An interaction with the manure level was nearly-significant for stover production, too (P=0.067), so this clouds the results somewhat.

| **Type III Tests of Fixed Effects for Stover Production** | | | | |
| --- | --- | --- | --- | --- |
| **Effect** | **Num DF** | **Den DF** | **F Value** | **Pr > F** |
| **cover** | 1 | 5.075 | 0.71 | 0.4367 |
| **Manure** | 1 | 5.08 | 3.46 | 0.1212 |
| **HW** | 1 | 20.48 | 7.99 | 0.0103 |
| **Manure\*HW** | 1 | 20.48 | 1.03 | 0.3230 |
| **cover\*HW** | 1 | 20.48 | 3.75 | 0.0666 |

| **HW Least Squares Means** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **HW** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** |
| 0 | 5329.92 | 293.59 | 7.465 | 18.15 | <.0001 |
| 1 | 4557.44 | 295.95 | 7.529 | 15.40 | <.0001 |

Handweeding had a statistically significant effect (although minor) on harvest-time crop plant populations, so that may explain why the estimated stover production was lower in those plots.

The cover crops didn’t provide a detectable weed-suppressing effect (P=0.6263).

Our additional hand-weeding did affect weeds DM production, however (P<0.0001).

Hand-weeded plots weeds dry matter production per ½ sq. meter: 13.88 grams

Un-hand-weeded plots weeds DM Production per ½ sq. meter: 53.42 grams

| **HW Least Squares Means** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **HW** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** |
| 0 | 53.4250 | 5.7756 | 26 | 9.25 | <.0001 |
| 1 | 13.8750 | 5.7756 | 26 | 2.40 | 0.0237 |

However, the hand-weeding didn’t have a statistically-significant effect on visual estimates of broadleaf weed pressure at harvest-time (0.4979). Hand-weeding did have a statistically-significant effect on visual estimates of grass weed pressure at harvest time (P=0.0013). These visual estimates were collected over 2 months after the most-recent hand-weeding (done on 4 August), however, so I’m not too surprised that they were variable.

**Crop Quality:**

We didn’t do much analysis ourselves for crop quality. We will be testing grain nutrient content eventually once all the samples are ground.