LAPORAN AKHIR PENELITIAN SUMBER DANA PNBP

SKEMA PENELITIAN PENUGASAN TEMATIK

Eksplorasi Potensi Buah Melon (*Cucumis melo L.*) sebagai Bahan Baku Produk Pangan Inovatif

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Bidang Fokus Penelitian : Pangan - Pertanian

POLITEKNIK NEGERI JEMBER

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Judul Penelitian	:	Eksplorasi Potensi Buah Melon (*Cucumis melo L.*) sebagai Bahan Baku Produk Pangan Inovatif
Skema	:	Penelitian Penugasan Tematik
Jenis TKT	:	TKT 4
Level TKT	:	Awal Penelitian : 3 Akhir Penelitian : 4

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IDENTITAS DAN URAIAN UMUM
Bagian ini berisi informasi sebagai berikut :

Judul Penelitian : *Eksplorasi Potensi Buah Melon (Cucumis melo L.) sebagai Bahan Baku Produk Pangan Inovatif*

Tim Peneliti : tuliskan tim peneliti dengan format sebagai berikut

No	Nama	NIDN/NUPTK	Pendidikan Terakhir
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Objek Penelitian : Limbah melon hasil budidaya untuk tujuan pembenihan

Masa Pelaksanaan : Juli - Desember 2025

Jumlah Dana PNBP Diusulkan : Rp. 25.000.000

Jumlah Dana PNBP Disetujui : Rp. 25.000.000

Lokasi Penelitian : Laboratroum Pengolahan dan Laboratroium TRP

Jurusan Teknologi Pertanian

Temuan yang ditargetkan : Produk hasil olahan melon

Kontribusi mendasar pada suatu bidang ilmu: Penelitian yang mengeksplorasi potensi produk olahan dari limbah daging buah melon memberikan kontribusi fundamental terhadap pengembangan ilmu pengetahuan, khususnya dalam bidang teknologi hasil pertanian, pangan fungsional, biomaterial, serta pemanfaatan hasil samping hortikultura. Kontribusi tersebut meliputi:

Memperluas Pengetahuan Ilmiah tentang Nilai Tambah Limbah Daging Buah Melon

Penelitian ini memperkenalkan data ilmiah baru mengenai karakteristik kimia, fisik, dan fungsional dari daging buah melon yang tidak layak jual, sehingga memperkaya literatur tentang potensi pemanfaatan limbah buah berair. Hal ini memberikan pemahaman lebih dalam tentang kualitas daging melon pada grade rendah sebagai bahan baku alternatif. selain itu juga Studi ini membantu membangun dasar ilmiah untuk menilai keamanan, daya simpan, kualitas sensori, serta potensi komersial produk olahan berbahan limbah daging melon. Hal ini memperkaya metodologi penilaian mutu dan kelayakan produk berbasis agro residu.

Rencana Luaran dan Target Pencapaian :

Rencana Luaran dan Target Pencapaian: uraikan dengan format berikut

No	Luaran	Jenis Luaran	Tahun	Status	Keterangan
1	Wajib	Artikel ilmiah di proceding internasio nal	2025	Submit	IOP Conference Series 2025 atau JTEFA POLIJE
2	Wajib	Seminar Internasional	2025	Presenter	ICOFA 2025
3	Tambahan	Artikel Ilmiah Jur nal	2025	Submit	Jurnal SINTA

RINGKASAN

Isian ringkasan penelitian tidak lebih dari 300 kata yng berisi urgensi, tujuan, metode dan luaran yang ditargetkan

Melon (Cucumis melo L.) adalah salah satu komoditas hortikultura unggulan yang sudah banyak dibudidayakan di Indonesia, termasuk salah satunya di wilayah Kab upaten Jember. Sejalan dengan pengembangan teknologi pertanian, Politeknik Negeri Je mber melalui Smart Green House (SGH) sudah mengembangkan aktivitas pembenihan melon untuk menghasilkan varietas unggul. Pada proses pembenihan tersebut, biji melon dipisa hkan dari daging buahnya yang selanjutnya menghasilkan daging buah yang belum dimanfaa tkan secara optimal

Tujuan dari penelitian ini adalah untuk melakukan eksplorasi pemanfaatan limbah daging melon hasil pembibitan sehingga dapat diperoleh suatu rekomendasi produk olahan yang mem iliki potensi pasar dan memiliki nilai kebermanfaatan. Pemanfaatan limbah daging buah m elon ini tidak hanya akan mengurangi potensi pencemaran lingkungan yang diakibatkan dari penumpukan limbah organik tetapi juga dapat meningkatkan nilai ekonomi dari buah melon yang kurang termanfaatkan. Pada penelitian ini produk yang akan diuji cobakan adalah ma nisan melon, cocktail buah, sari buah, dan penelitian ini dilakukan dengan metode eksperi mental. Analisa yang dilakukan meliputi analisis karakteristik produk dan anali sa data. Analisis karakteristik produk meliputi analisa kimia, sifat fisik, dan organo leptik atau preferensi konsumen. Eksplorasi ini diharapkan bisa menciptakan alternatif produk pangan bernilai tambah tinggi yang tidak hanya menekan limbah, melainkan juga s

ebagai upaya mendukung diversifikasi produk pangan lokal dan hilirisasi hasil peneli tian di lingkungan Politeknik Negeri Jember.

I. PENDAHULUAN

Pendahuluan penelitian tidak lebih dari 1500 kata yang memuat latar belakang, rumusan pe rmasalahan yang akan diteliti, pendekatan pemecahan masalah, state-of-the-art dan kebaru an, peta jalan (roadmap) penelitian setidaknya 5 tahun. Sitasi disusun dan ditulis berda sarkan sistem nomor sesuai dengan urutan pengutipan (style vancouver).

Melon (*Cucumis melo L.*) adalah salah satu komoditas hortikultura unggulan yang sudah ban yak dibudidayakan

di Indonesia, termasuk salah satunya di wilayah Kabupaten Jember. Kabupaten Jember s ebagai salah satu sentra pertanian di Jawa Timur, memiliki potensi besar dalam pengem bangan melon. Produksi melon di wilayah Kabupaten Jember menunjukkan tren yang cuku p stabil yaitu sebesar 4.068 kuintal (1). Melon mempunyai rasa manis, aroma khas ya ng segar, dan kandungan nutrisi yang cukup tinggi meliputi vitamin C, β-karoten, anti oksidan, dan serat pangan yang berguna untuk kesehatan (2). Sejalan dengan pengembanga n teknologi pertanian, Politeknik Negeri Jember melalui Smart Green House (SGH) sudah m engembangkan aktivitas pembenihan melon untuk menghasilkan varietas unggul. Pada proses pembenihan tersebut, biji melon dipisahkan dari daging buahnya yang selanjutnya menghas ilkan daging buah yang belum dimanfaatkan secara optimal. Pemanfaatan daging buah melo n masih didominasi untuk konsumsi segar, sedangkan pengolahan menjadi produk pangan in ovatif masih sangat terbatas (3).

Padahal, daging buah melon sisa dari proses pengambilan biji masih mengandung banyak senyawa bioaktif dan kandungan gizi yang sangat berpotensi untuk diolah menjadi produk pangan inovatif, seperti minuman fungsional, jelly, manisan, jus, puree, cocktail, ata u produk fermentasi (4). Pemanfaatan limbah daging buah melon ini tidak hanya akan me ngurangi potensi pencemaran lingkungan yang diakibatkan dari penumpukan limbah organi k, melainkan juga dapat menjadi langkah strategis untuk menghasilkan nilai tambah s ecaraekonomi (5). Dalam penelitian (6) menjelaskan bahwa ekstrak buah melon mempunyai aktivitas antioksidan yang tinggi dan sesuai untuk diaplikasikan sebagai produk panga n fungsional yang saat ini semakin diminati oleh masyarakat.

Pemanfaatan limbah agribisnis sebagai bahan baku produk pangan inovatif adalah salah s atu pendekatan sustainable development yang sekarang ini banyak diusahakan, baik dala m skala industri maupun institusi pendidikan vokasi. Hal tersebut sejalan dengan pr insip circular economy, di mana sisa hasil pascapanen

pertanian dan industri diolah menjadi produk berdaya guna (7). Politeknik Negeri Jembe r sebagai institusi pendidikan tinggi vokasi mempunyai peran strategis dalam upaya me ndorong inovasi teknologi pengolahan pangan berbasis pemanfaatan sumber daya lokal sekaligus mengurangi potensi limbah dari kegiatan agribisnis modern, seperti kegiatan pembenihan melon di Smart Green House Politeknik Negeri Jember.

Berdasarkan kondisi tersebut, diperlukan suatu aktivitas eksplorasi untuk mengidentifikasi potensi daging buah melon sisa pengambilan biji sebagai bahan baku produk pangan inovatif. Eksplorasi ini diharapkan bisa menciptakan alternatif produk pangan bernilai tambah tinggi yang tidak hanya menekan limbah, melainkan juga sebagai upaya mendukung diversifikasi produk pangan lokal dan hilirisasi hasil penelitian di lingkungan Politeknik Negeri Jember.

Permasalahan

Permasalahan penelitian ini yaitu bagaimana memanfaatkan buah melon yang merupakan limbah hasil

budidaya melon untuk pembibitan sehingga diperoleh rekomendasi produk unggulan yang berkualitas dan berdaya saing

Tujuan

Tujuan dilakukannya penelitian ini adalah dapat memberikan rekomendasi strategi pemanfaatan hasil samping

dalam sistem pembibitan agar lebih berkelanjutan dan

minim limbah

selain itu juga diharapkan dapat mendapatkan rekomendasi produk olahan buah melon yang unggul dan berdaya saing serta memiliki prospek pasar luas

Kebaruan,Manfaat dan Urgensi Penelitian

Buah melon pada smart green house POLIJE saat ini difokuskan kepada budidaya melon untuk pembibitan

sehingga untuk daging buah yang dihasilkan masih kurang memenuhi standart mutu untuk melon konsumsi di masyarakat. Penelitian ini menggali potensi nilai tambah dari limbah pertanian tersebut melalui pendekatan eksplorasi komposisi kimia, potensi bioaktif, dan alternatif pengolahan produk turunan. Penelitian ini berdasarkan Roadmap penelitian Program Studi Teknologi Industri Pangan, Jurusan Teknologi Pertanian Tahun 2021-2025 dengan tema penguatan agroindustri berbahan baku sumber daya lokal. Urgensi dari penelitian adalah untuk menghasilkan rekomendasi produk olahan melon sesuai dengan harapan konsumen yang mana mendukung prinsip pertanian berkelanjutan, dengan mendorong pemanfaatan seluruh bagian dari hasil pertanian, termasuk yang tidak lolos seleksi mutu konsumsi sejalan dengan pendekatan circular agriculture, yang menekankan penggunaan sumber daya secara efisien dan mengurangi limbah.

State The Art

Sebagian besar penelitian mengenai budidaya melon di Indinesia masih terfokus pada pengembangan varietas
unggul melalui teknik pembibitan dan seleksi genetik (Nurcahyani et al., 2020; Zhang et al., 2022). Secara umum tujuan utamanya adalah menghasilkan benih dengan ketahanan tinggi terhadap hama, iklim, dan hasil buah berkualitas tinggi. Akan tetapi dalam proses pembibitan tersebut, banyak buah yang dihasilkan tidak ditujukan untuk konsumsi karena hanya dimanfaatkan sebagai media penghasil benih. Karena itu umumnya daging buah yang diahsilkan masih belum sesuai dengan standart mutu daging buah untuk konsumsi. Karena factor tersebut seringkali bagian daging buah sering kali dibuang dan tidak termanfaatkan. Daging buah tersebut masih berpotensi mengandung nutrisi dan senyawa bioaktif yang potensial.

Beberapa studi telah dilakukan terkait pemanfaatan limbah buah-buahan secara umum, misalnya limbah semangka (Rahmawati et al., 2019) yang menunjukkan bahwa bagian daging buah yang tidak memenuhi standar pasar masih dapat diolah menjadi produk fungsional seperti selai, jus, tepung buah, hingga pakan ternak fermentasi. Penelitian mengenai pemanfaatan buah melon hasil pembibitan masih belum banyak dilakukan, sehingga potensi ekonomis dari limbah ini masih belum dilakukan secara maksimal. Penelitian yang mengintegrasikan inovasi teknologi pengolahan hasil samping dengan pendekatan keberlanjutan akan memberikan kontribusi strategis, baik dalam mengurangi limbah organik maupun dalam menciptakan nilai tambah dari produk samping.hal ini sejalan dengan pendekatan circular agriculture dan zero waste dalam sektor hortikultura yang mulai banyak diperhatikan dalam kebijakan pembangunan pertanian berkelanjutan (FAO,
2023).

