



## Nebraska On-Farm Research Network

# Corn Population Research Protocol: Two Populations

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**Objective:** Identify the most profitable corn plant population for a specific management system.

**Rationale:** Producers continually question whether they should be increasing corn plant populations to optimize yield and to maximize the efficiency of production inputs. In Nebraska, the environment for rainfed production can vary greatly from East to West, and from year to year at each location. For irrigated production this is also true, but producers are more interested in maximizing water productivity by selecting optimum populations.

Optimum plant populations are a moving target. Improved genetics and production practices, coupled with differences in growing conditions from year to year, make it difficult to pinpoint optimum corn plant population. In addition, private and public research has shown corn hybrids respond differently to the same population level under the same growing conditions. Evidence of environmental interactions between hybrids and years is also well known.

Previous on-farm research conducted in Eastern Nebraska would suggest corn populations, especially for rainfed conditions are too low. Experts in this field of study have also suggested that growing irrigated corn utilizing high-yield production methods requires significantly higher corn population than are currently the norm.

**Procedure:** This procedure is for a two plant population test. To accurately determine the optimum planting rate it is suggested that four plant populations be tested (see four population protocol), however, some growers may find a two population test more feasible. While evaluating two corn plant populations may be more convenient, it limits our ability to conduct statistical analysis and identify the optimum planting rate for a given hybrid. Nevertheless, if a grower chooses this method, results will still provide value to the participant.

A grower with a 16 row dual clutch planter system, will plant 8 rows of one population and the other 8 rows another population. After one round of planting we have 16 row blocks and can capture 8 row pairs with an 8 row corn head. The same can be done with an 8 row planter or any other number of rows. It may however take more of the operator's time to obtain a block of rows needed for harvest purposes. With only two plant populations, we need at harvest a minimum of 5 pairs for adequate replication. More replications are desired. This study will ideally be evaluated over multiple years.

Populations to evaluate must be considered based on rainfed/dryland or irrigated growing conditions. The following table of corn plant populations are being suggested as a starting point. When only two populations are being tested, the participant may select which two populations to use. It is strongly suggested the differences between each population be 4,000 kernels/acre. The highest treatment needs to be sufficient to "force" a negative yield response in order to estimate optimum populations.

Location	Populations to test			
	Population Rate 1	Population Rate 2	Population Rate 3	Population Rate 4
Rainfed/dryland West of Hwy 281	20K	24K	28K	32K
Sandy sites or dryland West of Kearney	18K	20K	24K	28K
Rainfed/dryland East of Hwy 281	24K	28K	32K	36K
Irrigated option 1 (all locations)	28K	32K	36K	40K
Irrigated option 2 (all locations)	30K	34K	38K	42K

**Treatment Design:** The following is an example treatment design for a two population trial. A total of 5 pairs need to be harvested for this trial (7 is preferred). The same hybrid and management practices should be used across the entire study area.

**NOTE:** The following example is for a 16 row planter and 8 row corn head.

Replication 1	Population Rate 1	Yield from 8 rows:
	Population Rate 2	Yield from 8 rows:
Replication 2	Population Rate 2	Yield from 8 rows:
	Population Rate 1	Yield from 8 rows:
Replication 3	Population Rate 1	Yield from 8 rows:
	Population Rate 2	Yield from 8 rows:
Replication 4	Population Rate 2	Yield from 8 rows:
	Population Rate 1	Yield from 8 rows:
Replication 5	Population Rate 1	Yield from 8 rows:
	Population Rate 2	Yield from 8 rows:
Replication 6	Population Rate 2	Yield from 8 rows:
	Population Rate 1	Yield from 8 rows:
Replication 7	Population Rate 1	Yield from 8 rows:
	Population Rate 2	Yield from 8 rows:

*Grower Requirements:*

1. Flag or mark GPS location of each treatment.
2. Provide all necessary inputs for crop production.
3. Complete background agronomic form about site and practices.
4. Collect yield data and grain moisture with weight wagon or yield monitor. If using yield monitor, please designate a separate “load” for each treatment and set up separate “products” names for each treatment harvested. Yield monitor must be **well calibrated**. Contact UNL Extension if assistance with this process is needed.
5. Collect stand counts at harvest.
6. Submit harvest data to UNL Extension within 30 days of harvest or by Dec. 15.
7. Allow UNL Extension to use submitted and collected data for research, educational, and informational purposes.

*Nebraska On-Farm Research Network will:*

1. Provide technical assistance in setting up replicated and randomized experimental design.
2. Provide assistance upon request with treatment implementation, flagging, stand counts, stalk rot tests, and recording yield.
3. Analyze raw data using statistical analysis and provide this information to the grower.

**Disclaimer:** The Nebraska On-Farm Research Network does not endorse the use of products tested in on-farm replicated strip trials. While treatments are replicated within trials and may be replicated across multiple sites under various conditions, your individual results may vary.

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