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FOOD & THE ELEMENTS



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OXFORD SYMPOSIUM ON FOOD & COOKERY

Beyond the Lemon – *A Comprehensive Exploration of Elements of Sourness in Persian Cookery*

Nader Mehravari

Persian cuisine is renowned for its vibrant tapestry of flavours, with souring agents as a central and defining element. Over the centuries, Persians have cultivated a unique and unparalleled appreciation for tangy tastes. This affinity has led to the discovery, development, and masterful use of a wider range of souring agents than found in any other global food culture.

Souring agents are ubiquitous in Persian cookery. Although often masterfully hidden in a range of savoury and sweet creations, at times however, they are visible team players in appetizers, side dishes, soups, rice dishes, desserts, and beverages, as well as standalone souring agents serving as condiments on the sidelines of the dining field.

The skilful use of sour flavours is a hallmark of Persian cuisine, contributing to its unique character and appeal. Whether it's the tangy marinade for grilled meat, the tartness of a yogurt-based dip, or the refreshing acidity of a summer drink, sourness plays a vital role in creating the memorable and flavourful experiences of Persian cuisine.

The range of souring agents employed in Persian cuisine is truly impressive. From the gentle tang of common and uncommon citrus fruit to such zesty berries as sumac and barberry, sour fruit such as pomegranates and sour cherries, the sharpness of unripe grapes and unripe plums, fruit of leguminous trees such as tamarind, fermented dairy products such as yogurt and kashk, and possibly the sourest culinary ingredient in the world, ghareh-ghoroot (a twice cooked, strained, fermented dairy product with an extraordinarily sour flavour).

This extensive assortment of souring elements is used in a variety of forms and shapes including fresh, juiced, dried, whole, ground, pickled, fermented, jammed, syruped, distilled, and inspissated.

Persian cooks use this vast arsenal of ingredients across the entire Persian cookery landscape including warm and cold cooked savoury food items (rice dishes, soups, stews, braises, porridges, grilled meats, dumplings, stuffed dishes, patties, egg-centric dishes, etc.), raw savoury dishes (yogurt dishes, salad-like dishes, etc.), confections, desserts, frozen sweets, hot and cold beverages, snacks, garnishing, as well as dry and liquid flavouring used by the diners at the table.

The goal of this paper is two-fold:

1. First, exploring an overarching, and as complete as possible, range of fundamental elements of sourness used in the Persian cookery landscape, their sources (plant-based, animal-based, or chemically synthesized), their preparation techniques, their uses across all categories of Persian savoury and sweet food items, whether used by cooks in the kitchen or by the diners at the table, and more.
2. Secondly, to offer a generic approach and framework that can be employed by others to explore the other foundational elements of cookery in other food cultures.

Nomenclature and Overall Approach

A comprehensive exploration of sourness in Persian cuisine requires distinguishing between "individual souring agents," used as ingredients by cooks or diners, and the "fundamental sources" from which they are derived. For example, fresh unripe green sour grapes are the fundamental source of at least six distinct souring agents:

- Whole fresh unripe green sour grapes (e.g., used by cooks to flavour stews)
- Verjuice (e.g., used by diners to flavour green salads)
- Whole dried unripe green sour grapes (e.g., used by cooks to flavour soups)
- Ground dried unripe green sour grapes (e.g., used by diners to sprinkle on grilled meat)
- Unripe green sour grape unsweetened molasses (e.g., used by cooks to flavour stews)
- Unripe green sour grape pickles (e.g., used by the diners as an accompaniment)

My investigation began by compiling an initial list of individual souring agents used in Persian cooking. This list underwent a multi-faceted analysis, including:

- Categorizing individual souring agents by their fundamental source.
- Identifying typical culinary uses of souring agents across Persian cuisine.
- Cross-referencing individual souring agents with their culinary applications.
- Visualizing the relationship between fundamental sources and the culinary techniques used to create the final souring agents.

Finally, several unique and less common Persian souring elements are highlighted with additional details.

Detail Listing and Categorization of Individual Souring Elements

Our investigation into souring elements in Persian cuisine began by compiling a comprehensive list of individual souring agents used by cooks, based on a range of sources including historical cookbooks, contemporary culinary texts, interviews with home and professional cooks, and drawing on my own over 40 years of experience in the study of Persian culinary history, principles, and practices.

