Traditional planting practice for Great Northern bean production in the Great Plains region of the U.S. includes row spacings of 56 and 76 cm, and plant populations in the range of 120,000 to 200,000 plants/ha. As growers strive to improve production efficiency, they question what effects row spacing and population changes might have on seed yield, seed size, and plant characteristics. Many growers who once used 56 cm row spacing now prefer 76 cm to accommodate larger tractors and to utilize planting and cultivating equipment also used in corn production. Other current questions include whether high populations would better accommodate direct harvest, and whether wide row spacings would reduce white mold incidence. Recently released Great Northern varieties have not been evaluated in a range of row spacing and population combinations.

A study was conducted at the University of Nebraska Panhandle Center to examine the response of Great Northern beans to changes in row spacing and plant population. The study included row spacings of 16, 36, 56, and 76 cm, populations of 100,000, 200,000, 300,000, and 400,000 plants/ha, three plant architecture types represented by the varieties of Spinel, Beryl, and Sapphire, and three crop seasons. The experimental design was a three factor randomized complete block with main factors of row spacing, population, and plant type. The main plots were split, with and without application of fungicide to suppress white mold which might affect measured parameters. The fungicide was applied at labelled rate, three times during the flowering period. Main and split plots were replicated four times. Only the results from the fungicide treated plots are reported here. Measurements included seed yield, seed size, number of main plant branches, diameter of the plant stem 2.5 cm above the soil surface, and distance from the soil surface to the point of attachment of the first pod with the plant.

There were statistically significant differences in yield, seed size, distance to first pod, stem diameter, and number of branches, caused by the main factor of plant type, and by year.
The main treatment factors of row width and population did not cause responses to all measured parameters, and must be discussed individually.

Regression of seed yield with population indicates the varieties Beryl and Sapphire steadily decreased in yield by approximately 200 kg/ha from plant populations of 100,000 plants/ha to 400,000 plants/ha. Conversely, the variety Spinel increased in yield by 200 kg/ha from 100,000 to 400,000 plants/ha plant population. Row width increase from 16 to 76 cm caused yield of Beryl and Sapphire to decrease by approximately 200 kg/ha. Yield of Spinel did not change with changes in row width.

Seed size changed significantly when both main factors of row width and population changed. The rate of change was very similar for all three plant types, although the seed size was different among the three plant types. As population increased from 100,000 to 400,000 plants/ha, seed size decreased by approximately 1.5 g/100 seeds. Seed size increased by nearly 0.8 g/100 seeds when row width increased from 16 to 76 cm.

Row width had relatively little influence on distance to first pod, stem diameter, and number of branches. As population increased, distance to first pod increased, but stem diameter and number of branches decreased.

Changes in row width between 16 and 76 cm and changes in plant population between 100,000 and 400,000 plants/ha did cause responses in the primary yield components of seed yield and seed size. However, these responses were relatively small, and were usually less than differences caused by variety.