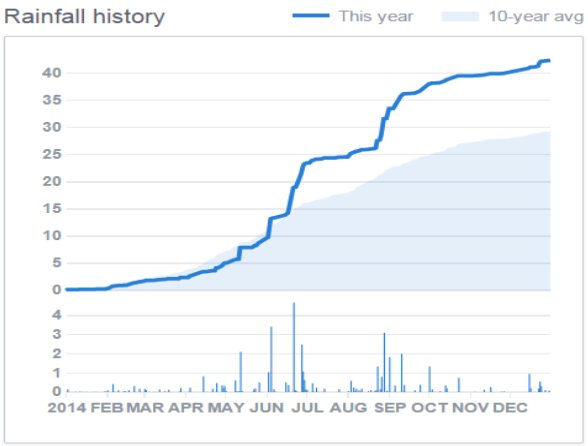
Nebraska On-Farm Research Network

Rainfed Corn Population Study – Population by Management Zones

Study ID: 029053201401
County: Dodge
Soil Type: Moody Silty Clay Loam
Planting Date: 5/4/2014
Harvest Date: not available
Row Spacing: 36”
Hybrid: DKC 62-89
Reps: 4
Previous Crop: Soybeans
Tillage: No-till
Herbicides:
Pre: 4 oz/ac Balance Flexx, 1 qt/ac Atrazine 4L, and 1 pt/ac Parallel Plus on 4/15/14
Post: 3 oz/ac Laudis, 1 qt/ac Cornerstone Plus, and 0.5 pt/ac Atrazine 4L on 6/11/14
Fertilizer:
11-52-0 and 7#/ac Zinc sulfate fall applied
20 gal/ac UAN 32% pre-plant, 4/2014
6 gal/ac 10-34-0 in furrow at planting
Insecticides/Fungicides: Cruiser 250 seed treatment
Note: Hailed 6/4/14
Irrigation: Not irrigated.



What is electrical conductivity (EC)?

Electrical conductivity is the ability of a material to conduct an electrical current. The primary factors influencing the EC of soils are salt content, type and amount of clay, water, mineralogy, and soil temperature. For a non-saline soil, EC will primarily be driven by soil texture. Clay soils will have higher particle to particle contact and higher moisture holding capacity and are therefore highly conductive. Sandy soils have limited particle contact and low moisture holding capacity and are therefore extremely poor conductors. Electrical conductivity maps can serve as a proxy for OM, clay content and CEC.

Introduction: Management zones for this study were created using the USDA Management Zone Analyst Version 1.0 Software. This software helps to create management zones and test the number of zones that should be created in a field. A number of information sources were used to create management zones for this field including normalized historical corn yield maps from 2000 to 2010, deep EC, shallow EC, and elevation data. These data were averaged into an 8 meter grid. Using the software, the grower decided to use 3 management zones, however zone 3 was very small in area and so it was combined with zone 2. Zone 1 had shallow EC averaging 17.2 and zone 2 had shallow EC averaging 24.6. Zone 1 contained the wetter portions of the field while zone 2 contained the dryer portions of

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the field (Figure 1). Within zone 1 and zone 2, eight planting populations were evaluated. The objective was to determine if the zones preformed differently and if an optimum seeding rate could be identified for each zone.

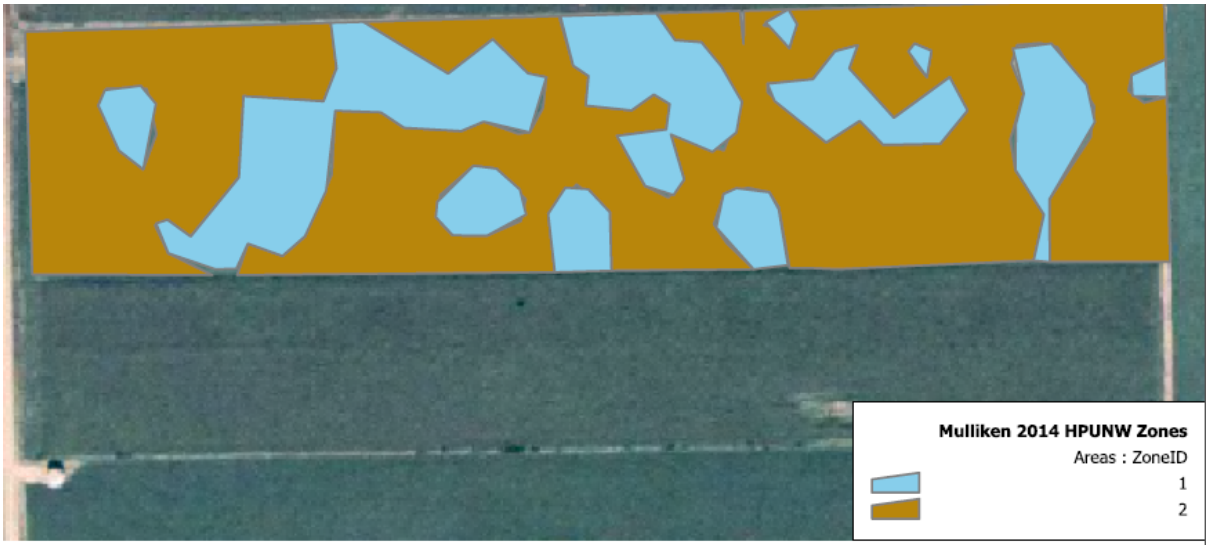

Figure 1: Map of the 2 management zones. Zone 1 has average shallow EC of 17.2; zone 2 has average shallow EC of 24.6.

