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Ethnoscience Reconstruction of Sasak Cengeh Cooking for Contextual Chemistry Learning

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Abstract

Ethnoscience reconstructions of traditional cooking can connect local knowledge to chemistry, but often leave unclear which claims derive from field records, established ingredient chemistry, or untested predictions. This bounded qualitative case study developed an evidence-graded interpretation of Sasak Cengeh preparation using one completed interview report from one household practitioner in Bunkate, Lombok, Indonesia, and six preparation/product photographs contained in that same report. The report and photographs were read as a single source package, not independently triangulated observations. Reported actions were assigned stage codes (D), related cautiously to published chemical mechanisms (L), and converted into propositions requiring new measurements (H). Six reported stages covered coconut grating, ingredient preparation, spice grinding, heating coconut milk and seasonings, adding vegetables after boiling, and serving. The resulting proposed matrix links these steps to coconut-milk emulsions, taro starch and oxalate, garlic sulfur chemistry, chili capsaicinoids, eggplant phenolics, and metabolites formed during prior shrimp-paste fermentation. It also identifies uncertainties in botanical identification, cooking conditions, and food-safety interpretation. Four untested inquiry tasks were specified for possible upper-secondary chemistry use, each requiring subsequent expert and classroom validation. No chemical assay, independent observation, or educational intervention was performed. The contribution is therefore a transparent single-case method for distinguishing documented practice from literature-based explanation and testable hypotheses, not proof of new reactions or learning effects.

Keywords: ethnoscience; Cengeh; coconut milk; food chemistry; contextual learning

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INTRODUCTION

Traditional cooking records can document ingredients, procedures, and pathways of household knowledge transmission, but such accounts do not by themselves establish the physicochemical processes occurring during preparation. Ethnobotanical surveys across different food cultures describe plant use and culinary heritage (Abbas et al., 2016; Alalwan et al., 2017; Alrhmoun et al., 2025; Bultosa et al., 2020), while Indonesian food-heritage studies emphasize cultural meanings and processing descriptions (Arum et al., 2026; Gozali et al., 2024). These studies provide contextual documentation rather than sample-specific measurements of reaction products,

emulsion structure, or food safety. No decline of cooking knowledge in the investigated Bunkate household was assessed.

Sukenti et al. (2016) provide the closest regional comparison through an ethnobotanical account of Sasak cuisine, including culinary plant use and local food knowledge. That publication should not be assumed to provide a validated chemical reconstruction of the particular Cengeh preparation recorded here; whether it expressly lists Cengeh requires checking the source text before making a dish-specific priority claim. Jannaturrayyan et al. (2020) document regional plant use, while Khery et al. (2021) and Suastra and Pujani (2021) discuss local-wisdom opportunities for science learning. In contrast, the final household report used in this study records one practitioner's Cengeh ingredients, sequence, and reported learning from her mother-in-law (Marwati et al., 2026). The provenance and permission status of that unpublished report must be confirmed by its custodians before depositing an anonymized supplement.

Research on ethnoscience instruction addresses different questions from the present descriptive reconstruction. Contextual collaborative learning, inquiry approaches, and digital ethnoscience have been investigated in various learner populations (Dewi et al., 2021; Harjono et al., 2025; Kurniawan & Basuki, 2024; Prayogi et al., 2023; Astawan et al., 2025; Suwono et al., 2026; Yuliana et al., 2021; Hadisaputra et al., 2025). These publications may motivate future educational testing but do not validate teaching materials or learning gains in this Cengeh case. For design purposes only, the proposed tasks target upper-secondary learners studying colloids, reaction rates/enzymes, and changes in food materials; grade-specific curricular alignment remains to be checked with the intended school.

A methodological challenge is to avoid translating a reported culinary action into an unverified chemical fact. Here, D denotes an ingredient, action, sequence, or statement explicitly documented in the final report; L denotes a mechanism supported by a cited study on a relevant ingredient or comparable system, without asserting that it occurred in the sampled Cengeh; and H denotes an explicit, falsifiable Cengeh-specific or instructional prediction requiring new data. Claims without a source locator or appropriately matched chemistry source are excluded or qualified. This evidence boundary is compatible with calls for dialogue between local knowledge and scientific models (Andrada et al., 2025; Dewi et al., 2020; Lorduy et al., 2026). Unlike a concept-identification precedent from Medaq Api (Andayani et al., 2022), the present analysis makes the D→L→H transition and uncertainty visible for each proposed claim; comparative details warrant checking against the full prior paper.