Road Map Penelitian

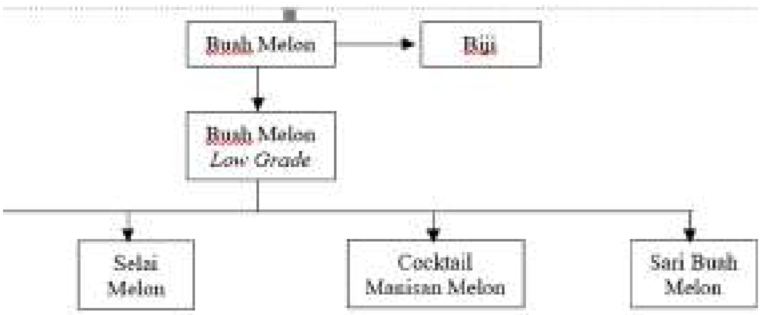
Penelitian ini berdasarkan Roadmap Penelitian Program Studi Teknologi Industri Pangan, Jurusan Teknologi
Pertanian Tahun 2021-2025 dan salah satu upaya mewujudkan RIR Polije (Rencana Induk R

iset Politeknik Negeri Jember) Tahun 2021-2025 dalam bidang fokus riset Pangan-Pertanian. Tema Riset adalah Teknologi Pascapanen dan Rekayasa Teknologi Pengolahan Pangan. Topik Riset adalah Diversifikasi dan hilirisasi produk pertanian dan perkebunan. Peta jalan penelitian ini yaitu: tahun pertama eksplorasi awal, karakterisasi,formulasi dan umur simpan produk olahan melon, Tahun ke-dua optimalisasi produk dan formulasi produk olahan melon. Tahun ke-tiga menentukan umur simpan, kemanan pangan dan jenis kemasan yang tepat. Tahun ke-empat Integrasi model pemanfaatan dengan sistem pembibitan melon. Berikut roadmap penelitian ini :

II. METODE

Isian metode atau cara untuk mencapai tujuan yang telah ditetapkan tidak lebih dari 1000 kata. Pada bagian ini wajib dilengkapi dengan diagram alir penelitian yang menggambarkan apa yang sudah dilaksanakan dan akan dikerjakan selama waktu yang diusulkan. Format diagram alir dapat berupa file JPG/PNG. Metode penelitian harus memuat sekurang-kurangnya prosedur penelitian, hasil yang diharapkan, indikator capaian yang ditargetkan, serta anggota tim/mitra yang bertanggung pada setiap tahapan penelitian. Metode penelitian harus sejalan dengan Rencana Anggaran Biaya (RAB).

Eksplorasi potensi buah melon merupakan solusi yang ditawarkan pada penelitian ini dalam mengatasi hasil samping proses produksi benih melon yang ada di Politeknik Negeri Jember. Terdapat 3 inovasi produk yang coba ditawarkan oleh tim peneliti yakni mengolah buah melon menjadi selai, cocktail, dan sari buah. Hal ini didasari dari penelitian pendahuluan, dimana melon ini memiliki nilai ^{0}Brix sebesar 5, tekstur 33,1 N dan 22,7 N. Penelitian ini mengkaji 3 pengembangan produk yakni:



Gambar 2. Konsep Penelitian Pengembangan Produk

Inovasi pertama yaitu **pembuatan selai melon** dari buah melon yang sudah dipisahkan bijinya. Pembuatan selai melon dapat menjadi solusi untuk menekan kehilangan hasil pascapanen dan meningkatkan nilai tambah dari buah afkir. Kombinasi antara pulp melon, gula, dan bahan pembentuk gel seperti pektin atau CMC (*Carboxymethyl cellulose*) menjadi kunci dalam menghasilkan tekstur dan cita rasa yang diinginkan. Selain itu, penambahan asam sitrat dapat berperan dalam menyeimbangkan pH, meningkatkan ketahanan mikrobiologis, dan memperkuat rasa buah(10). Pada penelitian ini ada 2 faktor utama yang berperan penting yaitu konsentrasi gula (45%, 55%, dan 65%). Faktor kedua yakni konsentrasi pektin (0,5%, 1,0%, dan 1,5%).

Inovasi kedua yakni dengan adanya inovasi pembuatan **manisan basah** atau **cocktail** melon. Pembuatan manisan basah umumnya melibatkan proses pemotongan, perendaman dalam larutan gula dengan atau tanpa *pre-treatment*, serta pengemasan dalam sirup konsentrasi tertentu. Penambahan asam sitrat sebagai pengatur pH dan antioksidan alami, serta perlakuan blansir, terbukti mampu mempertahankan mutu sensorik dan mikrobiologis produk(11). Konsentrasi sirup dan jenis pre-treatment memiliki pengaruh terhadap karakteristik o rganoleptik dan umur simpan produk(10). Oleh karena itu, ada 2 faktor yang perlu dikaji pada pembuatan cocktail melon ini yakni *pretreatment* (kontrol, perendaman asam sitrat 0,2% (10 menit), dan blansing 75^{0}C (1 menit)). Faktor kedua yakni suhu meliputi konsentrasi sirup gula (30^{0}Brix, 40^{0}Brix, dan 50^{0}Brix).

Inovasi ketiga yakni pengolahan melon menjadi produk **minuman sari buah**. Proses pembuatan sari buah meliputi penghancuran, penyaringan, penambahan air, gula, pengatur keasaman, dan dilakukan proses pasteurisasi untuk menurunkan mikroorganisme patogen tanpa merusak kualitas sensorik dan gizi produk. Keberhasilan produk sari buah sangat ditentukan oleh kestabilan warna, rasa, dan keasaman(11). Konsentrasi gula dan pH menjadi dua faktor kritis yang memengaruhi kesukaan konsumen dan daya simpan produk. Oleh karena itu, pada penelitian ini dilakukan pengkajian terkait penggunaan konsentrasi gula (8%, 10%, & 12%) dan konsentrasi asam sitrat (0,1%, 0,2%, & 0,3).

Penentuan Umur Simpan

Penentuan umur simpan dilakukan dengan menguji umur simpan produk dengan perlakuan terbaik menggunakan Metode Arrhenius. Penelitian ini dilakukan dengan 2 perlakuan utama selama 28 hari yaitu suhu penyimpanan produk pada 2 kondisi suhu dan 3 lama waktu penyimpanan dengan ulangan sebanyak 3 kali. Rancangan percobaan yang digunakan yaitu *Nested Design* seperti berikut:

Suhu Penyimpanan

S1 = Suhu Ruang

S2 = Suhu dingin (4°C)

Lama Waktu

L1 = 0 hari

L2 = 7 hari

L3 = 14 hari

L4 = 21 hari

Kegiatan penelitian ini diawali dengan penyusunan proposal untuk mengajukan pendanaan PNBP skema Rancangan percobaan pada penelitian ini dipilih RAL (Rancangan Acak Lengkap) dengan uji lanjut *tukey.* Pemilihan perlakuan terbaik dilakukan dengan menggunakan metode *multiple attributes*. Berikutnya dilakukan Analisa fisik(12), kimia(13), dan organoleptik. Analisis fisik berupa warna (L*,a*,&b*), tekstu, pH. Analisis kimia berupa kadar air, gula reduksi . Analisis organoleptik dilakukan dengan metode uji hedonik dan mutu hedonik pada 30 panelis. Selanjutnya dilakukan Analisa umur simpan produk terbaik.

III. HASIL DAN LUARAN YANG DICAPAI

Capain hasil dan luaran yang dijanjikan

Penelitian dilakukan dengan melakukan ujicoba pada tiga produk terpilih dengan mempertimbangkan pangsa pasar , kemudahan produksi, dan biaya produksi. Ketiga produk yang diperoleh dengan menyesuaikan dengan lingkungan kampus terlebih dahulu Adalah cocktail, syrup,dan , dan selai melon. Untuk mendapatkan produk yang berkualitas dilakukan penyesuaian dengan karakteristik melon yang digunakan sebagai bahan dasar. Melon yang digunakan memiliki rasa hambar, tekstur renyah,dan warna pucat.

Observasi awal menunjukkan hasil pengujian fisik dan organoleptic dari melon yang merupakan limbah dari proses budidaya melon untuk diambil benihnya. Hasil pengujian Adalah sebagai berikut

nilai ^{0}Brix sebesar 5, tekstur 33,1 N dan 22,7 N. hasil uji organoleptic menunjukkan bahwa melon memiliki daging buah yang bertekstur renyah, warna hijau sedikit pucat, rasa hambar, dan aroma yang netral.

Tahap 1

a. Pengeringan melon

Pada tahap awal melon dilakukan uji coba pengeringan dengan menggunakan dehydrator dengan suhu 60C dan dilakukan pengeringan selama 12 jam. Melon dilakukan proses pengecilan ukuran terlebh dahulu dan di tempatan pada tray selanjuutnya dilakukan proses pengeringan. Tahap ini bertujuan untuk mendapatkan chips melon yang kering sehingga dapat di proses menjadi keripik melon ataupun menjadi tepung atau serbuk melon agar dapat memudahkan dalam proses pembuatan prpduk yang lain . akan tetapi hasil pengeringan menunjukkan bahwa melon yang dikeringkan tidak mencapai hasil yang diharapkan. Melon menjadi lunak dan lengket sehingga tidak dapat diproses lebih lanjut.

b. Perendaman dalam larutan gula

Melon dilakukan proses pengecilan ukuran kemudian dilakukan perendaman dalam larutan gula dengan konsentrasi yang berbeda, dan diberikan perlakuan blanching dan tanpa blanching. Hasil yang diperoleh melon dengan Tingkat kandungan gula lebih tinggi dapat lebih awet dan memiliki aroma yang mulai memunculkan aroma khas melon dan tekstur juga tidak banyak mengalami perubahan. Pada melon dengan blanching hasil perendaman juga menampilkan warna yang tidak banya engalami perubahan dan rasa yang juga memunculkan rasa dan aroma khas melon. Akan tetapi proses pembuatan manisan memerlukan waktu yang lama dan beberapa kondisi dapat memicu kontaminasi bakteri.

Tahap kedua

Tahap kedua memrupakan proses pembuatan produk melon yang didasarkan pada target pasar be rupa mahasiswa dan lingkungan kampus serta eksternal kampus. Dengan demikian ditentukan p roduk yang dapat terjangkau dan mampu untuk mengimbangi kelemahan atas kualitas dari melo n yang digunakan.Produk yang di buat berupa tiga produk yaitu selai melon,cocktail buah, dan syrup melon.

1. selai melon
2 manisan basah
3.minuman sari buah

a. Selai melon

Pada penelitian ini ada 2 faktor utama yang berperan penting yaitu konsentrasi gula (45%, 55%, dan 65%). Faktor kedua yakni konsentrasi pektin (0,5%, 1,0%, dan 1,5%). Selai melon dapat dibuat dengan menghancurkan buah melon menjadi bubur dan memprosesnya d a dan bahan tambahan lainnya yaitu pektin dan asam sitrat. Ditambahkan sedikit essens unt katkan aroma melon pada selai. Berdasar treatmen maka terdapat 9 sample selai melon yang untuk mendapatkan hasil yang terbaik terutama dari segi penerimaan konsumen panelis. Bahan yang digunakan dalam pembuatan selai melon Adalah buah melon hasil budidaya pembe nihan Smart Green House Politeknik Negeri Jember, gula kristal putih, glukosa, asam sit rat,pektin,essens melon,dan air.

Penelitian dilakuan dengan Rancangan Acak Lengkap dengan 9 perlakuan dan 3 kali ulangan .Perlakuan pada penelitian ini meliputi konsentrasi penggunaan pektin dan konsentrasi k adar gula pasir yang digunakan yang terdiri dari perbandingan gula kristal purih dan gl ukosa dengan pektin sebesar :

1. A1 (45% gula (30% gula ristal putih: 15% glukosa) : 0,1% pektin)
2. A1 (45% gula (30% gula ristal putih: 15% glukosa) : 0,2% pektin)
3. A1 (45% gula (30% gula ristal putih: 15% glukosa) : 0,3% pektin)
4. A2 (55% gula (40% gula ristal putih: 15% glukosa) : 0,1% pektin)
5. A2 (55% gula (40% gula ristal putih: 15% glukosa) : 0,2% pektin)
6. A2 (55% gula (40% gula ristal putih: 15% glukosa) : 0,3% pektin)
7. A3 (65% gula (50% gula ristal putih: 15% glukosa) : 0,1% pektin)
8. A3 (65% gula (50% gula ristal putih: 15% glukosa) : 0,2% pektin)
9. A3 (65% gula (50% gula ristal putih: 15% glukosa) : 0,3% pektin)

Pada penelitian di uji pH ,kadar total padatan terlarut, daya oles selai, kadar gula reduksi, kadar vitamin C, dan pengujian organoleptic berupa uji hedonic dan mutu hedonik

Hasil pengamatan mengenai ph dan kadar brix dapat dilihat pada table berikut

Perlakuan	Kadar Total padatan terlarut (° Brix)	PH	Daya Oles
A1(45%gula 0,1 pektin)	58,85± 0,071c	5	8,65± ,212
A2 (45%gula 0,2 pektin)	58,1± 0,424b	5	9±0
A3 (45%gula 0,3 pektin)	51,75± 0,212a	5	8,5±,071
A4 (55%gula 0,1 pektin)	69,2±0,565g	6	8,1±0,141
A5 (55%gula 0,2 pektin)	66,6± 0,0f	6	8,15±0,212
A6 (55%gula 0,3 pektin)	65,58,2±0,283a	6	9±0
A7 (65%gula 0,1 pektin)	65,45± 0,071e	6	7,2±0,424
A8 (65%gula 0,2 pektin)	69,85± 0,071h	6	7,15±0,495
A9 (65%gula 0,3 pektin)	62,6± 0,0d	6	8,75±0,071

Analisa Hedonik

Table hasil Analisa hedonic

	warna	aroma	tekstur	rasa	keseluruhan
A1	3,462± ,8593ab	2,346± ,8458a	3,231± ,8629ab	2,846± ,9672a	3,000± ,9798a
A2	3,500± ,8602ab	2,577± ,7575a	3,654± ,6288bc	3,385± ,8521ab	3,038± ,7200a
A3	3,577± ,8086ab	2,538± ,8115a	3,692± ,8376bc	3,115± ,8162ab	3,115± ,8162a

