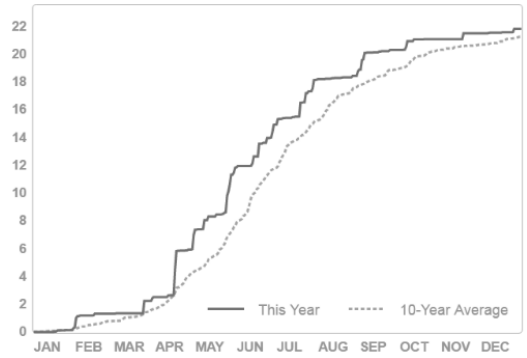
Field Pea Planting Population

Study ID: 624135201601
County: Perkins
Soil Type: Mace silt loam, 0-1% slope
Variety: Salamanca
Tillage: No-Till

Rainfall (in):



Study Objective: Grain-type field peas are a cool season grain crop (mid-March to late-July) typically grown as an alternative to no-till summer fallow in a semiarid cereal-based no-till cropping systems such as wheat-corn-fallow and/or wheat-fallow. Very little information is available on how field peas respond to different agronomic practices in semiarid Nebraska. **The objective of this study was to determine the economically optimal planting (EOP) population to grow field peas in western Nebraska.** The EOP can be defined as a population that maximizes profit made on investment, which in this case is seed.

Research Sites and Experimental Design: The study investigating the effects of different planting populations on field pea grain yield was conducted in 2016 (two studies) under an established no-till system in Perkins county. The experiment was set up as a randomized complete block design with seven treatments (seeding rates) replicated four times. The choice of seeding rates was based on current recommended plant population of 310,000 plants/acre and three populations under and over that recommendation.

The drill was calibrated for seeding rate (seed/lb) by dividing targeted plant population (plants/acre) by a multiplier of seeding weight (seed/lb) and percent germination rate for the field pea cultivar Salamanca. The study was planted in strips that were 40 feet wide and 300 feet long. Plant population data (plant/ft^2) was collected after the crop had an established stand (V3-V5 growth stage). Population counts were conducted in each strip by conducting four counts from a 25 ft^2 area. Grain yield data was collected by harvesting the middle 30 feet of each strip; a grain cart with built-in scale was used to record grain weight; and a subsample of grain was taken from the combine to record grain moisture content. Final grain yield was adjusted to 12% moisture for each strip. Yield response to actual plant population (plants/acre) was modeled using asymptotic regression model.

Results:
Data were analyzed using R: A language and environment for statistical computing. R Development Core Team (2016). R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, http://www.R-project.org.

Overall, yield response to plant population increased linearly from 15-20 bu/ac at low densities (0 to 150,000 plants/acre), then continued to increase from 20-24 bu/ac with decreasing rate at medium densities (150,000-200,000 plants/acre), ten started to plateau from 24-25 bu/ac at about 200,000 plants/acre, and reached its maximum at approximately 310,000 plants/acre *(Figure 1)*. Yield response at populations higher than 310,000 plants/ac was seldom observed; therefore, the effects of plant population for yield goals higher than 25 bu/ac need to be further investigated.

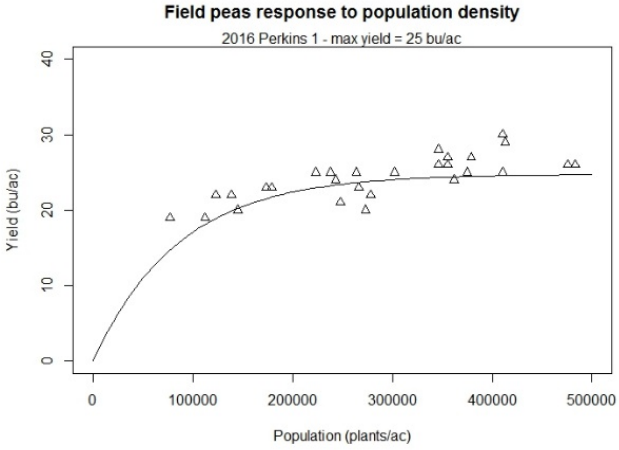


Figure 1. Field pea response to population density for three site years.

Assumptions for calculating EOP:

- Field pea variety has 2100 seeds/lb, test weight of 60 lb/bu at 12% moisture, and 90% germination
- Hail event or some other factor that may reduce stand count after emergence does not occur
- Price to purchase certified field pea seed = $15/bu
- Price of field peas on the market = $7/bu

According to the results of this study and using the aforementioned assumptions, the economically optimal population (i.e., maximum profit) for field peas is 220,000 plants/acre, which corresponds to a 116 lb of seed/acre seeding rate *(Figure 2)*. A penalty of $0.19/acre may occur for each additional pound of seed planted over this EOP. The current practice of many farmers in Central Great Plains is 180 to 200 lbs/acre; therefore, EOP may save farmers up to $16/acre. Planting higher populations to maximize yield potential is not always the best economic strategy due to the asymptotic nature of yield response to planting density.

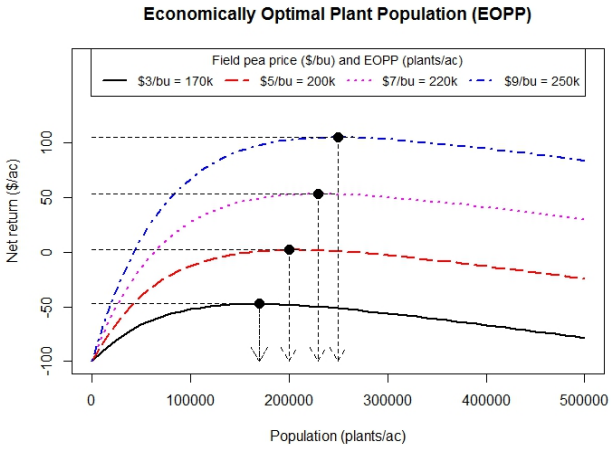


Figure 2. Economically optimum population: profitability as affected by field pea population and price of field peas

Conclusion: Although this study shows the potential for reduction in field pea population without lowering profits, these results are yet to be confirmed in additional production years and/or locations and should be taken with caution until further research is completed and results have been validated. Current recommendations for field peas seeding rates range from 180 to 200 lb/ac. UNL has been awarded a Research and Extension SARE grant for additional field pea research (2017-2020).

Sponsored by: University of Nebraska Lincoln; Nebraska Corn Board

In Partnership with: Nebraska Soybean Checkoff; Nebraska Corn Growers Association; Nebraska Dry Bean Commission