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From Science to the Table: Patagonian Mycoculture Capacity Building Through Community-Based Educational Workshops

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Abstract

Our paper reports on the implementation and assessment of Patagonian Mycoculture—a series of community-based mycoculture capacity-building workshops delivered in 2022–2023 in the province of Río Negro, Argentina. The results characterized Patagonian Mycoculture as being multi-sectoral because its planning and implementation involved ten governmental and non-governmental entities of different levels and scope. The initiative was also characterized as being multi-sensory given that workshops included visual, auditory, kinesthetic-tactile, olfactory and gustatory components. The workshop series is strong proof of concept of the importance of multi-sectoral and multi-sensory approaches to capacity building related to nutrition and small-scale production of edible mushrooms.

Keywords: Mycoculture, fungi, mushrooms, nutrition, community-based workshops

De la science à l'assiette : Renforcement des capacités en myciculture patagonienne par des ateliers éducatifs communautaires

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Résumé

Cet article présente la mise en œuvre et l'évaluation de myciculture patagonienne, une série d'ateliers communautaires de renforcement des capacités en myciculture organisés en 2022-2023 dans la province de Río Negro, en Argentine. Les résultats ont démontré le caractère multisectoriel de la myciculture patagonienne, sa planification et sa mise en œuvre ayant impliqué dix entités gouvernementales et non gouvernementales de différents niveaux et de différentes envergures. L'initiative s'est également révélée multisensorielle, les ateliers intégrant des composantes visuelles, auditives, kinesthésiques-tactiles, olfactives et gustatives. Cette série d'ateliers démontre clairement l'importance des approches multisectorielles et multisensorielles pour le renforcement des capacités en matière de nutrition et de production à petite-échelle de champignons comestibles.

Mots-clés : Myciculture, fonges, champignons, nutrition, ateliers communautaires

1.0 Introduction

While interest and scholarship in *ethnomycology*, the study of how people use fungi as food, medicine, and cultural practices (Dugan, 2020), is burgeoning in Argentina, it remains a field with much growth potential (Flamini et al., 2018; Molares et al., 2020). The consumption of mushrooms can contribute to a range of nutritional benefits and immunity fortifying properties (Barroetaveña & Pildain, 2022; Barroetaveña & Toledo, 2016; Molares et al., 2020). While Patagonian Indigenous communities in Argentina have long-standing relationships with mushrooms, some scholars have described Argentina as a "mycophobic" country characterized by limited fungi consumption (Abeyá et al., 2007; Barroetaveña & Pildain, 2022). Or, as conceptualized by other authors, in the Argentine context mushrooms can be characterized as a "marginal food", defined as "less important food in any cultural group or the food of marginal groups in a society" (Finnis, 2012 as per Molares et al., 2020, 10). As described by Molares and colleagues, "consumption of marginal food resources, even in low quantities or sporadically, can promote diet enrichment and play an important role in food sovereignty" (2020, p. 10). As such, fungi can provide rich sources of nutrients such as vitamins, proteins, essential fatty acids, and minerals acids (Barroetaveña & Toledo, 2016; Molares et al., 2020). Evidence also suggests that varieties of fungi can support health benefits such as immune promotion (e.g., antibiotic, anti-cancer, antioxidant properties) and metabolism regulation (Guzmán, 2008; Molares et al., 2020; Soković et al., 2017; Toledo et al., 2016a). In Patagonia, there are rich opportunities to amplify and expand upon traditional mushroom knowledges and practices, not only in the sphere of mushroom harvesting, but in mushroom cultivation (*mycoculture*) as a means of diversifying production, increasing access to nutritious food for geographically isolated communities, and fostering food sovereignty (Barroetaveña & Pildain, 2022; Molares et al., 2020).

Our paper discusses the implementation and assessment of Patagonian Mycoculture—a series of community-based mycoculture capacity-building workshops that were delivered in 2022 and 2023 as part of the 'From Science to the Table' program by the Secretary of Science and Technology of the Río Negro Innova Agency (a government agency in the province of Río Negro, Argentina). The From Science to the Table program was implemented in partnership with numerous other governmental and non-governmental organizations. The article provides a thick description of how the Patagonian Mycoculture initiative was implemented, discusses the pedagogical approaches and theory of change underpinning the workshops, and reports on outcomes.

The use of interactive workshops to engage with, and build capacity within, communities on a wide range of topics is a common practice in fields of community health and community development. To this end, outside of this project, scholars, activists and agencies have collaborated to facilitate community engagement and outreach about mushrooms in Patagonia through initiatives such as in-person and virtual workshops and meetings, print and electronic resources, and the development of a "Patagonia Fungi App" (Barroetaveña et al., 2020; Barroetaveña & Pildain, 2022; Barroetaveña et al., 2021b; Barroetaveña & Toledo, 2016; Barroetaveña et al., 2021a; Molares et al., 2020; Toledo et al., 2016b). These initiatives and resources have covered multiple topics, such as information about different types of edible mushrooms found in Patagonia, collecting mushrooms from natural forests/mycoculture trails, mushroom sustainability, and recipes for cooking with

mushrooms. Information about sowing and cultivating mushrooms also exists but appears to be less prevalent than other topics (CIEFAP, 2025).

Within this broader context, this project's Patagonian Mycoculture workshops focused on participants' sowing and cultivating their own mushrooms. The following learning objectives guided the workshops: By the end of the sessions, participants would be able to: (1) identify information about the nutritional benefits of edible mushrooms; and (2) apply skills to sow, grow, and harvest mushrooms for personal use and/or as small-scale business opportunities. Drawing from logic model and program evaluation practices and educational frameworks (Knowles et al., 2005; Kolb, 1984; Patton, 2012), we infer that the theory of change underlying the workshops was that active, multi-sensory, experiential learning would foster participant engagement and interest in edible mushrooms and achieve the workshop objectives.

