

THE BIOGENESIS AND METABOLISM OF CYANOGENIC GLUCOSIDES IN GERMINATING CASSAVA SEED AND SEEDLINGS

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SUMMARY

Analyses of the storage lipids (47%) and proteins (34%) of cassava seeds indicate that these could be nutritionally and industrially useful sources of vegetable fats and proteins. Seedlings have high lipolytic and proteolytic activities. In seedlings storage lipids are converted to carbohydrates. Valine and Isoleucine are incorporated respectively into the cyanogenic glucosides linamarin and lotaustralin. Seedlings of both bitter and sweet cultivars contain large amounts of cyanogenic glucosides. Electronmicroscope and tracer studies showed that the biosynthesis and metabolism of cyanogens, cyanide, proteins and lipids are associated with specific organelles and microbodies which become apparent after 10 days active seed germination.

RESUME

Les analyses du contenu de lipides (47%) et de protéines réservées (34%) ont montré que les graines de la cassave forment une source de graisses et de protéines végétales utilisables en industrie. Les germes portent une grande activité de lipolyse et de protéolyse, reconvertissent les lipides réservés en carbohydrates, et ils peuvent incorporer la valine et l'isoleucine dans les glycosides cyanogènes linamarine et lotaustraline, respectivement. La microscopie électronique et l'utilisation des substrats radioactifs ont montré que la biosynthèse et le métabolisme de substances cyanogènes, du cyanure, des protéines et des lipides sont liés à des organelles spécifiques et à des 'microbodies' qui se développent clairement au cours de 10 jours de germination active de graines.

RESUMEN

Los análisis de las reservas de lípidos (47%) y de proteínas (34%) en semillas de yuca, indican que podrían ser nutricionalmente e industrialmente fuentes útiles de grasas vegetales y proteínas. Las plantas tienen actividades lipolíticas y proteolíticas elevadas; en ellas las reservas de lípidos son convertidas en carbohydrates. La Valina y la Isoleucina se incorporan respectivamente a los glucósidos cianogénicos linamarina y lotaustralina. Las plántulas tanto de cultivos amargos como dulces, contienen grandes cantidades de glucósidos cianogénicos. La microscopía electrónica y los estudios con trazadores demostraron que la biosíntesis y metabolismo de cianógenos, cianuros, proteínas y lípidos se asocian con organelos y corpúsculos específicos que se hacen aparentes a los 10 días de la germinación de la semilla activa.

INTRODUCTION

The potential, and ultimate usefulness of cassava and all its products are expressions of genetic, biochemical and physiological processes and mechanisms we are investigating in Denmark.

CONSTITUENTS OF CASSAVA SEED

Localization of lipids and proteins

The cassava seed kernel contains 47% lipids and 34% proteins as major reserves, and 0.13% soluble nitrogenous compounds, 0.3% starch and 3.8% soluble carbohydrates as minor constituents¹⁷. Thus the major constituents of the cassava seed compare favourably with those of typical useful oil seeds such as those of *Ricinus*, *Sesamum*, *Elaeis* and *Glycine*³.

The bulk of cassava seed storage lipids and proteins are localized in the endosperm, although cotyledonary and radicle tissues show a similar distribution of storage materials. Figures 1 and 2 are electronmicrographs of thin sections through the endosperm and radicle tissues of a dry cassava seed. They show

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