working of the sucker is inevitable. The possibility of the sucker being a hydraulic structure cannot be ignored.

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Determination of Certain Phosphate Compounds in Plant Extracts

Except when isotopes have been used, the investigation of the metabolism of the sugar phosphates and related compounds in animal and plant tissues has long been restricted by a lack of specific methods of determination[1]. Recently, however, specific enzymatic techniques have been developed for the estimation of both sugar phosphates and glycolytic intermediates in extracts from animal and plant tissues[2–7]. The enzymatic methods present greater difficulties with plant than with animal extracts, partly because the contents of phosphate compounds are smaller, and partly because the presence of pigments and inhibitors interferes with the assays. But successful results have now been obtained with extracts of potato tubers, strawberry leaves and fruits of banana, tomato and apple.

Using the technique of Isherwood and Barrett[8], the tissue is extracted in trichloroacetic acid and this acid is removed. In some cases (for example, potato) glucose and fructose-6-phosphates can then be determined in the neutralized extract without further treatment. In general, however, after concentration *in vacuo* below 30° C, the extract is cleared with activated charcoal (Harington; 0·4–2·5 g charcoal/10 g plant tissue; two or more treatments as required) to remove pigments and inhibitors. Glucose and fructose-6-phosphates, fructose diphosphate, dihydroxyacetonephosphate, 3-phosphoglycerate and phosphoenolpyruvate were then determined by following the changes in optical density due to reduction of oxidized or oxidation of reduced pyridine nucleotides; these changes were measured either with a spectrophotometer or, for other components, such as fructose diphosphate, the content of which was usually low, a fluorimeter (ref. 9; an E.I.L. fluorimeter was used; three other makes of fluorimeter proved unsatisfactory for the purpose). With potato and banana, but not with strawberry leaf extracts, a further purification treatment was necessary to remove interfering material before using the fluorimeter.

Table 1 gives the contents of various phosphate compounds in certain plant tissues. In bananas a correlation was observed between the changes in the rate of respiration during ripening and the content of fructose diphosphate[10].

Table 1. Content of Certain Phosphate Compounds in Some Higher Plant Tissues as μmoles/100 g Fresh Weight

	Potato tuber (mature)	Strawberry leaf	Banana fruit (green)	Tomato fruit (green)	Apple fruit (immature)
Glucose-6-phosphate	7·0–16·0	16·0–19·0	7·0	8·0	8·0
Fructose-6-phosphate	1·0–3·0	2·0–4·0	1·5	1·5	1·0
Fructose-1,6-diphosphate	0·02–0·04	0·3–0·4	0·05	0·03	0·11–0·17
Dihydroxyacetonephosphate	0·1–0·2	0·5–0·6	0·6–0·7	—	0·2–0·4
3-Phosphoglycerate	2·0–3·0	—	—	—	0·8–1·4
Phosphoenolpyruvate	1·0–1·7	2·5–3·0	1·0	1·5–2·0	0·5–1·0

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Dependence of Length of Leaf Lamina on Length of Leaf Sheath in the Rice Plant

In 1960, I reported that water-logging reduced the size of the leaf lamina in upland rice variety Kindinga and that no such reduction occurred in swamp rice variety Dima, when grown under the same soil conditions. If the length of a leaf lamina depends on the length of its leaf sheath a reduction in the length of the latter will also lead to a consequent reduction in the length of the former. If this proposition holds true, the reduction in size of leaf lamina in upland rice variety due to water-logging can, therefore, be attributed to its similar effect on the length of the leaf sheath especially as the width of leaf lamina is not increased by this condition.

For this investigation twenty-four plants of upland rice variety, Agbede, and swamp rice variety, *BG*.79, were raised in pots, each pot containing one plant. Half this number of plants in each variety were grown under water-logged condition and the other half under 'dry' soil (about 75 per cent saturation) condition. Twenty-five leaves of different sizes and ages were selected at random from each group of plants in each variety and the lengths of their leaf laminæ and leaf sheaths measured. From the results obtained the regression line for each variety was drawn.

The lengths of the leaf sheath of the 5th, 6th, 7th, 8th, and 9th leaf of the main shoot of plants grown in water-logged and 'dry' soil conditions in each variety were also measured. Figs. 1 and 2 show that there is a linear relationship between the length of leaf sheath and that of leaf lamina in both upland and swamp