The overarching goal of the community-based Patagonian Mycoculture workshops was to build community-member capacity in the art and science of sowing, growing, cooking, and savoring Patagonian mushrooms. To achieve this goal, the workshops were designed to grow participants' knowledge about the nutritional and health value of edible mushrooms, and to increase access to and use of edible mushrooms through the identification of their characteristics, incorporation of mushrooms in food preparation, and the development of local mushroom production. The Patagonian Mycoculture educational workshops can be characterized as being both multi-sectoral and multi-sensory. These attributes were crucial features in the success of the initiative and, as will be discussed later, can serve as a model worthy of replication.

2.0 Materials and Methods

Within a case study approach (Yin, 2017) we utilized several data sources. The case itself was the overall initiative, Patagonian Mycoculture, which was organized by numerous agencies. The main component of the Patagonian Mycoculture initiative involved the facilitation of mycoculture capacity building workshops which were implemented in four distinct sites: (1) San Carlos de Bariloche Location A; (2) San Carlos de Bariloche Location B; (3) Río Manso; and (4) Río Chico. Further details on each site are provided in the results section. Two workshops were facilitated in each of the four respective sites (eight workshops in total). Data sources included facilitators' observations of each workshop; project documentation; interviews; and participant surveys. To note, in this section we describe the materials and methods of the study we conducted, not the rationale and process that went into planning and implementing the initiative.

All authors engaged in and observed at least one workshop; this engagement included various roles such as delivering didactic workshop content, facilitating activities for workshop participants, and/or actively engaging as a workshop participant. One author (PP) participated in and observed all eight workshops. Authors' detailed workshop observation notes were compiled and utilized to construct the thick description.

The following project documents were reviewed to cull basic information about partnering agencies' involvement, theory of change assumptions, and details of the organization and implementation of the initiative: (1) "Condiciones para el Financiamiento de Eventos de Capacitación" [Conditions for Financing Training Events]—Project proposal presented to the Consejo Federal de Inversiones by Río Negro INNOVA-Secretaría de Ciencia, Tecnología y Economía del Conocimiento

[Secretariat of Science, Technology and Knowledge Economy]; (2) "Producción de gírgolas sobre troncos de álamo Pleurotus ostreatus" [Production of oyster mushrooms on poplar trunks Pleurotus ostreatus] – Author: Agricultural engineer Jorge Sánchez - INTA – Agencia de Extensión Rural Centenario; and (3) Website: De la Ciencia a la Mesa, (Gobierno de Río Negro, 2022).[1]

In addition, four interviews were conducted via Zoom and transcribed verbatim: three interviews with workshop participants and one with a main workshop organizer from Río Negro (INNOVA). The three workshop participant interviewees (all males) were chosen as case examples from different sites that had informed us that they continued cultivating mushrooms after the workshop. Although there may have been other individuals as well, we were not able to learn who they were. The workshop organizer interviewee (female) was chosen because she was the main planner of the initiative and thus a key informant about overall planning and implementation details. The interviews and analysis of this data focused on understanding the operational and experiential aspects of the workshops, gaining a nuanced understanding of workshop implementation, and centering participants' lived experiences and perspectives about the impacts of the initiative. Drawing from these interviews, we compiled three summaries to provide a narrative overview of the workshop experience and participant perspective in the three respective sites that have continued with post-workshop mushroom cultivation. While not one of the summaries, the interview with the workshop organizer provided valuable supplementary information to interpret workshop history, implementation, and participant feedback. The interviews, transcription, and analysis were conducted in Spanish. Interviewees were shown the transcripts, and no revisions were necessary. The summaries were subsequently translated into English by the authors.

In each of the four sites, immediately after the second workshop, participants were asked to fill out a written survey questionnaire asking about their experience of the workshop, their knowledge related to mushrooms, and preliminary impacts at a personal level. A total of 294 survey questionnaires were completed, with a breakdown by gender of 56% female, 24% male, and 20% no reply. In relation to age, 21% aged 18–30, 45% aged 31–50, 18% over 50 years of age, and 16% no reply. Descriptive analysis results from these surveys are presented in the Findings section. Ethics approval received from the University of Manitoba's Research Ethics Board.

3.0 Results

3.1 Multi-Sectoral and Multi-Sensory

3.1.1. *Multi-sectoral.* The multi-sectoral description relates to how the Patagonian Mycoculture initiative resulted from cooperation among a variety of agencies and stakeholders, governmental and non-governmental, to organize and implement the workshops. As indicated earlier, the convener program was From Science to the Table, of the Secretariat of Science, Technology and Knowledge Economy, a dependency of the Río Negro Innova agency of the provincial government of Río Negro, Argentina. A complete list of collaborators is outlined in Table 1.

[1] https://cienciaytecnologia.rionegro.gov.ar/programa/109/de-la-ciencia-a-la-mesa

This long list of partners shows the degree to which federal and provincial institutions, as well as regional and local research and educational centres, came together to make the project possible. The variety of sectors had different albeit complementary roles, some providing funding, some technical expertise, some logistical support, some educational expertise, and some community-engagement capacity.

