
Effect of Growing Environment and Stubble Type on Seed Size Distribution in Two Kabuli Chickpea Varieties

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INTRODUCTION

As seed size increases for kabuli chickpea, the market price increases. Kabuli chickpea seeds ≥ 9 mm in diameter receive a price premium. Increases in the proportion of ≥ 9 mm diameter seed in the harvested seedlot will increase the overall economic returns from chickpea production. Although seed size is a genetically controlled trait, the seed size distribution in the harvested seedlot is strongly influenced by the growing season environment and crop maturity. This study examined the effect of environmental conditions, preceding stubble type, and fertility/inoculation management regimes on seed size distribution of two kabuli chickpea varieties CDC Frontier and CDC Xena

MATERIALS AND METHODS

Field experiments were conducted at both Swift Current and Shaunavon, Saskatchewan from 2004 to 2006. The large-sized variety 'CDC Xena' and medium-sized variety 'CDC Frontier' were grown on wheat and barley stubble and conventional summerfallow under each of the 8 *Rhizobium* inoculation and N fertilizer management regimes. Plots were harvested with a plot combine and the harvested seed samples were separated into different seed size categories by passing the seed samples through a series of sieves.

RESULTS AND DISCUSSION

Among the three years, the highest percentage (69%) of ≥ 9 mm diameter seeds was obtained in 2004 in the CDC Xena seedlot, and lowest proportion of ≥ 9 mm diameter seed (6%) was obtained in the 2006 CDC Frontier seedlot (Fig. 1). Drought conditions in 2006 shortened the period of seed-filling, resulting in smaller seed size. Averaged across the six site-years, 24% of the seed for CDC Frontier was ≥ 9 mm diameter, 50% between 8 to 9 mm, and the rest in the 7 to 8 mm category. In contrast, CDC Xena produced 59% of seed with ≥ 9 mm diameter, of which 22% was greater than 10 mm and 37% was between 9 and 10 mm in diameter.

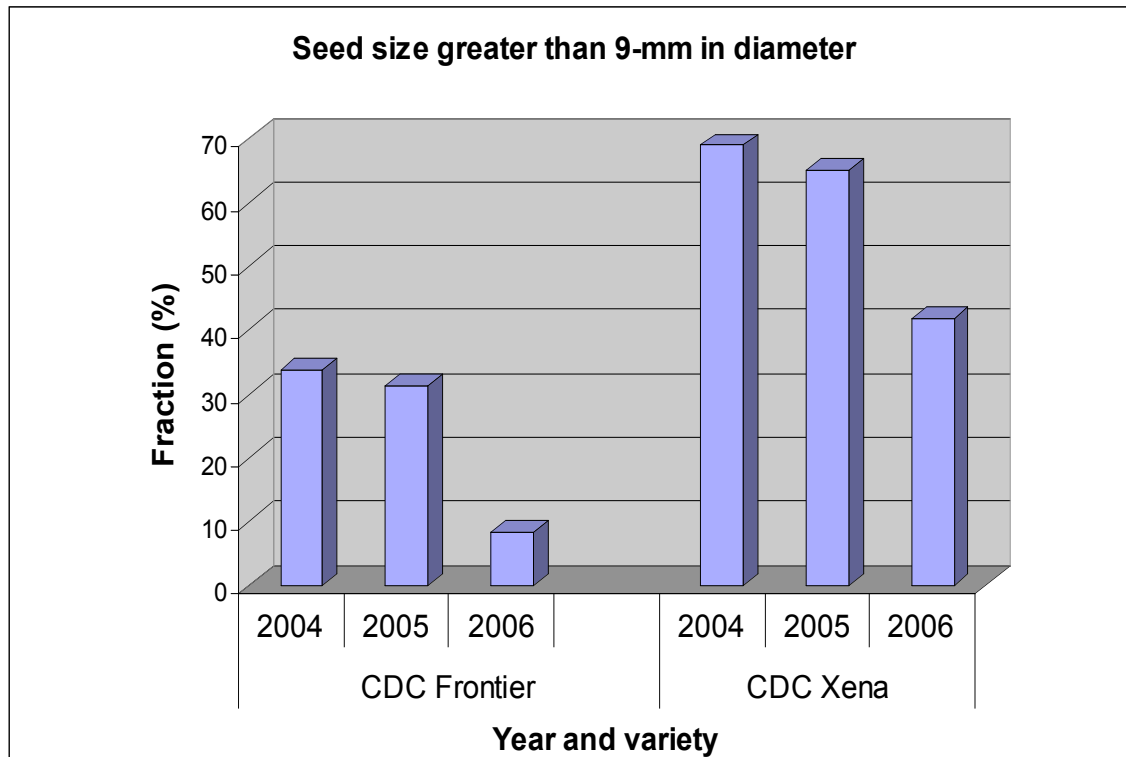


Fig. 1. The fraction of seed greater than 9-mm in diameter in the harvested seed samples of CDC Frontier and CDC Xena in 2004, 2005, and 2006.

