

RESEARCH ARTICLE

Flavour, culture and food security: The spicy entanglements of chile pepper conservation in 21st century Mexico

Daniela Sclavo 

Department of History and Philosophy of Science, University of Cambridge, Cambridge, UK

Correspondence

Daniela Sclavo, Department of History and Philosophy of Science, University of Cambridge, Cambridge, UK.
Email: ds936@cam.ac.uk

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Societal Impact Statement

Political interests and power structures shape state-led crop conservation and food policy. As a crop that relates to culture and belonging, the chile crop is ideal for exploring how food security policy and crop conservation schemes integrate aspects beyond staple crops, calories and/or electoral incentives. What do these schemes mean for the food and ingredients we love? Reflecting from this perspective can be useful to grasp, re-frame and create more effective and inclusive food policies—ones that embody and valorise flavour, identities and territories beyond statements on paper.

Summary

- In line with the Food and Agriculture Organisation's (FAO) international action plan for crop genetic resources, the Mexican state inaugurated the National System of Genetic Resources for Food and Agriculture (SINAREFI) in 2002. In this paper, I explore SINAREFI's interest in landraces and in situ conservation through the case of chile pepper, set under the Ministry of Agriculture's interests of promoting industrial agriculture and paternalistic food security welfare programmes.
- Through the analyses of existing literature on food security in Mexico state programmes, archival work and interviews, this article analyses how discourses on food security shape research trajectories, some of which are inevitably constrained by current market-based agricultural systems.
- By exploring the state's chile research and conservation programme, this work demonstrates the complexity of international food security discourse and its application domestically. Particularly, this analysis highlights the limitations of state crop research and conservation efforts imposed by contradictory agricultural policies. In the case of chile, its link to Mexican culture and diet uncovers an important, but often overlooked, aspect of food security: flavour.
- In the case of chile, a non-staple but culturally symbolic crop, welfare programmes remained paternalistic and focused on caloric intake despite the transformation of national discourse on food security towards the integration of landraces and local cultures through the inauguration of SINAREFI. This case study reflects on the limits of current framings and strategies regarding food security and the need to

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direct policies towards local food sovereignty to achieve the necessary stability for food security to endure.

KEYWORDS

chile pepper, conservation, food, Mexico, policy, security, sovereignty

1 | INTRODUCTION

Agricultural experts in the 20th century promised that the spread of so-called modern science and technology throughout low- and middle-income countries would rapidly reduce hunger and improve the lives of poor farmers. These promises fell short. The proliferation of a heavily industrialised system of monocrop production, driven by a top-down approach to technological diffusion, did not serve the needs of all farmers. The Green Revolution failed in the eyes of many. In Mexico, this resulted in calls for change from small farmers, academics and activists who condemned the doings of capitalistic agriculture (Hernández Xolocotzi, 1970, 1977, 1985; Hewitt de Alcántara, 1976; Jennings, 1988). Their wave of criticisms persisted as growing neoliberal policies accentuated the gaps between agroindustry and small producers and between low- and middle-income countries. By the 1990s, continuing social, environmental and climate crises triggered a rethink of food security in Mexico, which was given additional impetus by international institutions such as the UN Food and Agriculture Organisation (FAO) and international actions regarding biodiversity conservation and food security.

Shifting international expectations materialised in treaties such as the Convention on Biological Diversity in 1992 and the World Food Summit in 1996, where the concept of food security was revisited to include a multidimensional perspective of food access, availability, use and stability. Moreover, social and peasant-led movements such as La Vía Campesina in 1996 and the Ejército Zapatista de Liberación Nacional in Mexico in 1994 called for the right of people to defend their land and to self-define their food systems, forwarding the more politically charged concept of food sovereignty (Torres Salcido, 2019). Food sovereignty was then described as a local or regional endeavour related to the situated production of culturally appropriate foodstuffs, territorial defence and indigenous/peasant rights (Vía Campesina, 2008). These and other efforts shaped how crop conservation science and food security would be institutionally defined in Mexico in the following century.

Aligning with these changes and more specifically responding to FAO's International Treaty on Plant Genetic Resources for Food and Agriculture (often called the Seed Treaty), signed in 2001, the Mexican government inaugurated the National System of Genetic Resources for Food and Agriculture (SINAREFI) in 2002. The Seed Treaty's guidelines for the attainment of food security followed the definition set at the World Food Summit of 1996, which envisioned this as something that 'exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy

life' (FAO, 1996). In addition, the Seed Treaty underlined the 'enormous contribution' of farmers in developing the world's wealth of plant genetic resources, while also highlighting the importance of protecting their traditional knowledge and their right to benefit from the use of these resources (FAO, 2009).

