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[TOP](#) > [Journal List](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

ONLINE ISSN: 1349-0990

PRINT ISSN: 0011-1848

■ Japanese journal of crop science

Vol.65 , No.1(1996)pp.8-15

[\[Full-text PDF \(930K\) \]](#) [\[References \]](#)
Changes in Nitrogen Uptake with Aging and Under Heavy Application of Nitrogen in Tea Plants

Naoaki TACHIBANA, Toshihisa IKEDA and Katsuhiko IKEDA

- 1) Mie Agricultural Technical Center
- 2) Mie Agricultural Technical Center
- 3) Faculty of Bioresources, Mie University

[Published: 1996/03/05]

[Released: 2008/02/14]

Abstract:

Nitrogen absorption by mature tea plants was examined under different nitrogen levels. The annual increase rate of dry matter of five-year-old plants was 1.49 when no nitrogen was applied and increased with increasing nitrogen levels. The increase rate of seven-year-old tea plants decreased to one-half of that of five-year-old plants and differed a little among nitrogen levels. This means that seven-year-old plants have grown to the mature stage. The increase rate of dry matter of plants applied 180 kg 10 a⁻¹ of nitrogen annually became lower than that of plants given 60 kg 10 a⁻¹ of nitrogen. The amount of nitrogen uptake in five-year-old plants was 30 to 43 kg 10 a⁻¹yr⁻¹, but decreased 23 to 27 kg 10 a⁻¹yr⁻¹ in seven-year-old plants. Approximately 10 kg 10 a⁻¹yr⁻¹ of the nitrogen absorbed was estimated to derive from soil nitrogen produced by the decomposition of organic matter. When 60, 120 and 180 kg 10 a⁻¹ of nitrogen was applied to seven-year-old plants, the uptake efficiency of nitrogen was 21.5, 13.8 and 9.9%, respectively. The amount of ¹⁵N absorbed after autumn application was so small that the ratio of the contribution to the first crop of the next year was 5 to 10%. However, the greater the amount of nitrogen supplied in both autumn and spring, the greater the amount of ¹⁵N was absorbed, and every organs showed a higher ratio of contribution. However, the nitrogen content of stems, thick roots and white roots remained at a lower level in the heavy applied plot. This was considered to be attributable to the root damage caused by a high concentration of salts in the rhizospheres that results in restriction of nitrogen absorption.

Keywords:

Heavy application of nitrogen, Nitrogen absorption, ¹⁵N tracer technique, Tea plants

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