

INTISARI

Teh hitam menjadi salah satu minuman yang banyak dikonsumsi dan memiliki banyak manfaat bagi kesehatan. Selain rasa, aroma merupakan salah satu faktor utama yang menentukan kualitas teh hitam. Senyawa aroma dengan karakter *sweet floral* pada teh hitam terbentuk melalui degradasi oksidatif senyawa karotenoid yang dikatalisis oleh enzim *Carotenoid-cleavage Dioxygenase* (CCD) selama proses oksidasi enzimatis berlangsung. Penelitian ini bertujuan untuk meningkatkan senyawa aroma pada teh hitam melalui penambahan nanoemulsi β -karoten pada proses oksidasi enzimatis. Pada penelitian ini, enzim kasar yang diekstrak dari daun teh diharapkan mampu mengkatalisis reaksi pembelahan oksidatif dari substrat β -karoten yang ditambahkan. Hasil penelitian menunjukkan bahwa nanoemulsi β -karoten menghasilkan karakteristik nanoemulsi yang baik dan stabil. Teh hitam dibuat dari daun teh klon PGL 9 berdasarkan uji aktivitas enzim relatif tertinggi ($72,19 \pm 5,65\%$). Nanoemulsi β -karoten yang ditambahkan pada proses oksidasi enzimatis yaitu sebanyak 1% dan 2%. Penambahan 1% nanoemulsi β -karoten mampu meningkatkan aktivitas antioksidan, total senyawa fenolik, total karotenoid, dan tingkat kecerahan (*Lightness*) pada seduhan teh hitam. Berdasarkan kandungan theaflavin dan thearubigin, teh hitam dengan penambahan 1% Nanoemulsi β -karoten menghasilkan kualitas teh hitam yang lebih baik. Namun, penambahan 1% Nanoemulsi β -karoten justru menurunkan konsentrasi senyawa volatil turunan dari karotenoid apabila dibandingkan dengan teh hitam kontrol. Teridentifikasi sebanyak sembilan senyawa volatil hasil degradasi senyawa karotenoid, yaitu *β -damascenone*, *α -Ionone*, *Dihydro- β -ionone*, *Geranylacetone*, *α -Isomethyl ionone*, *trans- β -Ionone*, *Nerolidol*, *β -Cyclocitral*, dan *Dihydroactinidiolide* yang terbentuk oleh oksidasi enzimatis dan non-enzimatis senyawa karotenoid selama proses pengolahan teh hitam.

Kata kunci: Daun teh, aroma, β -karoten, *Carotenoid-Cleavage Dioxygenase*

ABSTRACT

Black tea was one of the most widely consumed drinks and has many health benefits. Apart from taste, the aroma was one of the main factors that determine the quality of black tea. Aromatic compounds with sweet floral characters in black tea are formed through oxidative degradation of carotenoid compounds catalyzed by the enzyme Carotenoid-cleavage Dioxygenase (CCD) during the enzymatic oxidation process. This study aims to increase the aroma compounds in black tea through the addition of β -carotene nanoemulsion in the enzymatic oxidation process. In this study, crude enzymes extracted from tea leaves were expected to be able to catalyze the oxidative cleavage reaction of the added β -carotene substrate. The results showed that β -carotene loaded nanoemulsion produced good and stable characteristics of nanoemulsion. Black tea was made from tea leaves from PGL 9 clones based on the highest relative enzyme activity test ($72.19 \pm 5.65\%$). The β -carotene nanoemulsion added to the enzymatic oxidation process was 1% and 2%. The addition of 1% β -carotene loaded nanoemulsion was able to increase antioxidant activity, total phenolic compounds, total carotenoids, brightness level (Lightness) in black tea steeping, and produces better quality black tea based on the content of theaflavins and thearubigins. However, the addition of 1% β -carotene nanoemulsion decreased the concentration of the carotenoid-derived volatile compounds when compared to the control black tea. There were nine volatile compounds were identified as a result of the degradation of carotenoid compounds, namely β -damascenone, α -Ionone, Dihydro- β -ionone, Geranylacetone, α -Isomethyl ionone, trans- β -Ionone, Nerolidol, β -Cyclocitral, and Dihydroactinidiolide which were formed by enzymatic and non-enzymatic oxidation of carotenoid compounds during the processing of black tea.

Keywords: Tea leaves, aroma, β -carotene, *Carotenoid-Cleavage Dioxygenase*