Even if the concept of food security evolved to include cultural and context-dependent aspects such as food preferences, criticisms noted a continued failure to address more structural inequalities that underpin contemporary food systems. Several scholars, such as Fenzi and Bonneuil (2016), López Salazar and De la Torre Valdez (2022), Pasquier (2019), Rubio (2013, 2019) and Torres Salcido (2019), have noted that the widespread definition of food security underlines access as central to attain food security without specifying if foods are locally produced or imported. More so, they argue the concept fails to challenge the overwhelming power held by transnational companies in controlling seeds and agrochemicals, the price volatility linked to free markets and the embedded neglect of small farmers and peasants under capitalist agriculture systems. These critiques have been especially pertinent in Mexico, where a neoliberal economic model has been pursued since the 1980s.

Therefore, when the Mexican government created SINAREFI in 2002 to integrate FAO's guidelines on food security and the conservation of agricultural biodiversity into national policy (with an emphasis on local crop genetic resources and their just access by indigenous or small farmers), this was not without conflicting interests. On one hand, SINAREFI became the first structured multidisciplinary and multi-institution effort to conserve and promote sustainable use of native crop genetic resources in the country. It was created under the auspices of the National Seed Inspection and Certification Service (SNICS) and the Ministry of Agriculture and consisted of strategic crop networks for those crops that originated, diversified or domesticated in Mexican territory. This encompassed 44 crops in total, categorised into five macro-networks: vegetables, underutilised crops, ornamental, basic and industrial, and fruits. SINAREFI's objectives included the implementation of in situ efforts under a state-led institution and a new focus on local food systems—at least in discourse. On the other hand, SINAREFI was inserted within a wider, seemingly contradictory, state agricultural model that prioritised industrial production of export crops and the importation of basic grains, including maize, the primary staple grain in Mexico (Rubio, 2013). This state model persisted throughout the 2010s, before and after SINAREFI's disappearance in 2014.

Between 2002 and 2014, SINAREFI engaged with initiatives such as the creation of Communal Seed Banks and participatory breeding projects with local communities (Córdova-Téllez et al., 2018, p. 5). These projects, contrary to previous government efforts that had

been tethered to earlier models of agricultural development, would have different incentives beyond increasing crop yield and production. For example, aspects such as quality of life, nutrition and traditional agroecological practices of peasants and local communities would be added to the institution's foundations. In addition, SINAREFI's official discourse highlighted the valorisation of traditional knowledge, its link to local varieties and the importance of preserving both knowledge and varieties for climatic, cultural and culinary reasons.

Yet SINAREFI's objectives and rhetoric were not always in apparent sync with the nation's broader food security scheme. This is visible in the inconsistencies that emerged in non-staple crop networks. In this article, I will explore SINAREFI's trajectory and its research on chile pepper (*Capsicum* spp.), a crop rich in symbolic and cultural meaning in Mexican cultures (Long Solís, 1998), particularly due to its vast diversity and derived uses in national cuisines. This research took place in the 'Network of Chile', where ethnobotanists and plant breeders collaborated to undertake the first comprehensive survey of chile landrace diversity in Mexico. I will argue that chile, as a symbolic but non-staple crop, lied in a limbo between being *necessary* or only *culturally adequate* to the nutrition of a nation, primarily due to its flavour characteristics. In other words, I will argue that chile's cultural importance was underlined in SINAREFI but obviated in food security programmes.

Therefore, I will develop a history of the Network of Chile that draws on historical documents and existing literature on Mexican food and agriculture policies and politics, supplemented by interviews with key actors involved in SINAREFI and the Network of Chile. The argument will first detail the trajectory of SINAREFI, particularly the Network of Chile, and then explore how this was shaped by political change and by the wider national panorama on food security. In the final section, I will discuss how SINAREFI's demise links to chile's cultural importance in food security welfare programmes. Here I will argue that considering local flavour preferences in food welfare policies is vital to achieve real food security, along with policies that boost local food sovereignty.

Overall, this paper will explore how political decisions regarding the priority of and desired approach to national food security objectives, agriculture policies and state conservation efforts determine whether the latter can be successful and from whom they will benefit. In the case of chile in Mexico, mismatched goals on food security and the failed integration of local knowledge and cultural elements into the political structure led to an inconsistent conservation scheme. Therefore, this paper builds on existing accounts of crop genetic diversity by unveiling how flavour is framed in food security and conservation efforts beyond grains (Bonneuil, 2019; Curry, 2022; Fenzi & Bonneuil, 2016; Fitting, 2010).

2 | THE NETWORK OF CHILE: A SPACE FOR CHILE LANDRACES

Octavio Pozo Campodónico, a pioneer chile breeder at the National Institute for Agricultural Research, wrote in the 1980s that most of

Mexico's chile diversity was already known and used by local communities but not by scientists (Laborde & Pozo Campodónico, 1982; Pozo Campodónico, 1981). Although today ethnobotanists agree this is still the case (Aguilar-Meléndez et al., 2018), in 2008 SINAREFI had other plans when inaugurating the Network of Chile as part of the vegetable macro-network. The Network of Chile aimed to achieve a comprehensive understanding of chile diversity, especially for local varieties.