Cengeh combines a reported coconut-milk cooking medium with taro, eggplant, komak, chilies, and crushed seasonings. Existing chemistry, rather than chemistry discovered by this study, provides the candidate explanatory models: oil-in-water emulsions (Onsaard et al., 2005; Wang et al., 2026), taro processing and raphide-related issues (Kapcum et al., 2022; Paull et al., 2022), and crushed-garlic sulfur chemistry (Borlinghaus et al., 2021). The applicability of each model to the recorded meal remains a hypothesis until sample-specific measurements become available.

The proposed methodological contribution is a source-located and uncertainty-aware reconstruction of one household case, not a claim that the described chemical

phenomena are new. Table 0 compares the intended analytical output with related regional studies; the comparison is provisional where a full-text methodological audit has not been performed. The study asks: (RQ1) Which ingredients and preparation stages are explicitly documented in the completed field report? (RQ2) Which chemistry concepts can be associated with these stages while keeping reported evidence, published mechanisms, and untested propositions separate? (RQ3) How can this distinction inform specific, safe, but as-yet unvalidated upper-secondary inquiry tasks?

METHOD

Research design and primary field evidence

This study used a bounded qualitative descriptive case design followed by an interpretive ethnoscience reconstruction. The sampling unit was one completed five-page report, Hasil Wawancara Terkait Pembuatan Masakan Tradisional Sasak "Cengeh", concerning one household practitioner from Bunkate Timuk, Bunkate Village, Jonggat District, Lombok (Marwati et al., 2026). The report states that the practitioner has prepared the dish since 2005 and learned it from her mother-in-law; these are self-reported experience indicators, not independently verified credentials. The case was selected because a completed record documenting ingredients, tools, steps, and photographs was available; a documented purposive recruitment procedure cannot be asserted. The report was completed in October 2026, but the interview date, interview mode, interviewer–participant relationship, original guide, recruitment criteria, consent terms, and possible follow-up interviews are not available in the supplied manuscript. They must be checked against the primary archive rather than retrospectively invented. Conclusions apply to this account, not all Sasak cooking.

The same field report contains six preparation/product photographs on its page 4 and an additional serving photograph on page 5. Images were matched descriptively by visible subject matter: grated coconut (a), ingredient display (b), seasonings (c), white coconut-milk mixture (d), mixed cooking contents (e), and finished food (f). Chronology was taken from the interview's reported sequence, not independently established by image timestamps. The images are part of the same report and thus do not constitute independent triangulation. No photograph independently verifies the precise boiling threshold, core temperatures, cooking duration, extraction water, squeezing, filtering, or a particular doneness cue. Six shallots, four garlic cloves, 20 chilies, and 5 g of terasi are the only specified ingredient quantities. Photo-reuse permission must be verified by the relevant rights holders before publication; the identifiable portrait was excluded.

Coding and scientific reconstruction

The unit of coding was a discrete reported ingredient, processing action, ordering rule, or visible photographic subject. D1–D6 identify the six reported preparation stages; the image panels are supporting depictions within the same source. A D code was assigned only if directly stated or visibly depicted, with the source type recorded; no missing procedural detail was filled in. Candidate L codes required a relevant, explicitly cited primary or review source and a clear statement of transferability limits.

H codes state a measurable comparison without claiming observed outcomes. Where source, mechanism, or context did not align, the proposition was deferred or qualified. For example, the report's 'add the main ingredients after boiling' is D5; published heat- and water-dependent starch changes in taro are L2 (Kapcum et al., 2022); the effect of taro-piece thickness on heating curves and texture is H2, which was not tested. Figure 1 presents this decision-gated logic. The supplied record does not establish the number or identities of coders, independent double coding, disagreement resolution, or reflexive logs; these are reporting limitations, and no inter-rater coefficient is claimed (Andrada et al., 2025; Lestari, 2024; Lorduy et al., 2026).

Table 1. Proposed audit coding book for the reported stages and chemistry propositions; original coder identities and decisions require archive confirmation.