A4	3,654±,9774ab	2,769±,8152a	3,385±1,0612abc	3,269±1,0414ab	3,231±,9081a
A5	3,500±,9899ab	2,577±,9021a	3,538±,8115abc	3,269±,9190ab	3,115±,7656a
A6	3,885±,9089b	2,692±,8840a	3,885±,7656	3,346±,9774ab	3,385±,8038a
A7	3,385±,9414ab	2,538±,8115a	3,654±,8458bc	3,500±1,1747b	3,423±1,0266a
A8	3,192±1,0206a	2,423±,7575a	3,038±1,1129a	3,115±,9931ab	3,000±,9381a
A9	3,385±,9829ab	2,769±,9511a	3,731±,7243bc	3,385±,8521ab	3,346±,7452a

Analisa Mutu Hedonik

Perlakuan	Warna	Aroma	Tekstur	Rasa	Keseluruhan
A1	2,769±.8629	2,231±.9511a	3,423±1,0648a	2,808±1,0590a	2,962±,7736a
A2	2,385±.8979a	2,115±.7656a	3,577±,8086a	2,962±,9157a	3,154±,8339ab
A3	2,654±.8458	2,192±.9806a	3,731±,8274ab	2,692±,9282a	3,115±,8162ab
A4	2,769±10699,000	2,192±.9806a	4,154±,9672bc	3,115±1,1774a	3,385±1,0612ab
A5	2,538±.8593a	2,115±.9519a	3,808±,8494ab	2,885±1,0706a	3,385±,9414ab
A6	2,923±.9348	2,269±.9190a	3,808±,8494ab	3,115±1,0706a	3,615±,7524b
A7	2,154±.9672a	1,962±.7736a	3,654±,7452ab	3,038±1,0385a	3,538±1,0288ab
A8	2,077±.8910a	2,000±.8000a	4,346±,7971c	2,808±1,2006a	3,000±1,0198a
A9	2,038±.8709a	2,115±.7114a	3,654±,8458ab	3,000±1,0954a	3,500±,9055ab

Kadar Vitamin C

vitamin c dilakukan pada hasil terbaik dari pengujian organoleptic yang dilakukan. Pada pengamatan diperoleh hasil terbaik yaitu pada sampel dengan penggunaan gula sebesar 40% dan kadar pektin sebesar 0,2%. Selai melon tersebut memiliki kadar vitamin C sebesar 6, 69 mg/100 gram . sedangkan pada daging melon yang digunakan sebagai bahan pembuatan selai diketahui kadar vitamin C Adalah sebesar 7,69 mg/100 gram. Data menunjukkan bahwa terjadi penurunan dari jumlah kandungan vitamin c dari melon segar menjadi selai melon sebanyak 1 mg/100 gram bahan

Kadar gula reduksi

Pada hasil Analisa pada produk perlakuan terbaik dari pengujian organoleptic diperoleh hasil kadar gula reduksi selai melon adalah sebesar 9,004%. Kadar gula reduksi pada selai dipengaruhi oleh kandungan gula yang ditambahakan.selain itu peningkatan kadar gula reduksi pada selai dipengaruhi oleh perlakuan pemanasan yang terjadi selama proses pembuatan selai

Pada selai melon kadar gula reduksi yang dihasilkan tidak terlalu tinggi karena kadar gula reduksi melon yang digunakan untuk diproses menjadi selai juga memiliki kadar gula reduksi yang rendah yaitu sebesar 3,375%.

Berdasarkan hasil pengamatan diperoleh hasil bahwa terdapat pengaruh konsentrasi gula kristal putih dan konsentrasi penambahan pektin terhadap kadar padatan total terlarut , daya oles,dan kadar brix dari selai yang dihasilkan. selain itu juga memberikan pengaruh yang nyata pada aroma dan tekstur dari selai yang dihasilkan. Pada daya oles selai melon , . semakin tinggi konsentrasi gula dan konsentrasi pektin yang digunakan ,selai akan menjadi semakin padat dan kental. Daya oles selai melon yang diteliti berada pada rentang 7,75 cm hingga 9,5 cm Dimana semakin tinggi konsentrasi gula yang digunakan maka selai menjadi semakin kental sehingga daya oles juga semakin berkurang. Kadar padatan total terlarut selai juga semakin meningkat seiring dengan peningkatan konsentrasi gula yang digunakan. Kadar padatan total selai melon berkisar antara 51,75° Brix. hingga 69,85° Brix . pada selai melon dengan konsentrasi gula sebesar 55% dan 65% memiliki selai dengan kandungan gula yang sudah sesuai dengan Standart mutu SNI yaitu di atas 65%. Hasil Analisa uji hedonic dan mutu hedonic menunjukkan bahwa Perbeedaan konsentrasi gula dan pektin yang digunakan juga memberikan pengaruh yang signifikan terhadap warna dan tekstur selai yang dihasilkan.

Selai melon yang dihasilkan juga dipengaruhi oleh karakteristik melon yang digunakan Dimana untuk melon yang digunakan merupakan melon yang ditujukan untuk pembenihan sehingga memiliki rasa yang kurang manis dan kurang beraroma khas melon sehingga selai yang dihasilkan juga memiliki aroma dan rasa khas melon kurang tajam.

Pengamatan dengan cara organoleptic memberikan hasil terjadi pertumbuhan mikroorganisme kapang pada hari ke 24 dan tekstur selai menjadi lebih cair.aroma juga menjadi lebih asam. Sedangkan pada perlakuan perlakuan total gula 55% pektin 0,3% setelah hari ke 10 mulai tumbuh kapang.

2. Coctail Melon

Sampel koktail yang diteliti dianggap cocok untuk penjualan komersial karena kandungan padatan terlarutnya (diukur dalam ∘Brix) berada dalam kisaran standar industri 6∘Brix hingga 18∘Brix,

Table 1. Total Soluble Solids (TSS) Content and pH of Melon Cocktail

Treatment	Total Soluble Sugar (° Brix)	pH
No Treatment	11,4	4,5
Blanched	13,1	4,5
Citric Acid	12,85	4,2

Data dari penelitian ini menunjukkan bahwa sampel koktail buah melon tanpa praperlakuan dan praperlakuan blansing menunjukkan pH yang relatif tinggi, yaitu 4,5. Sebaliknya, melon yang diolah dengan praperlakuan perendaman asam sitrat menghasilkan pH yang jauh lebih rendah, yaitu 4,2. pH yang relatif tidak berubah pada sampel blansing dan tanpa praperlakuan menunjukkan bahwa perlakuan termal atau tanpa praperlakuan tidak mengubah komposisi asam alami melon secara signifikan, meskipun blansing memfasilitasi pelepasan gula dari struktur sel yang terganggu.

Data Analisis Sensory Hedonic

Tabel Sensory Evaluation (Hedonic Test) of Consumer Liking for Three Melon Cocktail Formulations

Parameter	No Treatment	Blanched	Citric Acid
Color	3,44 ± 0,82 a	3,56 ± 0,71 a	3,64 ± 0,91 a
Aroma	3,96 ± 0,73 b	3,20 ± 0,91 a	3,52 ± 0,71 ab
Texture	4,00 ± 0,76 b	3,36 ±0,81 a	3,64 ± 0,56 ab
Taste	4,12 ± 0,78 b	3,48 ± 0,91 a	3,76 ± 0,77 ab
Overall	4,24 ± 0,66 b	3,52 ± 0,91 a	3,88 ± 0,72 ab

Hasil Analisa Mutu Hedonik Cocktail Melon

Tabel 3. Hedonic Quality Test of Melon Cocktail Formulations

Parameter	No Treatment	Blanched	Citric Acid
Color	2,12 ± 0,93 a	2,12 ± 0,93 a	2,04 ± 0,93 a
Aroma	3,20 ± 0,95 b	2,44 ± 0,96 a	2,72 ± 1,10 ab
Texture	2,36 ± 1,19 a	2,36 ± 1,11 a	2,44 ± 1,16 a
Taste	3,84 ± 0,74 b	3,20 ± 0,91 a	2,84 ± 1,14 a

Overall	4,28 ± 0,45 [b]	3,40 ± 0,64 [a]	4,08 ± 0,76 [b]

Hasil Analisa Vitamin C dan Gula Reduksi formulasi terbaik dari cocktail Melon

Table 4. Vitamin C and Reducing Sugar Content in Fresh Melon Fruit and Melon Cocktail

Sample	Vitamin C (mg/100g)	Reducing Sugar (%)
Fresh Melon Fruit	7,69	3,575
Melon Cocktail	8,18	8,361

Hasil penelitian menunjukkan adanya peningkatan yang signifikan pada kadar gula pereduksi pada komposisi formulasi yang paling disukai selama proses pengolahan dan perlakuan yang diterapkan. Pada buah segar, gula pereduksi terutama terdiri atas glukosa dan fruktosa, yang terbentuk dari hidrolisis pati atau sukrosa. Selama pengolahan, aktivitas enzim hidrolitik (seperti invertase atau amilase) atau perlakuan fisik dapat meningkatkan pelepasan gula sederhana, sehingga meningkatkan kadar gula pereduksi yang terukur.

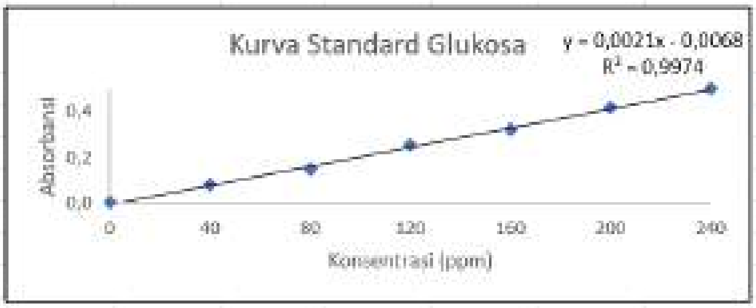
Selama proses pembuatan koktail buah, terutama dalam kondisi asam dan adanya perlakuan panas, ikatan glikosidik pada molekul sukrosa dapat terhidrolisis. Hidrolisis ini menghasilkan dua monosakarida yang lebih mudah larut dan lebih reaktif secara kimia. Reaksi tersebut tidak hanya meningkatkan nilai gula pereduksi, tetapi juga memengaruhi kenaikan Total Soluble Solids (TSS) dan mengubah profil rasa menjadi lebih manis dan lebih lembut

Dari perspektif sensori, peningkatan gula pereduksi ini berkontribusi terhadap keseimbangan rasa manis dan asam, yang merupakan faktor penting dalam penilaian hedonik panelis. Secara keseluruhan, hasil ini menunjukkan bahwa perlakuan pengolahan dan kondisi kimia pada larutan koktail berperan signifikan dalam meningkatkan nilai gula pereduksi dan kualitas sensori produk akhir.

3. Syrup Buah Melon

Hasil pengamatan vitamin c dan gula reduksi

Konsentrasi ppm	Abs
0	0,000
40	0,078
80	0,147
120	0,256
160	0,320
200	0,421
240	0,500



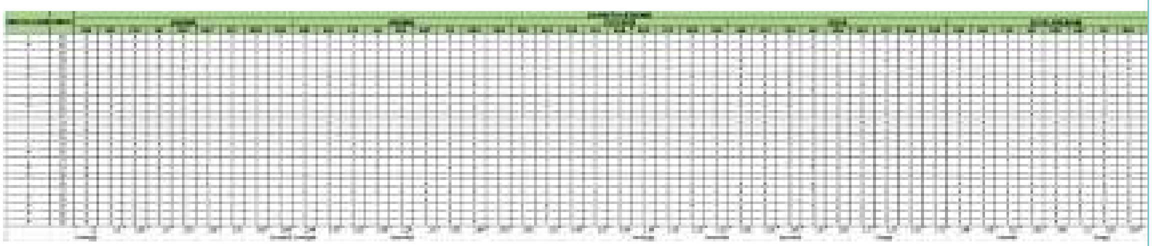
Sampel	Berat (mg)	ml Ekstrak	FP	Absorbansi		ppm Kurva		% Karbohi	
				1	2	1	2	1	
121.4	10000,0	250	10	0,042	0,034	23,238	19,429	0,581	(

Kadar Vitamin C

Sampel	gr/mL sampel	FP	mL Titrasi	rerata titrasi	Vit C (mg/100gr
121.4 (ul1)	5	1	0,28	0,28	4,84
121.4 (ul2)			0,27		

Hasil Uji hedonic

Hasil Uji Mutu Hedonik



Pada pengamatan dengan uji organoleptic, Sari buah pembuatan tgl 28 agustus, ditaruh suhu ruang. Untuk sample dengan kadar gula 10% pada tgl 2 September mulai muncul lapisan warna putih di bagian atas.

Pendugaan umur simpan dengan metode arhenius masih berjalan.

Untuk dokumentasi kegiatan dicantumkan pada lampiran

IV. KESIMPULAN DAN SARAN

Jadwal disusun berdasarkan pelaksanaan penelitian, harap disesuaikan berdasarkan lama tahun penelitian

Berdasar hasil penelitian yang telah dilakukan maka diperoleh Kesimpulan bahwa berdasar pembuatan produk diperoleh hasil produk olahan berupa selai melon, syrup melon, dan cocktail melon dengan beberapa variasi perlakuan dan formulasi pembautan produk. Berdasar formulasi yang dilakukan dan hasi Analisa organoleptic diperoleh hasil terbaik yang sesuai dengan kesukaan konsumen. Pada pengamatan diperoleh hasil terbaik yaitu pada sampel dengan penggunaan gula sebesar 40% dan kadar pektin sebesar 0,2%. Selai melon tersebut memiliki kadar vitamin C sebesar 6,69 mg/100 gram. Pada cocktail melon juga diperoleh perlakuan terbaik yaitu pada control.