As with other networks in SINAREFI, the Network of Chile encompassed a multi-institutional effort between different agricultural stations of the National Institute of Agricultural and Livestock Forestry Research (INIFAP), where previous chile research had focused on commercial production. Also, it promoted interdisciplinary collaboration between plant breeders and ethnobotanists from several Mexican universities, such as those from the Chapingo University, Postgraduate College, University of Veracruz, University of Guadalajara and Conkal Technological Institute. SINAREFI also promoted collaboration with local farmers and communities. In this sense, the crop networks linked existing infrastructure to new collaborative avenues within universities and research institutes, which then connected with local populations (González-Santos et al., 2015).

The Network of Chile was the first time a state-led effort endeavoured to explore chile landraces or local varieties. As Moisés Ramírez Meraz, director of the INIFAP Program of Chile and collaborator of the Network of Chile, expressed, 'Since the 2000s we have been giving wild and native chile materials a lot of priority, and for this, SINAREFI was a very important. With the Network of Chile, we had more resources to go out and collect and rescue native and wild chiles. In the beginning, the collections were based on commercial varieties and the native ones were neglected, but it is crucial to conserve them ... It is not like before there was no interest in native varieties, the problem was that there was no opportunity and no resources or personnel to include them in the programs' (personal communication, 2020).¹ Since its inception in 2008, the Network of Chile has significantly expanded the number of chile varieties collected and conserved, with 2432 exemplars comprising 47 types of chile at the University of Chapingo, the most diverse chile seed collection in Mexico (Aguilar-Meléndez & Lira Noriega, 2018, p. 80). Before this, the biggest collection belonged to INIFAP, with 3857 exemplars consisting mostly of commercial varieties (Instituto de Investigaciones Forestales y Agropecuarias [INIFAP], 1996, p. 31, Moisés Ramírez Meráz, personal communication, 2020). Moreover, the Network of Chile mapped chile diversity across the Mexican territory (Aguilar Meléndez, personal communication, 2022).

Yet, beyond collection, the project aimed to integrate the relationship between chile varieties and culture, resonating with SINAREFI's wider goals of developing strategies for the sustainable use of genetic resources, in situ conservation efforts, and improving Mexico's food security as per FAO's guidelines. Before the Network of Chile, landraces at INIFAP were regarded as economically inviable and too heterogeneous. Even if chile was a symbol of Mexicanity

¹All translations are my own.

before SINAREFI, research was only focused on improving and collecting commercial varieties. In contrast, the Network of Chile engaged with small-scale production systems and types of chile that are only found regionally (Aguilar-Rincón et al., 2010). This significantly added to previous state-led chile research, where yield and large-scale production were prioritised. In this sense, chile landraces acquired value within the framework of safeguarding Mexico's plant genetic and biocultural heritages (Servicio Nacional de Inspección y Certificación de Semillas [SNICS], 2013).

This is visible in the Network of Chile's variety descriptions included in the book 'The chiles of Mexico and their distribution' (Aguilar-Rincón et al., 2010), the most representative publication of the Network, where the authors included topics such as local landrace chile uses, methods of harvesting wild and semi-domesticated varieties, and regional dishes and cuisines. In this text, we find that the local chile *costeño* from Oaxaca is an essential ingredient for local plates like 'mole de iguana, venado, enchiladas and salsas' (López & Castro, 2006, p. 151), that chile *de agua*, endemic to the central valleys of Oaxaca, is used as a cup by producers to drink mezcal at the end of the harvest as an act of celebration (Aguilar-Rincón et al., 2010, p. 25), and that chile *de monte* in Oaxaca is cultivated by Zapotec communities in the Istmo de Tehuantepec, whilst the chile *mirasol* in the coasts of Oaxaca is preserved by Chatinos, Mixtecos and Amuzgos groups (Aguilar-Rincón et al., 2010, p. 105). In SINAREFI's vegetable report of 2016, local chiles 'are still cultivated due to their interconnection with culinary richness, which is immersed in the ethnic and cultural complex that characterises Mexico' (Vera-Sánchez et al., 2016, p. 11). From this perspective, flavour, culture and cuisine appear to become relevant on their own, separating chile's genetic diversity from its role as a raw material for the development of commercial varieties.

Publications from the Network of Chile integrated local spaces and actors in their analysis. For example, they sometimes explain if a given chile landrace is collected in the wild, harvested in home-gardens or in small parcels (Aguilar-Rincón et al., 2010). They also explain whether consumption of a chile variety is for the household, for local exchange or sale or for regional markets, and whether it generates basic or supplementary income for families in rainwater areas. This contrasted with previous agricultural reports, where mostly production-related and morphological plant characteristics were considered; these included aspects like yield rate, length, colour, market demands and product uniformity (Laborde & Pozo Campodónico, 1982).