Next, we developed a classification system to group these agents. After considering several options, such as categorization based on chemical properties and regional usage, we chose a scheme centred around the fundamental sources of the souring agents, shown in Figure 1, as the most useful for exploring these elements from a culinary perspective. These fundamental sources include a wide range of plant-based, animal-based, and chemically synthesized food items.

Next, we applied the selected categorization scheme to the comprehensive list of individual souring agents that we had compiled. The results are shown in Figure 2 below.

Most Typical Uses of Souring Agents in Persian Cookery

The next key step in our exploration was to identify the most typical ways in which souring agents are used in Persian cookery. There are two facets to this question:

1. Whether the individual souring agents are used by the cook in the kitchen or by the diners at the dining table.
2. What class (type, category) of dishes the individual souring agents are used in.

The result of that analysis is shown in Figure 3.

Cross-Reference Between Individual Souring Elements and Their Uses

Our next step was to develop an extensive cross-reference between individual souring agents and their uses in Persian cuisine. This was achieved by carefully relating each of the individual 47 souring agents identified earlier, as listed in Table 2, with one or more of the uses as identified in the previous section, as listed in Table 3. The results of that exercise is shown in Figure 4.

Culinary Techniques Utilized to Develop the Individual Souring Agents

The final step in was to study the relationship between the base sources for souring agents and culinary techniques utilized to develop the actual souring agents used by the cooks. The specific culinary techniques considered included:

- Used fresh and whole without any processing
- Juiced
- Dried whole
- Dried ground
- Pickled
- Fermented
- Jammed
- Syruped
- Distilled
- Inspissated
- Cooked and then dried

The results this part of our exploration is shown in Figure 5.

A Sampling of Unique and Less Common Persian Souring Elements

In addition to the systematically exhaustive analysis of all the souring agents used in Persian cookery landscape, I felt it was important to highlight several of more unique and uncommon Persian soring agents.

Ghareh-Ghoroot

- Fundamental Source: Milk
- Production Process: An extraordinarily sour ingredient which is a fermented diary product that has gone through two different lengthy stages of cooking and one stage of straining. It is one of the sourest culinary ingredients anywhere. Milk is first fermented to produce yogurt. A mixture of yogurt and water is heated causing it to curdle. The curdled mixture is strained separating the solids from the liquid whey. The liquid whey is then boiled for an extended period resulting in a dark blackish brown paste which is ghareh-

ghoroot. See Figure 6 for colour changes of whey as it boils down to form ghareh-ghoroot.

- Primary Usage: Beyond its role as a flavouring agent for meat braises and soups, it’s a cherished snack for many Iranians.

Limoo-Parak:

- Fundamental Source: Lime fruit
- Production Process: Limoo-paraks are the dried interior segments (endocarp) of lime with the thin membranes removed. It is the most concentrated form of lime sourness. The process begins by first fermenting and drying whole fresh Persian limes resulting in what is known as Limoo-Omani which has a unique umami earthy flavour and comes in range of colours from pale brown to dark brownish black. These dried whole limes are then cracked open and the interior dried segments of the dried lime separated.
- Primary Usage: Souring agents for meat braises and soups. They are also used as an ingredient in sour tisanes.

Rob-é-Ghooreh:

- Also Known As: Unripe green sour grape unsweetened molasses
- Fundamental Source: Unripe green sour grapes
- Production Process: Inspissation – is the process of increasing the viscosity of a fluid typically by boiling resulting in anywhere from a highly viscous but still pourable liquid to a paste. It is an ancient and popular practice in Persian culinary landscape. In Persian, the resulting thickened syrup or paste is called “robe.” The process is applied to a wide range of fruits and vegetables including pomegranates, sour plums, and tomatoes. There is no single-word English name for “robe.” While English-language texts often categorize it as a "molasses," traditional “robe” contains no added sugar.
- Primary Usage: Souring agent for meat braises and soups.

A Generic Approach and Framework

The specific steps used to explore the elements of sourness in Persian culinary landscape, as described above, can easily be generalized to form a generic approach and framework that can be employed by others to explore the other foundational elements of cookery in different food cultures. Figure 8 depicts such a generic framework and its encompassing steps. The italicized texts in Figure 8 represent examples of how the components of this generic framework correspond to steps used to explore the elements of sourness in Persian culinary landscape.