DAFTAR PUSTAKA

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LAMPIRAN

1. **Log Book Penelitian**

2. **Tanggal:** 7 Juli 2025

Lokasi: Laboratorium Pengolahan

Deskripsi Kegiatan:

Observasi Pengujian Mutu Buah Melon

Aktivitas yang Dilakukan:

1. Pengukuran tingkat kemanisan (° Brix): 5-6
2. Pengujian organoleptik buah:
    - Warna: hijau muda pucat (agak putih)
    - Tekstur: keras dan renyah
    - Rasa: hambar, sedikit asam, renyah tapi berair (bagian atas sedikit manis; bagian bawah hambar, asam, dan segar)
    - Aroma: tidak beraroma
3. Pengukuran tingkat kekerasan (tekstur):

- Bagian hijau/utuh: 33,1 N
- Bagian putih/bagian dalam: 25,7 N

Hasil/*Output*:
Buah melon memiliki karakteristik fisik dan kimia yang sesuai untuk diolah menjadi produk:

- Manisan (basah dan kering)
- Selai
- *Cocktail* buah
- Jus/sari buah

Kendala/Catatan Khusus:
Tingkat kemanisan buah relatif rendah, yaitu hanya mencapai 5-6° Brix. Kondisi ini menjadi kendala dalam pengolahan karena rasa manis alaminya belum mencukupi untuk menghasilkan produk dengan karakter sensoris yang diharapkan. Oleh karena itu, penambahan gula atau sumber pemanis lain diperlukan dalam formulasi untuk menyeimbangkan profil rasa, meningkatkan penerimaan konsumen, serta memastikan kualitas akhir produk tetap konsisten.
.

Dokumentasi Kegiatan:

3. **Tanggal:** 10

Lokasi: Ruang Rapa

Deskripsi Kegiatan:
Diskusi hasil observasi & pembagian tugas.

Aktivitas yang Dilakukan:

1. Presentasi ringkas hasil observasi mutu buah melon dari tanggal 7 Juli
2. Diskusi kelompok mengenai implikasi hasil pengujian terhadap formulasi produk
3. Pembagian tugas anggota kelompok penelitian

Hasil/Output:

- Kesepakatan kelompok mengenai target produk dan perlakuan yang akan diuji
- Pembagian tugas pembuatan proposal sudah jelas

Kendala/Catatan Khusus:
Perlu koordinasi yang baik untuk memastikan semua anggota memahami peran mereka.

Dokumentasi Kegiatan:

4. **Tanggal:** 15 Juli 2025

Lokasi: Ruang Rapat Jurusan

Deskripsi Kegiatan:

Diskusi Rencana Uji Coba dan Pengolahan Skala Kecil

Aktivitas yang Dilakukan:

1. Diskusi desain eksperimen dan perlakuan yang akan diterapkan
2. Penentuan jadwal pelaksanaan uji coba (disepakati: 17 Juli 2025)
3. Penjelasan mengenai formulasi laboratorium dan prosedur sesuai dengan proposal
4. Perencanaan evaluasi organoleptik awal

Hasil/Output:

- Protokol uji coba terstruktur
- Jadwal pelaksanaan: Kamis, 17 Juli 2025 dengan fokus pada evaluasi organoleptik awal produk

Kendala/Catatan Khusus:

Seluruh bahan dan peralatan yang diperlukan harus dipersiapkan secara lengkap sebelum t anggal 17 Juli agar proses pelaksanaan kegiatan dapat berlangsung lancar dan sesuai den gan rencana yang telah ditetapkan.

Dokumentasi Kegiatan:

5. **Tanggal:** 17 Juli 2025

Lokasi: Laboratorium Pengolahan

Deskripsi Kegiatan:

Melakukan uji coba pembuatan produk olahan melon dengan berbagai formulasi

Aktivitas yang Dilakukan:

1. Pembuatan Cocktail buah:

(pH = 4 ; ° Brix = 14,9)

2. Pembuatan Sari buah:

(pH = 4,5 ; ° Brix = 10,6)

3. Pembuatan Selai buah tanpa asam sitrat dan pektin:

(pH = 5,5 ; ° Brix = 84,7)

4. Pembuatan Selai buah dengan asam sitrat dan pektin:

(pH = 5,5 ; ° Brix = 75)

5. Evaluasi organoleptik awal terhadap semua produk

Hasil/Output:

- Empat variasi formulasi produk berhasil dibuat
- Data pH dan ° Brix tercatat untuk analisis lanjutan
- Produk layak untuk diuji lebih lanjut

Kendala/Catatan Khusus:

- Penyesuaian waktu proses untuk mencapai pH dan ° Brix target
- Selai dengan penambahan asam sitrat dan pektin menghasilkan ° Brix lebih rendah (75 vs 84,7)

Dokumentasi Kegiatan:

6. **Tanggal:** 28 Agustus 2025

Lokasi: Laboratorium Pengolahan

Deskripsi Kegiatan:

Pembuatan produk sari buah dan cocktail buah untuk kebutuhan analisis sensori

Aktivitas yang Dilakukan:

1. Pembuatan Sari buah dengan tiga perlakuan kadar gula:
    - Perlakuan 1: 8%

- Perlakuan 2: 10%
- Perlakuan 3: 12%

2. Pembuatan Cocktail buah dengan tiga perlakuan:
    - Kontrol (buah melon tanpa perlakuan)
    - Perendaman dalam larutan asam sitrat
    - *Blanching*
3. Penyimpanan produk untuk uji organoleptik

Hasil/Output:

- 6 sampel produk (3 sari buah + 3 cocktail) berhasil diproduksi
- Semua produk siap untuk pengujian organoleptik

Kendala/Catatan Khusus:
Diperlukan perhatian khusus terhadap proses sterilisasi dan kondisi penyimpanan produk untuk memastikan kualitas tetap terjaga sebelum dilakukan uji hedonik.

Dokumentasi Kegiatan:

7. **Tanggal:** 1 September 2025

Lokasi: Laboratorium Pengolahan

Deskripsi Kegiatan:
Pembuatan produk selai buah melon untuk kebutuhan analisis sensori

Aktivitas yang Dilakukan:

1. Pembuatan Selai buah dengan kombinasi perlakuan:
    - Kadar gula dan glukosa: 45%, 55%, 65% (3 level)
    - Kadar pektin: 0,1%, 0,2%, 0,3% (3 level)
    - Total: 9 sampel produk
2. Pengamatan visual konsistensi dan tekstur
3. Penyimpanan sampel dalam wadah tertutup berlabel

Hasil/Output:

- 9 sampel selai dengan kombinasi perlakuan berbeda
- Penampilan visual dan konsistensi awal dicatat
- Produk siap untuk pengujian organoleptik

Kendala/Catatan Khusus:
Variasi kadar gula dan glukosa menghasilkan perbedaan tekstur yang signifikan—perlu pengamatan cermat selama proses cooking.

Dokumentasi Kegiatan:

8.
Lokasi: Laboratorium Pengolahan

Deskripsi Kegiatan:
Melakukan uji organoleptik (uji hedonik dan uji mutu hedonik) terhadap semua produk olahan

Aktivitas yang Dilakukan:

1. Uji hedonik (tingkat kesukaan) terhadap:
    - Sari buah (3 variasi kadar gula: 8%, 10%, 12%)
    - Cocktail buah (3 perlakuan: kontrol, asam sitrat, blanching)
    - Selai buah (9 kombinasi perlakuan)
2. Uji mutu hedonik untuk mengevaluasi atribut spesifik (rasa, tekstur, aroma, warna)
3. Melibatkan panel panelis terlatih dan tidak terlatih

Hasil/Output:

- **Sari buah terbaik:** Kode 172 (kadar gula 12%) - paling disukai oleh panelis

- **Selai terbaik:** Kode 067 (kadar gula dan glukosa 55%, kadar pektin 0,3%) - paling disukai oleh panelis
- Data preferensi panelis tercatat lengkap

Kendala/Catatan Khusus:
- Perlunya koordinasi waktu dengan panelis
- Evaluasi mutu hedonik membutuhkan panduan kriteria yang jelas untuk setiap atrib ut

Dokumentasi Kegiatan:





9.

Lokasi: Ruang Rapat Jurusan

Deskripsi Kegiatan:
Pembagian tugas untuk menghasilkan luaran riset (artikel ilmiah, poster presentasi, lap oran lengkap).

Aktivitas yang Dilakukan:

1. Review hasil riset keseluruhan
2. Diskusi struktur artikel ilmiah dan pembagian bagian penulisan
3. Perencanaan poster presentasi
4. Penentuan jadwal penyelesaian setiap luaran

Hasil/Output:

- Pembagian tugas jelas untuk setiap anggota tim
- Timeline penyelesaian luaran ditentukan

Kendala/Catatan Khusus:
Koordinasi untuk memastikan konsistensi data dan metodologi di semua luaran.

Dokumentasi Kegiatan:

10. **Tanggal:** 11 September 2025

Lokasi: Laboratorium Pengolahan

Deskripsi Kegiatan:
Melakukan pengujian fisik-kimia lanjutan (pH dan ° Brix) pada produk selai, sari buah, dan cocktail.

Aktivitas yang Dilakukan:

1. Pengukuran pH menggunakan pH meter pada:
    - Selai (produk terpilih dan alternatif)

- Sari buah (produk terpilih dan alternatif)
- Cocktail buah (semua perlakuan)

2. Pengukuran ° Brix menggunakan refraktometer pada semua produk
3. Pencatatan data dan analisis variasi antar sampel

Hasil/Output:

- Data pH dan ° Brix produk akhir terkumpul lengkap
- Verifikasi kestabilan parameter mutu dari uji coba ke produksi final

Kendala/Catatan Khusus:
Perlu kalibrasi alat ukur sebelum pengujian untuk memastikan akurasi data.

Dokumentasi Kegiatan:

11. Tanggal: 16 September 2025
Lokasi: Laboratorium Biosains

Deskripsi Kegiatan:
Melakukan pengujian analisis kimia pada produk selai, sari buah, dan cocktail.

Aktivitas yang Dilakukan:

1. Pengukuran kadar vitamin C menggunakan metode titrasi iodometri pada:
   - Selai buah (produk terpilih)
   - Sari buah (produk terpilih)
   - Cocktail buah (sampel representatif)
2. Pengukuran kadar gula reduksi menggunakan metode Luff-Schoorl
3. Pengolahan data dan perhitungan rerata dengan standar deviasi

Hasil/Output:

- Data kadar vitamin C tercatat untuk setiap produk
- Data kadar gula reduksi tercatat
- Informasi nilai gizi produk akhir diperoleh

Kendala/Catatan Khusus:

- Ketergantungan pada jadwal ketersediaan Laboratorium Biosains
- Perlu persiapan sampel yang tepat sesuai SOP laboratorium

Dokumentasi Kegiatan:



12. Tanggal: 26 September 2025

Lokasi: Laboratorium Pengolahan

Deskripsi Kegiatan:

Mengevaluasi karakteristik fisik selai terpilih (daya oles/spreadability) sebagai parameter mutu tekstur produk.

Aktivitas yang Dilakukan:

1. Pengujian daya oles menggunakan metode penetrometer atau uji empiris
2. Pengukuran konsistensi dan kemudahan aplikasi selai pada permukaan uji standar
3. Pencatatan hasil pengamatan dan pengukuran

Hasil/Output:

- Data daya oles selai (produk kode 067) terekam
- Verifikasi bahwa produk memiliki tekstur yang mudah dioleskan

Kendala/Catatan Khusus:

Suhu ruang dapat mempengaruhi hasil pengujian—perlu dilakukan pada kondisi terkontrol.

Dokumentasi Kegiatan:


13. Tanggal: 25 Oktober 2025 - Presentasi di Seminar ICOFA 2025

Lokasi: Online – Seminar ICOFA 2025

Deskripsi Kegiatan:

Mempresentasikan hasil riset penugasan kepada audiens akademik dan praktisi untuk mendapatkan *feedback* dan meningkatkan visibilitas penelitian.

Aktivitas yang Dilakukan:

1. Presentasi oral mengenai:
    - Latar belakang dan tujuan riset
    - Metodologi pengolahan buah melon
    - Hasil uji mutu dan uji organoleptik
    - Kesimpulan dan rekomendasi
2. Sesi tanya jawab dengan audiens
3. Networking dengan peneliti lain di bidang pengolahan pangan

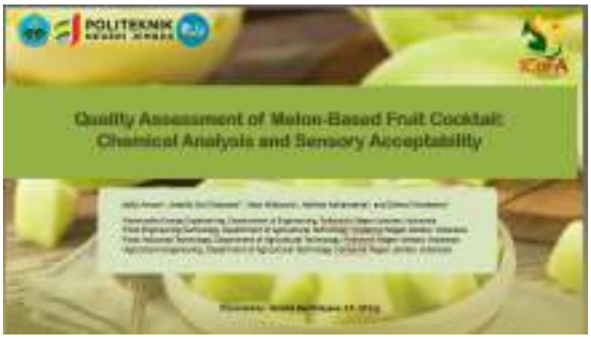
Hasil/Output:

- Hasil riset tersebar di kalangan akademis
- Feedback dari sejawat diperoleh untuk penyempurnaan
- Pengalaman presentasi ilmiah bertambah

Kendala/Catatan Khusus:

Perlu persiapan materi presentasi

Dokumentasi Kegiatan:



November 2025

Proses pembuatan Produk untuk pengujian Umur Simpan Produk Melon

Deskripsi Kegiatan:

Pembuatan produk cocktail buah melon untuk kebutuhan analisa umur simpan metode arhenius.