Stubble systems also influenced seed size distribution for both CDC Frontier and CDC Xena (Fig. 2). CDC Xena grown on barley stubble produced 59% of seeds ≥ 9 mm, 6 percentage points higher than for CDC Xena grown on wheat stubble, averaged across the six site-years, although this difference was mainly due to 2004 when the two stubbles types were in adjacent fields. Advantages of growing kabuli chickpea on conventional summerfallow were realized only in the dry year of 2006 when the fallow-grown CDC Xena produced 60% of ≥ 9 mm seeds, significantly higher than when grown on barley (35%) or wheat (31%) stubble.

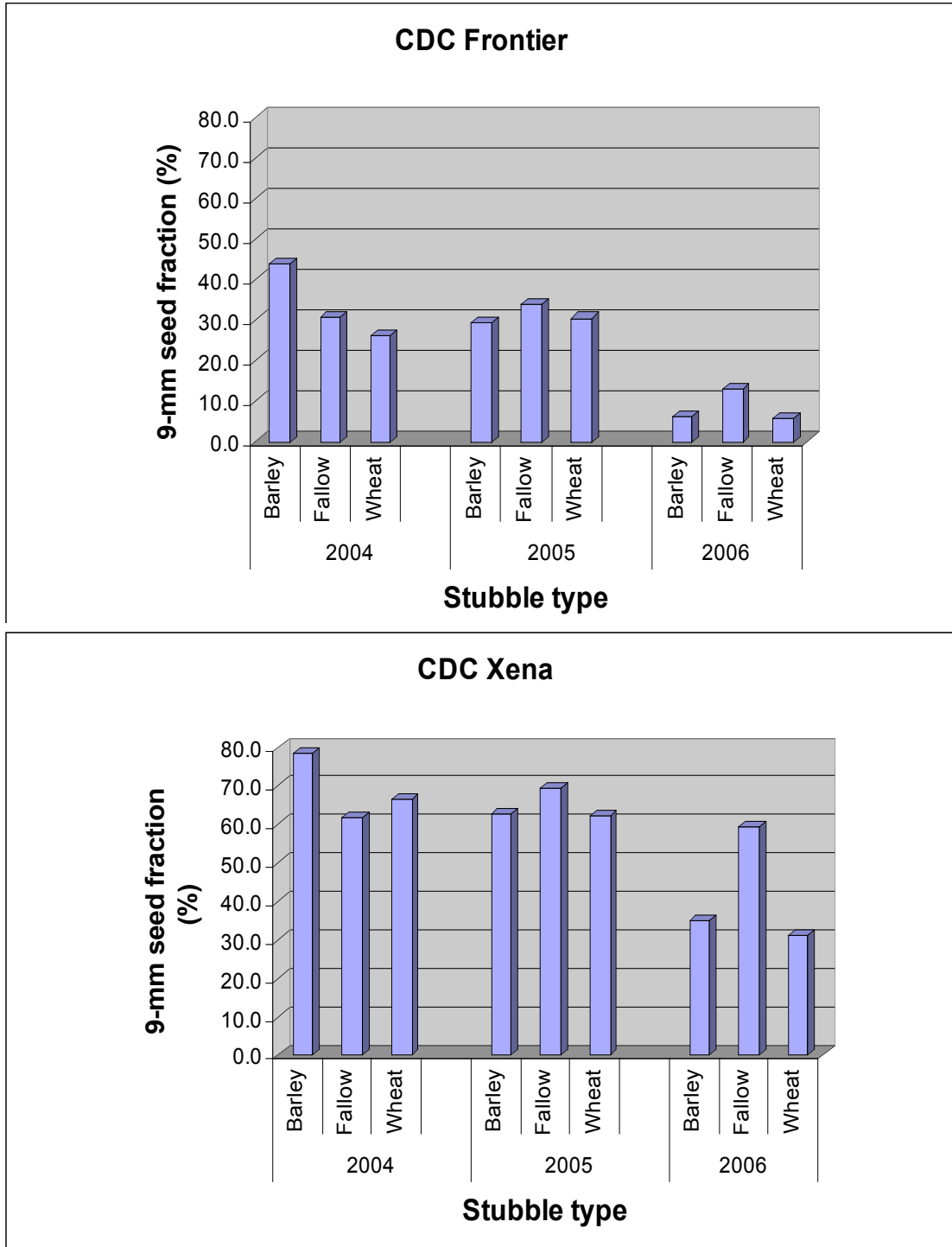


Fig. 2. Fraction of seeds greater than 9-mm in diameter for CDC Frontier (top) and CDC Xena (bottom) grown on barley and wheat stubble and on summerfallow in 2004, 2005, and 2006.

