## Highlight of the "EJA paper of the month" (April 2012)


## "Optimizing chickpea phenology to available water under current and future climates" by Afshin Soltani and Thomas R. Sinclair / Europ. J. Agronomy 38 (2012) 22–31

Chickpea (*Cicer arietinum* L.) is an important cool-season food legume and a major source of protein for millions of families in the world. Average chickpea yield remains low in major producing countries due mainly to inadequate water, and a crucial issue for the future of these countries is the likely yield response to changing climate

Soltani and Sinclair (2012, EJA 38: 22-31) simulated potential benefits of modified phenology in chickpea in two contrasting water-limited environments under current and future (+4 $^{o}$C increase in temperature, 15% lower precipitation and $CO_2$ concentration of 700 µmol $mol^{-1}$) climates. Long-term simulations were performed for Tabriz (spring crop, 39 years) and Gonbad (winter crop, 35 years) that represent major chickpea producing areas of Iran. An important feature of the simulations for Tabriz was the determination within the simulations of sowing date based on the spring temperature scenario.

Mean yield increased 42% in Tabriz (from 138 to 196 g $m^{-2}$) and 21% in Gonbad (from 181 to 218 g $m^{-2}$) under the future climate. Greater increases in Tabriz were due to the possibility of earlier sowing dates (mean of 21 days) under future climates. Yield increases were mainly due to accelerated development rate and earlier maturity under higher temperature of future climates, and the resultant escape of late-season drought.

However, plant alterations to achieve earlier maturity resulted in mixed responses. A 20% shorter vegetative period from emergence to flowering increased crop yield at both locations under current (13-14%) and future (18-20%) climates. Earlier maturity as a result of a 20% shorter grain filling period did not result in yield increase, indicating excessive vegetative growth of chickpea in both locations. A combination of 20% shorter vegetative growth and 20% longer grain filling period led to the greatest yield increase (17-24%) in both locations and under current and future climates. These results occurred as a result of shifting the growth period of the crop away for the late-season terminal drought.

Overall, development of cultivars with the higher-yielding phenotypes is recommended based on these simulations. These results indicated minimum expected benefits from modified phenology under both current and future climates. In fact, the merits of earliness may be even higher under farmer conditions where the crop is commonly sown later than simulated and on marginal, shallow soils.

**More information**

http://www.sciencedirect.com/science/article/pii/S1161030111001274

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