

## RINGKASAN

Tanaman kelor merupakan tanaman yang kaya akan nutrisi dan memiliki banyak manfaat untuk kesehatan. Daunnya merupakan sumber nutrisi seperti protein, vitamin, mineral, dan fitonutrien seperti karotenoid, polifenol, flavonoid, alkaloid, dan tanin. Keberadaan tanin sebagai senyawa antigizi menjadi salah satu kelemahan dalam pengolahan daun kelor. Tanin dapat menurunkan daya cerna protein, sehingga tingkat absorpsi di dalam tubuh untuk komponen gizi tersebut menjadi rendah. Oleh karena itu perlu dilakukan upaya pengolahan daun kelor lebih lanjut untuk mengatasi masalah tersebut. Salah satu cara yang dapat digunakan yaitu dengan mengolahnya menjadi minuman kombucha yang difermentasi menggunakan SCOBY (*Symbiotic Culture of Bacteria and Yeast*). Penelitian ini bertujuan untuk mengetahui pengaruh konsentrasi bubuk daun kelor dan waktu fermentasi terhadap karakteristik kimia kombucha daun kelor, mengetahui perubahan kadar tanin dan kadar protein terlarut kombucha daun kelor selama fermentasi, serta menentukan kombinasi perlakuan terbaik kombucha daun kelor berdasarkan karakteristik sensori.

Penelitian ini menggunakan Rancangan Acak Kelompok (RAK). Faktor yang diteliti meliputi konsentrasi bubuk daun kelor (K) yang terdiri dari konsentrasi 1% (K1); 1,3% (K2); 1,6% (K3); serta waktu fermentasi (F) yang terdiri dari 4 hari (F1), 8 hari (F2), 12 hari (F3). Variabel yang diamati terdiri dari variabel kimia (nilai pH, kadar tanin, kadar protein terlarut) dan variabel sensori (warna, aroma, kemanisan, *bitterness*, keasaman, dan tingkat kesukaan). Data variabel kimia dianalisis menggunakan analisis ragam dan uji lanjut *Duncan Multiple Range Test* pada taraf kepercayaan 95%. Data variabel sensori dianalisis menggunakan uji Friedman dan penentuan perlakuan terbaik menggunakan metode indeks efektivitas.

Hasil penelitian menunjukkan bahwa semakin tinggi konsentrasi bubuk daun kelor yang digunakan dapat meningkatkan kadar tanin, kadar protein terlarut, dan nilai pH kombucha daun kelor. Semakin lama waktu fermentasi berlangsung dapat menurunkan kadar tanin dan nilai pH kombucha daun kelor, sebaliknya dapat meningkatkan kadar protein terlarut kombucha daun kelor. Perubahan kadar tanin terbesar dihasilkan oleh kombucha perlakuan konsentrasi bubuk daun kelor 1,3% dengan waktu fermentasi 12 hari (K2F3) yang mengalami penurunan sebanyak 0,12%. Sedangkan perubahan kadar protein terlarut terbesar dihasilkan oleh kombucha perlakuan konsentrasi bubuk daun kelor 1% dengan waktu fermentasi 8 hari (K1F2), yaitu mengalami kenaikan sebanyak 0,18%. Perlakuan terbaik kombucha daun kelor berdasarkan karakteristik sensori diperoleh pada perlakuan konsentrasi bubuk daun kelor 1% dan waktu fermentasi 4 hari (K1F1). Karakteristik sensori dan kimia kombucha tersebut yaitu memiliki tingkat kesukaan disukai (3,77); rasa manis (3,50); rasa agak asam (2,77); rasa tidak pahit (1,87); aroma khas kombucha (3,70); warna kuning (1,10), kadar tanin 0,07%; kadar protein terlarut 0,70%; dan nilai pH 3,56.

## SUMMARY

*Moringa plant is a plant rich in nutrients and has many health benefits. The leaves are a source of nutrients such as protein, vitamins, minerals, and phytonutrients such as carotenoids, polyphenols, flavonoids, alkaloids, and tannins. The presence of tannins as anti-nutritional compounds is one of the weaknesses in processing Moringa leaves. Tannins can reduce protein digestibility, so the level of absorption in the body for these nutritional components becomes low. Therefore, it is necessary to make further efforts to process Moringa leaves to overcome this problem. One method that can be used was by processing it into a fermented kombucha drink using a SCOBY (Symbiotic Culture of Bacteria and Yeast). This study aims to determine the effect of moringa leaf powder concentration and fermentation time on the chemical characteristics of moringa leaf kombucha, determine changes in tannin and soluble protein levels of moringa leaf kombucha during fermentation, and determine the best treatment combination of moringa leaf kombucha based on sensory characteristics.*

*This research used a Randomized Group Design. The factors studied included the concentration of Moringa leaf powder (K), which consisted of a concentration of 1% (K1); 1,3% (K2); 1,6% (K3); as well as fermentation time (F) which consists of 4 days (F1), 8 days (F2), 12 days (F3). The variables observed consisted of chemical variables (pH value, tannin content, soluble protein content) and sensory variables (color, flavor, sweetness, bitterness, acidity, and level of liking). Chemical variable data were analyzed using analysis of variance and the Duncan Multiple Range Test at a confidence level of 95%. Sensory variable data was analyzed using the Friedman test and the best treatment is determined using the effectiveness index method.*

*The results showed that the higher the concentration of moringa leaf powder used, the higher the tannin content, soluble protein content, and pH value of moringa leaf kombucha. The longer the fermentation time, the lower the tannin content and pH value of moringa leaf kombucha, while the higher the soluble protein content of moringa leaf kombucha. The largest change in tannin content was produced by kombucha treated with 1,3% moringa leaf powder concentration with a fermentation time of 12 days (K2F3), which decreased by 0,12%. Meanwhile, the largest change in soluble protein content was produced by kombucha treated with 1% moringa leaf powder concentration with a fermentation time of 8 days (K1F2), which increased by 0,18%. The best treatment of moringa leaf kombucha based on sensory characteristics was obtained in the treatment of 1% moringa leaf powder concentration and 4 days fermentation time (K1F1). The sensory and chemical characteristics of kombucha were having a preferred level (3,77); sweet taste (3,50); slightly sour taste (2,77); not bitter taste (1,87); typical kombucha flavor (3,70); yellow color (1,10), tannin content 0,07%; soluble protein content 0,70%; and pH value 3.56.*