Code	Analysis unit	Decision rule	Locator	Audit limit
D1–D6	Reported action / visible subject	Retain only explicit interview detail; tag photo as same-source support	Report procedure/ingredient list; Fig. 2(a–f)	Missing measurements remain 'not reported'
L1–L7	Literature mechanism	Attach process-matched citation; never promote ingredient literature to field observation	Author-year source per Table 2	Transferability noted individually
H1–H7	Testable prediction	Specify variable, measurable endpoint, controls and boundary	Table 2; teaching subset Table 3	Not a finding; prospective only
Exclude/qualify	Unsupported assertion	Reject invented stage, safety or chemistry value; record missing support	Absence in source report	No claim from missing evidence

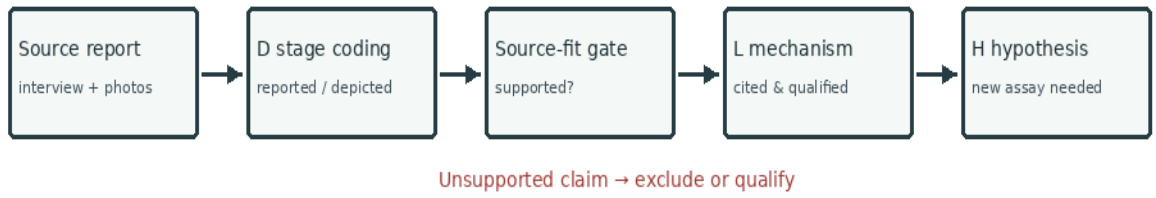


Figure 1. Conceptual workflow from report statements and photographs to D coding, source-fit screening for L interpretation, and measurable H proposals. A claim is excluded or qualified when source provenance or mechanism fit is insufficient; no independent observation or educational validation was undertaken.

Reference selection and analytical boundaries

The literature consultation was purposive and non-systematic, not a systematic review. The manuscript mentions two accompanying reference compilations, but their titles, creators, search dates, platforms, search strings, screening counts, and coverage are not supplied; these cannot be reconstructed reliably. For the present analytical framework, chemistry claims were retained only when the cited paper addressed the relevant substance/process and when extrapolation to Cengeh was expressly qualified: coconut emulsion studies (Onsaard et al., 2005; Wang et al., 2026), taro cooking versus raphide-associated biology (Kapcum et al., 2022; Paull et al., 2022), garlic reactions (Borlinghaus et al., 2021), eggplant browning (Villanueva et al., 2024), and prior terasi fermentation (Helmi et al., 2022; Herlina & Setiarto, 2024). We cross-checked taxonomic names and molecular structures conceptually against Plants of the World Online and PubChem (National Center for Biotechnology Information, n.d.; Royal Botanic Gardens, Kew, n.d.). Neither a comprehensive source search nor full independent article-level DOI validation is asserted. There were no laboratory measurements, botanical vouchers, classroom trials, or statistical inferences.

RESULTS AND DISCUSSION

Field-verified culinary sequence and material evidence

The report names talas, terong, komak, green chilies, coconut, shallots, garlic, and terasi, and mentions a knife, cooking pot, coconut grater, and stove (Marwati et al., 2026). The practitioner reports learning the recipe from her mother-in-law and preparing it since 2005; this documents one reported intergenerational learning pathway, not a general cultural prevalence pattern. The submitted manuscript does not include the exact verbatim transcript; therefore, it provides no unattributed or reconstructed direct quotation. D1–D6 in Table 1 describe what was reported, while photograph labels identify supporting depictions within the same report.

Table 2. Reported Cengeh preparation stages (D1–D6), source locations, and documentation limits.

ID	Reported action (D)	Report/photo locator	Uncertainty
D1	Grate coconut; preparation of santan is implied but extraction method undocumented	Report, procedure; Fig. 2a, 2d; same-source images	No reported water ratio, pressing, filtering, or yield
D2	Prepare taro, eggplant, komak and green chilies	Report, ingredient list; Fig. 2b	Species/maturity and cut sizes not confirmed
D3	Grind 6 shallots, 4 garlic cloves, 20 chilies, and 5 g terasi	Report, recipe step; Fig. 2c	Grinding time and sequence unknown
D4	Combine coconut milk and ground seasonings; begin heating	Report, procedure; Fig. 2d	No measured temperature or stirring record

ID	Reported action (D)	Report/photo locator	Uncertainty
D5	Add principal vegetables after liquid is described as boiling	Report, procedure; Fig. 2e	Boiling cue reported; no measured temperature or time
D6	Continue cooking and serve	Report, procedure; Fig. 2f	Specific doneness cue not reported

Figure 2 shows images presented in a sequence consistent with the report's written account; the sequence itself is determined by interview statements, not independently verified photograph timestamps. Panels (a)–(f) depict ingredients, a white coconut-milk phase, mixed cooking contents, and the prepared dish. They cannot establish droplet size, chemical identity, thermal history, or food safety. A separate serving image on report page 5 includes rice, tempeh, and sambal, which are not classified as Cengeh ingredients.