Table 1. *Key Collaborators in the Patagonian Mycoculture Initiative*

Collaborating organization	**Role in Patagonian Mycoculture initiative**
From Science to the Table, Secretariat of Science, Technology and Knowledge Economy	Primary convener of the initiative. Dependency of the Río Negro INNOVA agency of the provincial government of Río Negro, Argentina.
Centro de Investigación Forestal y Andino Patagónico (CIEFAP)	Regional research centre
Consejo Federal de Inversiones (CFI)	Federal government entity
Instituto Nacional de Tecnología Agropecuaria (INTA)	Federal agricultural technology institute
Centro de Etnosalud	Regional university-affiliated research centre – workshop facilitator
La Zeta El Manso	Community company – workshop facilitator
Fundación San José Obrero Bariloche	Social work foundation (in Bariloche) – workshop location
Instituto Superior de Educación Técnica Profesional de Bariloche	Post-secondary technical education institute (in Bariloche) – workshop location
Centro de Educación Técnica N° 35	Technical education centre (in Río Manso) – workshop location
Cooperativa Agrícola Ganadera Nuevo Río Ltda	Rural cooperative (in Río Chico) – workshop location
Escuela N°163	Elementary school (in Río Chico) – site of community visit

The Patagonian Mycoculture workshops were well-positioned to build on earlier work in this field. The use of edible mushrooms has had a strong imprint on local development and food sovereignty notions, thanks to CIEFAP through their program *Patagonia Fungi* related to the positioning of wild and cultivated edible mushrooms as a food source, as well as touristic and gastronomic resources (Gobierno de Río Negro, 2022). In fact, in 2023, prior to the Patagonian Mycoculture initiative, CIEFAP researchers added 20 new wild mushrooms to the list of edible Patagonian mushrooms (Boletín Oficial de la República Argentina, 2023). As a result of this work, these wild mushrooms are now considered a new productive resource for the Patagonian region (Boletín Oficial de la República Argentina, 2023). As such, government agencies sought to promote the link between scientific research on fungiculture with scientific-technological transfer activities, with priority foci to cultivate mushrooms in controlled environments, as well as roll-out environmental education related to the seasonal collection of various mushrooms with a focus on myco-tourism.

The Patagonian Mycoculture workshops took place between September 2022 and October 2023 in the format of two sets of two-day workshops at four locations in the province of Río Negro. Each workshop site had distinct socio-economic, cultural, and geographic characteristics. The first site was Fundación San José Obrero Bariloche, a social work foundation located in a low-income neighbourhood on the outskirts of the city of Bariloche. The second site was Instituto Superior de Educación Técnica Profesional de Bariloche, a postsecondary technical educational institute directly within Bariloche (population ~135,000). The third site was Centro de Educación Técnica N° 35 in Río Manso, a technical education school located in a rural town of approximately 700 mostly middle-income inhabitants. The fourth site was Cooperativa Agrícola Ganadera Nuevo Río Ltda., an agricultural cooperative in the small, low-income rural town of Río Chico (population ~300). The format of the workshops was similar across the four sites, although with one minor variation: the Río Chico workshops (site 4) did not include visiting myco-paths because it is a semi-desertic area with lack of forests, and thus a minimum capacity for wild mushroom growth. The sites were chosen by RN INNOVA, the primary convener of the initiative, in consultation with the other organizations. A criterion that particularly weighed for the choice of the Río Manso site was that of national sovereignty, given its very close proximity to the border with Chile. The total number of workshop participants was 294 across all eight workshops. Table 2 shows the distribution of participants by site and workshop.

Table 2. *Distribution of Patagonian Mycoculture Workshop Participants*

Site	**# of Participants**		
	Workshop 1: Education & Mushroom Sowing (2 days)	**Workshop 2: Follow-Up & Discussion of Sowing Results (2 days)**	**Total**
1. Fundación San José Obrero Bariloche (Bariloche - Location A)	25	44	69
2. Instituto Superior de Educación Técnica Profesional de Bariloche (Bariloche - Location B)	42	66	108
3. Centro de Educación Técnica N° 35 (Río Manso)	7	15	22
4. Cooperativa Agrícola Ganadera Nuevo Río Ltda. (Río Chico)	46	49	95
Total	120	174	**294***

Note: *These are not necessarily unique individuals, given that a proportion of individuals participated in both workshops (according to the survey 22% of respondents participated in both workshops). Inferences are taken with caution due to the possibility of pseudo replication errors. Interestingly, there were consistently higher numbers of participants in the second workshop across the four sites; a possible reason for this is that word-of-mouth following the first workshop generated increased community interest and participation in the second workshop.

The relevance of the project being multi-sectoral was crucial due to the complex nature of the initiative. The multi-sectoral characteristics of the initiative required an effective combination of funding, locations, logistics, educational/technical expertise, and community-centeredness, from governmental and non-governmental partners.

3.1.2. Multi-sensory. Multi-sensory teaching is an inclusive pedagogical approach that incorporates multiple modalities, or senses, in the learning process (Morin, n.d.; Ministry of Education |Te Tāhuhu o te Mātauranga, n.d.). Drawing from the work of Orton and Gillingham, a multi-sensory educational approach commonly features a VAKT framework to incorporate visual, auditory, and kinesthetic-tactile components (Institute for Multi-Sensory Education, 2018). This multi-pronged approach provides flexibility to engage with a range of participant learning preferences, and promotes participant engagement through active opportunities for application, problem-solving, and synthesis of information (Teaching and Learning in Higher Education, n.d.). The Patagonian Mycoculture workshops extended the VAKT framework even further to incorporate taste and smell, modalities that are less commonly used in many traditional workshop pedagogies, through in-person cooking demonstrations and shared tasting experiences. This multi-sensory approach is particularly important in teaching and learning about food and food practices. As described by Nazarea, food practices themselves are experiential; they are not "primarily textual" (2006, p. 327) or primarily auditory. Rather, everyone is "culturally consumed by a world filled with forces, smells, textures, sights, sounds and tastes, all of which trigger cultural memory" (Nazarea, 2006, p. 327).