The use of *Rhizobium* granular inoculant increased 6 percentage points of the proportion of ≥ 9 mm diameter seed for CDC Frontier compared to treatments that received N-fertilizer or no-N no-inoculant (28% versus 22%) (Fig.3). Similar trends were found for CDC Xena where use of *Rhizobium* or high level of N-fertilizer increases the proportion of >9 mm seed.

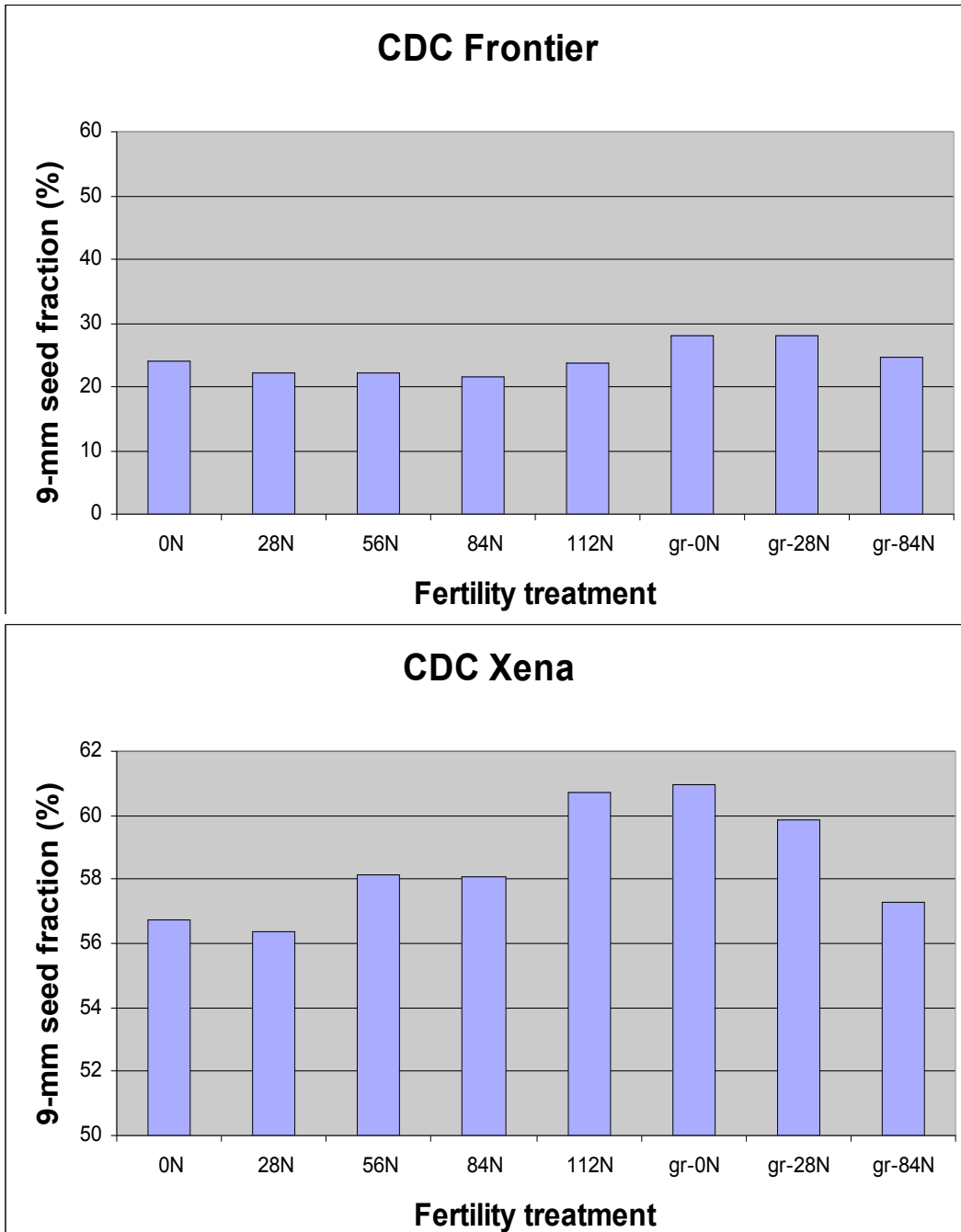


Fig. 3. The effect of fertility treatments (inoculant versus N fertilizer) on the fraction of seed greater than 9-mm in diameter for CDC Frontier (top) and CDC Xena (bottom) averaged across six site-years.

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