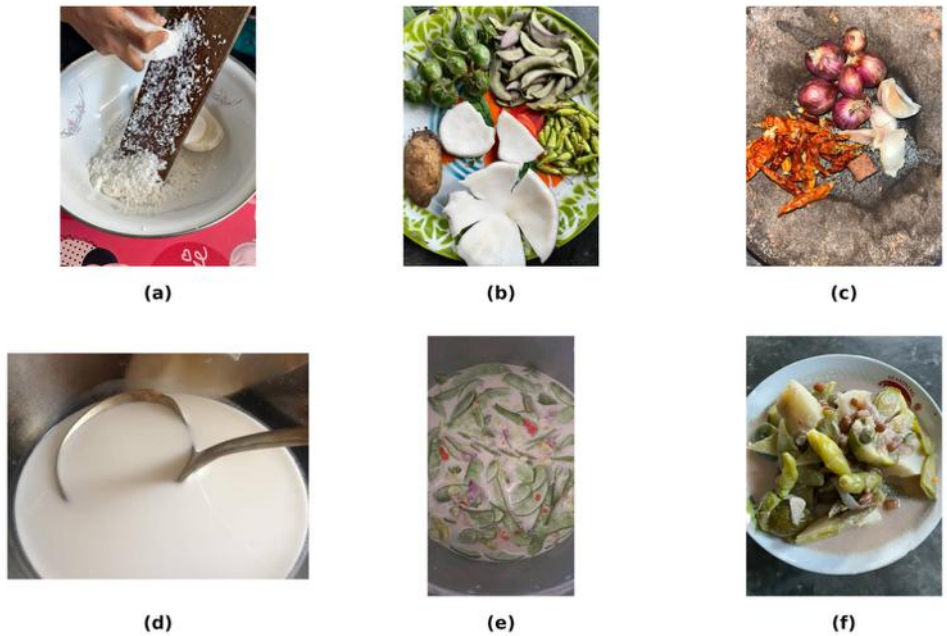


Figure 2. Photographs from the completed Cengeh field report: (a) grated coconut; (b) principal ingredients; (c) seasonings; (d) coconut milk and seasonings; (e) combined cooking contents; (f) finished dish. Panels depict subjects, not independently verified temporal stages or replicate experiments. Source: Marwati et al. (2026), report p. 4; reuse permission pending verification.

Table 2 presents a traceable proposal rather than a demonstrated reproducible chemical model. Each D code points to a reported stage or depicted ingredient, each L code names a mechanism with a source-specific citation, and each H code states a new measurement required to establish whether the mechanism affects Cengeh under specified conditions. No literature-derived mechanism is classified as directly observed.

Table 3. Evidence-graded, source-linked chemical interpretations and untested propositions for the single Cengeh case.

D ID and locator	L: cited mechanism (not measured here)	H: prospective test	Limit of evidence
D1/D4; report procedure; Fig. 2a,d	L1: Coconut-milk emulsion, with model-protein vs whole-milk source distinction (Onsaard et al., 2005; Wang et al., 2026).	H1: Controlled heating changes observable separation-height profiles.	No droplet imaging or heating series; photos from same report.
D2/D5; report; Fig. 2b,e	L2: Taro starch can undergo water-dependent gelatinization (Kapcum et al., 2022).	H2: Piece thickness influences measured center temperature/texture.	No gelatinization, time or geometry assays.
D2/D5; report taro ingredient	L3: Raphide-associated components occur in taro (Paull et al., 2022); processing effects are context-dependent (Kapcum et al., 2022).	H3: Total and soluble oxalate differ between raw corm, cooked solids and broth.	Broth is consumed; no safety or oxalate assay.
D3; report; Fig. 2c	L4: Crushed garlic may permit alliinase-dependent sulfur transformations (Borlinghaus et al., 2021).	H4: Time and heating conditions alter measured sulfur-compound profile.	No chemical assay; no timing.
D2/D3/D4; report chili + santan	L5: Capsaicin activates TRPV1 (Yang & Zheng, 2017); emulsion partition is not established by this source.	H5: Validated food-matrix analysis may reveal treatment-dependent capsaicinoid distributions.	Do not infer K or quantify pungency from taste.
D2/D5; report eggplant	L6: Eggplant browning may involve PPO and chlorogenic acid (Villanueva et al., 2024).	H6: Oxygen exposure and slicing-to-heating interval affect measured color.	No observed quantitative color change.
D3; report terasi	L7: Terasi manufacture involves fermentation-related metabolites (Helmi et al., 2022; Herlina & Setiarto, 2024).	H7: Ingredient-source variation affects chemical profile of finished broth.	Fermentation occurred before cooking, not in pot.