The content covered during the workshops was similar in each site and focused on the fungi kingdom. The content specifically addressed: fungis ecosystem and its relation to the environment; nutritional characteristics of mushrooms; potential health benefits of consuming mushrooms; social appreciation of ancestral knowledge in relation to mushrooms; and applications to different types of economic production, such as biomaterials, gastronomy, bioremediation, and myco-tourism. In comparing workshop one and workshop two at each site, the main difference was that workshop one involved the actual inoculation (sowing) of oyster mushrooms in poplar logs; during workshop two, the results of the earlier inoculations were assessed and discussed. Oyster mushrooms were chosen because of the relative ease with which they can be sowed, grown and harvested, and the teaching team's rigorous experience and expertise cultivating oyster mushrooms. Furthermore, workshop two addressed post-harvesting strategies and explored different mushroom preservation methods (e.g., dehydration). In three of the sites (Río Manso and the two Bariloche sites), the workshops included field trips to "myco-paths" designed for myco-tourism. During these excursions, participants observed the natural environment to identify a variety of fungi kingdom species that had been discussed in the workshops. Main components of the content offered in workshop one were provided again in workshop two, both to share key information with participants who had not attended the earlier workshop, and to reinforce and expand upon foundational concepts that returning participants learned in workshop one.

To illustrate the pedagogical attributes of this multi-sensory approach, we detail the agenda of the Río Chico Workshop 1 (two days). In addition, we also briefly describe two community visits that resulted from the workshops: workshop facilitators visited a local farm and the local elementary school in Río Chico. The intention is to showcase the content, activities, pedagogical approaches, educators, and community participants of the workshop.

3.2 Workshops

October workshop Río Chico: A multi-disciplinary team, made up of researchers, health professionals, government officials, agricultural producers, community facilitators, and a chef, facilitated the two-day Patagonian Mycoculture workshop at the Nuevo Río Agricultural Cooperative in the town of Río Chico de Río Negro. The workshop was advertised through social media, local community radio, flyer postings in several local agencies, and word of mouth. Río Chico is a very small rural town of approximately 300 people, not including those living in the surrounding areas. The workshop was free of charge and any interested residents of Río Chico and surrounding areas were welcome to participate. The workshop involved several modalities, such as didactic oral presentations, audiovisual materials (e.g., PowerPoint with images, infographics, and text), small group discussions, interactive dialogue among presenters and participants, food tasting, and hands-on activities. Active learning approaches featured prominently throughout the workshop. The multi-sensory pedagogies used— observation, smell, taste, discussion, and opportunities for each participant to inoculate poplar logs for oyster mushrooms— actively engaged participants and connected to multiple ways of learning, knowing, and doing.

3.2.1. Workshop 1: Education – Day 1

Figure 1: Variety of fresh and dried mushrooms.

Prior to the start of the workshop, baskets with a variety of fresh and dried mushrooms were placed in the workshop room for participants to see/touch/smell.

A. **Introduction to From Science to Table (RN INNOVA):** The project leader delivered an oral presentation with PowerPoint (text and images) about the history of the project and introduced basic information about mushrooms (e.g., types of mushrooms, ways mushrooms are used).

B. **Interactive presentation on intercultural health**: Facilitated by the physician/director of a local research centre, Centro Etnosalud, this presentation included a didactic oral presentation about mushrooms and culture and included considerations such as family/community, identity,

environment and adaptations to the environment, and differing worldviews about food and nutrition, and about the use of mushrooms.

C. **Small group discussions on culture and mushrooms**: Building on the previous presentation, participants were invited to engage in small group discussions (~8-10 participants per group). Discussion topics included:

- participants' own culture and cultural identities;
- participants' family history with, and knowledge of, mushrooms;
- brainstorming the types of mushrooms participants already knew; and
- sources of knowledge about mushrooms in Argentina (e.g., Indigenous People's, Middle Eastern, European).

Following the small group discussions, key ideas were highlighted in a whole group debrief. These important ideas were also summarized on a whiteboard.

A. **Presentation about harvesting experiences**: The agricultural producer of the small company La Zeta de El Manso and an assistant drew connections to the From Science to Table initiative and orally shared about their own experiences growing and harvesting mushrooms. While the morning sessions were taking place, the chef was preparing mushroom empanadas in a kitchen adjoining the main room. Throughout the workshop session, participants could smell the empanadas that were being prepared.

B. **Interactive presentation on mushrooms and nutrition**: A physician and nutrition expert facilitated an interactive presentation about the nutritional value of mushrooms. This presentation included a PowerPoint presentation, with a number of multiple-choice questions to actively engage participants.

C. **Cooking demonstration and tasting:** During the presentation, the chef was also present in the main room with all the ingredients to prepare a rice and oyster mushroom dish. Following the presentation, the chef explained and demonstrated, step-by-step, each ingredient for the dish and how to prepare it. Participants were welcome to take a closer look at how the food was being prepared; many chose to take photos and videos during the cooking demonstration. At the conclusion of the cooking demonstration, workshop participants and facilitators shared lunch together of the delicious mushroom empanadas and the mushroom rice dish.

3.2.2. Workshop 1 - Day 1: The chef explained and prepared mushroom empanadas and a mushroom rice dish. Following the demonstration, workshop participants and facilitators shared this delicious meal together.

