# ABSTRAK

Herlina Iriyanti, 2025. *Penyusunan E- Modul Berbasis Riset Uji Kualitas Kombucha Teh Herbal Indonesia.* Skripsi. Program Studi Pendidikan Biologi, FKIP, Universitas Pgri Madiun, Pembimbing (I) Pujiati, S.Si., M.Si., (II) Sri Utami, S.Pd., M.Pd.

Penelitian ini bertujuan untuk mengevaluasi kualitas kombucha berbasis teh herbal asli Indonesia melalui analisis multidimensional yang mencakup validasi media pembelajaran (E-Modul), uji organoleptik, perubahan pH, pertumbuhan biomassa SCOBY, serta aktivitas antibakteri dan antioksidan. Enam jenis teh herbal, yakni daun gambir, jati belanda, daun kelor, kumis kucing, temulawak, dan teh hijau digunakan sebagai substrat fermentasi selama 24 hari. Validasi E-Modul oleh ahli materi dan media menunjukkan tingkat kelayakan masing-masing sebesar 85,23% dan 94,32%, mengindikasikan bahwa modul sangat layak digunakan dalam konteks pembelajaran. Analisis organoleptik menunjukkan bahwa parameter visual (warna) merupakan atribut paling disukai panelis, sementara aroma dan rasa bervariasi antar individu.

Hasil pengukuran pH menunjukkan penurunan signifikan pada hari ke-3 hingga ke-9, dengan teh jati belanda dan daun kelor mengalami penurunan pH paling drastis. Berat SCOBY tertinggi dihasilkan oleh teh gambir (29,2 g pada hari ke-12), sedangkan teh kumis kucing menunjukkan pola pertumbuhan fluktuatif akibat senyawa antimikroba yang terkandung di dalamnya. Uji antibakteri mengindikasikan bahwa teh temulawak memiliki aktivitas paling kuat terhadap Staphylococcus aureus (zona hambat 8,5 mm), sedangkan teh gambir memiliki efek terbatas terhadap Escherichia coli. Uji antioksidan dengan metode DPPH menunjukkan bahwa teh jati belanda memiliki kapasitas antioksidan tertinggi (IC50 = 24,21 ppm), diikuti oleh daun gambir (28,49 ppm), sedangkan kumis kucing memiliki aktivitas terendah.

Secara keseluruhan, jenis teh herbal memberikan pengaruh yang signifikan terhadap parameter kualitas kombucha. Hasil ini menegaskan bahwa teh herbal lokal Indonesia berpotensi tinggi sebagai substrat fermentasi kombucha fungsional dan dapat diintegrasikan dalam pengembangan media pembelajaran berbasis produk pangan fermentasi.

Kata Kunci: Kombucha, Teh Herbal Indonesia, SCOBY, Antioksidan, Antibakteri, Fermentasi,E-Modul.

# ABSTRACT

**Herlina Iriyanti**, 2025. Development of an E-Module Based on Research on the Quality Testing of Indonesian Herbal Tea Kombucha. Thesis. Biology Education Program, FKIP, Universitas Pgri Madiun, Supervisors (I) Pujiati, S.Si., M.Si., (II) Sri Utami, S.Pd., M.Pd.

Keywords: Kombucha, Indonesian Herbal Tea, SCOBY, Antioxidant, Antibacterial, Fermentation, E-Module.

This study aims to evaluate the quality of Indonesian herbal tea-based kombucha through a multidimensional analysis that includes validation of the learning medium (E-Module), organoleptic testing, pH changes, and SCOBY biomass growth, as well as antibacterial and antioxidant activity. Six types of herbal tea gambir leaves, Dutch teak, moringa leaves, cat's whiskers, temulawak, and green tea were used as fermentation substrates for 24 days. E-module validation by subject matter experts and media specialists indicated suitability levels of 85.23% and 94.32%, respectively, indicating that the module is highly suitable for educational use. Organoleptic analysis revealed that visual parameters (color) were the most preferred attribute by panelists, while aroma and taste varied among individuals.

The pH measurement results showed a significant decrease on days 3 to 9, with Dutch teak tea and moringa leaves experiencing the most drastic pH decrease. The highest SCOBY weight was produced by gambir tea (29.2 g on day 12), while cat's whisker tea showed a fluctuating growth pattern due to the antimicrobial compounds it contains. Antibacterial testing indicated that temulawak tea had the strongest activity against Staphylococcus aureus (inhibition zone of 8.5 mm), while gambir tea had a limited effect on Escherichia coli. Antioxidant testing using the DPPH method showed that Dutch teak tea had the highest antioxidant capacity (IC50 = 24.21 ppm), followed by gambir leaves (28.49 ppm), while cat's whiskers had the lowest activity.

Overall, herbal tea types significantly influence kombucha quality parameters. These results confirm that Indonesian herbal teas have high potential as substrates for functional kombucha fermentation and can be integrated into the development of educational media based on fermented food products.