Coconut milk: emulsion chemistry and process interpretation

The reported grating of coconut (D1) indicates tissue disruption, while the presence of a white cooking liquid is depicted in Figure 2d. Coconut anatomy provides context for lipid-bearing endosperm (Beveridge et al., 2022), but the report does not specify water addition, squeezing, straining, or yield. Those actions cannot be written as field findings. Onsaard et al. (2005) studied emulsions stabilized by coconut skim-milk proteins, whereas Wang et al. (2026) addresses coconut-milk stability and processing more directly; these source systems are related but not interchangeable. The present L1 classification concerns a plausible oil-in-water emulsion structure, not a microstructural result measured in the cooking pot.

In oil-in-water emulsions, lipid droplets are dispersed within an aqueous continuous phase, not molecularly dissolved. Model interfacial components can affect stability, but effects depend on matrix composition and processing (Onsaard et al., 2005; Wang et al., 2026). Figure 3 is illustrative. The simple interfacial-energy expression $E = \gamma A$ treats interfacial tension (γ) and area (A) as assumed conceptual quantities, neither estimated nor measured in Cengeh. An arrow toward larger droplets must not be interpreted as proof of coalescence after heating.

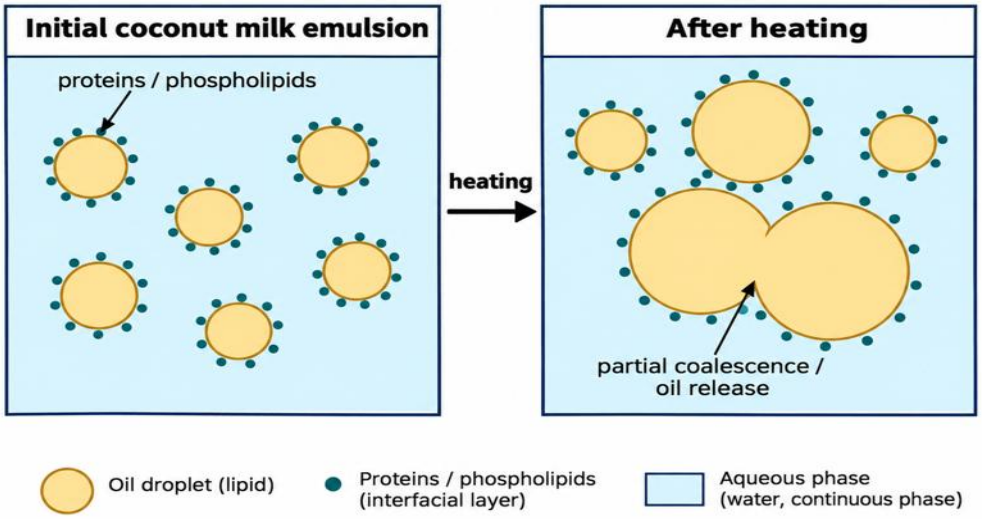


Figure 3. Conceptual oil-in-water emulsion structure of coconut milk before and after heating. Larger droplets illustrate possible coalescence; neither droplet size nor oil separation was measured for Cengeh.

The D→L→H distinction creates an instructional opportunity: students first identify the reported white santan (D1/D4), then explain the emulsion model (L1), then design a separation-height comparison (H1), without confusing visual cloudiness with a newly formed compound. A future protocol would hold sample volume, initial concentration, vessel diameter, standing time, and observation temperature constant; heating condition would be varied, and layer height recorded at fixed intervals. Such work was not undertaken in this study (Onsaard et al., 2005; Wang et al., 2026).

Taro starch transformation, oxalate crystals, and food safety

Taro is a reported ingredient heated in broth (D2/D5). Literature on taro cooking supports a possible hydration-driven starch gelatinization mechanism (L2), with the amylose/amylopectin repeat-unit formula $(C_6H_{10}O_5)_n$ used only as a polymer model, not measured Cengeh composition (Kapcum et al., 2022). Granule swelling and loss of structural order should not be equated with stoichiometric hydrolysis to glucose. No starch-state or texture measurements were obtained from the recorded meal.