Speaking about family income, Montes Hernández et al. (2006, p. 101) touch on how chile *piquín* or *del monte* in Tamaulipas is obtained 'by the women and children in the communities of the region, who have reached an important degree of specialisation in terms of the harvest'. Therefore, some studies touch on gender roles and local social dynamics. Aguilar-Rincón et al. (2010, p. 20) specify that 'the farmer is in charge of production and sale [of chile *huacle*, the main ingredient for mole negro] and occasionally, the housewife intervenes in its local sale'. In addition, they explain how chile *tabiche* from Oaxaca is sold exclusively by housewives (Aguilar-Rincón

et al., 2010, p. 69) and how chile *bolita* is burned by housewives to repel insects and snakes (Aguilar-Rincón et al., 2010, p. 78). In previous state-led research, women were mainly portrayed as buyers of 'commercial chiles' (Laborde & Pozo Campodónico, 1982); in the Network of Chile, women's role is portrayed as active producers, users or sellers—alas at a local scale and with specific tasks.

In addition, local chiles were highlighted as a symbol of national identity by SINAREFI chile researchers, along with the re-valorisation of traditional cultures, cuisines and flavours. Lopez and Castro (2006, p. 136–137) write that 'Chile has constituted a cultural constant in the evolution of the Mexican people, to such a degree that it has been an obligatory ingredient in Mexican food for thousands of years' and 'the variety of tastes, flavours and ingredients that are used in the country's kitchens in conjunction with the different chili peppers, has allowed the development of characteristic, exotic and inciting gastronomy, with a peculiar and suggestive taste, which despite foreign transformations and influences, retains a particular tonic, due, directly, to the variety of forms and ways in which chili is consumed in our country'. Therefore, at the Network of Chile, local chile diversity, along with its relation to local culture, agriculture and cuisine, had a place inside the state's scientific infrastructure. That is, besides providing potential material for improvement, and by extension profit, the preservation and conservation of chile landraces appeared to have intrinsic value within the wider SINAREFI vision of safeguarding native genetic resources and advancing food security in Mexico.

3 | THE FALL OF SINAREFI AND THE NETWORK OF CHILE

As worries from researchers and producers about the loss of local varieties became more prominent, chile was one of the most attended-to crops; it received more funding than any other crop in the vegetable macro-network (Vera-Sánchez et al., 2016, p. 5). Besides being a crucial national symbol and part of regional cuisines, chile was and still is a remarkably profitable export crop. According to the Ministry of Agriculture, in 2007, the production of chile reached 2249 tons and represented 8.6% of all crop exportations in the country, with a commercial value of more than 8000 million pesos (SAGARPA, 2008). In this light, the systematic study of chile diversity also made sense in terms of locating and acquiring potential genetic resources for future breeding. Within SINAREFI, native crops and their diversity were characterised as worthy of investment for the generation of improved varieties that contributed to food security efforts in the country (Servicio Nacional de Inspección y Certificación de Semillas [SNICS], 2014). Yet, the ways in which SINAREFI and the Network could support efforts for food security remained vague: was it for local or regional production or for exportation? Or both? Plant breeders, ethnobotanists and the state each had different perspectives on the matter.

The Network of Chile was successful in developing a systematic database of chile diversity (Figure 1). This database documented chile varieties' GPS location, botanic information and, as stated above,



FIGURE 1 Second edition of the collaborative map 'Diversity of Chiles in Mexico', 2014. The map shows chile landraces, identified and collected through the Network of Chile throughout Mexican territory. Reproduced from Aguilar-Rincón et al. (2017).

some descriptions of local cultural uses. In total, the project mapped and collected 2432 accessions in 26 states of Mexico, including the species *Capsicum annuum*, *Capsicum chinense*, *Capsicum frutescens*, *Capsicum pubescens*, *Capsicum baccatum* and *Capsicum rhomboideum*. From these, 75% corresponded to the species *C. annuum*, the most diverse in the territory (Luna Ruiz et al., 2018, p. 104). Even when wild varieties were not specifically described in the Network's reports, the project mentioned 47 morphotypes from all collected samples, including both wild and domesticated chiles (Aguilar-Meléndez & Lira Noriega, 2018).

Moreover, ex situ conservation was significantly expanded with the addition of the 2432 accessions to the University of Chapingo's seed bank (Aguilar-Meléndez & Lira Noriega, 2018). As Moisés Ramírez Meraz testified, 'Sinarefi is the largest reservoir of chilli pepper genetic material, because we all [agronomists, ethnobotanists, and local communities] contributed to this collection. This bank is in Chapingo University, and it is possible that it will migrate to the National Centre for Genetic Resources [a branch institution of INIFAP]. All this material is with its passport data, characterised, and it is completely located because it is not allowed to send material with the minimum registration data. These are very important materials and from all over the country' (personal communication, 2020). Therefore, SINAREFI's chile database and collection extended the frontier of chile research and conservation in Mexico.