Conclusions and Closing Thoughts

Persian cuisine boasts a rich and diverse tapestry of flavours, with souring agents playing a pivotal role. This exploration delved into the unique significance of sourness in Persian culinary traditions, showcasing the vast array of souring agents used, their diverse applications in both sweet and savoury dishes, and their preparation techniques. Through meticulous research, approximately 50 distinct souring agents were identified while highlighting their fundamental sources, culinary uses, and the intricate relationship between raw ingredients and finished products.

Some of the key findings include:

- Persian cuisine employs approximately 50 distinct souring agents, with even more regional variations, showcasing the breadth of their culinary tradition.
- These souring agents are derived from a variety of sources, including plants, animals, and synthetic processes, with the majority being plant-based.
- Unripe fruits play a pivotal role in the creation of souring agents, highlighting the ingenuity of Persian culinary practices.
- The versatility of certain fruits is evident in their ability to yield four to six individual souring agents, demonstrating the depth of flavour manipulation in Persian cuisine.
- Pomegranates, unripe grapes, unripe green plums, sour cherries, and limes stand out as foundational ingredients, collectively contributing to over half of the most popular souring agents.
- Souring agents are integral to a vast array of Persian dishes, spanning from hearty stews and delicate pastries to refreshing beverages and flavourful condiments.
- The transformation of base ingredients into souring agents involves a diverse range of culinary techniques, including juicing, drying, jamming, pickling, grounding, fermenting, distilling, and inspissating.
- Citrus-based souring agents emerge as the most versatile, finding applications across nearly all categories of Persian cuisine.

This paper not only illuminates the specific role of souring agents in Persian culinary landscape but also proposes a broader framework for analysing foundational elements in any food culture.

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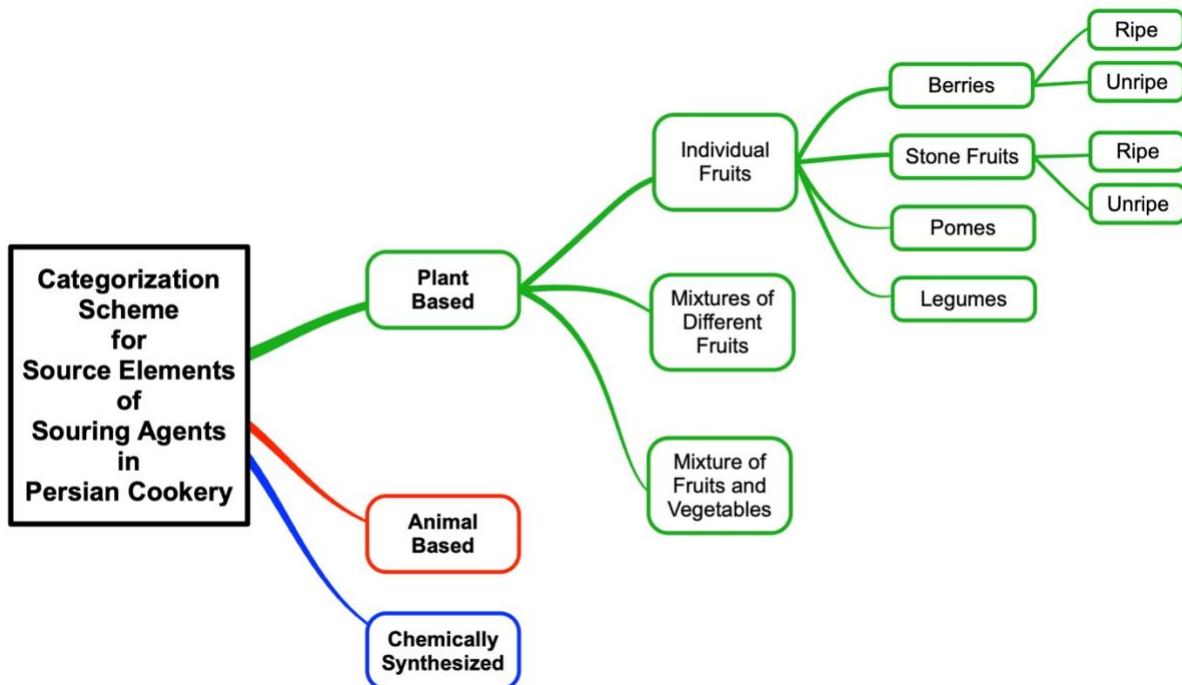