Some taro tissues contain calcium oxalate raphides in idioblasts and associated proteins implicated in acridity (Paull et al., 2022). This botanical claim (L3) must be separated from any claim that a particular cooking procedure reduced oxalate or ensured safety. Figure 4 schematically shows starch-related tissue changes, not a verified safety endpoint. The model equilibrium $Ca^{2+}(aq) + C_2O_4^{2-}(aq) \rightleftharpoons CaC_2O_4(s)$

illustrates solubility but does not demonstrate precipitation in Cengeh. Both total and soluble oxalate require appropriate laboratory assays.

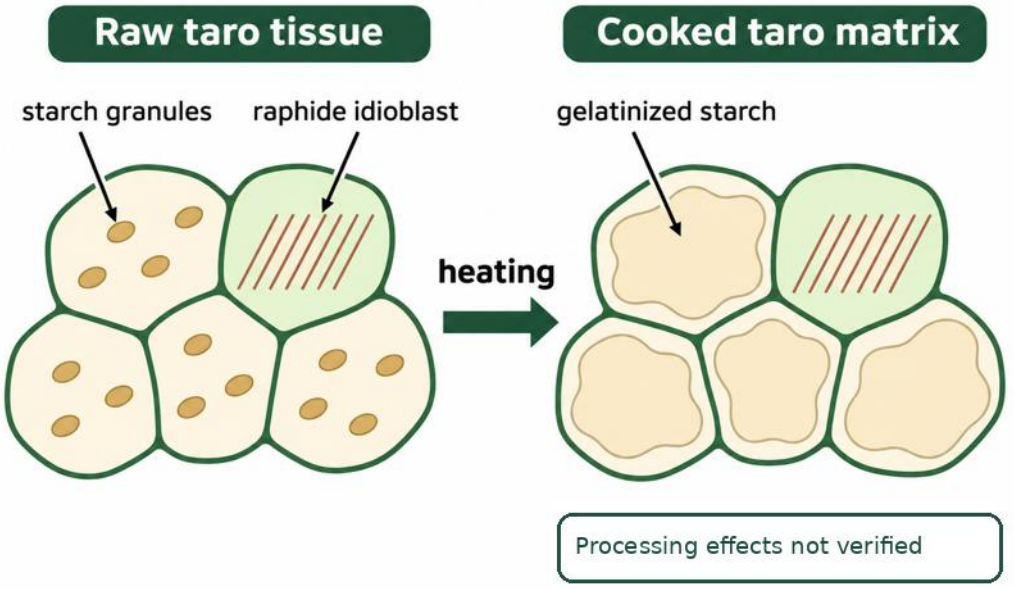


Figure 4. Illustrative taro tissue before and after moist heating, showing a possible starch-matrix change and a raphide-bearing idioblast. Any depiction of reduced irritation is hypothetical, not supported by an oxalate assay or food-safety verification. Broth-associated exposure also remains unknown.

Because Cengeh is eaten with its broth, possible migration of soluble oxalate from taro tissue into liquid does not necessarily reduce total intake. A prospective H3 study would separately quantify total and soluble oxalate in uncooked taro, cooked solids, and broth, account for mass balance and serving fractions, and document time–temperature conditions. Published taro cooking results depend on cultivar and protocol (Kapcum et al., 2022); no reduction or safety threshold is demonstrated here. Students must not taste undercooked taro or use sensory irritation as a test.

Crushed seasonings: sulfur chemistry, phenolics, and capsaicinoids

D3 records the grinding of garlic-containing seasoning. Literature supports an inferred L4 sequence in crushed garlic in which contact between alliin and alliinase can generate sulfur intermediates and allicin (Borlinghaus et al., 2021). Subsequent heating may affect enzyme activity and sulfur products, but the report lacks grinding-to-heating time, temperature, and chemical analysis. Thus, neither the formation nor concentration of allicin in Cengeh was measured.

Green chilies are reported ingredients (D2/D3). Capsaicin activation of TRPV1 helps explain pungency (Yang & Zheng, 2017), but that paper is not a direct source for quantitative transfer into coconut milk. Possible association with lipid-rich microenvironments is retained only as H5, not as an established Cengeh partition coefficient. The model $K = C_{lipid}/C_{water}$ assumes defined phases at equilibrium and is not directly applicable to the uncharacterized multiphase broth. Any experiment would require a validated analytic matrix method; school activities must avoid capsaicin tasting.

