Improving Chickpea Maturity: Inoculation or Fertilization?

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INTRODUCTION

Chickpea has a strong indeterminate growth habit. When conditions are favourable, the plants continue their vegetative growth which delays maturity. When ready-to-use N and water is available in the early stages of crop development, the plants may develop a more vigorous vegetative growth, which depletes soil nutrients and water earlier in the season, promoting more timely maturity. The objective of this study was to develop best management practices for chickpea to advance crop maturity and to enhance seed yield and quality.

METHODS

Experiments were conducted at Swift Current and Shaunavon in 2004. Chickpea was grown on summerfallow, and on wheat and barley stubble. The following fertility treatments were applied:

1) No-N and no-inoculant (check);
2) No-N, granular (GR) inoculant;
3) N=28 kg ha-1, no-inoc. 4) N=56 kg ha-1, no-inoc.
5) N=84 kg ha-1, no-inoc. 6) N=112 kg ha-1, no-inoc.
7) N=28 kg ha-1, GR inoc. 8) N=84 kg ha-1, GR inoc.

The 4 replicate experiment was a randomized complete block design with plot size of 2 x 8 m. Plant maturity was recorded every 5 to 7 days starting when the plants first began turning colour (Fig. 1). The maturity was quantified using a 1 to 10 scale, with 1 being when <10% of the plants had begun to turn colour, and 10 being when 100% of the pods were ripe.

PRELIMINARY RESULTS

- Plants matured earliest when grown on barley stubble, followed by wheat stubble, and then fallow (averaged across all fertility treatments). Fertility treatments affected the maturity of chickpea significantly both at Swift Current and Shaunavon (Fig. 1).

- Days to reach 80% of the pods turning colour was used as the criterion to quantify maturity progress (Table 1). Plots that received 28 to 84 kg N ha^{-1}, but no inoculant, matured 13 (kabuli) to 23 (desi) days earlier than the check treatment (no-N, no-inoculant).

- Plots that received 112 kg N ha^{-1}, or 28-84 kg N ha^{-1} together with inoculant, matured 8 (kabuli) to 16 (desi) days earlier than the check. Plots that received inoculant only matured 5 to 8 days earlier than the check, but 8 to 15 days later than those receiving 28 to 84 kg N ha^{-1}.

Fig. 1. Fertility treatments affected chickpea maturity significantly in 2004; chickpea were grown at Swift Current and Shaunavon, SK.

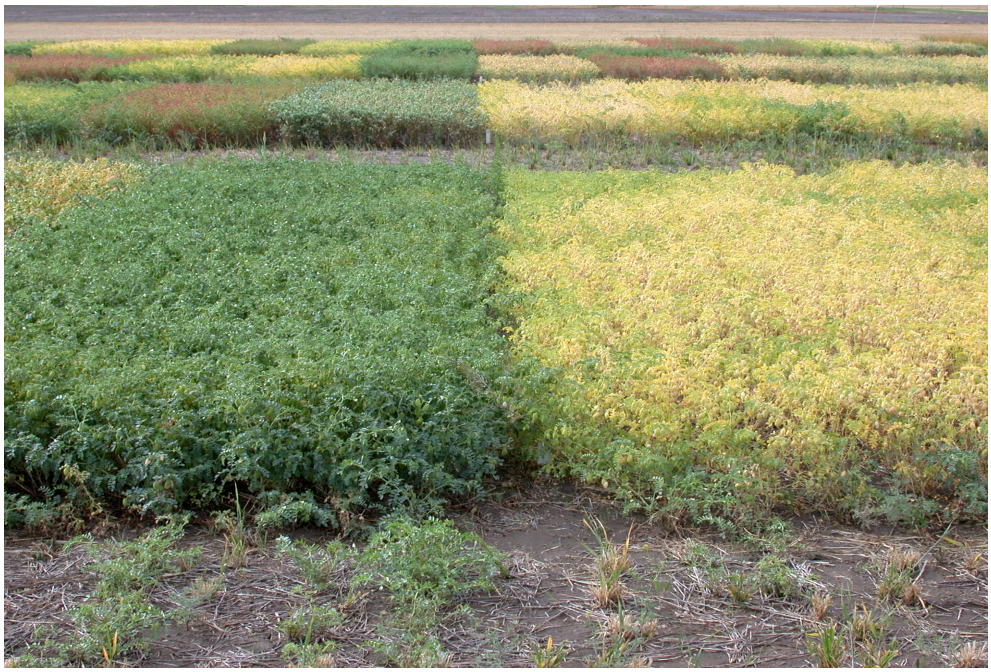


Table 1 . Date on which 80% of the pods turned colour in fertilized - and inoculated -chickpea grown on barley stubble at Swift Current, 2004.

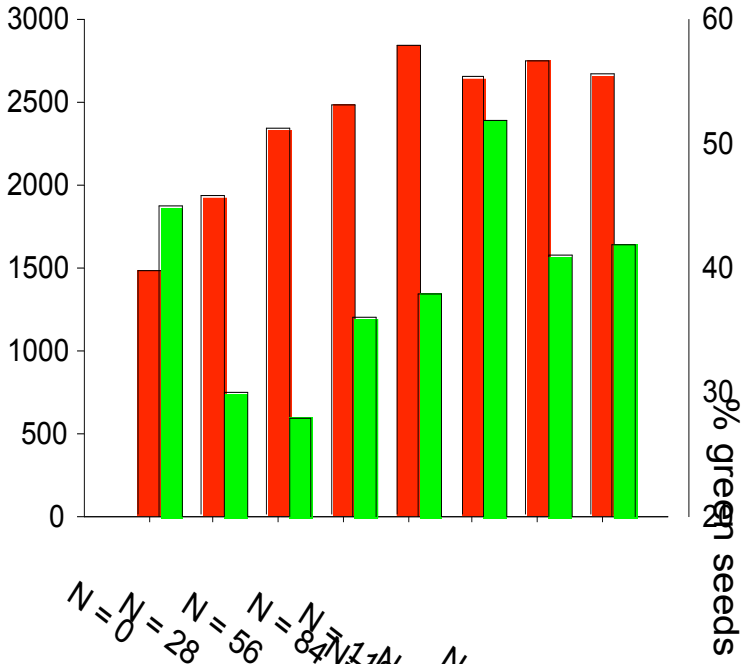
Group of treatments	Treatment	Date when 80% of the pods turned colour		Days advancement in maturity relative to the check	
		Desi (CDC Anna)	Kabuli (CDC Xena)	Desi (CDC Anna)	Kabuli (CDC Xena)
I	N=28 (kg ha^{-1}) N=56 (kg ha^{-1}) N=84 (kg ha^{-1})	30 Aug	10 Sep	23	13
II	N=112 (kg ha^{-1}) N=28+Inoculant N=84+Inoculant	6 Sep	15 Sep	16	8
III	N=0, Inoculant	14 Sep	18 Sep	8	5
IV	Check (no -N, no-Inoculant)	22 Sep	23 Sep	-	-

† Granular inoculant applied at 5.6 kg ha^{-1}.

- Seed yield increased with increased N rates from 0 to 112 kg ha^{-1} (Fig. 2). Plots that received inoculant only produced similar seed yields as plots that received 84 kg N ha^{-1}, but the former produced the highest (24%) proportion of green seeds due to delayed maturity.

- Plots that received zero N and zero inoculant produced the lowest seed yield with the highest (>20%) proportion of green seeds.

Fig. 2. Fertility treatments affected chickpea seed yields and the proportion of green seeds significantly in 2004 (data are means of both Swift Current and Shaunavon.



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