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ADENOSINE TRIPHOSPHATASE ACTIVITY IN HEVEA LATEX WITH SPECIAL
REFERENCE TO BROWN BAST

BY

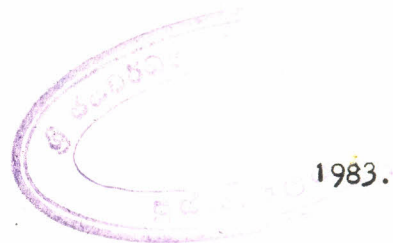
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Thesis submitted in partial fulfilment of the
requirements for the

Degree of Master of Science

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C.P. WICKREMASINGHE

A B S T R A C T

Adenosine triphosphatase (ATP-ase) from F-serum of Hevea brasiliensis was purified by $(\text{NH}_4)_2\text{SO}_4$ sequential precipitation, gel filtration and gel electrophoretic techniques. This enzyme had a pH optimum of 7.5 and a temperature optimum of 37°C. It had a K_m value in the range of 0.6 to 0.8 mM at pH 7.4 and 37°C in Tris/HCl buffer. The activity of the enzyme was found to be cation dependent. The removal of cations by dialysis and re-introduction them into the enzyme system confirmed this. Five cations were investigated for their effect on the ATP-ase activity and the stimulatory action was in the order of $\text{Mn} > \text{K} > \text{Mg} > \text{Ca} > \text{Na}$. When various cationic combinations two-ion, three-ion and four-ion etc was tried, it was observed that combinations (Na + K), (Na + K + Mn), (Ca + Mg + K + Mn) had greater stimulatory influence on the enzyme activity.

Comparative studies on ATP-ase activity in brown bast and healthy trees of Hevea, showed higher ATP-ase activity in healthy serum of clones RRIM 600 and RRIC 52, than that of brown bast trees and vice versa in the clones of PB 86 and RRIC 101. In brown bast bark the enzyme activity was always found to be

greater than that of healthy in all four clones investigated namely RRIM 600, RRIC 101, RRIC 52 and PB 86. The ATP-ase activity in bark extracts at different heights of brown bast trees was found to be higher than that of healthy trees, at corresponding heights, giving an indication of the spread of brown bast condition into the neighbouring tissues too, as suggested by some of the previous workers.

Cationic analysis of bark and latex showed Ca-less, Mg-more (except for RRIM 600), N-more were associated with brown bast condition. When these conditions were simulated, a higher ATP-ase activity as anticipated, was observed in F-serum. These results strongly favours a generally held view that a nutritional imbalance may be associated with this physiological disorder.

In addition to various cations and their combinations, phenolic substances in the bark also had a significant effect on ATP-ase activity.

Kaempferol was found to be stimulatory at low concentrations (up to 4 mM) and had an inhibitory effect at high concentrations. 2,4 Dinitrophenol and Quercetin were inhibitory at low concentrations (up to 1 mM and 8 mM respectively) and they were found to be stimulatory at above these concentrations.

I

C O N T E N T S

MEMORANDUM

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