At the end of the first day of Workshop 1, two participants invited the workshop facilitators to come visit their farm. At their farm, they generously hosted representatives of INTA Jacobacci and Secretariat of Science and Technology (RN INNOVA), micro producers, representatives of the Nuevo Río Cooperative, and Centro Etnosalud, showed the area's farms, and provided a tour and explanation of agriculture and animal farming in the community.

Figure 2: Chef explaining the mushroom empanadas and a mushroom rice dish.

3.2.3. Workshop 1: Sowing - Day 2

A. **Demonstration and preparation of sowing supplies**: Workshop participants gathered outside for a demonstration of how to cut and prepare the poplar logs (i.e., how to select appropriate logs, the length of logs to cut, where to cut the log to create the "log cap" to place on top of the spores, etc.). Participants observed logs being prepared and cut by workshop facilitators. Throughout the demonstration, participants could ask questions and engage in dialogue with the facilitators. Enough logs were prepared for all the participants.

B. **Demonstration of sowing mushrooms**: Following the preparation of the logs outside, the logs were carried inside for a demonstration of how to sow the poplar log. The representative of La Zeta de El Manso invited volunteer participants to help complete each step of sowing a log. This included steps such as crushing up the seed parts, introducing the seeds into the log, putting the "log cap" on, hammering in the nail to secure the cap to the log, wrapping the seeded part of the log in Saran Wrap, placing the log in a plastic bag, and sealing the bag.

C. **Hands-on activity:** After watching the step-by-step demonstration, there was an opportunity for participants to prepare their own logs. Each participant had access to the supplies and worked independently on their own log. Facilitators circulated to answer questions and ensure the steps were followed correctly. After log preparation, facilitators reviewed instructions about when the sealed bag should be opened for watering and the timelines in which the log could be expected to produce mushrooms. Each participant left the workshop with a fertilized log.

Figure 3: Sowing of oyster mushrooms using logs.

3.2.4. Workshop 1 - Day 2: Under the guidance of the facilitators, workshop participants sow oyster mushrooms using logs.

In addition to the two-day workshop, facilitators also visited a local elementary school to deliver a modified version of the workshop to the students and staff. Approximately 100 students were present at the whole school assembly. The presentation involved the following elements:

A. **Demonstration of sowing mushrooms:** Two representatives of La Zeta de El Manso did a demonstration of how to prepare poplar logs for sowing oyster mushrooms. Several poplar logs were prepared, and student volunteers were asked to assist with sowing the logs.

B. **Interactive presentation on mushrooms and nutrition:** The nutrition expert did an oral presentation about nutrition and mushrooms. Key ideas were written on chart paper displayed on the wall.

C. **Mushroom tasting:** Workshop facilitators joined school students and staff for lunch. The lunch that was prepared was a rice dish that incorporated oyster mushrooms.

D. **Emergent opportunity - Radio interview:** Following the lunch, two students approached the nutrition expert and requested to interview him. Those students were involved in a local radio program and wished to share some of this mushroom knowledge with their community listeners.

4.0 Survey Findings

We conducted a survey immediately after Workshop 2 (a few months after Workshop 1) among participants at each of the four sites with varying response rates. The survey findings provide some brief information about how participants felt about the process of the workshops and about possible impacts according to their experience (see Table 3).

Table 3. *Survey Sample*

Site of Workshop 2 (2 days)	**# of participants**	**# of Survey respondents**	**Response rate**
San Jose	44	23	52.3%
ISETP	66	34	51.5%
Río Chico	49	13	26.5%
Río Manso	15	15	100%
Total	**173**	**85**	**49.1%**

In relation to general impressions of the workshops, almost half of the survey respondents (45.9%) indicated that they had liked them a lot, and 20.0% indicated they had liked them (see Table 4). More so, an even larger percentage agreed that they would suggest more mushroom workshops be held (88.2%) and expressed willingness to participate in similar types of workshops about other topics (87.1%). These numbers suggest a high level of satisfaction with the workshops and an interest in future capacity-building opportunities.

Table 4. *Workshops*

Question	**Liked it**	**Liked it a lot**	**No response**
What did you think of the workshop?	20.0	45.9	34.1
	No	Yes	No response
Would you suggest that we hold mushroom workshops in other places?	0	88.2	11.8
Would you participate in similar workshops about other topics?	2.4	87.1	10.6

When addressing knowledge, most participants mentioned having some existing knowledge about edible mushrooms before attending the workshop (70.6%), about the production of mushrooms (58.8%), and about mushrooms in the area (71.8%). The survey suggested that the workshops played a role in participants further increasing their knowledge about the nutritional and health benefits of mushrooms, with 54.1% responding that they had learned “a lot” about that topic at the workshop (see Table 5).

Table 5. *Knowledge*

Question	Nothing	Little	A lot	No response
Prior to attending the workshop				
How much did you know about edible mushrooms?	9.4	70.6	15.3	4.7
How much did you know about the production of edible mushrooms?	32.9	58.8	5.9	2.4
How much did you know about mushrooms in your area?	12.9	71.8	12.9	2.4
After attending the workshop				
How much did you learn about the nutrition and health benefits of mushrooms?	1.2	8.2	54.1	36.5

The major impact of the workshops was related to diet. Of those who participated in Workshop 1 (and who were surveyed at the end of Workshop 2), 84.2% identified that they had introduced mushrooms into their diet. In relation to growing mushrooms themselves, 20.7% of respondents stated that they had started doing so (see Table 6).