Figure 1 – Categorization Scheme for Source Elements of Individual Souring Agents in Persian Cookery

Higher Level Categorization	Source Elements	Individual Souring Elements						
Plant Based	Berry	Sumac	Whole dried sumac Ground dried sumac					
		Barberry	Whole dried barberry Dried barberry jam					
			Pomegranate	Pomegranate juice Fresh pomegranate arils Dried pomegranate arils Ground dried pomegranate arils Pomegranate unsweetened molasses				
		Grapes		Wine vinegar				
		Tomatoes		Tomato paste				
		Unripe		Unripe Sour Green Grapes	Whole fresh unripe green sour grapes Verjuice - Juice of fresh unripe green sour grapes Whole dried unripe green sour grapes Ground dried unripe green sour grapes Unripe green sour grapes unsweetened molasses Unripe green sour grape pickle			
			Unripe Sour Green Plums		Whole fresh green sour plums Whole dried green sour plums Pickled green sour plums Green sour plums unsweetened molasses			
	Drupes				Cornelian Cherries	Fresh Cornelian Cherries Dried Cornelian Cherries Cornelian Cherries Jam Cornelian Cherries Pickle		
						Sour Cherries	Fresh sour cherries Sour cherry juice Dried sour cherries Pickled sour cherries Sour cherry syrup	
							Citrus	Limes
			Lemons					
		Seville Oranges		Seville orange juice Seville orange unsweetened molasses				
			Pom	Apples	Apple cider vinegar			
		Leg.	Tamarind	Tamarind paste				
		Mixture	Various Fruit	Lavashak - Persian-style fruit rollup				
	Fruit & Veg.		Pickles					
	Animal Based	Milk	Yogurt Strained yogurt Kashk Ghareh-Ghoroot					
			Chemically Synthesized	Citric acid powder				

Figure 2 - Categorization of Individual Souring Agents

Uses of Persian Souring Agents		Used by the cook in the kitchen	Used by the diners at the table
a	As an ingredient in cooked warm savoury dishes	X	
b	As an ingredient in cooked cold savoury dishes	X	
c	As an ingredient in raw savoury dishes	X	
d	As an ingredient in confections	X	
e	As an ingredient in frozen sweets	X	
f	As an ingredient in compotes	X	
g	As an ingredient in jams	X	
h	As an ingredient in pickles	X	
i	As an ingredient in snacks	X	
j	As an ingredient in hot beverages	X	X
k	As an ingredient in cold beverages	X	X
l	As a garnish for cooked warm savoury dishes	X	
m	As a garnish for cooked cold savoury dishes	X	
n	As a garnish for raw savoury dishes	X	
o	As a liquid flavouring at the table		X
p	As a ground dry flavouring at the table		X
q	As an accompaniment at the table		X
r	As a breakfast component		X
s	As a snack		X

Figure 3 - Uses of Persian Souring Agents

			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s			
			Ingredient in cooked warm savoury	Ingredient in cooked cold savoury dishes	Ingredient in raw savoury dishes	Ingredient in confections	Ingredient in frozen sweets	Ingredient in compotes	Ingredient in jams	Ingredient in pickles	Ingredient in snacks	Ingredient in hot beverages	Ingredient in cold beverages	Garnish for cooked warm savoury dishes	Garnish for cooked cold savoury dishes	Garnish for raw savoury dishes	Liquid flavouring at the table	Ground dry flavouring at the table	Accompaniment at the table	Breakfast component	Snacks			
Plant Based	Berry	Sumac	Whole dried sumac																					
			Ground dried sumac																					
		Barberry	Whole dried barberry																					
			Dried barberry jam																					
		Pomegranate	Pomegranate juice																					
			Fresh pomegranate arils																					
			Dried pomegranate arils																					
			Ground dried pomegranate arils																					
	Grapes	Pomegranate unsweetened molasses																						
		Wine vinegar																						
	Tomatoes	Tomato paste																						
	Unripe	Unripe Sour Green Grapes	Whole fresh unripe green sour grapes																					
			Verjuice - Juice of fresh unripe green sour grapes																					
			Whole dried unripe green sour grapes																					
			Ground dried unripe green sour grapes																					
			Unripe green sour grapes unsweetened molasses																					
	Drupes	Unripe Sour Green Plums	Whole fresh green sour plums																					
			Whole dried green sour plums																					
			Pickled green sour plums																					
			Green sour plums unsweetened molasses																					
	Drupes	Cornelian Cherries	Fresh Cornelian Cherries																					
			Dried Cornelian Cherries																					
			Cornelian Cherries Pickle																					
		Sour Cherries	Fresh sour cherries																					
			Sour cherry juice																					
	Drupes	Sour Cherries	Dried sour cherries																					
			Pickled sour cherries																					
			Sour cherry syrup																					
	Citrus	Limes	Lime juice																					
			Whole dried lime																					
Ground dried lime																								
Dried lime interior segments																								
Lemons		Dried lime interior segments jam																						
		Lemon juice																						
		Pickled lemon																						
Seville Oranges	Seville orange juice																							
	Seville orange unsweetened molasses																							
Pom	Apples	Apple cider vinegar																						
Leg.	Tamarind	Tamarind paste																						
Mixture	Various Fruit Fruit & Veg.	Lavashak - Persian-style fruit rollup																						
		Pickles																						
Animal Based	Milk	Yogurt																						
		Strained yogurt																						
		Kashk																						
		Ghareh-Ghoroot																						
Chemically Synthesized		Citric acid powder																						

