

ABSTRACT

The metabolism of plants grown in the cultivation medium is influenced by its composition and availability of CO₂. In this project the effect of cultivation medium on the activity phosphoenolpyruvate carboxylase (PEPC, EC 4.1.1.31), NADP-malic enzyme (NADP-ME, EC 1.1.1.40), pyruvate, phosphate dikinase (PPDK, EC 2.7.9.1) and enzymes of nitrogen metabolism: nitrate reductase (NR, EC 1.7.1.1), glutamine synthetase (GS, EC 6.3.1.2), glutamate synthase (GOGAT, EC 1.4.1.13) and glutamate dehydrogenase (GDH, EC 1.4.1.2) was studied.

The tobacco plant *Nicotiana tabacum* L., cv. Petit Havana SR1 were grown *in vitro* in containers fitted with a filter, which caused limited access of CO₂. The cultivation medium was modified Murashige-Skoog agar with decreased amounts of phosphate, nitrate, ammonium, or with casein as source of nitrogen and with or without of 1.5% sucrose as additional carbon source

Activity of PEPC was higher in plants grown in medium in the presence of sucrose. Reduced concentrations of phosphates, nitrates or NH₄⁺ ions or when casein was the only source of N in medium caused decreased activity of PEPC. Under these conditions, also activity of NADP-ME and of enzymes of nitrogen metabolism: NR, GS decreased. Activity of all enzymes was also negatively affected by limited CO₂. On the other hand activity of PPDK was higher in plants grown under limited availability of phosphates, nitrates or NH₄⁺ ions. Similarly, activity of GOGAT and activity of NAD⁺/NADP⁺-GDH were higher in plants grown in medium with reduced concentrations of nitrates. The results show that the decreased amount of N and P in Murashige-Skoog medium negatively affected PEPC activity and activity of nitrogen metabolism enzymes, which correlates with decreased mass of roots and shoots of plants. Other enzymes, especially PPDK, participate in metabolic adaptations to nitrate, NH₄⁺ ions or phosphate deficiency.

Key words: PEPC, NADP-ME, PPDK, NR, GS, GOGAT, GDH, nitrogen assimilation