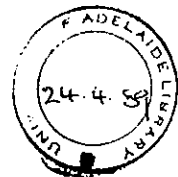


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SUCROSE AND STARCH METABOLISM IN LEAVES, STORAGE ORGANS  
AND DEVELOPING FRUITS OF HIGHER PLANTS

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SUMMARY.

General.

Sucrose and starch are the two most prevalent forms of carbohydrate used as food by man, the quantities consumed annually being about  $1 \times 10^8$  tonnes and  $7 \times 10^8$  tonnes respectively. The aim of the research described in the thesis was to contribute to the understanding of the regulation of the synthesis and storage of these carbohydrates by plants with the hope that knowledge will eventually lead to increasing the yield and/or efficiency of production by agricultural, chemical or biotechnological means. A natural extension of the work was to study the development and biochemistry of storage organs of plants (fruit) and this led also to some work on food quality of processed fruit. With threats of liquid fuel shortages, conversion of carbohydrates to alcohols has gained attention and production of liquid fuels from sugar, starch and latex plants is an area of research which shows fluctuating popularity. Whether or not liquid fuel production from plants ever becomes an economic proposition and thereby an added bonus to any improvement in crop production, increased yields of even small percentages would be of great benefit to mankind in view of the huge amount of carbohydrate used as food.

The discovery, partial purification and study of the properties of sucrose phosphatase was a major achievement and work on this enzyme which is certainly vital for sucrose synthesis and possibly involved in sucrose transport across membranes has continued over the years. The enzymic pathways of sucrose synthesis and breakdown, and the movement of sucrose into storage cells has been another major contribution of my work. Starch synthesis and its regulation has also been studied in many plants and my particular contributions have been the description of starch synthesis in the absence of added primer in vitro and the synthesis of starch in cassava (tapioca) and fruit. The demonstration of the hastening of ripening of grapes by chemical means may have an important practical application in viticulture while other work has resulted in the patenting of an inexpensive rapid method for testing the quality of dried vine fruit.