

Abstract

Incorporation of [^3H]TTP into DNA by pea chloroplast extracts was highly dependent on the age of the tissue from which plastids were prepared. Catalytic activity was greatest in samples from 6- to 9-d-old plants; preparations from more mature tissues were much less effective. Moreover, activity was 3 to 10 times greater in younger tissues regardless of whether chlorophyll, protein or plastid number was used as the index of comparison. Enzymes from the first (oldest), second, third, and fourth (youngest) leaves of the same plants were also studied. Again, activity was 4 to 10 times greater in samples from the youngest tissues. When plastid extracts from older leaves were mixed with those from younger tissues, they did not reduce synthesis. Thus, the decline in activity does not appear to be due to the production of an inhibitor during plant development. One explanation for these data is that enzymes of ctDNA replication, such as DNA polymerase, vary in activity during leaf development; therefore changes in enzyme levels may be an important factor in controlling chloroplast DNA replication during development. We have also examined the incorporation of [^3H]TTP into DNA by isolated intact pea chloroplasts; in general, labelled TTP was less readily incorporated into chloroplast DNA than was [^3H]thymidine.