Aktivitas yang Dilakukan:

4. Pembuatan dan penyimpanan cocktail buah perlakuan terbaik dengan perlakuan:
    - Suhu 5C, 25 C, 45C
    - Lama penyimpanan untuk diamatai yaitu pada hari ke 0 hari, 7 hari, 14 hari,21 hari,dan 28 hari.
    - Pengamatan dilakukan pada aktivitas kapang pada sample
5. Pengamatan visual konsistensi dan tekstur
6. Penyimpanan sampel dalam wadah tertutup berlabel dan pada suhu serta umur simpan berbeda

Hasil/Output:

- sampel cocktail melon dengan kombinasi perlakuan berbeda
- Penampilan visual dan munculnya mikroorganisme kapang dapat dideteksi
- Produk siap untuk pengujian umur simpan

Kendala/Catatan Khusus:

Penyimpanan dengan suhu dan waktu yang berbeda diduga akan menghasilkan perbedaan yang signifikan pada kenampakan dan pertumbuhan kapang dapat dideteksi—perlu pengamatan cermat selama proses penyimpanan

Dokumentasi Kegiatan:

Luaran Jurnal Internasional

Article BIO WEB Conference

Quality Assessment of Melon-Based Fruit Cocktail: Chemical Analysis and Sensory Acceptability

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Abstract. This study aimed to develop and evaluate a melon-based fruit cocktail as a value-added product to extend melon shelf life and enhance its market potential. Fresh melon (*Cucumis melo L.*) was processed into three formulations: untreated, blanched, and citric acid-pretreated, in a standardized syrup solution. Sensory evaluation and chemical analyses were conducted to assess quality attributes. Results showed that citric acid pretreatment significantly increased total soluble solids (TSS) and reducing sugar. However, the untreated sample achieved the highest sensory acceptance (overall score 4.24±0.66), maintaining desirable aroma, texture, and flavor balance. Its vitamin C and reducing sugar contents were also higher than those of fresh melon, likely due to improved extractability during processing. The inclusion of papaya and pineapple contributed additional sugars, enzymes, and organic acids that enhanced TSS and flavor complexity. Overall, the study demonstrates that controlled formulation and mild processing can produce a stable, nutritious, and consumer-preferred melon cocktail suitable for commercialization and waste reduction.

1 Introduction

Melons (*Cucumis melo L.*) are a significant horticultural crop prized worldwide for their refreshing taste, high water content, and nutritional profile, being a valuable source of vitamins (A and C), minerals (particularly potassium), and antioxidants such as carotenoids and phenolic compounds [1]. Despite their global popularity and seasonal abundance, postharvest losses remain a substantial challenge due to their high perishability and short shelf-life [2]. This issue necessitates the development of value-added processed products that nutritional conditioning is directed at optimizing seed quality, which directly affects the characteristics of the fruit pulp produced. Melons from this type of cultivation generally have sensory characteristics that differ from commercial melons, mainly characterized by a texture that tends to be denser and less sweet.

The main problem arising from this seedling cultivation practice is the sub-optimal utilization of fruit pulp. After the seeds are removed, the fruit pulp is often not utilized and ends up as biomass waste. This situation poses serious challenges related to agricultural waste management and loss of potential economic value. Therefore, effective diversification and processing strategies are needed to convert this fruit waste into value-added products.

Among the various processing avenues, ready-to-eat fruit cocktails represent a dynamic and growing segment of the food industry. These products cater to modern consumer demands for convenience, health, and variety [3]. However, the commercial fruit cocktail market is often dominated by a limited range of fruits, such as peaches, pears, and pineapples, with melons being an underutilized component. Incorporating melons into a formulated fruit cocktail presents a unique opportunity to diversify the product landscape, but it also introduces specific technical challenges. The delicate texture and subtle flavor profile of melons can be compromised during processing, particularly through thermal treatments, potentially leading to undesirable softening, loss of volatile aromatics, and nutrient degradation [4].

Therefore, a systematic approach to product development is crucial. This study focuses on the formulation and comprehensive evaluation of a novel fruit cocktail where melon serves as the primary or signature ingredient. The research was designed to address two fundamental aspects of product quality. First, organoleptic testing involving trained panelists was conducted to evaluate critical sensory attributes such as flavor, aroma, color, texture, and overall acceptability. Second, chemical analysis was performed to quantify and measure the nutritional compounds in the final product, including assessments of vitamin content, soluble solids.

By bridging the gap between chemical composition and consumer perception, this research aims to establish the scientific and practical feasibility of a melon-based fruit cocktail. The findings will provide critical data for the food industry to optimize processing parameters that maximize both nutritional quality and sensory appeal, ultimately contributing to reduced food waste and the introduction of innovative, health-promoting fruit products to the global market.

2 Materials and Methods

The primary ingridients, melon was obtained from the Smart Greenhouse of Politeknik Negeri Jember. The melon cocktail was formulated using a standardized syrup solution composed of 1 L of water, 10% (w/v) sucrose, 0.1% (w/v) citric acid, and 0.1% (w/v) sodium benzoate were heated at 85–90°C until fully dissolved, then cooled to 30–35°C before being mixed with the fruit to prevent heat damage. This formulation was selected to achieve an optimal balance of sweetness, acidity, and preservation stability, consistent with standard beverage formulations reported in fruit processing studies [5]. Melon, papaya (*Carica papaya*), and pineapple (*Ananas comosus*) were washed, peeled, and cut into uniform size in equal proportions. The fruit and syrup were filled into sterilized glass jars (80% capacity),

2.1 Sample treatment

The size-reduced melon pieces was placed into the cocktail mixture. This was done using three different pre-treatment methods for comparison. First batch melon with no pre-treatment. The second batch was blanched in hot water at 75°C for 10 minutes before immersion. The final batch was first soaked in a 0.2% citric acid solution. The prepared fruit cocktail was then cooled to room temperature and stored at 4 ± 1°C to maintain its quality during storage for 5 days until sensory evaluation was performed.

2.2 Sensory Analysis

The sensory acceptance of the three melon cocktail formulations with the three treatments used was evaluated using a Hedonic Test. A total of 25 trained panelists were recruited and presented with the samples in a sensory evaluation laboratory under controlled lighting conditions. Samples were served at a standardized temperature to ensure consistency and were presented in clear, identical plastic cups labeled with random three-digit codes to prevent bias.

2.3 Data Analysis

The organoleptic test data were analyzed using Analysis of Variance (ANOVA) at a 95% significance level. With this method if the results showed a significant effect, researcher was proceeded with the Duncan Test

2.4 Chemical Analysis

Chemical analysis comprised two phases. Initially, all three cocktail formulations were subjected to basic physicochemical assessments: Total Soluble Solids (TSS) and pH. Subsequently, further detailed analysis, including the determination of Vitamin C content and reducing sugar content, was selectively performed only on the sample that demonstrated the highest overall preference based on the combined results of the Hedonic and Hedonic Quality sensory evaluations.

3 Results and Discussion

3.1 Total Soluble Sugar (TSS)

The present study demonstrated that citric acid pretreatment significantly increased the total soluble solids (TSS) content in melon compared to the control treatment showed in Table 1. This finding can be attributed to several interconnected physicochemical mechanisms that occur during acid immersion. This enhancement is primarily attributed to the acid-induced hydrolysis of cell wall polysaccharides, which releases soluble pectin fragments and sugars into the surrounding solution. The acidic environment also increased cell membrane mechanisms explain the higher soluble solid content and improved quality of melon cocktails pretreated with citric acid.

The inclusion of papaya and pineapple in the melon cocktail formulation played a role in enhancing both total soluble solids (TSS) and reducing sugar content. This improvement arises from the synergistic interactions between the enzymatic activities of the companion fruits and the acid-based pretreatment. Papaya and pineapple contain proteolytic enzymes—papain and bromelain, respectively—that degrade structural proteins within fruit cell walls. This enzymatic softening complements the acid-induced hydrolysis triggered by citric acid, facilitating greater release of soluble sugars and organic acids into the cocktail medium. The synergy between proteolysis and acid hydrolysis enhances mass transfer and solubilization efficiency, increasing the measurable TSS [9], [10].

The cocktail samples investigated were deemed suitable for commercial sale because their soluble solids content (measured in ∘Brix) fell within the industry-standard range of 6∘Brix to 18∘Brix, as specified by Wazed et al [11].

Table 1. Total Soluble Solids (TSS) Content and pH of Melon Cocktail

Treatment	Total Soluble Sugar (°Brix)	pH
No Treatment	11,4	4,5
Blanched	13,1	4,5
Citric Acid	12,85	4,2

3.2 pH

Citric acid treatment was effective in achieving the highest measured TSS values because the resulting low pH environment helped to preserve the sugar content by reducing enzymatic browning and degradation [12]. The data from this study revealed that the melon fruit cocktail samples that underwent no pretreatment and blanching pretreatment exhibited a relatively high pH of 4.5. In contrast, melon treated with the citric acid immersion pretreatment yielded a significantly lower pH of 4.2. The relatively unchanged pH in the blanching and no pretreatment samples indicates that thermal or no pretreatment does not significantly alter the natural acid composition of melon, even though blanching facilitated the release of sugars from disrupted cell structures.

These results are shown in Table 1. in line with findings reported by Vu et al [13] who observed that citric acid treatment in minimally processed fruits not only reduced pH but also enhanced the retention of soluble solids by limiting oxidative and enzymatic degradation. The observed low pH environment within the melon cocktail formulation is primarily attributed to the inclusion of pineapple as a secondary fruit component, in addition to the exogenous addition of citric acid in the syrup. Pineapple naturally possesses a significantly lower pH compared to melon, which is generally considered a higher pH fruit [14]. When these two fruits are mixed, the substantial release of organic acids—predominantly citric acid and malic acid—from the pineapple tissue [15] into the surrounding cocktail syrup (which is remains a critical determinant of product success. Pre-treatments such as blanching or citric acid immersion can modify color, texture, aroma, and flavor—attributes that directly influence consumer perception and preference. Therefore, beyond improving stability and composition, the sensory response of consumers serves as a key indicator of overall product feasibility. To evaluate these aspects, hedonic and hedonic quality tests were conducted to assess panelists' preferences and perceptions toward the formulated melon cocktail, providing insights into how processing interventions affect consumer acceptance.

3.3.1 Hedonic Assesment

The hedonic test results revealed significant variations in consumer acceptance across different treatment methods, with notable differences observed in multiple sensory attributes.

Table 2| Sensory Evaluation (Hedonic Test) of Consumer Liking for Three Melon Cocktail Formulations

Parameter	No Treatment	Blanched	Citric Acid
Color	3,44 ± 0,82 [a]	3,56 ± 0,71 [a]	3,64 ± 0,91 [a]
Aroma	3,96 ± 0,73 [b]	3,20 ± 0,91 [a]	3,52 ± 0,71 [ab]
Texture	4,00 ± 0,76 [b]	3,36 ±0,81 [a]	3,64 ± 0,56 [ab]
Taste	4,12 ± 0,78 [b]	3,48 ± 0,91 [a]	3,76 ± 0,77 [ab]
Overall	4,24 ± 0,66 [b]	3,52 ± 0,91 [a]	3,88 ± 0,72 [ab]

Analysis of individual sensory parameters provided valuable insights into the factors driving overall consumer preference. Color perception exhibited no significant differences among treatments. This uniformity suggests that the applied treatments did not substantially alter the visual characteristics of the product, or that any color changes that occurred were not discriminable by consumers at a level affecting hedonic response. This finding is consistent with previous studies indicating that mild processing treatments often preserve color attributes while modifying other quality parameters [11].

The uniformity of color perception across treatments may be attributed to several factors. First, the intrinsic pigments of melon appear relatively stable under the mild thermal conditions used during blanching as well as under the moderate acid levels applied during citric acid immersion [16], [17]. Both pre-treatments may have caused only minimal degradation or oxidation of color compounds, leading to visual characteristics comparable to those of the no treated sample. Additionally, citric acid has been reported to act as an antioxidant in certain fruit matrices, potentially helping to preserve color by limiting enzymatic browning [17], although this protective effect did not manifest as a statistically significant improvement in the present study.

In contrast, aroma acceptability demonstrated significant treatment effects, with the

Based on the results of the Duncan Multiple Range Test (DMRT) on the texture aspect, all three formulations showed significantly different levels of preference. This difference in texture preference can be correlated with the results of instrumental texture measurement using a texture analyzer. The fresh melon used in this study had a hardness value of 22.7 N, which reflects the characteristic firm and crisp texture of good-quality melon. After processing into a cocktail product in syrup, a decrease in hardness occurred due to the combined treatment of citric acid soaking and heating (pasteurization), which caused the degradation of cell wall structure and the softening of the fruit tissue. Several previous studies [5], [19], [20]have reported that processed melon products experience a significant reduction in hardness compared to the fresh condition. This decrease in hardness is generally attributed to pectin solubilization, cell wall polysaccharide depolymerization, and pectinolytic enzyme activity during processing.