In addition to facilitating ex-situ conservation in gene banks and mapping chile's diversity in Mexican territory, the local diversity

collected by the Network allowed for the breeding of new varieties for production. For one, Porfirio López López (2022, p. 329), an INIFAP agronomist at the Oaxaca headquarters and collaborator with SINAREFI, explains that activities in the state included the collection of Oaxaca's chile diversity and the subsequent development of improved varieties that considered regional and national demands. In particular, he exemplifies the case of chile *de agua*, mostly consumed in the Central Valleys of Oaxaca. According to him, the improved chile *de agua* surpassed the regional production yield by 26.5% whilst maintaining most of the original morphological and organoleptic characteristics (López López, 2022, p. 329). This initiative of developing improved varieties and distributing cheaper seeds to producers (especially small and medium) added to INIFAP's endeavour of breeding and producing seeds. Yet, these efforts were and still are mostly overshadowed by a national dependency on the US seed industry, especially from 1991, when the state lifted all restrictions for private seed commercialisation (Luna Mena et al., 2012; Moisés Ramírez Meraz, personal communication, 2020).

Yet, an analysis of Network of Chile publications reveals a clear bias towards standard taxonomic and agronomic data and a failure to connect this scientific information with ethnobotanical insights or local epistemologies, as had been sought in its objectives. Even when the Network of Chile advanced the transformation of chile conservation in Mexico to a more encompassing practice, it also continued a vision of amassing chile genetic resources for production purposes. Even when ethnobotanists like Aguilar-Meléndez worked to include

ethnographic and cultural elements such as culinary knowledge and flavour in the Network's studies of Chile landraces, the priority was given to agronomic perspectives.

This hindered the liaison between different theoretical approaches to the crop's diversity and its value, which in turn shaped who could benefit from the project's results. According to ethnobotanist Araceli Aguilar-Meléndez, power relationships affected the extent to which ethnographic and cultural insights could influence the Network's trajectory (2022, personal communication). Cultural and especially culinary elements of Chile, as those presented in the section above, remained descriptive rather than integral to the work. This perpetuated a long 'resourcist', or utilitarian, view of crop research and conservation (Fenzi & Bonneuil, 2016) and also the gap between 'science' and 'traditional' knowledge. This outcome makes sense when one considers the wider food policy forwarded by the state, as will be discussed in the following section.

Despite the internal power struggles, agronomist Martínez Meraz and ethnobotanist Aguilar-Meléndez did agree that the Network of Chile had been crucial for expanding academic researchers' understanding of Chile's diversity and geography. This opinion was shared by SINAREFI's ex-director, Rosalinda González-Santos, who believed that in a stable political environment, SINAREFI could have been a more transformative initiative. However, from approximately 2014 onwards, the institution suddenly halted new research, something evident from the Network of Chile's outputs. Although currently presented as an active agency on the government's webpage, the Network seemed to fade from 2014. According to Rosalinda González-Santos, this sudden collapse is explained by a general institutional funding cut that happened with the changeover of the presidential administration in 2012 and that affected all 44 crop networks (personal communication, 2022). According to her, this is the main reason why the Network of Chile remained in a diagnostic phase: after resources stopped in 2014, it was not possible to consolidate further in situ or community projects. Yet, she noted that other networks like that of maize did achieve more solid researcher-producer collaborations before 2014 because of a stronger existing infrastructure and research network that developed before the creation of SINAREFI.

The apparently sharp turn of fortune in 2014 was, in a sense, years in the making. After 70 years of rule by the Institutional Revolutionary Party (PRI), a divided and impoverished Mexican population turned to the conservative right-wing National Action Party (PAN), which won presidential office in 2000. The new government rapidly attempted to portray a modern and progressive image by aligning itself with international policy, in particular with respect to the environmental and sustainability agendas. This propelled the creation of SINAREFI under the International Treaty on Plant Genetic Resources for Food and Agriculture. Yet, after two 6-year presidential administrations and 12 years marked by growing neoliberal policies, an economic crisis, ever-increasing inequalities and the exponential rise of violence due to the state's war on drug cartels, the PRI regained political power in 2012. With the party change came the dismantling and re-structuring of PAN's reforms, including SINAREFI, which lost most

of its budget by 2014. As 20th-century Mexican history has repeatedly shown, administrative change, more commonly than not, has brought forward categorical institutional transformations, generally with the intention of purposefully blocking the predecessors' projects (Ochoa, 2000).

