

# Nitrogen Requirements at Bulb Initiation for Production of Intermediate-Day Onions

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## Abstract

The effect of nitrogen application on growth, nitrogen (N) uptake, yield, and quality of intermediate-day onion (*Allium cepa* L. ‘Guimar’) was evaluated in the field in southern Portugal. Plants were fertilized with 30 kg·ha<sup>-1</sup> N at transplanting, 10 kg·ha<sup>-1</sup> N at 29 days after transplanting (DAT) during early leaf growth, and with 0, 20, 40, and 60 kg·ha<sup>-1</sup> N at 51 DAT at the initiation of bulbing. The root system of plants in each treatment were concentrated in the top 0.1 m of soil and limited to 0.3-m depth but neither root length density nor rooting depth were affected by N application during later stages of bulb development. Leaf and bulb dry matter, on the other hand, increased linearly with N rate during bulb growth (85 DAT) and at harvest (114 DAT), respectively. Soil nitrate-N (NO<sub>3</sub>-N) at 0-0.3 m depth likewise increased linearly with N rate during bulb growth but declined from 15–30 mg·kg<sup>-1</sup> at bulbing to <10 mg·kg<sup>-1</sup> in each treatment by harvest. A substantial amount of N in the plants, which ranged from 302–525 mg, was taken up from the soil. Application of 60 kg/ha N resulted in luxury consumption. Yield (fresh bulb weight) was correlated to bulb diameter and averaged 0.19 kg/plant with no N at bulbing and increased to as much as 0.28 kg/plant with 60 kg·ha<sup>-1</sup> N. Bulbs harvested from plants fertilized 40–60 kg/ha N averaged 8.2–8.5 cm in diameter, while those from plants with no N at bulbing averaged only 7.2 cm in diameter. Other components of quality, including neck diameter, bulb water content, soluble solids, and juice pH, were not affected by N applied at bulbing. Application of N fertilizer is thus recommended at bulbing to increase N uptake and production without any impact on quality of intermediate-day onions, particularly in dry Mediterranean climates where many onions are produced.