In the context of fruit cocktail products, a texture that is too soft can reduce consumer acceptability because of the loss of the desired crispness sensation. However, no treatment sample appears to be able to maintain a better texture compared to the other formulations. This aligns with the higher hedonic score for the texture parameter. The most striking finding from this study is the consistent and excellent performance of no pre-treatment sample across almost all sensory parameters.

In the hedonic test, which measures overall liking, formulation containing untreated melon achieved significantly higher scores for aroma, texture, flavor, and overall acceptance compared to the other two formulations. Its overall acceptability score of 4.24±0.66 on a 5-point scale indicates a high level of consumer preference. This suggests that the formulation with melon that was not pretreated retained sensory characteristics that were most appealing to the panelists. The inherent, fresh quality of the fruit, unaffected by thermal or chemical intervention, appears to be the most crucial factor for consumer liking. This enhanced performance is further corroborated by the hedonic quality test, which assesses the appropriateness of attribute intensities.

3.3.2 Hedonic Quality Assesment

Table 3 presents the hedonic quality evaluation of melon cocktail formulations subjected to three different pre-treatments. The sensory attributes assessed include color, aroma, texture, taste, and overall acceptance. This assessment aims to determine how each pre-treatment influences consumer perception of quality and to identify which formulation delivers the most favorable sensory characteristics. The hedonic scores obtained from trained panelists provide critical insights into the effects of thermal and acid-based treatments on the sensory integrity of melon cocktail products.

Parameter	No Treatment	Blanched	Citric Acid
Color	2,12 ± 0,93 [a]	2,12 ± 0,93 [a]	2,04 ± 0,93 [a]
Aroma	3,20 ± 0,95 [b]	2,44 ± 0,96 [a]	2,72 ± 1,10 [ab]
Texture	2,36 ± 1,19 [a]	2,36 ± 1,11 [a]	2,44 ± 1,16 [a]
Taste	3,84 ± 0,74 [b]	3,20 ± 0,91 [a]	2,84 ± 1,14 [a]
Overall	4,28 ± 0,45 [b]	3,40 ± 0,64 [a]	4,08 ± 0,76 [b]

All formulations were evaluated as having comparable and acceptable levels of color and texture intensity, notable differences emerged in aroma and, particularly, flavor perception. Color scores ranged from 2.04 to 2.12, with no statistically significant differences among treatments. All formulations exhibited similar visual appearance, suggesting that neither blanching nor citric acid treatment substantially altered the color attributes of melon cocktail. The relatively low color scores indicate that panelists perceived the lught, which is characteristic of melon flesh. This uniformity across treatments suggests that color stability was maintained regardless of preservation method, an important quality attribute for consumer acceptance.

Aroma scores varied significantly among treatments, ranging from 2.44 to 3.20. These differences indicate that preservation treatments affected volatile aroma compounds in melon cocktail. The most preferred aroma score of no treated samples reflects the retention of fresh melon volatile compounds while blanching significantly reduced aroma intensity, likely due to thermal degradation and volatilization of heat-sensitive aroma compounds.

Texture scores showed minimal variation, ranging from 2.36 to 2.44, with no significant differences among treatments. All formulations received similar texture ratings, suggesting that blanching and citric acid treatment did not substantially affect the firmness, crispness, or mouthfeel of melon pieces in the cocktail. This consistency is advantageous for product standardization, as texture remains uniform regardless of preservation method employed.

Panelists expressed the highest approval for the taste profile of melon without pre-treatment which received the greatest flavor adequacy rating (3.84 ± 0.74), indicating an optimally balanced flavor intensity. In contrast, melon underwent citric acid immersion, received the lowest flavor score (2.84±1.14). This suggests that citric acid treatment may have introduced a sourness or altered the natural flavor profile in a way that was perceived as less ideal, negatively impacting its hedonic quality despite a moderate overall liking score.

The blanching pre-treatment appears to have been detrimental to its sensory appeal. It consistently recorded the lowest scores in the hedonic test for key drivers of liking such as aroma, texture, flavor, and overall acceptance. Thermal processing often leads to the loss of volatile compounds and enzymatic changes that can diminish fresh aroma and alter texture, which likely explains its poor performance relative to the untreated control [4].

Overall acceptability scores followed a similar pattern to taste ratings, with the no pretreated sample achieving the highest score (4.28 ± 0.45), followed by citric acid-treated outweighed any potential benefits. This finding suggests that blanching may not be the optimal preservation method for melon cocktail when sensory quality is a priority.

Therefore, no pretreated formulation which represents the highest consumer acceptance, should be considered the benchmark for this product category. Consequently, further tests were conducted on this sample to determine its Vitamin C and reducing sugar content.

3.4 Vitamin C

The analysis of Vitamin C (Table 4.) shows an increase in Vitamin C content in no treatment melon compared to fresh melon fruit. This increase can be explained by the increased extractability of vitamin C after the fruit cell tissue was destroyed during the processing. Physical treatments such as cutting, crushing, or mixing can break down cell walls and release ascorbic acid that was previously trapped in the fruit matrix, resulting in higher measurable vitamin[21]. These results are in line with previous studies showing that processing fruit with mild treatment (light treatment without excessive heating) can maintain or even slightly increase vitamin C content due to increased bioavailability [22].

Table 4. Vitamin C and Reducing Sugar Content in Fresh Melon Fruit and Melon Cocktail

Sample	Vitamin C (mg/100g)	Reducing Sugar (%)
Fresh Melon Fruit	7,69	3,575
Melon Cocktail	8,18	8,361

3.5 Reducing Sugar

The results of the study indicate a significant increase in the reducing sugar content of the most preferred formulation composition occurred during the processing and applied treatment. In fresh fruit, reducing sugars primarily consist of glucose and fructose, which are formed from the hydrolysis of starch or sucrose [8]. During processing, the activity of hydrolytic enzymes (such as invertase or amylase) or physical treatment can enhance the release of simple sugars, thus increasing the measured reducing sugar level. This aligns with the report by Venetikidou et al [10] which states that fruit processing treatments can increase the availability of simple sugars due to the breakdown of sucrose into glucose and fructose.

During the fruit cocktail processing, particularly under acidic conditions and in the presence of heat treatment, the glycosidic bonds in the sucrose molecule can be hydrolyzed. This hydrolysis yields two monosaccharides that are both more readily soluble and more chemically reactive. This reaction not only increases the reducing sugar value but also affects the rise in Total Soluble Solids (TSS) and shifts the flavor profile to be sweeter and smoother [23], [24].

From a sensory perspective, this increase in reducing sugars contributes to the balance of sweet and sour taste, which is a critical factor in the panelists' hedonic evaluation. Overall, This study successfully developed and characterized a novel fruit cocktail with melon as the primary ingredient. The findings conclusively demonstrate that the choice of pre-treatment profoundly influences the product's final quality, creating a clear trade-off between physicochemical properties and sensory acceptance. While the citric acid pre-treatment was effective in increasing the Total Soluble Solids (TSS) through mechanisms of cell wall hydrolysis and sucrose inversion, it adversely affected the flavor profile, making it less ideal for consumers. Similarly, the blanching pre-treatment consistently resulted in the lowest sensory scores, likely due to the loss of volatile aromas and textural degradation. Therefore, the melon without pre-treatment emerged as the most preferred formulation, achieving the highest level of overall consumer acceptability. Its success is attributed to the preservation of the fruit's inherent fresh aroma, natural texture, and unaltered flavor. The concomitant increases in Vitamin C and reducing sugar content in this sample further validate its quality, suggesting that mild processing can enhance nutrient bioavailability without compromising sensory appeal.

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The Effect of Variations in Sugar and Pectin Concentration on the Physicochemical and Organoleptic Properties of Fruit Jam Made from Seed Production Melon.

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Abstract. Melon jam has a sweet taste, made from melon, sugar, pectin, and acid. The melon used for this study are intended for seeding and have slightly different characteristics to commercial melons.This study aimed to determine the effect of different concentrations of sugar and pectin on the physical properties of the fruit jam. This study used completed randomized design. The treatment applied were various concentration of sugar (30%,40%,50%), 15% glucose, and pectin (0,1%,0,2%,0,3%). Chemical analysis were pH levels, total dissolved solids, reduced sugar levels, vitamin C, and organoleptic properties of the jam. The results showed that the increasing concentrations of sugar and pectin reduce the spreadability of melon jam. Total dissolved solids of melon jam were 51.75°Brix to 69.85°Brix. The results of the hedonic quality assesment indicated that different concentrations of sugar and pectin had a significant effect on the aroma and texture of the jam, as the concentration of crystal sugar and pectin increases, the texture of the jam becomes thicker and more densely structured. The characteristics of melon jam also influenced by the properties of the melon used, which has a mild, distinctive aroma and flavor.

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potential to development. Melon is not only consumed or processing into processed food and beverage products, but melon is also cultivated to take its seeds for seedling. The cultivation technique involves by conditioning nutrients and other growth factors to optimize the quality of melon seeds so the seeds are obtained. however, the pulp has not yet been optimally utilized. Melon comprises a range of nutritionally relevant bioactive components, including vitamins, essential mineral elements, dietary fiber, and an array of secondary metabolites or other non-nutritive bioactive substances (Kader *et al,*2004 in [1]). Melon being climacteric fruit and has high water content making it highly perishable to extend their shelf life. [2] stated that melon has a high water content 93 ml/100 gram. Melon can be processed into jam, syrup, sweets, fruit juice, and jelly. During jam production the uniform gel formed from the fruit mixture by thermal concentrated [3]. The production of jam fundamentally relies on the precise formulation and interaction of pectin, sugar, and acid to achieve proper gel formation. [4]. Jam has a sweet taste and a slightly gel-like texture. In the process of making jam, the forming a gel is influenced by sugar, pectin, and acid. Low pectin content requires the addition of higher amounts of sugar to obtain a stable gel structure, while high pectin levels allow for lower sugar use. The purpose of adding sugar in making jam is to obtain a good appearance, taste, and texture, it also functions as a preservative and sweetness. Sugar increases the resistance of the gel to mechanical damage, extend self life, and form the texture. Citrit acid contributed in gel formation and also function as an acidity regulator.

In addition to the influence of pectin, sugar, and acid, the color and aroma of the fruit raw materials determine the final quality of the jam. Although melons generally have bright flesh color and a distinctive sweet aroma, melons from seed cultivation often do not meet commercial quality standards. Cultivation focused on seed production causes plants to be conditioned to produce quality seeds, while the fruit flesh often has lower sensory quality, especially in terms of texture, aroma, and taste. This condition results in a large amount of fruit flesh that is not utilized and has the potential to become waste. Additionally, melons are fruits with relatively low pectin content, so the addition of other ingredients is needed to improve the texture of the jam produced.

Although melons have been widely processed into various food products (10), studies on the use of melon flesh from seed cultivation as a raw material for jam are still very limited. Most previous studies have focused more on the nutritional characteristics of fresh melons or commercial melon processing, rather than on melon waste from seed systems. In addition, there have been few scientific reports that systematically discuss the effect of variations in pectin, sugar, and citric acid concentrations on the quality of melon jam made from fruit that is less than ideal in texture and weaker in aroma than melons for consumption. Thus, there is a need to evaluate the appropriate jam formulation so that melon pulp waste from seed cultivation can be processed into value-added products. This study aims to explore and optimize the utilization of melon pulp from seed cultivation—which has been underutilized and tends to become waste—as raw material for value-added processed food products. Through these processing efforts, this study is expected to contribute to increasing the efficiency of melon cultivation by-product utilization, reducing fruit biomass waste, and creating alternative processed products with commercial development potential.

2 Material and methods

The ingredients of melon jam production are melon production seed from Smart Green House of the Politeknik Negeri Jember, white crystal sugar, glucose, citric acid, pectin, melon essence, and water. Melon essence used because the melon production seed less of aroma, color, and melon flavor than commercial melon.

The study was conducted using Complete Random Design with nine treatments and three replications. The treatment in this study included the concentration of pectin and the concentration of granulated sugar levels which consisted of the comparison of pure crystal sugar and glucose with pectin of:

1. A1 (30% sugar : 15% glucose : 0.1% pectin)
2. A2 (30% sugar : 15% glucose : 0.2% pectin)
3. A3 (30% sugar : 15% glucose : 0.3% pectin)
4. A4 (40% sugar : 15% glucose : 0.1% pectin)
5. A5 (40% sugar : 15% glucose : 0.2% pectin)
6. A6 (40% sugar : 15% glucose : 0.3% pectin)
7. A7 (50% sugar: 15% glucose : 0.1% pectin)
8. A8 (50% sugar: 15% glucose : 0.2% pectin)
9. A9 (50% sugar: 15% glucose : 0.3% pectin)

The data result was analyzed using SPSS, one way ANOVA (Analysis of Variance) and Duncan's multiple range test (DMRT) with a significant level of 5%. The chemical analysis of Melon Jam was using Nelson Somogi method for reduction sugar , refractometer for measure the total dissolved solid levels and iodometri methode for Vitamin C. The sensory analysis include hedonic and hedonic quality test with 26 panelist. Respondents provided their assessments using a five-point hedonic scale namely dislike extremely (1), dislike (2), like slightly (3), Like (4), Like very much (5).

