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Changes in Nitrate Reductase Activity of Leaf and Nitrogen Distribution with Growth in Potato Plants

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Abstract:
Four field-grown potato cultivars, Irish Cobbler, May Queen, Dejima and Nishiyutaka, were subjected to measurements of leaf nitrate reductase (NR) activity (in vivo assay) and the distribution of nitrogen during growth and development. Varietal differences in NR-activity averaged over a season were observed : Highest activity was Nishiyutaka (6.08 NO_2^- μmol h^{-1} g^{-1} fresh weight) and lowest was May Queen (4.92 NO_2^- μmol h^{-1} g^{-1} fresh weight). Slightly high NR-activities were observed during the 30 days of early growth in all cultivars, and as growth proceeded, they tended to fall. The NR-activity was positively correlated with the percentage total leaf nitrogen, and with nitrogen accumulated in the leaf. The NR-activity had no correlation with total dry matter or tuber dry matter. The accumulation of nitrogen in the leaves declined with age, whereas it increased in the tubers regardless of the cultivar. At the end of the season, all cultivars except Nishiyutaka accumulated almost the same level of nitrogen in the tubers. A significant linear correlation (r=0.749***) was found between the natural logarithm of SPAD reading (relative chlorophyll content) and NR. Harvest indices for nitrogen showed that the partitioning of nitrogen to the tubers was higher in Irish Cobbler and May Queen than in Dejima and Nishiyutaka. There was no evidence to conclude that NR-activity has a direct effect on dry matter production in potato.

Keywords:
Chlorophyll reading, Nitrate reductase activity, Nitrogen accumulation, Nitrogen harvest index, Potato

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