Figure 4 - Cross-Reference Between Individual Souring Agents and Their Uses

Higher Level Categorization		Source Elements	Forms, Shapes, and Processing Methods														
			Fresh			Dried			Pickled	Fermented	Jammed	Syruped	Distilled	Inspissated	Cooked & Dried		
			Whole	Juice	Other	Whole	Ground	Other									
Plant Based	Berry	Sumac															
		Barberry															
		Pomegranate															
		Grapes															
		Tomatoes															
	Unripe	Unripe Sour Green Grapes															
		Unripe Sour Green Plums															
	Drupes	Cornelian Cherries															
		Sour Cherries															
	Citrus	Limes															
		Lemons															
		Seville Oranges															
	Pom	Apples															
	Leguminous	Tamarind															
Mixture	Various Sourish Fruit																
	Fruits & Vegetables																
Animal Based	Milk																
Chemically Synthesized	Citric Acid Powder																

Figure 5 - Relationship between the base sources for souring elements and culinary techniques utilized to develop the actual souring agents used by the cooks



Figure 6 - Colour changes of ghareh-ghoroot in its second cooking stage as it gets sourer as it gets darker



Figure 7 - Limoo-parak: the dried interior segments (endocarp) of dried whole lime with the thin membranes removed

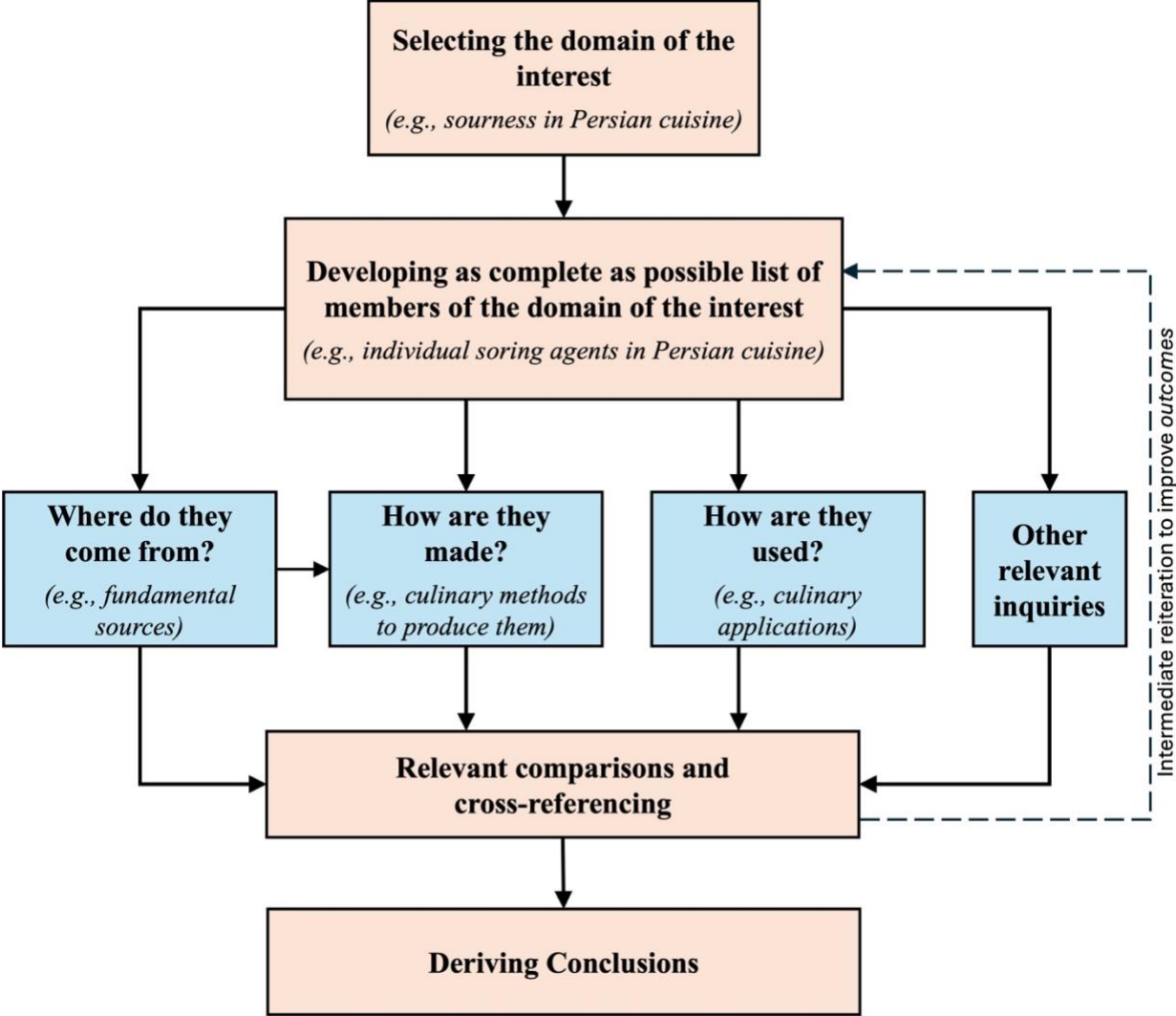


Figure 8 – A Genetic Approach and Framework

References:

- Neda Mollakhalili Meybodi, Maryam Tajabadi Ebrahimi, and Amir Mohammad Mortazavian, ‘Ethnic Fermented Foods and Beverage of Iran’, in *Ethnic Fermented Foods and Alcoholic Beverages of Asia*, ed. by Jyoti Prakash Tamang (India: Springer, 2016) 309–322.
