EFFECT OF NO_3^- ON ACETYLENE REDUCTION IN A NODULATED NITRATE REDUCTASE DEFICIENT MUTANT

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In root nodules of leguminous plants such as pea, acetylene reduction (N2~fixation) is inhibited by nitrate. There are significant indications in the literature suggesting that the origin of the nitrate inhibition has to be sought in the plant rather than in the bacteroid (4). Nitrate reduction in the plant seems especially to be involved although the effect of nitrate in a nitrate reductase (NaR) deficient mutant can provide direct information. Such mutants have been isolated in the pea (1,2,3). Therefore, we studied the effect of nitrate on acetylene reduction in our mutant E1. In vitro and in vivo NaR activity of young leaves of this mutant are about 5Vand 20%. of the activity in the parent cv 'Rondo[1].

Parent and mutant plants were inoculated with Rhizobium leguminosarum strain PF2 (kindly provided by Dr. Lie, Wageningen). Plant culture, nitrate treatment, and determination of acetylene reduction of nodulated plants will be described elsewhere. Nodulation characteristics of the mutant E1 were not negatively affected by the NaR deficiency.

Without nitrate acetylene, reducing activities of cv Rondo and mutant E1 were essentially the same. After NO_3^- treatment parent acetylene reduction was significantly inhibited (47%) whereas in mutant E1 the inhibition was only 19% and not significant. This shows that the inhibiting effect of nitrate is mediated by the plant. Nitrate itself as a causative factor can be eliminated, because uptake in mutant E1 is still intact as the highly increased nitrate content in leaves of plants cultured on a medium with NH4NO3 as N-source indicated (1,2).

The observation that in mutant E1 nitrate effect is not completely absent presumably is due to the fact that in vivo NaR activity is not zero.

The way in which the process of nitrate reduction or reduction products is involved will be subject of further experiments.

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