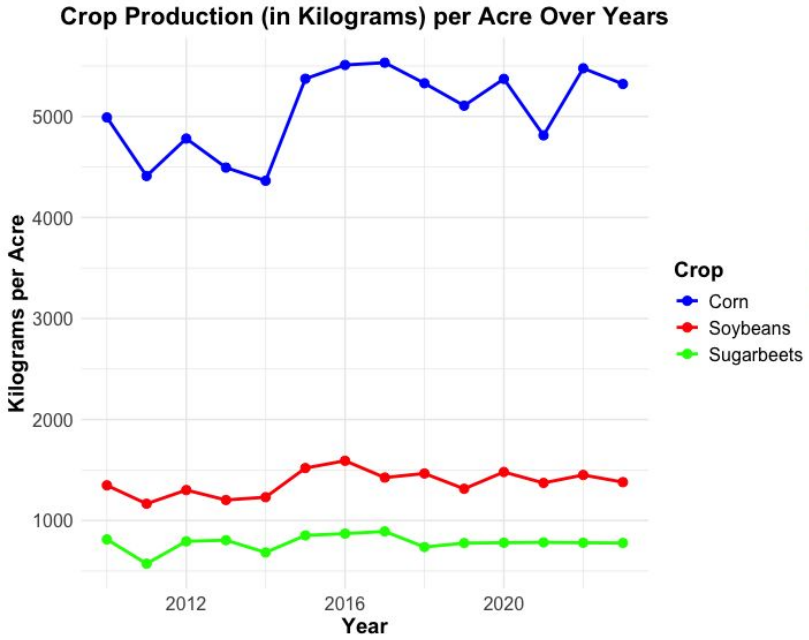
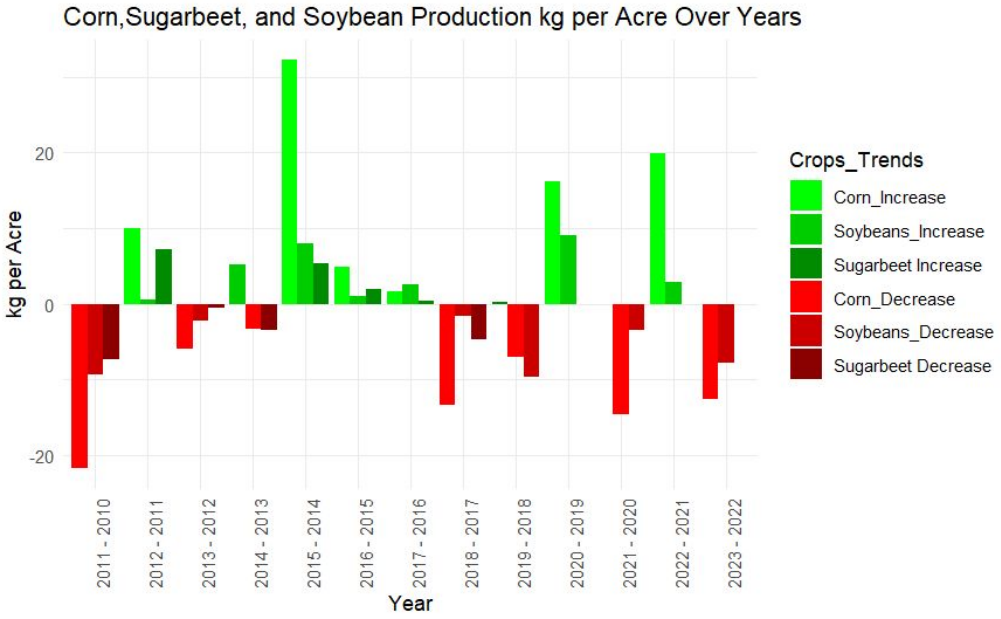
MUDAC Prezi

