

ABSTRAK

Jagung merupakan tanaman pangan yang menghasilkan tongkol jagung sebagai limbah yang tak termanfaatkan. Oleh karena itu, perlu pemanfaatan tongkol jagung dalam formula optimum sebagai inhibitor tirosinase. Penelitian ini bertujuan untuk mengetahui uji penghambatan enzim tirosinase formula optimum fraksi tongkol jagung. Tongkol jagung diekstraksi dengan metode maserasi menggunakan pelarut etanol 70 % kemudian dipartisi dengan kloroform, etil asetat dan air sehingga menghasilkan 3 fraksi yaitu fraksi kloroform, fraksi etil asetat dan fraksi air. Ketiga fraksi dianalisis uji inhibitor tirosinase dengan metode penghambatan enzim tirosinase secara *in vitro* dan aktivitas antioksidan menggunakan uji penangkapan radikal DPPH (*2,2-difenil-1-pikrilhidrazil*). Uji kandungan fenolik total dan flavonoid total menggunakan spektrofotometri UV-Vis. Fraksi terpilih selanjutnya diformulasi dalam sediaan gel dan dioptimasi dengan metode *Simplex Latice Design* serta diverifikasi untuk mendapatkan formula optimum. Formula optimum dilakukan pengujian stabilitas menggunakan metode *freeze thaw cycling* selama 4 siklus, pengujian antioksidan menggunakan metode DPPH, pengujian proteksi kulit secara *in vitro*, pengujian iritasi kulit dan uji aktivitas penghambatan enzim tirosinase.

Hasil uji inhibitor tirosinase diperoleh aktivitas tirosinase tertinggi pada fraksi etil asetat dengan nilai IC_{50} $185,76 \pm 1,21$ $\mu\text{g/ml}$. Hasil aktivitas antioksidan dengan menggunakan metode DPPH diperoleh menunjukkan aktivitas antioksidan tertinggi pada fraksi etil asetat dengan nilai IC_{50} $25,79 \pm 4,91$ $\mu\text{g/ml}$. Kandungan fenolik total fraksi tongkol jagung berkisar antara 1,73 sampai 7,43 %b/b EAG, sedangkan kandungan flavonoid totalnya berkisar antara 0,01 sampai 1,34%b/b EK. Ketiga fraksi tongkol jagung mempunyai aktivitas tirosinase dan antioksidan yang berkorelasi dengan kandungan fenolik total dan flavonoid total. Fraksi terpilih etil asetat selanjutnya dilakukan optimasi formula optimum gel diperoleh komposisi bahan karbopol: TEA: propilen glikol = 1,2 :0,4: 9,4. Hasil uji verifikasi pada sifat fisik gel tidak berbeda signifikan dengan nilai yang diprediksikan. Hasil uji stabilitas fisik tidak signifikan sebelum dan sesudah *cycling test*. Hasil uji aktivitas antioksidan formula optimum dengan nilai IC_{50} $29,62 \pm 10,96$ $\mu\text{g/ml}$. Hasil uji aktivitas proteksi kulit dengan nilai SPF 10,55 pada konsentrasi 200 ppm. Hasil uji iritasi dengan nilai indeks iritasi primer adalah kategori respon iritasi sangat ringan dengan nilai 0,03. Hasil uji inhibitor tirosinase diperoleh aktivitas tirosinase nilai IC_{50} $149,98 \pm 44,12$ $\mu\text{g/ml}$ dengan kontrol positif asam kojat diperoleh nilai IC_{50} $125,90 \pm 67,19$ $\mu\text{g/ml}$ dan tidak berbeda signifikan dengan kontrol positif. Kesimpulan formula optimum gel fraksi etil asetat mempunyai aktivitas sebagai inhibitor tirosinase.

Kata kunci : tongkol jagung, tirosinase, antioksidan, fenolik total, flavonoid total

ABSTRACT

Corn is a food crop that produces corn cobs as waste that is not used correctly. Therefore, it is necessary to use corn cobs in the optimum formula as a tyrosinase inhibitor. This study aims to determine the tyrosinase enzyme inhibition test for the optimum formula for corn cob fraction. Corn cobs were extracted by maceration method using 70% ethanol solvent and then partitioned with chloroform, ethyl acetate, and water to produce three fractions, namely chloroform fraction, ethyl acetate fraction, and water fraction. The three fractions were analyzed by the tyrosinase inhibitor test using the tyrosinase enzyme inhibition method *in vitro* and the antioxidant activity using the DPPH (2,2-diphenyl-1-picrylhydrazil) radical scavenging test. Test the total phenolic content and total flavonoid using UV-Vis spectrophotometry. The selected fraction was then formulated in a gel preparation and optimized using the Simplex Lattice Design method and verified to obtain the optimum formula. The optimum formula was tested for stability using the freeze-thaw cycling method for four cycles, tested for antioxidants using the DPPH method, tested for skin protection *in vitro*, tested for skin irritation, and tested for tyrosinase enzyme inhibitory activity.

The results of the tyrosinase inhibitor test showed that the highest tyrosinase activity was in the ethyl acetate fraction with an IC_{50} value of $185,76 \pm 1,21 \mu\text{g/ml}$. The results of antioxidant activity using the DPPH method showed the highest antioxidant activity in the ethyl acetate fraction with an IC_{50} value of $25,79 \pm 4,91 \mu\text{g/ml}$. The total phenolic content of the corncob fraction ranged from 1,73 to 7,43 %b/b EAG, while the total flavonoid content ranged from 0,01 to 1,34%b/b EK. The three corncob fractions had tyrosinase and antioxidant activity, which correlated with total phenolic content and total flavonoid. The selected fraction of ethyl acetate was then optimized for the optimum gel formula to obtain the composition of carbopol material: TEA: propylene glycol = 1,2:0,4:9,4. The verification test results on the physical properties of the gel were not significantly different from the predicted values. The results of the physical stability test were not significant before and after the cycling test. The results of the antioxidant activity test of the optimum formula with an IC_{50} value of $29,62 \pm 10,96 \mu\text{g/ml}$. The activity test results on skin protection with an SPF value of 10,55 lie at a concentration of 200 ppm. The results of the irritation test with the primary irritation index value were the very mild irritation response category with a value of 0,03. The results of the tyrosinase inhibitor test showed that the IC_{50} value of tyrosinase activity was $149,98 \pm 44,12 \mu\text{g/ml}$ with positive control of kojic acid obtained an IC_{50} value of $125,90 \pm 67,19 \mu\text{g/ml}$ and was not significantly different from the positive control. Conclusions The optimum formula for the gel fraction of ethyl acetate has activity as a tyrosinase inhibitor.

Keywords: Corn Cobs, Tyrosinase, Antioxidant, Total Phenolic, Total Flavonoid