Table 6. *Impact*

Question: After the workshop	No	Yes	No response
Did you introduce mushrooms into your diet? *	15.8	A little: 60.5 A lot: 23.7	0
Did you start growing mushrooms?**	79.3	20.7	0

*Respondents who attended both workshops (n=38)

** Respondents who attended both workshops (n=29)

5.0 Narrative Perspectives

While the quantitative data speaks to many aspects of the workshops, the heart of the workshops were the stories, perspectives, and experiences of the workshop participants in the four sites. To capture some of these experiences, we conducted three interviews with participants who each engaged in both workshops, continued working with mushrooms in some way following the workshops, and who were each located at a different site where the workshops took place. We have condensed the three participant interviews into narrative "perspectives" to provide a summary description of three participants' experiences of the workshops and subsequent outcomes. The perspectives are not meant to be representative of all workshop participants. Rather, these provide a "snapshot" of the experiences of three

individuals who were interviewed. These perspectives were created by synthesizing information from the respective interview transcripts; interviewer questions/comments were removed, and verbatim participant responses were organized to create a narrative flow. Interview participants reviewed the perspective based on their interview and were given the opportunity to make any desired changes or clarifications.

5.1 Perspective 1: Community Leader and Member of the Cooperativa Agrícola Ganadera - Río Chico

I am from Río Chico. I belong to the Cooperativa Agrícola Ganadera Nuevo Río. Some time ago, I became interested in mushroom cultivation. I didn't know anything about that, but I started to get interested. The Río Chico workshops were held at the headquarters of Cooperative Nuevo Río and I participated. I really like the world of mushroom cultivation. Above all, the workshops got rid of the doubts I had. I started from scratch, without having much of an idea. The workshops were very good, with very professional people from every point of view, from the nutritionist, the chef who cooked, people who farmed, all the rest of the team. They captivated me!

From there, I began exploring what mushroom cultivation was like. Dabbling in cultivation in the same way that I make lettuce, I started with the oyster mushroom, since it's the fungus that one can manipulate with fewer risks. That was the first year, with a few inoculated logs that we brought from the workshop and others that people who had participated in the workshops left me with, because I had the space and the desire. That's how I started with six logs, two of ours, one of mine and one of my wife's, and the rest belonged to a woman from INTA who left them with me, and from other neighbours. The following year, I bought more at the laboratory (the laboratory of the Centro de Investigación Forestal y Andino Patagónico-CIEFAP). I learned more through the contacts I had made at the workshop. I asked around, and then I called the laboratory and bought the inoculated seeds to produce my own oyster mushrooms.

And this year, I have cultivated mushrooms not only for self-consumption and to give to friends, but also for selling. I realized that there is an interesting market in the Jacobacci area. I always thought of selling in the Andean zone, in Bolsón. But here in the southern region, we call the southern region the Río Negro steppe, which is a very large extension of

territory, within it is Ingeniero Jacobacci, a town of more than 1,200 inhabitants, which has turned out to be a great success. I have good clients who request mushrooms. The truth is that what I had was not enough! I sold fresh and dried mushrooms. This year I am going to inoculate again. I want to have 500 logs in production, always in poplar logs, for two reasons: economically it's good because it sells. There aren't many fresh oyster mushrooms in Jacobacci, so mine are selling well. Also, because other people are going to start selling so there will be competition. We'll see what happens. In that respect, it's very good.

Another very interesting part of this activity is the investment by the government of the province of Río Negro that enables rural people, in this case me, but also others in Río Chico, to do this kind of thing. First, learning about activities that for cultural reasons are not common to us. Also to diversify production, and through this more people can start producing these types of things. And this also has to do with our rural roots.

But there is also another aspect that I discovered with this process, which is the connection that occurs throughout the process. From the moment you start watering, and the oyster mushrooms begin to appear, at that moment you forget that the world exists, that problems exist. That aspect is also very good, and I think it's as interesting or more interesting than the other part. Not only discovering this new world, but it's also a highly recommendable activity. This activity makes you connect with other parts of yourself and makes you feel very good.

5.2 Perspective 2: Teacher at Agrotechnical Secondary School - Río Manso

The mushroom workshops were something innovative for the region because people are not used to eating mushrooms. Even though it's an area that has ideal conditions for mushroom growth, as they are seen in the wild and we even have an explosion of mushrooms in autumn and spring, people are not in the habit of consuming them. In this area, mushrooms were not considered part of the diet. The workshops, which were held in the Agrotechnical School building, allowed the children and the community to begin to look at mushrooms as food. They were able to try them in a simple way, cooking them sautéed with oil on the grill, and they were all surprised.

They couldn't believe it and the people, who are very carnivorous, said “this is like a steak… it's like meat.” They were all fascinated! So, the change in diet was a positive result.

Also, during the workshops, fungal inoculation was an important part of the training in which students and people from the community participated. There were some inoculated logs left for demonstration at the school. However, we do not have ongoing production because we do not have the staff to support production. We just continue doing it for educational purposes. Surely whoever wants to do it as a venture is going to have to invest, for example, in a sprinkler system and in something to have better shade conditions when they require it.

The workshops were not only about oyster mushroom production but also about the consumption of edible wild mushrooms. The workshops allowed us to develop a different view. Although all changes take time, in just two years we can see that there are many people who now recognize oyster mushrooms, especially in their wild form, and are beginning to eat them.

At our site, school students (aged 15 and 16) and interested community members participated in the workshops. Promotion among the general public was done through social networks. The workshops were comprehensive. In addition to the nutritional importance of mushrooms, the medicinal importance was also explained. Then there was the practical, hands-on part. For rural people, talking about inoculation is like thinking of a vaccine. But when you see a log and make a cut with a chainsaw and inoculate the seeds in the log, the inoculation that may seem mysterious becomes understandable. It’s important to have done the practical part. I think that was key. There was the bonus that the workshops had the gastronomic part! A chef spoke and the tasting was done with preparations of dishes known by everyone because they were everyday dishes, but with the incorporation of mushrooms in the dishes. So, for me the workshops were excellent; they covered all aspects that can be covered.