By Avi, Bin, and Jack

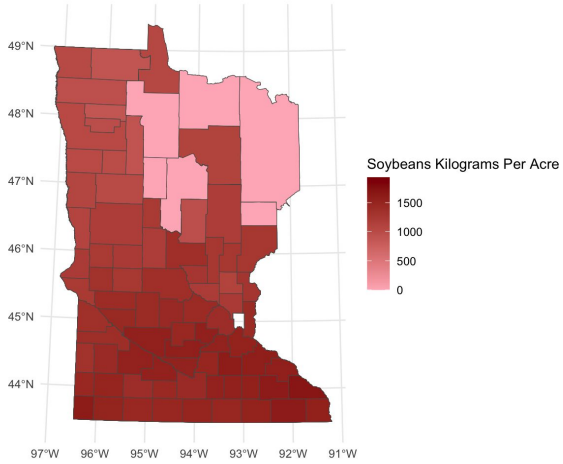
Comprehending The Crops

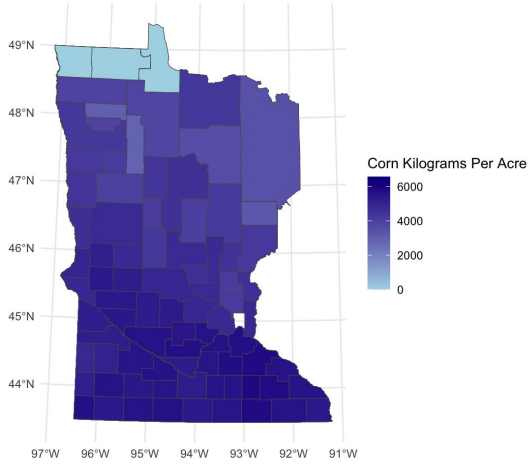
- Corn is Minnesota's flagship agricultural product
- Corn and soybeans generally grow better in the southern parts of the state than the northern parts
- Interestingly, sugar beets grow best in the west

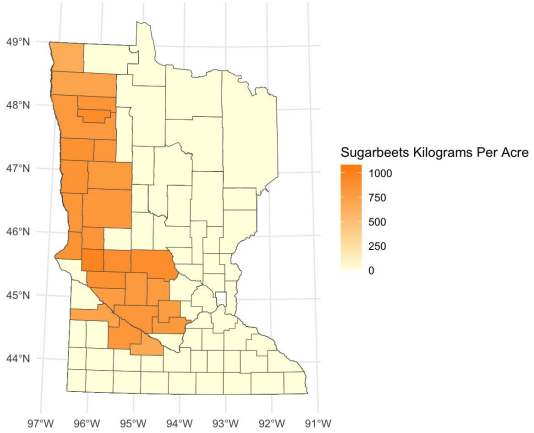




Useful Plots: Crops

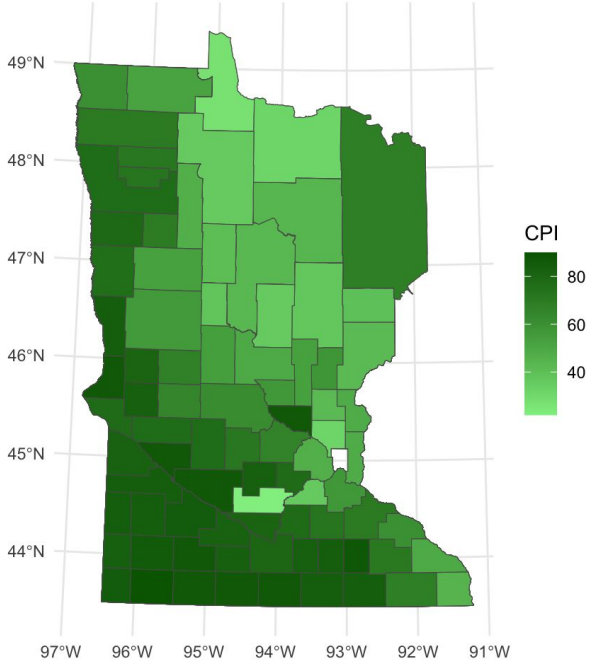






Soil Quality

- Based on the CPI for each county in MN, we get an idea of the soil quality across the state
- In general, the southern counties have better soil for farming
- The western border with the Dakotas has pretty good soil as well

