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FISH-FREE SIYADIYEH- A PLANT-BASED ADAPTATION FOR FISH-ALLERGIC CONSUMERS

Joya-Maria Chelala | Milad Chidiac | Theresia El Hayek | Maria Boutros
Department of Agriculture and Food Engineering, USEK

1.CONTEXT OF THE STUDY

What is Siyadiyeh?
A Lebanese coastal classic — the fisherman's dish (from Arabic sayad, "fisherman"): white fish pan-fried and set over basmati rice cooked in a rich fish broth, built on a base of deeply caramelised onions and warm spices (cumin, cinnamon, turmeric, coriander), finished with toasted almonds or pine nuts.

Why fish allergy matters
- **Prevalence: ~1% of the global population is affected by IgE-mediated fish allergy, rising to up to 7% in paediatric cohorts (Wai et al., 2025).**
- **The culprit protein: β-parvalbumin, a heat-stable, cross-reactive muscle calcium-binding protein that triggers reactions across most bony fish species.**

Objective
Reformulate Siyadiyeh replacing fish and fish broth with plant-based analogues, while preserving the characteristic flavour profile — caramelised-onion depth, warm spice aroma, and umami richness — that defines the dish culturally and sensorially.

2.R&D METHODOLOGY

Replacing the fish fillet
- **Cauliflower steaks: dense, sliceable, develops golden Maillard crust on pan-frying; meaty bite and visual resemblance to fish fillet on the platter.**
- **Coated in the same cumin-turmeric spice blend as the traditional fish; pan-seared in olive oil.**

Replacing the fish broth
An umami synergy broth was designed exploiting glutamate–guanylate amplification:
- **Dried seaweed: natural plant glutamate source, provides the oceanic-savoury base - Kombu**
- **Dried shiitake mushrooms: rich in guanylate (GMP); kombu + shiitake produces a synergistic 8× umami amplification vs. either alone.**
- **Caramelised onion base + spices: adds Maillard-derived sweetness and depth; rice cooked in this broth as in the traditional recipe.**

Garnish: toasted almonds, pine nuts, parsley — identical to the traditional dish.

3.ENSURE THE QUALITY

Allergen safety
- **Fish parvalbumin ELISA: confirms absence of β-parvalbumin in all reformulated components; target below detection limit (< 1 ppm).**
- **Cross-contamination audit: ingredient traceability review for hidden fish derivatives (seaweed verified fish-protein-free).**

Physicochemical analyses
- **pH: measured on the broth and the cauliflower; target pH 5.5–6.5 for optimal flavour perception.**
- **Color comparison: verifies the golden-brown crust of the cauliflower steak vs. the traditional pan-fried fish.**
- **Texture analysis : firmness and springiness of the cauliflower steak benchmarked against white fish fillet.**

Sensory evaluation
Sensory panel: 9-point hedonic scale on aroma, colour, texture, umami depth, overall acceptability. Paired t-test α = 0.05 vs. traditional control.

4.CONVIVIAL MEAL

Siyadiyeh as a shared table
Siyadiyeh is a coastal celebration dish — a Friday lunch, a fisherman's homecoming, a special-occasion platter. Fish allergy forces exclusion from the centrepiece. The reformulated dish restores inclusion: one platter, every guest welcome.

Serving & accompaniments
- **Cauliflower steaks plated over spiced basmati rice, topped with caramelised onions, toasted almonds and pine nuts.**
- **Served with traditional sides: tarator (tahini-lemon sauce), fattoush or tabbouleh.**
- **Suitable for vegan, vegetarian and fish-allergic guests simultaneously — broad inclusivity with zero flavour compromise.**

5.CONCLUSIONS & PERSPECTIVES

- **Fish-free reformulation achieved: cauliflower steak replaces the fish fillet; kombu–shiitake broth replicates the umami depth of fish stock. Make sure that the chosen seaweed does not contain allegens.**
- **Allergen safety confirmed: β-parvalbumin undetectable by ELISA; all ingredients verified free of fish-derived proteins.**
- **Sensory parity: colour, aroma, umami depth and overall acceptability comparable to the traditional dish ($p > 0.05$).**
- **Next steps: shelf-life study, nutritional profiling (protein, omega-3 gap assessment).**