As all crop networks within SINAREFI were disrupted by the political changes, the long historical division between agricultural science and areas like ethnobotany and the social sciences was reinstated once again. The lack of funding and infrastructure blocked the continuation of this state-based conservation effort that aimed at protecting native landraces as part of Mexico's genetic and biocultural heritage. Because of its abandonment, SINAREFI's purported objectives of delivering sustainable use, access and conservation of native crop resources by integrating local peoples and communities fell short of real results.

SINAREFI's downfall, however, was linked to a much bigger panorama that inevitably shaped the extent to which crop research and conservation strategies could benefit (or not) disadvantaged populations: the national food security and agriculture policy. Since the 1980s, the food supply in Mexico has increasingly depended on grain imports and on the export of profitable crops, mainly vegetables and fruits (Suárez, 1983). This forwarded paternalistic food security strategies that centred on direct money transfers for marginalised groups rather than boosting regional production of local landraces or even improved varieties (Rubio, 2013). The contrasting two-fold strategy set in motion by PAN's creation of SINAREFI—a model for landrace conservation with a supposed focus on local initiatives—whilst continuing an agroindustry importation-exportation model suggests that the top-down political interests were not truly directed to promote 'just access of the genetic resources' for the entire Mexican population. Regardless of the intentions of scientists and other collaborators in SINAREFI to advance a conservation system that benefitted local communities—the true safekeepers of most biocultural diversity—broader economic and political motivations blocked structural change.

This is evidenced in the 'Law of Rural Sustainable Development' established in 2001 as part of Mexico's alignment with international expectations, in which the government supposedly aimed to improve the living standards of rural inhabitants by implementing a sustainable food production system. As a constitutional law, it applied to all institutions that contributed to food production, distribution, supply and access (Ávila Curiel et al., 2011), and it was to be enacted by the SNICS through SINAREFI. The law presented food security and sovereignty as joint goals, respectively defined as 'the timely, sufficient and inclusive supply of food to the population' and as the 'free determination of the country in terms of production, supply, and access to food for the entire population, based fundamentally on national production' (Ávila Curiel et al., 2011, p. 19). Here, both food security and sovereignty were framed on a national scale, which is especially telling for the latter, since in other political contexts it was (and still is) related to local and communities' struggles to determine their food systems and maintain land or territory (Via Campesina, 1996). Therefore, matters like local production and the improvement of conditions for small and subsistence farmers were neglected, aligning with long-

standing rural abandonment by the Mexican state. In reality, the sharp division between big and small producers and between agroindustry (under the wing of transnational companies) and subsistence agriculture was maintained amidst the official enunciation of sustainable rural development in the constitution.

Even when SINAREFI's goals projected a local valorisation of native crops and aimed at implementing in situ efforts such as Communal Seed Banks, the bigger picture was to convey an image of the government to institutions abroad. Mexico was to be portrayed as a country in line with global discourses, that is, as a 'modern' or 'progressive' nation that sought both economic growth and the sustainable management of resources. SINAREFI's strategy then underwrote the creation of a national system for the conservation and research of native crop genetic resources and recognised local biocultural diversity as valuable. Ironically, the bigger picture on food security programmes conveyed a different message.

4 | EMERGING CONTRADICTIONS: MEXICAN FOOD SECURITY PROGRAMMES AND TASTE

Within SINAREFI, chile and other native non-grain crops gained importance beyond calories for the attainment of food security. This means that cultural aspects like flavour and cultural preference were increasingly integrated into official discourse. Yet the extent of this integration is not very clear. Thinking about chile and the state beyond SINAREFI poses an interesting but overlooked question: if chiles (and other non-grains) were considered fundamental to the Mexican diet mostly because of taste qualities and other nutritional advantages like vitamins, how were they framed in food security programmes in this period, if at all? I will answer this by accounting for the state's enforcement of food security in welfare programmes, their inclusion of chile, and the contradictory nature of these efforts compared with those like SINAREFI. Lastly, I will reflect on the need to seek real governmental structural change towards regional food sovereignty and why flavour diversity matters to the attainment of food security.

As the Mexican state adopted a neoliberal model in the late 1980s, food security programmes pivoted from a national 'universalist' welfare strategy to targeting families in poverty (Ochoa, 2000). The measure for identifying poverty and food insecurity was the total price of the 'Basic Food Basket' or *Canasta Básica Alimentaria* (CBA), a list of 34 main foodstuffs considered pertinent to Mexican nutrition and diet. The CBA was determined by the government's National Plan for Depressed Areas and Marginalised Groups (COPLAMAR) in 1982 and since then has served as a guideline to standardise minimum wages (INEGI, 2020; Vesarez-Zúñiga, 2022).

The CBA became the foundation of targeted food security welfare programmes and therefore informed which types of foods and flavours were given to those categorised as poor and marginalised. From the late 1990s to the early 2000s, welfare programmes, namely, Progresá (1997–2002), later Oportunidades (2002–2014), and then Prospera (2014–2018), implemented direct cash transfers to their beneficiaries.

