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Purification and Characterization of Alkaline Invertase from the Hypocotyls of Mung Bean (*Phaseolus radiatus* L.)

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The alkaline invertase was isolated and characterized from the hypocotyls of mung bean. The enzyme was purified by consecutive step using DEAE-cellulose anion exchange, 1st Sephadex G-200, DEAE-sephadex A50 and 2nd Sephadex G-200 chromatography. The overall purification was about 77-fold with a yield of about 6%. The finally purified enzyme exhibited a specific activity of about 48 μmol of glucose produced mg^{-1} protein min^{-1} at pH 7.0 and appeared to be a single protein by nondenaturing PAGE. The enzyme had the native molecular weight of 450 kD and subunits molecular weight of 63 kD and 38 kD as estimated by Sephadex G-200 chromatography and SDS-PAGE, respectively, suggesting that the enzyme is a heteromeric protein composed of two types of polypeptides of 63 kD and 38 kD. On the other hand, the enzyme likely is not a glycoprotein. The enzyme had a Km for sucrose of 19.7 mM at pH 7.0 and maximum activity around pH 7.5. The enzyme was most active with sucrose as substrate, compared to raffinose, cellobiose, maltose and lactose. Therefore, the alkaline invertase seems to be a β-fructofuranosidase.

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The Effect of Plant Hormones and Light Quality on the Invertase Activity in *Zea mays* L. and *Phaseolus radiatus* L.

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The effects of plant hormones and light qualities on the changes of invertase isozyme activities in leaves of maize and mung bean seedlings were investigated. NAA accelerated the increase of invertase isozyme activities, on the contrary, GA_3 had little effect in the increase of enzyme activities from the leaves of maize and mung bean seedlings. BA accelerated an increase in the activities of the invertase isozyme from the leaves of mung bean seedlings whereas it had little effect in the increase of the enzyme activities from those of maize seedlings. The activities of the enzyme were little affected by various light qualities. In the simultaneous applications of plant hormone and light quality, NAA with white light was very effective in the increase of the enzyme activities from the leaves of maize seedlings, whereas NAA application with blue light showed a prominent enhancement in the acid invertase activity from those of mung bean seedlings. These results suggest that plant hormone, particularly NAA, may be a more important factor than various light qualities in the stimulation of invertase activity.