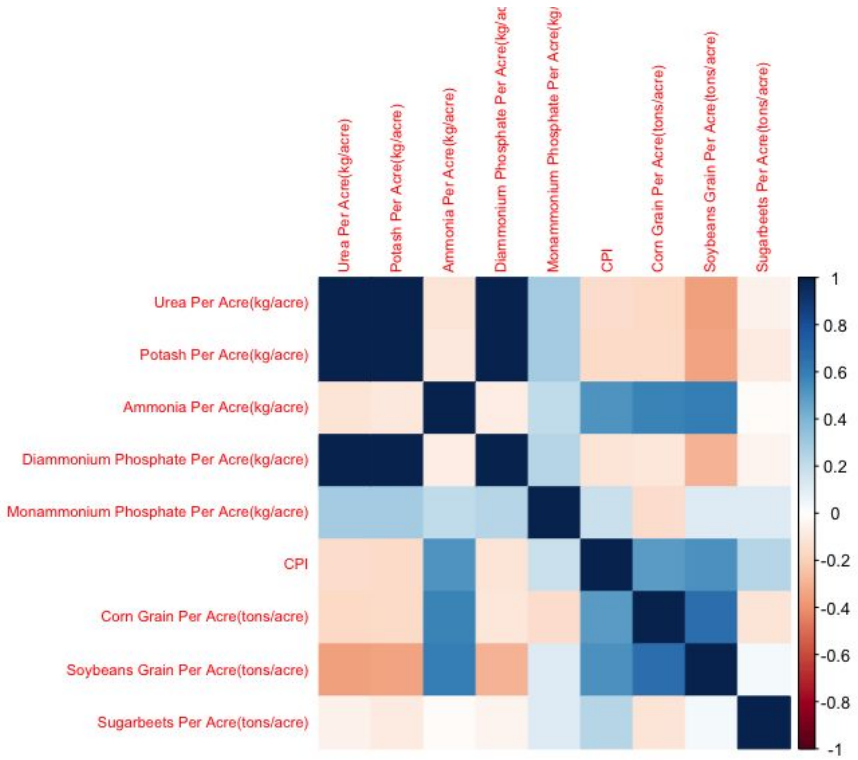


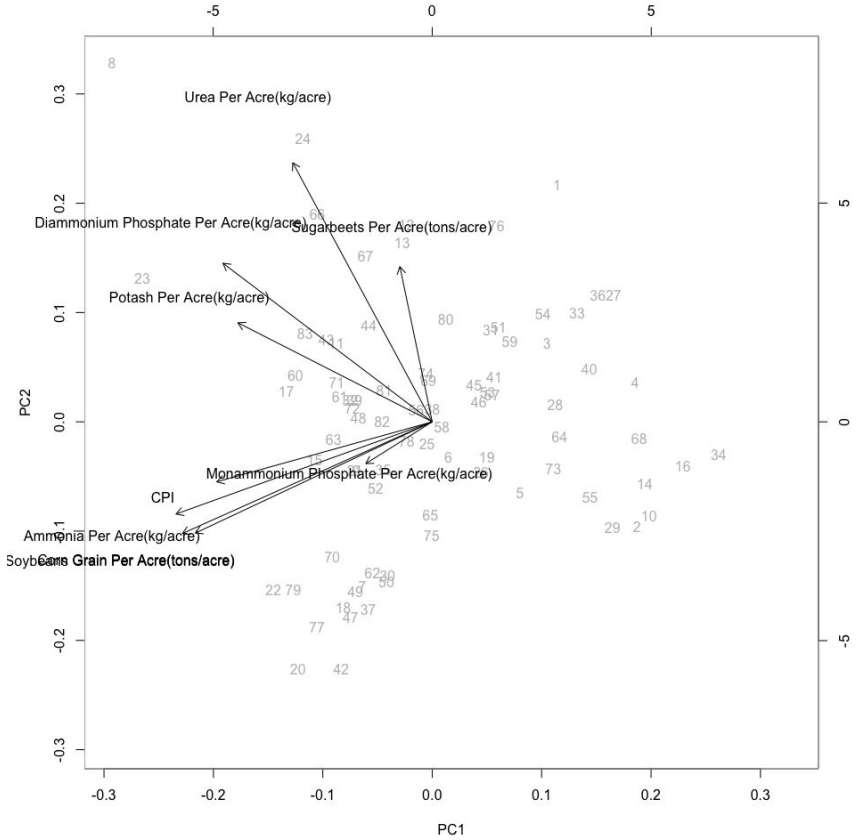
Organic Fertilizer (Manure)

- Stearns and Kandiyohi counties were, by a large margin, the highest manure producing counties in MN on average
- Calculated by multiplying number of farm animals by average manure produced per year per year animal
- In these two counties, specifically, it may be beneficial to utilize the manure as organic fertilizer instead of synthetic fertilizer

	County	Average Manure Production, in Thousands of Tons
1	STEARNS	21.4882136643
2	KANDIYOHI	20.8372654143
3	SWIFT	12.7518508643
4	TODD	11.5999901071
5	MORRISON	11.0346015143
6	MARTIN	10.1195576929
7	OTTER TAIL	9.3837197857
8	MEEKER	8.6583760071
9	LYON	8.1397626286
10	BLUE EARTH	8.0381026286

Comparative Analysis





Best Districts for Crop Production per Acre (Corn)

Let X represent the mean crop yield per acre for each county, and μ represent the true average mean crop yield for each district(The true average mean crop yield per acre for all counties). We want to investigate whether it is reasonable to assume that the distribution of X is normally distributed.

