

sugar companies, the station is managed by a Director and a Board composed of the representative from the larger companies. The agricultural, engineering and chemical aspects of sugar production are studied in three separate divisions, the aim of the research work as a whole being to find optimal conditions in sugar production from the time the cane is in the soil to the time it is exported as sugar. Research is aided by the fact that sugarcane growing is confined to one district in the island and that as all cane is exclusively planted by the factory interests, experimental work can also be effectively controlled.

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Growth of Seedlings in Light and in Darkness in Relation to Available Nitrogen and Carbon

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General Summary 1. Growth of the seedling is influenced by the nature and relative amounts of the food reserves of the seed, as well as by differences in the external environment such as light and darkness, and the presence and absence of nitrates in the nutrient solution. When the seedlings are grown without nitrogen from an outside source the following responses have been found: (a) Seeds having a high nitrogen and relatively low carbon content produce seedlings with a large top in proportion to the roots. (b) Seeds having a low nitrogen and high carbon content produce seedlings with a relatively small top in proportion to the size and weight of the roots. (c) Seeds intermediate in the proportions of their reserves of carbon and nitrogen produce seedlings with intermediate proportions of shoots to roots.

2. Nitrates are synthesised into growth promoting substances, both in light and darkness, but much more rapidly in the light.

3. Nitrates favour the growth of shoots more than of roots.

4. Light strongly favours the growth of roots.

5. (a) Seedlings developed from high-protein seeds benefit most under the influence of light. The roots and leaves are larger, more numerous, and much heavier than in the case of seedlings grown in darkness. This applies to high-protein seedlings grown with and without extra nitrogen, but the effect is greater in the case of the latter. (b) Seedlings grown from low-protein seeds without extra nitrogen are influenced less by light as to weight of different organs. Leaves of the very low-protein types grow even less in light than in darkness. When extra nitrogen is supplied these seedlings also benefit by the influence of light.

6. Seedlings with limited nitrogen supply undergo rapid differentiation and maturing of tissues in the light. The lower the nitrogen content of the seed the more rapid the process.

7. Light favours secondary thickening in stems and roots and deposition of strengthening materials in the cell walls.

8. The responses as to the effect of varying amounts of reserve carbon and nitrogen on growth of the seedling agree with results obtained with tomato cuttings having similar (although in some cases more extreme) variations in composition of the reserves.

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