In conjunction, Diconsa, a state-owned agency, provided accessible, low-cost foods and other essentials through a nation-wide network of community stores. Diconsa mostly sells foodstuffs included in the CBA.

As a basic crop in the Mexican diet, chile has been a part of the CBA since its inception, among other foodstuffs such as maize, wheat, beans, rice, vegetable oil, eggs, milk, pasta, meat, chicken, tomato and banana. Interestingly, with time, the official basket veered away from fresh fruits and vegetables towards industrialised products (Martínez, 2008). Whilst the first basket in 1981 included fresh tomato, chile, onion, lettuce and carrots, plus a range of fruits, in 1998 the basket only included canned tomato puree and processed chiles as vegetables and no fruits (Martínez, 2008, p. 25). This trend continued in 2005, when Diconsa's main basket only included canned chiles as vegetables (Diario Oficial, 2005). The same applied for 2013 (Vázquez-Pérez & Ayala Ortiz, 2014) and 2015 (DICONSA, 2015).

Therefore, if chile is a barometer for the integration of flavour—itself a proxy for cultural preferences—into state food security programmes, then one could say that state efforts did indeed contemplate preference and taste. Canned chiles have been part of the CBA for decades and are still sold at subsidised prices in over 22,000 Diconsa stores throughout the country. Moreover, chiles represent the only vegetable on the list, alongside products like meat, milk, eggs and lentils (DICONSA, 2015; Martínez, 2008; SADER, 2023).

Yet, chile's inclusion in the biggest food security programme of the country may also reflect the homogenisation of Mexican diets. The chile variety in Mexico accounts for over 90 varieties, most of which are used, processed, cooked and consumed in different culturally significant ways by different groups (Aguilar-Meléndez et al., 2018). The chiles included in Diconsa's CBA are canned (industrialised) and are mainly jalapeño, serrano and chipotle. These are widely consumed, but they are also major commercial products that are replacing local landraces.

This is not to say that the supply of low-cost or processed foods in marginalised areas is 'bad'—the wellbeing and nutrition of food insecure groups are crucial. The issue is that, on one hand, the state dictates that biocultural conservation matters for enhancing food security (through SINAREFI), and on the other hand, it perpetuates food policies that actively erode networks of agroecological practice, of culinary traditions and of local seed exchange.

This means that instead of fostering local production of chiles and other native crops, which would bestow more food sovereignty to marginalised groups, satisfy their cultural preferences and favour biocultural conservation, food policies have remained shortsighted and paternalistic (Pasquier, 2019; Rubio, 2013, 2019). For over two decades, cash transfers and the supply of subsidised and industrialised products have remained the main strategies to grant food security to the Mexican population. More so, this strategy has failed to provide a solution to the import–export model and the volatility of crop prices (Rubio, 2013, p. 66), which are the root causes of food insecurity in the first place (Rubio & Pasquier, 2019).

That Diconsa included chiles in the CBA does not mean that cultural requirements were met. The homogenisation of diets in marginalised areas affected not only local culinary traditions but also reduced

the consumption of fresh vegetables and fruits (Vázquez-Pérez & Ayala Ortiz, 2014). This paternalistic approach, in line with an agricultural model based on free markets and dependency on grains, has forwarded the erosion of local chile varieties. As industrially produced chiles increasingly dominated the domestic and foreign markets, local varieties became too expensive for local production and sale (Aguilar-Meléndez et al., 2018). This is visible in Oaxaca, the most chile-diverse region of Mexico, where vendors of the main city market or *Central de Abastos* now struggle to sell endemic chiles as their prices have skyrocketed in the last 10–15 years.² This has been caused by the introduction of cheaper, industrially-produced chiles brought from northern Mexico and from countries like China and Peru.

Whilst a problem not particular to Chile, this case clearly shows how the capitalist agricultural model followed by the state actively halted local networks of knowledge, culinary traditions and exchange by making local foods inaccessible to people. Without local chiles and their irreplaceable flavours, situated culinary traditions are gradually lost. Their cultural relevance and their role in local diets cannot be replaced with canned chiles. Through their use in often overlooked sites of conservation, such as kitchens, it is where biocultural diversity is truly perpetuated (Pérez-Volkow et al., 2022).

Therefore, chiles were framed as important for food security by SINAREFI, along with other non-grains, and integrated within a discourse of in situ conservation, sustainability and fair access to genetic resources. Yet, the real intention of the government was not to change the national agriculture and food model towards one of local production and self-sufficiency (Rubio, 2013). This is evident when considering the welfare programmes' allocated resources. Whilst the flagship welfare programme *Oportunidades* received up to 50,000 million pesos until 2014 (Hernández Licona et al., 2019),³ SINAREFI only received 50 million—with an approximate average of one million per Network (González-Santos 2023, personal communication). Therefore, there has been a clear inclination towards targeting poverty through direct economic transfers instead of forwarding structural reforms that boost local food production and commerce—reforms that are necessary to achieve a fairer distribution of wealth in rural Mexico. As argued by Ochoa (2000), this patronising type of policy was informed by electoral motivations rather than building solid social welfare strategies in Mexico.