The workshops were not solely a training that passed or simply a topic that remains for the school. Our family and other people in the community continue to keep these workshops in mind. A fundamental change in our

family was that we incorporated the oyster mushroom in our diet, and several other families that we know also have incorporated it. Another thing we saw is that after the doctor at the workshop talked about the medicinal part, my father-in-law and other people who have had cancer incorporated the consumption of Turkey Tail (a type of mushroom). My great-grandmother, who has a health problem, is also incorporating mushrooms as part of her routine. They are thinking of mushrooms in a different way.

5.3 Perspective 3: Gastronomy Teacher at a Tertiary Technical School—ISETP Bariloche

The mushroom workshops were a very positive experience. We are at the Higher Institute of Professional Technical Education of Bariloche. It's a tertiary institute (school) and among the different professions that we train, we train professionals in gastronomy. There are students of all ages, from 18 years of age to over 50 years. We have been working with micro-gastronomy for several years. In 2018, we started the "flavours laboratory" to carry out research and teaching. In the haute cuisine course that I teach, we started with the research part and in the laboratory, we began to develop the preservation part, but going outside of traditional foods.

The most important thing for me about the mushroom workshops was the possibility of gaining new knowledge. Because we in gastronomy, and especially the young people who are just starting out, when it comes to mushrooms, we only think of portobello mushrooms, dried pine, nothing else. The idea is to be able to bring hundreds of varieties of mushrooms, and to bring people who come to the school to give talks and show us and teach us. And the truth is that the most enriching part for us is being able to share these teachings we have received with other people. That is essential so that it does not get cut off and that the teaching continues. Now, without further workshops, we are going to do things in ways that we can with our format, with what we have received and have been able to develop these years. We will explore more at the school. If the workshops could be resumed tomorrow, it would be great, because they are something that does not exist here. They were an arrowhead. Although it's a pity that they are not continuing, we are at least going to do our bit, adding to the future

generations of students at the school by sharing with them what we learned, so that they can also become more aware of fungi.

After the workshops, we moved forward exploring what mushroom pickles and dehydrated mushrooms are like. Together with the students, we went more in-depth and began to throw around ideas to be able to make some new preserves. We started playing with the theoretical part at the beginning and going to the field doing a little bit of research. We started developing mushroom jams. We made some very good jelly. We made oil. We made mushroom syrup. Also, we dehydrated mushrooms to later activate more mushroom creations. We made compote. We made ice cream! We gave these creations to the local people to try. Many said they loved the taste. Many people at first preferred not to try, but after they had tried them, they loved them.

We began to develop foods and wrote everything we could. We have created recipes that are in PDF and that we share with interested people. Consequently, we began to generate more connections with the community in terms of preserves. We held an event at the school where we were able to develop many of these recipes for the public and have tastings. The star of the tasting was one of the desserts, a kind of pudding that we made with mushroom jam. The truth is that being able to have the laboratory and do experiments with mushrooms was something very nice and enriching for everyone.

6.0 Perspective Themes

The interviews supported and supplemented data collected in the surveys. We applied a thematic analysis of the transcripts to identify cross-cutting experiences, descriptions, and ideas among the three workshop participants (Kiger & Varpio, 2020). The three primary themes are described below: (1) Experience of the Workshop, (2) Exposure to New Ideas, and (3) Extension and Impacts.

6.1 Experience of the Workshops

The three workshop participants who were interviewed all expressed a positive experience of the workshop. One specific strength of the workshops was the incorporation of expertise from differently positioned professionals (Perspectives 1 & 2); interview participants described that this multi-disciplinary approach made the workshops feel “comprehensive” (Perspective 2) in that multiple meaningful topics related to mushrooms were addressed. This multi-sectoral approach also seems to have facilitated a broad appeal in which individual participants connected with

workshop content that was specifically relevant to their interests, such as small business opportunities for mushroom production (Perspective 1), incorporating edible mushrooms into one's diet (Perspective 2), and gastronomy (Perspective 3).

A second strength of the workshop that was highlighted was the value of integrating different forms of experiential learning into workshop delivery. The hands-on opportunity for workshop participants to sow their own mushrooms into logs was highlighted as an important workshop feature (Perspective 2), as was participants' ability to each take home their inoculated log (Perspective 1). The involvement of a chef to explore gastronomical possibilities was also a meaningful feature described in Perspectives 1 & 2; while Perspective 3 did not mention the chef directly, the application of "new knowledge" from the workshop related to recipes, including mushrooms, featured very prominently in his reflection about the workshop experience.

6.2 Exposure to New Ideas

A second category that the three interview participants discussed was the value of exposure to new ideas, ways of knowing, and ways of doing through the workshops. As described in Perspective 2, "the workshops allowed us to develop a different view"—in that case, specifically around the students' perceptions of mushrooms as a food source that can be integrated into the diet. Perspective 1 described that learning more through these workshops alleviated the participant's doubts around the feasibility of mushroom cultivation, and Perspective 3 emphasized that "the possibility of gaining new knowledge" about mushrooms through these workshops was "the most important thing." Circling back to the strength of the broad content addressed in the workshop design, each of the three interview participants highlighted specific new ideas that were uniquely relevant to their particular interests: logistics of inoculation and scaling up mushroom production (Perspective 1), integration of mushrooms into the diet and nutritional implications (Perspective 2), and broadening the scope of available mushrooms and creative culinary possibilities (Perspective 3).