Eggplant preparation (D2/D5) provides an optional L6 context for chlorogenic-acid oxidation and polyphenol oxidase in cut tissues (Villanueva et al., 2024). Oxygen availability and the delay before heating would be independent variables in a proposed study, while image-based color values could be outcomes. No color shift was quantified in the case report; the schematic PPO reaction does not demonstrate browning in this particular dish.

Komak legumes, fermented seasoning, and biochemical boundaries

The name 'komak' is recorded in the report, but its species and developmental stage were not authenticated. It is tentatively compatible with Lablab purpureus descriptions yet visible material in the ingredient photograph is insufficient to resolve immature pods versus seeds confidently. Reviews of legume processing and antinutrients cannot be transferred to the photographed item without a voucher and maturity assessment (Ndibalema et al., 2026). No species-specific chemical effect is included as a verified finding.

Terasi is documented as a pre-existing seasoning (D3), not as a fermentation event during Cengeh cooking. The reported literature concerns proteolysis and metabolic changes in terasi manufacture (L7), potentially producing peptides and free amino acids (Helmi et al., 2022; Herlina & Setiarto, 2024). These studies do not establish analyte levels, fermentation, or sensory contributions in the finished Cengeh broth; an ingredient-source comparison would be a separate prospective hypothesis.

Heat transfer, geometry, and supporting biological concepts

D4–D5 report heating the coconut-milk mixture before adding vegetables when boiling is perceived. For proposed upper-secondary chemistry instruction, students can qualitatively compare heat transfer and, with known mass and measured temperature, use $Q = mc_p\Delta T$ as an illustrative calculation; effective food-mixture heat capacity is not supplied. Fourier conduction and convective heat-transfer equations are advanced extensions rather than learning prerequisites. NIST data for pure water cannot be substituted as measured parameters of Cengeh (Harvey, 1998).

The theoretical scaling $t_c \sim L^2/\alpha$, where $\alpha = k/(\rho c_p)$, may support an optional advanced extension for students already familiar with heat transfer, exponents, and proportional reasoning. It predicts only a simplified dependence of thermal response on geometry under comparable conditions. The field report does not record ingredient thickness, temperature curves, or thermal diffusivity, so cooking completion time cannot be calculated for Cengeh.

The reported plant materials can illustrate supporting anatomy: taro is commonly a corm, eggplant and chili are fruits, solid coconut flesh is seed endosperm, and shallot/garlic have bulb-associated storage structures (Beveridge et al., 2022; Paull et al., 2022; Royal Botanic Gardens, Kew, n.d.). These are contextual biological comparisons rather than the paper's chemistry novelty. Species and cultivar assignment to locally named ingredients, especially komak, remains tentative without vouchers.

Instructional reconstruction for contextual chemistry

The intended educational output is four proposed, untested upper-secondary inquiry tasks (Table 3), not a validated lesson plan or an achievement outcome. Their distinctive role is the explicit transition from reported D-stage evidence through a carefully bounded L model to a testable H proposition and a criterion for evaluating student explanations. Studies on contextual inquiry and community knowledge support this design rationale, not the performance of the four specific tasks (Aisyah et al., 2026; Andrada et al., 2025; Lestari, 2024). Curricular suitability, content validity, safety, and classroom feasibility require subsequent review.

Table 4. Proposed, untested upper-secondary inquiry tasks with D–L–H links, variables, safety constraints, and explanation criteria.

Learners / evidence chain	Proposed question and operational variables	Safety and assessment criterion
SMA/upper-secondary; D1/D4 → L1 → H1; colloids	Why is santan cloudy? IV: heating condition; DV: layer height over time; controls: volume, concentration, container, standing time and temperature.	Use non-ingested teaching samples; avoid burns; identify emulsion vs solution; cite D and L, label result as H.
SMA/upper-secondary; D2/D5 → L2 → H2; starch/heat	Why does taro change texture? IV: safely preselected thickness; DV: temperature curve/texture proxy; controls: variety, mass, heating medium and duration.	Teacher-controlled cooking only; never taste undercooked taro; explain hydrated starch structurally without asserting Cengeh sample gelatinization.
SMA/upper-secondary; D3 → L4 → H4; enzymes	How can crushing change garlic aroma? IV: time after crushing or controlled temperature; DV: non-ingestion odor descriptors; controls: mass, cutting and exposure time.	Supervised, ventilation and allergy awareness; aroma ≠ allicin concentration; distinguish inference from chemical assay.
SMA/upper-secondary; D2/D3/D4 → L5 → H5; molecules/colloids	How could lipophilic molecules interact with a fat-rich medium? IV: oil content in a safe non-capsaicin model; DV: observable surrogate distribution; controls: volume, mixing and time.	No capsaicin extraction/tasting; use harmless colored model; explain why model ≠ Cengeh partition coefficient.