Hypothesis Test: one sided t-test at a 5% significance level

Correction: bootstrap t-test

$H_o : \mu_1 \leq \mu_2$

This is for corn

$H_a : \mu_1 > \mu_2$

district1	rank_score
EAST CENTRAL	2
SOUTH CENTRAL	2
SOUTHEAST	2
SOUTHWEST	1
NORTH CENTRAL	0
NORTHEAST	0
NORTHWEST	0

Best Districts for Crop Production per Acre (Soybeans)

district1	rank_score
SOUTH CENTRAL	3
EAST CENTRAL	2
NORTH CENTRAL	1
SOUTHEAST	1
SOUTHWEST	1
NORTHEAST	0
NORTHWEST	0

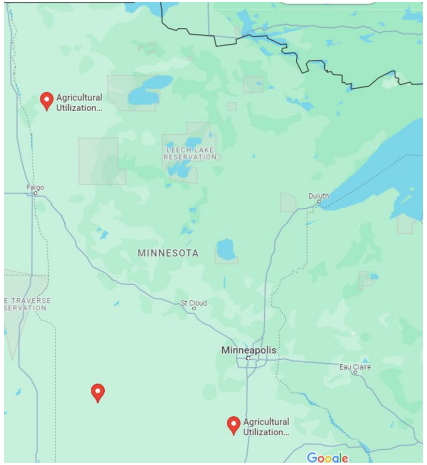
Rank Score: The number of districts one of the districts is significantly greater than in terms of average yearly crop(corn or soybeans) produced per acre
Power: at 1.2 tons higher is at 50% for corn
Power: at 0.6 tons higher is at 60% for soybeans

Large-scale ammonia storage is already in place:

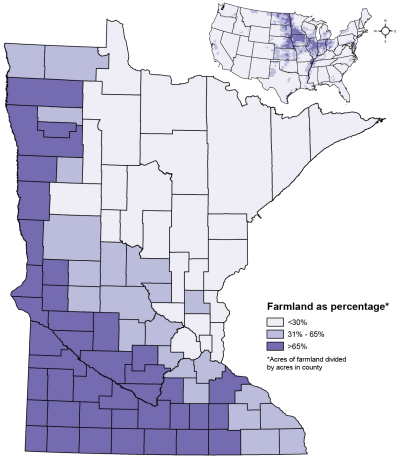
CF Industries Glenwood Ammonia Terminal

- **Capacity of 60,000 tons of NH_3**
- **Equivalent to an estimated 111,000 MWh of electricity**
- **Wind and solar PV in close proximity**
- **Capex 500 kV line in close proximity**
- **Hub for wind energy transmission**

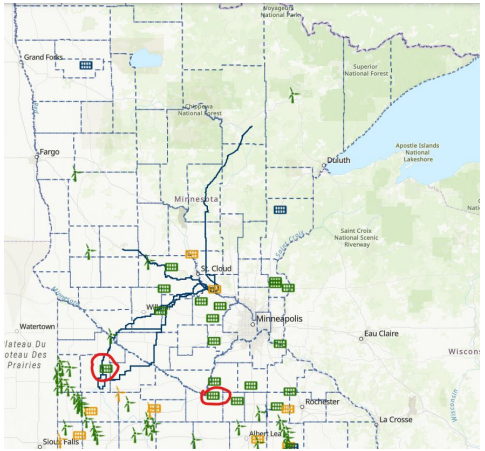
AURI in Minnesota: Waseca county, Lyon county, Polk County



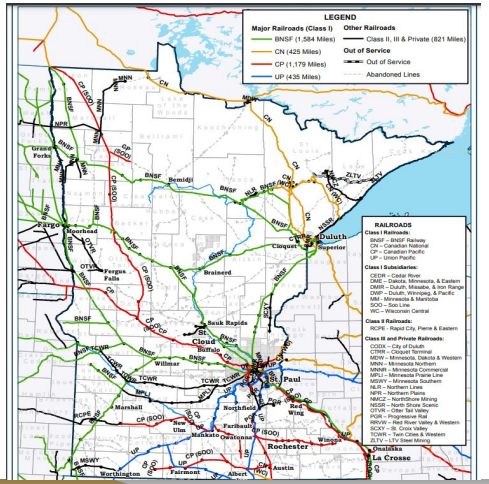
Farmland percentage distribution



Solar Panels + Wind Turbine Farm



Rail-roads in Minnesota



Our Prediction:

We predict that the optimal location for the two “green” fertilizer facilities are at 44.28°03 N 93.59°44 W and 44.28°03 N 95.48°55 W.