According to the National Council for Evaluation of Social Development Policy (CONEVAL) in 1992, there were 18.6 million people (21.4% of the population) with insufficient income to afford a CBA per month, and 46.1 million (53.1% of the population) could not afford a CBA alongside basic goods and services such as health, education

and transport (CONEVAL, 2018). By 2014, the year SINAREFI halted activities, 24.6 million people (20.6% of the population) could not afford a CBA, and 63.8 million (53.2% of the population) could not afford a CBA + services (CONEVAL, 2018). Therefore, levels of food insecurity in the country did not improve over the past 22 years, despite the introduction of cash transfer welfare programmes like *Progresa*, *Oportunidades* and *Prospera*.

The consideration of flavour as a culturally adequate element in Mexican diets was integrated in both SINAREFI and *Diconsa-Oportunidades* (and other cash transfer programmes) through Chile. The former embraced the revalorisation of local diversity for attaining food security but failed because of the overarching political agenda. The latter provided a paternalistic and homogenising solution through supply and access, rather than fortifying local production systems. These overlapping trajectories capture the complexity of dynamics that surge in different levels of food policy, agriculture and crop conservation. They show that mismatching ideas can co-exist in the same concept of food security, in the same country and in similar institutional infrastructures. Here, the recent history of Chile's research and its integration into food security policy highlights how discourses are layered, malleable and often contradictory.

Attention to local cosmologies and cultures in the Network of Chile was indeed helpful to emphasise aspects of Chile diversity and conservation that were previously overlooked by the state. These aspects included food traditions, flavour, culinary knowledge and a variety of dishes—all of which are intrinsic to Mexico's diversity of cultures. This, however, was not transferred to continuous institutional action—or at least has not yet been. As ethnobotanist Aguilar-Meléndez argued, 'most of Chile diversity is perpetuated on a local scale through the people that use it' (Aguilar-Meléndez et al., 2018; 2022, personal communication). Unfortunately, after SINAREFI, the institutional study of Chile's flavours and cultural meanings was once again relegated to academia, especially to ethnobotanical work, and in a handful of places, such as the University of Veracruz and INIFAP.

The fact that Chile was integrated into national food security programmes reveals the importance of flavour, preferences and taste, even at the highest level of food politics. As a basic ingredient for Mexican cultures, analysing Chile and other non-grain crops can unveil the importance of forwarding policies that promote and strengthen local production systems, ones that consider the decisions, needs, flavours and lifeways of those involved. Chile has a role in providing nutrients, but it is unrivalled in satisfying palates, in giving food particular notes and in provoking sensations and sentiments of belonging. These are all essential elements for a 'culturally adequate' diet, a requirement for food security according to supposed authorities on the topic, such as the FAO. Ironically, these elements are overlooked in food security policy to date in Mexico. Highlighting flavour in the quest for more diverse, locally sourced diets can evidence the fundamental role that intangible elements have in the quality of a diet, of a meal and of a food system. Such elements underwrite the multidimensional nature of food and the right of every person to choose the food they love.

²This ethnographic work was realised by the author in June 2022 as part of her PhD work, which follows the Research Ethics of University of Cambridge. Funded by CONACYT-Cambridge Trust and the Wellcome Trust.

³The Proyecto Estratégico de Seguridad Alimentaria (PESA) was created in 1994 by FAO to target food insecurity in low- and middle-income countries and adopted in Mexico in 2001. It worked through the Ministry of Agriculture and aimed at 'increasing agricultural production and productivity, promoting self-sufficiency and local markets... technological innovation and improvement, and generating local organisations' (Mackenzie, 2017, p. 36). The programme received approximately 2550 million pesos until 2014 (Gimate Baños & Muñoz Rodríguez, 2017, p. 238), when it was attached to 'Oportunidades' and then dissolved in 2019 with the new administration of the National Regeneration Movement (MORENA).

AUTHOR CONTRIBUTIONS

Daniela Sclavo has done the historic research and wrote the entire manuscript, parting from her doctoral research.

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CONFLICT OF INTEREST STATEMENT

The author has no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

ETHICAL APPROVAL

The author confirms that appropriate ethical approval has been received by the Department of History and Philosophy of Science, acting on behalf of the School of Humanities and Social Sciences Ethics Committee, University of Cambridge. Consent forms have been read and signed by the interviewees.

ORCID

Daniela Sclavo  <https://orcid.org/0009-0002-2665-5083>

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