Prediction–observation–explanation, concept maps, and evidence tables are suggested formats because they can require learners to identify the data source, describe the scientific model, and explicitly mark unsupported claims. They are not tested instructional outcomes of the present work. Prior educational studies supply broad rationale for contextual inquiry but no Cengeh-specific effectiveness evidence (Arizona et al., 2025; Martawijaya & Palloan, 2026; Serepinaha et al., 2026; Adiansha et al., 2026; Deta et al., 2026; Sutrisno et al., 2025).

Educational use must respect household expertise while keeping scientific inference distinct from observed practice (Lorduy et al., 2026; Pageh et al., 2025). The proposed activities invite learners to discuss what the record shows, what an

ingredient-level model predicts, and what would need to be measured. No claim about a particular journal's educational remit is needed to support the argument (Dewi et al., 2021; Hadisaputra et al., 2025).

Comparison with prior studies and limitations

As an ethnobotanical comparator, Sukenti et al. (2016) characterize Sasak food knowledge; Suastra and Pujani (2021) address Lombok local wisdom as science-learning potential; and Andayani et al. (2022) identify chemistry concepts from a Lombok practice. These studies have different source materials and objectives, and their full coding and evidence-treatment procedures should be checked before a definitive originality claim. As provisionally contrasted in Table 0, this paper's narrower contribution is an inspectable single-case chain linking reported stage, literature mechanism, uncertainty, and proposed experiment. Such a framework may be transferable as an analytical procedure, but this one record cannot establish statistical or cultural generalizability (Alrhmoun et al., 2025; Arum et al., 2026; Gozali et al., 2024).

Limitations include a single source report with non-independent images, unknown recruitment and interviewing metadata, unverified permissions and verbatim transcript availability, no documented coder reflexivity or independent adjudication, purposive literature selection, missing preparation measurements, uncertain komak identity, and no chemical or microbiological assays. These omissions cannot be repaired by retrospective inference; archive checks or fresh consent and fieldwork are needed. The final status of the report does not independently confirm its accuracy or representativeness. Any audit trail remains provisional until original interview text, researcher role, coding records, and rights approvals can be supplied.

CONCLUSION

This bounded case documents six reported stages of one practitioner's Cengeh preparation. Its provisional methodological contribution is the D–L–H map that distinguishes those reported actions from published ingredient chemistry and explicit experiments still required. Four upper-secondary inquiry tasks follow from that distinction but have not been validated, and neither chemical characteristics of the dish nor learning benefits were measured. The applicability of the method beyond this case requires independent source and coding audits.

RECOMMENDATION

Priority next steps are to verify the interview archive and permissions, make the code-to-source trail auditable, authenticate komak and other uncertain ingredients, and obtain time–temperature and ingredient-mass records in new fieldwork. Controlled laboratory studies should quantify relevant endpoints, including total and soluble oxalate separately in taro solids and broth, without taste-based safety testing. The four inquiry tasks require expert content validation, safety review, curricular alignment, and subsequent classroom pilots. Before submission, the authors must supply verified statements on participant consent, image rights, anonymity, author

contributions, conflicts of interest, and primary-data availability; the present source documents do not establish those approvals.

ETHICS, DATA AVAILABILITY, AND DECLARATIONS

Ethics and consent: The authors must confirm the primary participant's informed consent for interview use and for reproduction of non-identifying photographs. The supplied manuscript does not document formal ethics review, consent language, or rights-holder approval; no approval is claimed. Data availability: The primary unpublished field report is cited as Marwati et al. (2026). An anonymized supplementary copy and code-to-quotation log may be made available only after custodial authority, participant consent, and image rights are confirmed. Author contributions and competing interests: Detailed roles, financial support, and any competing interests must be completed and verified by all authors before submission.

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