Results: The results were analyzed with a main-plot factor of zone and sub-plot factor of planting populations. There was no yield interaction between zone and population, therefore population and zone were analyzed separately. Table 1 shows the results for the 2 management zones. A hail storm in June resulted in stand loss and consequently the relationship between yield and planting population is not related to the initial planting rates. Additionally, the harvest stand counts did not correlate to the planting populations. Yield and moisture values for the planting population main effect are shown in table 2 with yields adjusted by a covariate of harvest stand counts. Additionally, the harvest population is compared to yield by zone in Figure 2.

Table 1: Yield, moisture, harvest population, and net return for the 2 management zones (values shown are averaged across all planting populations).

	Yield† (bu/acre)	Moisture (%)	Harvest Pop (plants/acre)	Net Return ‡
Zone 1 (shallow EC averaged 17.2)	131 B	17.3% B	18,156 B	$458.50
Zone 2 (shallow EC averaged 24.6)	165 A*	17.4% A	19,781 A	$577.50
P-Value	*0.0059*	*0.0441*	*0.0941*	--

†Bushels per acre corrected to 15.5% moisture.

*Values with the same letter are not significantly different at a 90% confidence level.

‡Net return based on $3.50/bu corn price.

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Table 2: Yield, moisture, harvest population, and net return for the 8 planting populations (values shown are averaged across both management zones).

	Yield†§ (bu/acre)	Moisture (%)	Harvest Pop (plants/acre)	Net Return ‡
23,200 seeds/ac	154 A*	17.3 AB	20,000 A	$450.03
24,940 seeds/ac	154 A	17.4 AB	18,375 A	$425.07
27,260 seeds/ac	144 A	17.4 AB	20,625 A	$404.62
29,000 seeds/ac	143 A	17.4 AB	19,500 A	$383.16
31,321 seeds/ac	140 A	17.3 B	16,875 A	$331.21
33,600 seeds/ac	146 A	17.3 B	18,750 A	$363.44
34,800 seeds/ac	153 A	17.4 AB	18,875 A	$386.30
37,100 seeds/ac	151 A	17.5 A	18,750 A	$365.93
P-Value	*0.5155*	*0.0698*	*0.5180*	--

†Bushels per acre corrected to 15.5% moisture.

§ Yield values are adjusted based on a covariate of harvest stand counts using the GLIMMIX procedure in SAS 9.4 (SAS Institute Inc., Cary, NC).

*Values with the same letter are not significantly different at a 90% confidence level.

‡Net return based on $3.50/bu corn price and $343/bag seed cost.

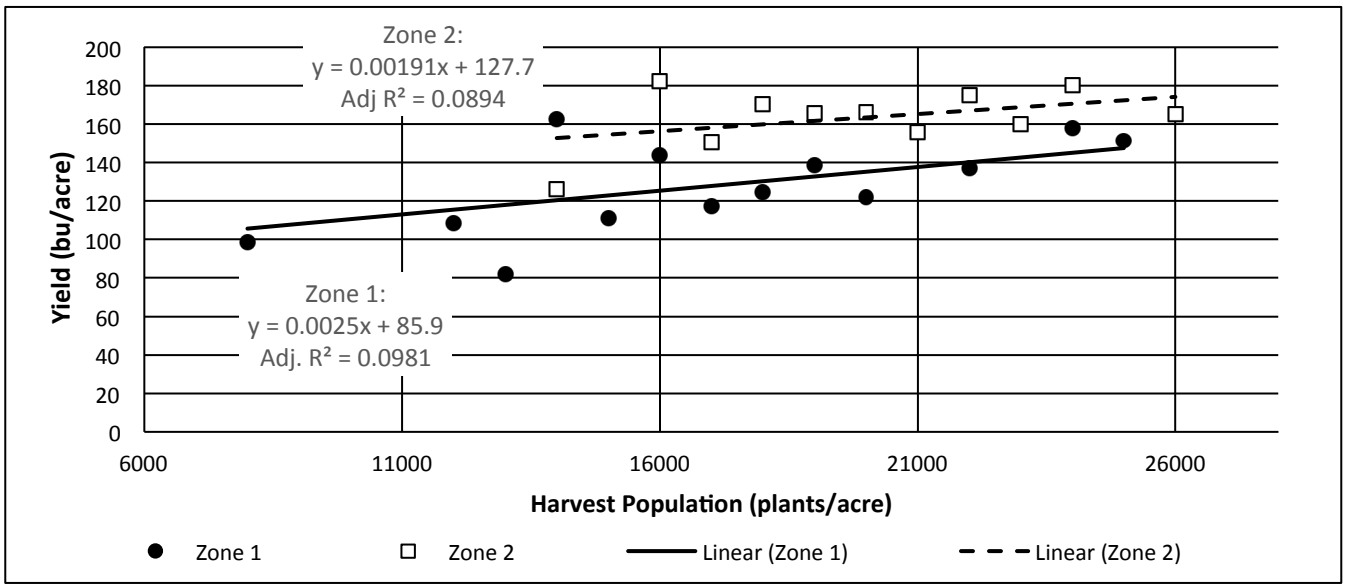

Figure 2: Yields compared to harvest populations separated by management zone.

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Summary: Zone 2 was significantly higher yielding, had higher grain moisture at harvest, and had a higher final harvest population. A hail storm in June resulted in stand loss and consequently the relationship between yield and planting population is not related to the initial planting rates. There was no yield difference for planting populations of 23,200 seeds/ac to 37,100 seeds/acre for either zone. Some variations in moisture occurred across seeding rates but did not follow an explainable trend. Final harvest populations were not significantly different across all populations tested and did not correlate to the planting populations. When comparing yield to the harvest populations it appears that yield for zone 1 is more responsive to increasing plant population than zone 2. In zone 1 there is a 2.5 bu/acre increase for each 1000 additional plants/acre added and in zone 2 there is a 1.9 bu/acre increase for each 1000 additional plants/acre.

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