- Arva Ahmed, ‘Persian or Indian Recipes that Use Unusual Sour Ingredients’, *Pan Frying Adventures Podcast*, 31 October 2020 <https://www.fryingpanadventures.com/the-deep-fried-podcast/persian-or-indian-recipes-sour-ingredients> [accessed 21 October 2024].
- Margaret Shaida, *The Legendary Cuisine of Persia* (Henley-on-Thames: Lieuse Publications, 1992).
- Gilgamesh, ‘Sour and Sweet – The Secret Ingredients of Persian Cuisine’, <https://irantour.tours/iran-blog/sour-and-sweet.html> [accessed 21 October 2024].
- Margaret Shadia, ‘The Sometimes Sweet but Mostly Sour Flavour of Many Persian Dishes Today’, in *Spicing Up the Palate - Proceedings of the Oxford Food Symposium on Food and Cookery 1992*, ed. by Harlan Walker (London: Prospect Books, 1993).
- Bitá Arabian and Beata Nazem Kelley, ‘The Sours in Persian Cuisine’, *Modern Persian Food Podcast*, 9 September 2021 <https://modernpersianfood.com/episode-52-the-sours-in-persian-cuisine> [accessed 21 October 2024].
- Ligaya Mishan, ‘How Sourness Has Come to Dominate Our Dining Habits, and Our Discourse,’ *New York Times Style Magazine*, 14 May 2019.
- Vanniya Sriangura, ‘The sour side of Thai Cuisine,’ *Bangkok Post*, 8 December 2023.
- Nader Mehravari, ‘How to Stock a Persian Pantry’, 1 December 2022 <https://www.seriousseats.com/how-to-stock-a-persian-pantry-6834907> [accessed 21 October 2024].
- Nader Mehravari, ‘Persian Comfort Food – A Foodways Exploration’, *Digest Journal of Foodways and Culture*, 9 (2022).