6.3 Extension of Workshop Content

A third theme that emerged was the ways in which the implications and applications of the workshops extended beyond the specific participants who attended. While the three interview participants were selected due to their ongoing engagement with mushrooms following the workshops, the interviews brought to light the broader impacts of the workshops on their respective networks and communities. In Perspective 1, as the participant continues to explore scaling up mushroom production, he identified multiple burgeoning collaborations and relationships with governmental and non-governmental contacts and with clients in a range of geographic locations. As the teacher described in Perspective 2, "the workshops were not solely a training that passed or simply a topic that remains for the school. Our family and other people in the community continue to keep these workshops in mind." In particular, the teacher described that workshop participants, their families, and community members have explored integrating mushrooms into their diet for both nutritional and medicinal reasons addressed in the workshops: "they are thinking of mushrooms in a different way" (Perspective 2). And the significant extension and innovation of workshop content described in Perspective 3 was the most prominent feature in this teacher's interview. Referencing the many ways in

which student workshop participants have applied workshop content to create and disseminate their own unique mushroom recipes, he described, "the truth is that the most enriching part for us is being able to share these teachings we have received with other people" (Perspective 3). In all three Perspectives, the knowledge, skills, and experiences gained through participation in the workshops were a springboard for the ongoing extension and application of workshop content—for the participants themselves and for their networks and communities.

7.0 Discussion

We characterized the Patagonian Mycoculture community-based educational workshops as being multi-sectoral, given that their planning and implementation involved ten governmental and non-governmental entities of different levels and scope. It was precisely the partnership among a variety of sectors with complementary roles, which included the provision of funding, technical expertise, logistical support, educational expertise, and community engagement capacity, that seemingly led to the success of the initiative. In fact, these types of inter-institutional collaborations have shown to be fruitful in other forays of mycocultural promotion, including safely and sustainably harvesting naturally grown mushrooms, and promoting mycotourism trails (Barroetaveña & Pildain, 2022). What was particularly novel in the Patagonian Mycoculture series of community-based capacity building workshops was its emphasis on nutrition, and on controlled sowing and production of oyster mushrooms at the local level.

We also characterized the workshops as being multi-sensory inasmuch that they included visual, auditory, kinesthetic-tactile, olfactory and gustatory components. This is in line with what other authors have defined as multi-sensory teaching, an inclusive approach that incorporates multiple modalities, or senses, in the learning process (Morin, n.d.; Ministry of Education | Te Tāhuhu o te Mātauranga, n.d.). As grasped from participant surveys and interviews, the multi-sensory pedagogical approach was not only well-received but highlighted by workshop participants as a strength.

Other studies have explored the harvesting of mushrooms that grow in the wild in Argentinian Patagonia (Toledo et al., 2016b; Molares et al., 2020). A study that explored mycological knowledge within Mapuche/Tehuelche communities in Patagonia found that collected/harvested mushrooms were periodically sold to contribute towards family income (Molares et al., 2020). While not ignoring the importance of seasonal wild edible fungi, the emphasis of the Patagonia Mycoculture workshop series was on the cultivation of mushrooms. The reason being that the appearance of wild edible mushrooms is limited to a couple of months in spring and autumn and is driven by precise environmental conditions. Thus, their availability can be unreliable, being one of the factors why the use of mushrooms as food remains quite marginal. The possibility of growing and producing edible mushrooms on a more reliable basis for household use and/or for commercial purposes increases the potential of edible mushrooms becoming a more common and relatively inexpensive food source. The Patagonia Mycoculture workshops were a strong addition to the valuable work already being done related to the harvesting of wild mushrooms. Future directions would include continuing to explore cultivation options and, as described by Barroetaveña and Pildain to "diversify the supply of food products and improve nutrition in vulnerable rural/peri-urban populations by incorporating mushroom cultivation in the family or community gardens" (Barroetaveña & Pildain, 2022, p. 8)

Our study provided evidence of strong support among workshop participants from the four sites for capacity-building opportunities related to nutrition and small-scale agricultural production. Specifically in relation to mushrooms, in line with what Molares and colleagues (2020) have suggested, future directions that workshops may take could be related to the "appropriation of technological developments (understood as cultural innovations, i.e., drying techniques and packing) arising from the interactions with urban cultures and with the scientific-technological sector solved practical problems such as preservation and delivery to market" (Molares et al., 2020, p. 20). We agree with what Barroetaveña and Pildain have stated, that "it is necessary to continue with training programs for young people, adults, and for technical staff in different public sectors, rescuing the importance of non-formal education and popular knowledge" (Barroetaveña & Pildain, 2022, p. 8). An important tension in knowledge translation and exchange initiatives is between top-down approaches overtaking traditional knowledge perspectives. To some extent the mycoculture capacity-building workshops, despite being multi-sectoral, had an element of top-down knowledge translation and exchange. There was nonetheless a strong effort to counterbalance this with the workshops being jointly organized with community-based organizations. Current evidence shows that balanced approaches (combining top-down and bottom-up strategies) are more effective in fostering a culture of innovation and entrepreneurship (Boni et al., 2018; Maldonado-Mariscal, 2023). Nonetheless, as shown in the findings, the sustainability of this type of initiative is challenging.

The Patagonia Mycoculture workshop series has shown to be a strong proof of concept of the importance of multi-sectoral and multi-sensory approaches to capacity building related to nutrition and small-scale production of edible mushrooms, particularly for impoverished rural and urban areas, that can well be replicated in the Patagonian context as well as other regions.

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