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## The Effects of Irrigation Regimes and Nitrogen Rates on some Agronomic Traits of two Rapeseed Cultivars

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### Abstract

Rapeseed (*Brassica napus* L.) has potential to become an alternative oilseed crop in Karaj, Iran. Information on effective management of irrigation regime and nitrogen rate for rape seed is limited in this region. Therefore, a study was initiated to investigate the effects of irrigation regime and nitrogen rate on the yield and agronomic characteristics of two cultivars of winter rapeseed (Zarfam and Modena) in a semi-arid region, during 2007 and 2008. The four different irrigation regimes were 30 % (I1), 45 % (I2), 60 % (I3) and 75 % (I4) the maximum allowable depletion (MAD) of available soil water (ASW). Four N fertiliser rates were established: 0 (N1), 90 (N<sub>2</sub>), 180 (N3) and 270 (N4) kg N ha<sup>-1</sup>. In both years, there were effects on yield, yield components and water use efficiency due to irrigation regimes, nitrogen rates, and cultivars. Cultivars tended to respond similarly to irrigation regimes and nitrogen rate for seed yield in both years of the study. The results revealed that treatment combinations of I1\*N4, I1\*N3 and I2\*N4 maintained significantly greater leaf area index (LAI), above-ground dry matter (DM) and seed yield of the crop than other combinations. For all irrigation levels, the seed yield was highly responsive to N fertiliser rates from zero to about 147 kg N ha<sup>-1</sup> (N inflection), and thereafter, the rate of yield responses declined. The amount of N fertiliser required to achieve the maximum seed yield was 147 kg N ha<sup>-1</sup> for I4, 150 kg N ha<sup>-1</sup> for I3, 189 kg N ha<sup>-1</sup> for I2 and 166 kg N ha<sup>-1</sup> for I1. The present results highlight the practical importance of adequate N fertilisation in yield formation in winter oilseed rape and suggest that the rate of N inflection will be about adequate for the crop to meet its N requirements. Earlier flowering, longer flowering duration, and greater tolerance to drought stress for Zarfam cultivar were detected as determinant physiological traits for successful adaptation to water deficit.

**Keywords:** Cultivar, irrigation, maximum available depletion, nitrogen, rapeseed, seed yield