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[\[Full-text PDF \(1173K\) \]](#) [\[References \]](#)**Suitable Level of Nitrogen Fertilizer for Tea (*Camellia sinensis* L.) Plants in Relation to Growth, Photosynthesis, Nitrogen Uptake and Accumulation of Free Amino Acids**

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Abstract:

The physiological responses of pot-grown tea plants to various levels of nitrogen fertilizer were investigated to determine the suitable level of nitrogen for tea plants. Defining an arbitrary unit of nitrogen application as 1 N plot (200 mgN pot⁻¹ year⁻¹, corresponding to 10 kgN 10a⁻¹ year⁻¹), experimental plots from 0 to 27 N were prepared using ammonium sulphate. The plants exhibited symptoms of nitrogen deficiency below 3 N plots. High photosynthetic activity and favorable growth were observed from 6 to 12 N plots. Tip-burn of mature leaves and inhibition of photosynthesis were first detected at the level of 15 N plot. At the level of more than 18 N plots, the falling of mature leaves, depression of root respiration and death of some plants occurred. Based on these results, the critical level for growth and yield was determined to be 6 N plot. Nitrogen uptake increased with the increase in the amount of nitrogen applied, while the capacity of uptake gradually saturated. The recovery rate of applied nitrogen declined linearly with the increase in nitrogen dressing. The concentration of free amino acids in the first flush shoots increased in an unlimited manner with the increase in nitrogen dressing. However, the absolute amounts in the new shoots were greatest in 9 to 15 N plots due to the inhibition of new shoot growth in heavily manured plots. Thus, with respect to the accumulation of free amino acids, the critical level for leaf quality is estimated to be around 12 N plot. The theanine content in the first flush shoots increased up to 9 N plot. Thereafter, a high content of arginine was detected, implying disorder in the nitrogen metabolism. These results demonstrate that the critical level of nitrogen for leaf quality is very close to the toxic level and is twofold greater than that for growth and yield.

Keywords:Arginine, *Camellia sinensis*, Critical level, Excess nitrogen, Free amino acid, Green tea, Nitrogen uptake, Nutritional diagnosis

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