ABSTRACTS
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ISOLATION AND CHARACTERIZATION OF THE GENE ENCODING NODULE-ENHANCED GLUTAMATE SYNTHASE IN ALFALFA

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Glutamate synthase (NADH-GOGAT) is one of several proteins whose expression is either enhanced in, or specific to developing legume root nodules induced by (Brady)Rhizobium infection. This enzyme catalyzes the second committed step in the assimilation of symbiotically fixed nitrogen; the transamidation of 2-oxoglutarate by glutamine to yield two moles of glutamate. We have previously purified alfalfa root nodule NADH-GOGAT and raised antibodies against this protein. To investigate the regulation of the gene encoding this enzyme, we have isolated a full length cDNA clone for NADH-GOGAT from an alfalfa nodule cDNA library. This 7.5 kb cDNA includes the sequence encoding the mature 210 kd protein (the amino terminus of which has been sequenced), as well as an apparent transit peptide. Northern blots indicate that mRNA levels are developmentally regulated in the nodule, showing a similar pattern to that of previously characterized genes encoding aspartate aminotransferase and phosphoenolpyruvate carboxylase. Protein levels as determined by Westen blots, and enzyme activity correlate well with mRNA levels. Southern blots suggest that NADH-GOGAT is encoded by a low or single copy gene. The deduced peptide encoded by this cDNA shows strong homology to both subunits of the E. coli glutamate synthase protein, and also to maize ferredoxin GOGAT.