3 Results and discussion

Jam is a processed fruit product that has a sweet taste and a thick, gel-like texture. Jam is a type of fruit preserve or spread. It is commonly made from various fruits, sugar, and pectin and is intended for consumption during the off-seasons Jam is a form of fruit preserve or spread, typically prepared from various fruits in combination with sugar and pectin, and enable to consumption during the off season [5]. The type of fruit used greatly affects the final quality of the jam, especially in terms of taste, aroma, and texture. Melon (Cucumis melo L.) is a horticultural commodity that has the potential to be used as a raw material for jam because of its aroma and sweet taste. However, the melons used in this study were grown from seedlings, so the characteristics of the fruit produced were different from commercial melons. In the seedling system, fruit flesh development is not a priority, so the sensory quality of the fruit tends to be lower.

sugar content, vitamin C content, and organoleptic testing to assess the physical and sensory quality of the product.
The results of observations regarding ph and total solid content can be seen in the following table

Table 1. The Result of physical and chemical analyze

Treatment (sugar : glucose : pectin)	Total Soluble solidscontent (°Brix)	pH	Spreadability
A1 (30% :15% : 0.1)	58,85± 0,071^{c}	5	8,65± 0,212 ^{ac}
A2 (30% :15% : 0.2)	58,1± 0,424^{b}	5	9±0^{cd}
A3 (30% :15% : 0.3)	51.75± 0.212^{a}	5	8,5±,071 ^{acd}
A4 (40% :15% : 0.1)	69,2±0,565^{g}	6	8,1±0,141^{ab}
A5 (40% :15% : 0.2)	66,6± 0,0^{f}	6	8,15±0,212 ^{acd}
A6 (40% :15% : 0.3)	65,58,2±0,283^{a}	6	9±0^{d}
A7 (50% :15% : 0.1)	65,45± 0,071^{e}	6	7,2±0,424^{d}
A8 (50% :15% : 0.2)	69.85± 0.071^{h}	6	7,15±0,495^{ad}
A9 (50% :15% : 0.3)	62.6± 0.0^{d}	6	8,75±0,071^{ac}

Notes: value presented by different letters in the row indicated a significantly different (P<0.05) analyzed by DMRT test

3.1 Spreadability

Jam commonly used as a spread on bread. Good quality jam will generally be easy to spread. Good Jam has good Spreadability were easy to applied to bread, has a bright, chewy color, and has a real fruit taste [6]. The melon jam produced lacks the authentic fruit flavor because it is in line with the characteristics of the melon used as the base ingredient, which has a less sweet taste typical of melons. The analysis using SPSS shows that the use of sugar and pectin at different concentrations in melon jam had significantly different result (p> 0,05). Sugar and pectin affect the texture of the jam produced. The spreadability of jam can be influenced by the sugar and pectin content used because it can increase the density of the jam. The higher the sugar concentration and the concentration of pectin used, denser and thicker the jam. Jam that has a very thick to hard texture will be difficult to spread on bread or other products. The spreadability of the melon jam studied ranged from 7.75 cm to 9.5 cm. The higher the sugar concentration used, the thicker the jam becomes, thereby reducing its spreadability. Spreadability is closely related to consistency and dispersibility, which can be influenced by citric acid and the sugar used in gel formation [7] was reported that incorporating sucrose into jam formulations can influence the texture of konjac-based gels through its bulking properties. Sucrose competes with xanthan for available water molecules, thereby altering the structural firmness of the gel.

3.2 pH

During the jam processing the most important factor that should be controlled and monitored is PH value [10] Moreover, pH plays a critical role in facilitating proper gel development in jam, making it necessary to regulate pH during processing to ensure the production of a high-quality final product. [11]. The resulting melon jam exhibited a pH range between 5 and 6. The jam formulated using 45% total sugar which consist of 30% sugar and 15% glucose (A1 until A3) had a pH of 5, while the sample A4 until A9 which using 55% total sugar (consist of 40% sugar and 15% glucose and 65% total sugar (consist of 50% sugar and 15% glucose) had a pH of 6. This trend suggests that an increasing concentration of added sucrose positively correlates with a slight increase in the final pH of the melon jam product. The increased sucrose caused the increased of ph during heating , fructose and glucose formed. This is occurs in acidic environments and called sucrose inversion, the pH value of glucose from 4 to 6 and sucrose is 7 [12]. The pH values observed in this significantly exceed the optimum range of SNI specifications. This condition may be attributed to the characteristics of the raw material, as the melon used had a relatively high initial pH of approximately 6. Moreover, the melon contained a low level of pectin, which reduces gel-forming capacity and contributes to the higher pH of the jam. According to [13] The addition of 0.5% citric acid, lime juice, or pineapple juice as acidulants in jam production failed to achieve the optimal pH range for jam, which is 3.1–3.5. The condition may occur because the pH of the melon used also relatively high at pH of 6. In addition, the melon used as the base ingredient for the jam has a low pectin content. This causes the pH of the jam to be high. Consequently, the incorporation of citric acid or other acidulants is necessary to effectively lower the formula's pH, ensuring it reaches the optimal acidic condition required for effective pectin gel formation and compliance with SNI quality standards.

3.3 Total Soluble Solids (TSS) Analysis

Total Soluble Solids (TSS) is a key quality parameter in fruit products, primarily indicating the soluble sugar content which is directly correlated with the overall product quality. As stated by Buckle *et al.* [14], an increase in sucrose concentration within a ripening fruit directly leads to higher TSS values. Given that the raw melon material utilized in this study exhibited a low initial TSS value of only 5°Brix, the strategic addition of external sugar (sucrose) and pectin was deemed essential to achieve an acceptable jam formulation.

The Indonesian National Standard (SNI) specifies a minimum total soluble solids (TSS) content of 65°Brix for jam products. In this study, melon jam exhibited TSS values ranging from 51.75°Brix to 69.85°Brix, depending on the sugar and pectin concentrations employed. Notably Melon jam formulation containing 45% total sugar (40% sugar,15% glucose) failed to meet the SNI requirements, regardless of pectin levels (0.1-0.3%). The TSS values for these formulations remained below the 65°Brix threshold, indicating insufficient soluble solids for standard compliance. In contrast, melon jam using 55% total sugar and 65% total sugar (A4 until A9) successfully achieved TSS values exceeding 65°Brix, thereby conforming to SNI quality standards. These results demonstrate that sugar concentration plays a critical role in determining the final TSS content and overall product quality of melon undergoes inversion, breaking down into its constituent monosaccharides—glucose and fructose [13]. These reducing sugars, along with residual non-reducing sugars (sucrose), organic acids, pectin, and proteins, constitute the total dissolved solids in jam. This compositional complexity explains the substantial contribution of sugar concentration to the final TSS measurements.While increased sugar concentration effectively elevates TSS content and ensures compliance with quality standards, excessive sugar addition requires careful consideration. Although a certain amount of sugar is essential for improving jam quality, texture, and preservation, over-incorporation of sucrose presents technological challenges. Specifically, excessive sugar levels during jam preparation may lead to sucrose crystallization on the gel surface [16], resulting in undesirable textural defects and reduced product acceptability. To obtain the gel firmness, the sugar content should be kept below 65% [17].

3.4 Hedonic Assesment

The hedonic test of the melon jam in this study asessment by 26 panelist using five point hedonic scale namely dislike extremely (1), dislike (2), like slightly (3), Like (4), Like very much (5). The parameter asessment are color,aroma, tekstur,taste,and overall. The result of the hedonic analyze showed in the table 2.

Table 2. The results of hedonic test

Treatment (sugar : glucose : pectin)	Color	Aroma	Tekstur	Taste	Overall
A1 (30% :15% : 0.1)	$3,462 \pm 0,8593^{ab}$	$2,346 \pm 0,8458^{a}$	$3,231 \pm 0,8629^{ab}$	$2,846 \pm 0,9672^{a}$	$3,000 \pm 0,9798^{a}$
A2 (30% :15% : 0.2)	$3,500 \pm 0,8602^{ab}$	$2,577 \pm 0,7575^{a}$	$3,654 \pm 0,6288^{bc}$	$3,385 \pm 0,8521^{a}$	$3,038 \pm 0,7200^{a}$
A3 (30% :15% : 0.3)	$3,577 \pm 0,8086^{ab}$	$2,538 \pm 0,8115^{a}$	$3,692 \pm 0,8376^{bc}$	$3,115 \pm 0,8162^{a}$	$3,115 \pm 0,8162^{a}$
A4 (40% :15% : 0.1)	$3,654 \pm 0,9774^{ab}$	$2,769 \pm 0,8152^{a}$	$3,385 \pm 1,0612^{abc}$	$3,269 \pm 1.0414^{a}$	$3,231 \pm 0,9081^{a}$
A5 (40% :15% : 0.2)	$3,500 \pm 0,9899^{ab}$	$2,577 \pm 0,9021^{a}$	$3,538 \pm 0,8115^{abc}$	$3,269 \pm 0,9190^{a}$	$3,115 \pm 0,7656^{a}$
A6 (40% :15% : 0.3)	$3,885 \pm 0,9089^{b}$	$2,692 \pm 0,8840^{a}$	$3,885 \pm 0,7656^{c}$	$3,346 \pm 0,9774^{a}$	$3,385 \pm 0,8038^{a}$
A7 (50% :15% : 0.1)	$3,385 \pm 0,9414^{ab}$	$2,538 \pm 0,8115^{a}$	$3,654 \pm 0,8458^{bc}$	$3,500 \pm 1,1747^{b}$	$3,423 \pm 1,0266^{a}$
A8 (50% :15% : 0.2)	$3,192 \pm 1,0206^{a}$	$2,423 \pm 0,7575^{a}$	$3,038 \pm 1,1129^{a}$	$3,115 \pm 0,9931^{ab}$	$3,000 \pm 0,9381^{a}$
A9 (50% :15% : 0.3)	$3,385 \pm 0,9829^{ab}$	$2,769 \pm 0,9511^{a}$	$3,731 \pm 0,7243^{bc}$	$3,385 \pm 0,8521^{a}$	$3,346 \pm 0,7452^{a}$

Notes: value presented by different letters in the row indicated a significantly different ($P<0.05$) analyzed by DMRT test influences consumer appeal and purchase intention, often serving as the first quality indicator before consumption. Food-grade coloring agents were incorporated during jam production to enhance color intensity and visual appeal. The color development in melon jam results from the interaction between the thermal processing conditions and the inherent pigments present in melon tissue [2]. The higher sugar concentrations employed in this study likely contributed to improved color stability and enhanced caramelization reactions during cooking, resulting in more appealing visual characteristics.

Aroma represents another essential sensory parameter for evaluating jam quality, alongside color, texture, and flavor [18]. The melon variety utilized in this study exhibited a mild intrinsic aroma, which posed challenges in achieving optimal aroma intensity in the final product. To address this limitation, food-grade essences were added during processing to enhance both color and aroma characteristics simultaneously. The highest aroma acceptance was observed in sample A9, with a hedonic score of 2.769, indicating "slightly like - moderately like." Despite the addition of aroma-enhancing essences, the overall aroma acceptability remained below the target threshold. This subdued aroma perception can be attributed to two primary factors: first, the melon fruits used possessed inherently weak aromatic compounds even at full maturity; second, thermal processing significantly affected the volatile aroma profile.

During heating, aromatic compounds from raw materials undergo volatilization and may participate in complex chemical interactions with other formulation components, leading to the formation of novel aroma compounds or the degradation of existing ones [19]. This thermal-induced aroma modification can result in either enhancement or diminution of desirable aroma characteristics, depending on processing parameters and ingredient interactions. In the case of melon jam, the heating process appeared to further reduce the already-weak natural aroma of the fruit, despite efforts to compensate through essence addition. Statistical analysis revealed that texture acceptability was significantly influenced by formulation variables at the 5% significance level ($p < 0.05$). Both sugar and pectin concentrations demonstrated positive correlations with texture preference scores. As sugar concentration increased, panelists acceptance of texture improved correspondingly. Similarly, higher pectin levels enhanced texture acceptability, though this relationship exhibited optimal thresholds beyond which acceptability declined. The presence of sugar causes pectin to coagulate and form fine fibers, while the level of compactness and gel density is determined by the amount of pectin and sugar added. The addition of pectin at specific concentrations can facilitate gel formation [20].

Flavor acceptability exhibited a positive relationship with sugar concentration, consistent with texture results. As sugar levels increased, panelists' preference scores for melon jam flavor improved significantly. The melon variety employed in this study possessed relatively low natural sweetness, necessitating supplementary sugar addition to achieve commercially acceptable flavor profiles. Consumer preference studies consistently demonstrate that jam products with pronounced sweetness receive higher acceptability ratings. Comprehensive sensory evaluation revealed complex interactions between formulation variables and overall acceptability. Generally, increasing sugar concentration led

3.5 Hedonic Quality Assesment

Hedonic quality assessment was conducted to evaluate the sensory attributes of melon jam formulations with varying sugar and pectin concentrations. A panel of 26 semi-trained assessors evaluated five sensory parameters: color, aroma, flavor, texture, and overall acceptability. Statistical analysis was performed using SPSS software. Data were subjected to one-way analysis of variance (ANOVA) to determine significant differences among treatments. When significant effects were detected ($p < 0.05$), Duncan's Multiple Range Test (DMRT) was applied as a post-hoc analysis to identify which specific treatments differed from one another. This statistical approach enabled comprehensive evaluation of how different concentrations of crystalline white sugar and pectin influenced the sensory properties of the resulting jam products. The result of hedonic quality asessment showed on the table 3.

