Identity and stability of carotenoids from Neurospora intermedia N-1

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Abstract

Oncom is a fermented food product from Indonesia, particularly from West Java. Red oncom is produced by Neurospora sp. mold, containing pink to orange color due to carotenoid content in its conidia. Generally, carotenoids sensitive to light, heat and oxidation. Neurospora intermedia N-1 has been isolated and identified from red oncom. The objectives of this research are to identify the carotenoids of Neurospora intermedia N-1 and to study its stability by accelerated stability testing method. On this research, carotenoids from Neurospora intermedia N-1 was produced by solid substrate fermentation and identified by HPLC method. The stability of this pigment was analyzed using spectrophotometer UV-Vis and calculated by Arrhenius equation method. Orange spores were obtained by fermentation of N. intermedia N-1 on waste tofu which incubated at 30°C for 3-5 days. Carotenoids from dried spores were extracted with acetone and identified by HPLC with a detector UV-Vis. Analysis data of HPLC UV-Vis was compared to the previous data of HPLC-PDA. Results analysis by HPLC-UV Vis shows four carotenoid compounds were identified in spores of N.intermedia N-1 i.e. lycopene, neoxanthin, α-carotene, and β-carotene. The stability data showed that total carotenoid of N. intermedia N-1 extract in oil follows the first-order kinetic model with its half life time (t ½) at 25°C was 95 days and 90%-self life was 799 days.

Keywords: carotenoids, identity, stability, N.intermedia, Arrhenius

Introduction

Carotenoids are widespread in nature that traditionally though of as plant pigments, instead occur extensively also in animals and microorganisms. Because plants are able to synthesize carotenoids de novo, the carotenoid composition of plant foods is enriched by the presence of small on trace amounts of biosynthetic precursors, along with derivatives of the main components (Rodriguez-Amaya, 2001). Many sources of plant carotenoids are not green. Yellow, orange and red plant tissues, including fruit, flowers, roots and seeds, may contain high concentrations. In fungi, carotenogenic species are present in classes making their synthesis widespread in nature. In several species carotenoid biosynthesis is up-regulated by light. This can be taken as an indication that carotenoids function as light protecting pigments in these organisms. The predominating carotenoids in fungi are the β-carotene, γ-carotene and torulene as well as their hydroxyl and keto derivatives (Sandmann et al., 2008).

Oncom is a fermented food product from Indonesia, particularly from West Java. Red oncom is produced by Neurospora sp. mold, containing pink to orange color due to carotenoid content in its conidia. Pigment or natural colorant from Neurospora sp. is a secondary metabolite product and a promising alternative food additive and safer than synthetic colorants. Application of natural colorants may be preferable due to its safety and benefit to health, for example β-carotene from carrot and palm oil. However, carotene from plants needs much longer time and bigger land area for plantation. Several types of algae, molds, and bacteria have been reported for carotenoid production. Carotenoid from Neurospora sp. can be produced by either liquid or solid substrate fermentation. Carotenoids in Neurospora crassa have been reported containing phytoene, lycopene, β-carotene, γ-carotene, neurosporene and neurosporaxanthin (Sandmann et al., 2008). The objective of this research is to identify and to confirm the carotenoids of Neurospora intermedia N-1, and to study its stability by accelerated stability testing method.

Materials and Methods

Strains and growth condition

The Neurospora intermedia N-1 was obtained from Research Center for Chemistry LIPI, Bandung, was used in this study. Dried waste tofu was used for the culture of mycelia, and potato dextrose agar (PDA) slant medium was used for the stocking of strains and harvesting of conidia.