Tabel 3. Hedonic quality assesment

Treatment (sugar : glucose : pectin)	**Color**	**Aroma**	**Tekstur**	**Taste**	**Overall**
A1 (30% :15% : 0.1)	2,769±0.863^{c}	2,231±0.951^{a}	3,423±1,0648^{a}	2,808±1,06^{a}	2,962±0,77^{a}
A2 (30% :15% : 0.2)	2,385±0.898^{abc}	2,115±0.766^{a}	3,577±0,8086^{a}	2,96±0,916^{a}	3,154±0,84^{ab}
A3 (30% :15% : 0.3)	2,654±0.846^{bc}	2,192±0.981^{a}	3,731±0,8274^{ab}	2,692±0,928^{a}	3,115±0,84^{ab}
A4 (40% :15% : 0.1)	2,769±1,07^{c}	2,192±0.981^{a}	4,154±0,9672^{bc}	3,115±1,177^{a}	3,385±1.06^{ab}
A5 (40% :15% : 0.2)	2,538±0.859^{abc}	2,115±0.952^{a}	3,808±0,8494^{ab}	2,885±1,071^{a}	3,385±0,94^{ab}
A6 (40% :15% : 0.3)	2,923±0.935^{c}	2,269±0.92^{a}	3,808±0,8494^{ab}	3,115±1,0706^{a}	3,615±0,75^{b}
A7 (50% :15% : 0.1)	2,154±0.967^{ab}	1,962±0.774^{a}	3,654±0,7452^{ab}	3,038±1,039^{a}	3,538±1.03^{ab}
A8 (50% :15% : 0.2)	2,077±0.891^{a}	2,000±0.8^{a}	4,346±0,7971^{c}	2,808±1,201^{a}	3±1,02^{a}
A9 (50% :15% : 0.3)	2,038±0.871^{a}	2,115±0.711^{a}	3,654±0,8458^{ab}	3,000±1,095^{a}	3,5±0,91^{ab}

Notes: value presented by different letters in the row indicated a significantly different ($P<0.05$) analyzed by DMRT test compounds. The Maillard reaction represents a principal mechanism contributing to color darkening in sugar-containing food systems heated above 100°C. This complex series of reactions occurs between reducing sugars (glucose and fructose) and amino acids or proteins present in the fruit matrix, producing brown-colored melanoidin pigments.

3.5.2 Texture

In the texture test, The highest texture score (4.34) was obtained from the melon jam formulated with 65% total sugar and 0.2% pectin, indicating a desirable thick consistency. The increase in thickness is primarily associated with the high sugar content, which reduces the amount of free water in the matrix, thereby enhancing viscosity. Sugar also disrupts the stability of pectin solutions; at sufficiently high concentrations and in the presence of acid, increased hydrogen ion activity promotes partial pectin precipitation and subsequent gel formation (Hui, 2006 in [3]). Panelists generally rated the texture from 'moderately thick – thick', consistent with the progressive increase in sugar and pectin levels. Pectin contributes directly to gel formation, especially in fruits with naturally low pectin, such as melon. Meanwhile, sugar binds water and strengthens the gel network. Texture firmness is further influenced by vitamin C content, pectin concentration, and sugar levels.

In this study, the optimal texture corresponded to a thick but not overly firm gel. This condition may be attributed to melon's low natural pectin content and the thermal gelation behavior of high-methoxyl pectin during cooking [21]. Additionally, because the melon used had relatively low sweetness, the 65% total sugar level provided adequate viscosity without causing excessive hardness. Overall, higher sugar and pectin concentrations consistently increased jam firmness, aligning with the functional role of pectin in maintaining structural stability, supporting flavor release, and minimizing syneresis [22]. However, consumer preference generally favors jams that are neither runny nor excessively firm, as overly dense textures reduce spreadability and negatively impact acceptability.

3.5.3 Aroma

The addition of white crystalline sugar and pectin did not produce significant differences in the aroma of melon jam. This is primarily attributed to the low intrinsic aromatic intensity of the melon used, which lacked the characteristic sweet melon note typically found in commercial cultivars. As a result, panelists rated the aroma between *no detectable aroma* and *slightly detectable melon aroma*, indicating weak overall aromatic perception. The low aromatic profile of the raw material also translated directly into the final product, suggesting the need for added flavor enhancers or natural melon extracts to improve aroma quality. Although the overall effect was limited, the highest aroma score was observed in the formulation containing 65% total sugar (50% sucrose and 15% glucose). This slight improvement may be attributed to the role of sugar in enhancing volatile release and to the caramelization reactions occurring during heating, which can contribute additional aromatic notes. As reported by [23,24], heating in the presence of sugars and acids promotes caramelization, a known contributor to aroma development in foods. Citric acid present in the formulation may also influence aroma perception by modifying flavor balance and perception by interacting with pectin and water, supporting proper gel formation while improving flavor release. Additionally, sugar acts as a preservative and contributes to the desirable sensory quality of jams. Generally, consumers prefer jams with a balanced sweetness and a distinct fruit flavor, and the findings of this study indicate that increased sugar concentration improved taste acceptability despite the weak intrinsic flavor of the melon.

3.5.5 Overall

The overall acceptability of melon jam was rated at a moderate level, with scores generally falling within the *slightly acceptable* category. The highest acceptance score (3.65) was observed in the formulation containing 65% sugar and 0.2% pectin, indicating that increased sweetness and improved gel structure contributed positively to consumer preference.Lower acceptance in other formulations was primarily attributed to the weak natural aroma and flavor of the melon used, which lacked the characteristic melon notes expected by panelists. Consequently, the addition of flavoring and higher sugar levels became essential to enhance sensory quality. As sugar and pectin concentrations increased, overall liking also improved due to better sweetness intensity and more desirable gel consistency. These findings highlight that appropriate sugar and acid levels not only enhance gel formation but also improve texture, which plays a key role in shaping flavor perception and, ultimately, overall consumer acceptance.

4 Vitamin C

Vitamin C analysis was conducted on the most preferred formulation identified from the organoleptic evaluation, the jam containing 40% sugar and 0.2% pectin. This sample contained 6.69 mg/100 g vitamin C, compared with 7.69 mg/100 g in the fresh melon used as raw material. The results indicate a reduction of approximately 1 mg/100 g, which can be attributed to thermal processing during jam preparation. Ascorbic acid is highly sensitive to oxidation, and its degradation rate increases in the presence of heat, light, alkaline conditions, oxidative agents, and catalytic metals such as copper and iron [24]. This trend is consistent with findings from other fruit-based jams, where heating accelerates the conversion of ascorbic acid into dehydroascorbic acid, leading to significant nutrient loss [2]. Overall, the decrease in vitamin C content reflects the inherent instability of ascorbic acid during cooking and underscores the impact of thermal processing on the nutritional quality of melon jam.

5. Reducing Sugar

The presence of acid and heat during jam processing promotes sucrose hydrolysis, leading to the formation of glucose and fructose. Analysis of the best-performing formulation based on organoleptic assessment showed that the melon jam contained 9.004% reducing sugars. The reducing sugar content was influenced primarily by the amount of added sugar and the thermal treatment applied during processing. Although sucrose is classified as a non-reducing sugar due to the absence of a free reactive hydroxyl group, exposure to heat and acidic sugar accumulation.

6. Conclusion

The results indicate that variations in white crystal sugar and pectin concentrations significantly influenced the total soluble solids, spreadability, °Brix value, aroma, and texture of the resulting melon jam. Higher concentrations of sugar and pectin produced a denser and more viscous gel structure, which consequently reduced spreadability. The spreadability values ranged from 7.75 to 9.5 cm, showing a consistent decline as sugar concentration increased. Total soluble solids also increased proportionally with sugar addition, with °Brix values ranging from 51.75°Brix to 69.85°Brix. Formulations containing 55% and 65% total sugar met the Indonesian National Standard (SNI) requirement of ≥65°Brix for jam products. Sensory analysis further confirmed that sugar–pectin variations had a significant effect on color and texture attributes. The overall quality of the jam was also influenced by the characteristics of the raw material. The melon used—cultivated primarily for seed production—possessed low sweetness and weak characteristic aroma, which resulted in jam with less pronounced melon flavor and aroma.

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Jember, Oktober 25, 2025
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Proses Produksi untuk Analisa umur simpan produk cocktail melon

ANALISA KELAYAKAN USAHA

Pada usaha ini dilakukan produksi per harinya dengan menghasilkan 15 produk *cocktail* buah. Adapun biaya variabel pada usaha *cocktail* buah yang dapat dilihat pada Tabel 2.

Tabel 1. Biaya Tetap *Cocktail* Buah

Komponen Biaya Tetap	Total Biaya
Tenaga Kerja	Rp 75.000
Penyusutan Timbangan	Rp 228
Penyusutan Sendok	Rp 57
Penyusutan Talenan	Rp 68
Penyusutan Spatula	Rp 41
Penyusutan Pisau	Rp 55
Penyusutan Baskom	Rp 164
Penyusutan Panci	Rp 96
Penyusutan Piring	Rp 16
Penyusutan Mangkok	Rp 10
Pengusutan Gelas Ukur	Rp 16
Penyusutan Kompor	Rp 547
Total Jumlah	Rp 76.298

Tabel 2. Biaya Variabel *Cocktail* Buah

Bahan	Total Biaya
Gula Pasir	Rp 18.000
Air	Rp 18.000
Asam Sitrat	Rp 900
Benzoat	Rp 1.908
Melon	Rp 0
Pepaya	Rp 12.000
Nanas	Rp 15.000
Kemasan Jar	Rp 30.000
Gas	Rp 500
Total Jumlah	Rp 96.308

Pada produk *Cocktail* ini diperoleh hasil 15 produk dalam satu kali produksi dengan rincian biaya per produksi pada Tabel 1 dan Tabel 2. Dihitunglah Harga Pokok Penjualan dan Biaya Per Unit dengan rumus sebagai berikut:

$$\text{HPP} = \frac{\text{Biaya Tetap + Biaya Produksi}}{\text{Jumlah Produksi}}$$

$$= \frac{\text{Rp } 76.298 + 96.380}{15}$$

$$= \text{Rp } 11.507$$

$$\text{Biaya Per Unit} = \frac{\text{Biaya Variabel}}{\text{Jumlah Produksi}}$$

$$= \frac{\text{Rp } 96.380}{15}$$

$$= \text{Rp } 6.420$$

HPP dan Biaya per Unit dihitung untuk mengetahui biaya rata-rata yang dikeluarkan untuk menghasilkan satu unit produk. Kemudian analisa dilanjutkan pada pengambilan laba dengan pengambilan laba 30% dari HPP 11.507 sehingga di dapatkan laba Rp 3.452 per produknya. Dari laba ini dapat ditentukan harga jual sebesar Rp 15.000 per produknya kemudian dapat dikalikan 15 sebagai jumlah produk yang di dapat, diperoleh total pendapatan Rp 225.000 Keuntungan per produksi dapat dihitung dengan mengurangi total pendapatan dengan total biaya produksi, dan diperoleh Rp 52.394. Untuk mengetahui BEP per unitnya di dapat melalui rumus berikut ini:

$$\text{BEP Unit} = \frac{\text{Biaya Tetap}}{\text{(Harga Jual – Biaya Per Unit)}}$$

$$= \frac{\text{Rp } 76.298}{\text{(Rp } 15.000 - \text{Rp } 6.420)}$$

$$= 9 \text{ unit}$$

Artinya telah mencapai BEP atau titik impas pada produksi 9 produk. Kemudian juga dihitung BEP dalam rupiah.

$$\text{BEP Rupiah} = \text{BEP Unit x Harga Jual}$$

$$= 9 \text{ Unit x Rp } 15.000$$

$$= \text{Rp } 135.000$$

BEP Rupiah adalah titik impas dalam nilai uang, yaitu jumlah pendapatan minimum dalam rupiah yang harus dicapai oleh pelaku usaha. Sehingga usaha tidak dalam keadaan untung dan rugi (EH, 2024).

Revenue Cost Ratio (R/C Ratio) dihitung sebagai berikut ini:

$$\text{R/C Ratio} = \frac{\text{Total Pendapatan}}{\text{Total Biaya Produksi}}$$

$$= \frac{\text{Rp } 225.000}{\text{Rp } 172.606}$$

$$= 1{,}3 \text{ (Layak)}$$

Nilai > 1 menunjukkan bahwa usaha menghasilkan pendapatan lebih besar daripada biaya produksi, yang berarti usaha dalam kondisi efisien dan layak secara finansial. R/C Ratio > 1 juga digunakan oleh Sugiarti. Prayoga, & Astuti (2025) dalam analisis Minuman Fungsional Bunga Rosela di CV X Magelang.

Return on investment (ROI) menunjukkan konsistensi modal dalam menghasilkan laba bersih yaitu:

$$\text{ROI} = \frac{\text{Keuntungan}}{\text{Total Biaya Produksi}} \times 100\%$$

$$= \frac{52.394}{172.606} \times 100\%$$

$$= 30\%$$

HASIL ANALISA KAPANG

Sampel	Total Kapang (Koloni/g)
5 C	
H0	$2{,}2 \times 10^{3}$
H7	$2{,}6 \times 10^{3}$
H14	$4{,}2 \times 10^{3}$
H21	$3{,}5 \times 10^{2}$
H28	$2{,}5 \times 10^{2}$
25 C	
H0	$2{,}2 \times 10^{3}$
H7	$1{,}2 \times 10^{6}$
H14	$2{,}4 \times 10^{6}$
H21	$2{,}8 \times 10^{6}$
H28	$1{,}4 \times 10^{5}$
45 C	
H0	$2{,}2 \times 10^{3}$
H7	5,0
H14	5,0
H21	0,0
H28	0,0