

FROM THE KITCHEN TO THE BIOFACTORY:
The women who transform the Mexican countryside

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INTRODUCTION

The agroecological transition currently underway in various regions of Mexico represents one of the most significant transformations of the Mexican countryside in decades. Beyond the shift in agricultural practices, it entails a new way of understanding the relationship between people, food production, and nature. In the face of the environmental, economic, and social limitations of the conventional agricultural model, agroecology proposes reviving peasant knowledge, strengthening community organization, and promoting more resilient, healthy, and sustainable production systems.

Rural women play an increasingly important role in this process. Their participation in the production of bio-inputs, the management of vegetable gardens, and seed conservation demonstrates that the agroecological transition does not depend solely on technical innovations, but also on communities' capacity to generate collective knowledge, strengthen cooperation, and rebuild the social fabric.

The work developed by the Asociación Nacional de Empresas Comercializadoras de Productores del Campo, A.C. (ANEC) over more than three decades provides a unique vantage point from which to observe this process. Although the organization was founded with the purpose of strengthening the marketing of grains produced by small and medium-sized farmers, over the years it has expanded its work to include sustainable production, technical training, and the development of alternative agricultural models. Throughout this journey, women's roles have evolved from being limited to administrative or support functions to becoming fundamental actors in all aspects of innovation, organization, and leadership.

This article analyzes the contribution of rural women to the agroecological transition in Mexico, drawing on ANEC's experience and observations made at Agroecological Field Schools (Escuelas de Campo Agroecológicas, or ECAs) and Rural Learning Communities (Comunidades de Aprendizaje Campesinos, or CACs) established by two federal programs in various regions of the country. It argues that women's participation not only

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strengthens sustainable agricultural production but also drives new forms of community organization, the revival of ancestral knowledge, and the development of alternatives in the face of the environmental and food crises.

BACKGROUND

Mexico served as a testing ground where the Centro Internacional de Mejoramiento de Maíz y Trigo (International Maize and Wheat Improvement Center, CIMMYT), together with scientists from many countries, shaped the agricultural production model known as the Green Revolution. This was a radical agricultural transformation carried out between 1950 and 1970, based on high-yield seeds, irrigation, and chemically synthesized fertilizers and pesticides. Its stated goal was to eradicate hunger, and although it prevented mass famines, it came at a huge cost. It enabled a handful of international companies to monopolize every aspect of agricultural production by forming alliances with governments, universities, and other institutions involved in the agricultural economy.

Mexico served not only as a training ground, but also as a living example of the Green Revolution, in which the Ministry of Agriculture and Water Resources (SARH) and the National Rural Credit Bank (BANRURAL) supported a business model that is extremely dependent on external, often imported, inputs and agricultural machinery designed to make the work faster and more efficient. This technology continues to advance around the world, even as food-related health issues increase and many farmers' livelihoods have become much more precarious.

In recent years, agroecology has emerged as a singular alternative to the Green Revolution, one grounded in human health and flourishing rural communities. In Mexico, this transformation began with community and Indigenous initiatives, where some farmers, civil society organizations, and producer groups opted for sustainable farming methods. Predominantly Indigenous communities — which historically avoided agrochemicals and today use them only minimally — played a key role in that process.

In 2010, two of ANEC's member organizations began to use vermicomposting to produce humus and leachates to improve soils. Initially, this began as an economic alternative and a smallholder business initiative, without the term "agroecology" being formally used. It was not until 2013, in the wake of a profitability crisis in corn production, that many farmers actively sought alternatives to improve yields. This triggered a shift in mindset toward environmental sustainability that, although motivated by cost reduction, ignited a spirit of change, a quest for knowledge, and a definitive foray into agroecology.

The definitive turning point occurred in 2019, under the administration of President Andrés Manuel López Obrador, with the launch of two major public initiatives. The Ministry of Agriculture and Rural Development (SADER) implemented its Technical Support Strategy as part of the Production for Well-being initiative, organizing producers into the Agro-ecological Field Schools (ECAs). At the same time, the Ministry of Welfare launched the *Sembrando Vida* (Sowing Life) program, organizing farmers into Rural Learning Communities (CACs) for sustainable agroforestry management, the latter backed by a substantial budget.

Both programs marked the government's first action to expand the practice of agroecology in Mexico. They also represented the first official opportunity for rural women to fully, spontaneously, and efficiently demonstrate their skills, abilities, and talents, breaking free from the limitations imposed by the traditional patriarchal system. Today, 25% of the ECAs and 35% of the CACs are led by women.

THE WOMEN FARMERS OF ANEC

Since 2019, some of ANEC's technical staff have been directly involved in the creation and training of several ECAs in various regions. During this time, ANEC's leadership has made direct contributions to some ECAs, and in other cases we participated in national events where representatives of ECAs, together with technical advisors, presented their achievements. These presentations were given by both women and men producers. However, we gained the greatest and most positive insight when we visited their facilities and their bio-inputs production sites as part of a series of formal meetings

carried out under a collaborative agreement signed with SADER in April 2024. This article draws from those meetings.

We visited 80 ECAs and inspected 80 Bio-Inputs Production Sites (EPBs) in 16 states across four regions:

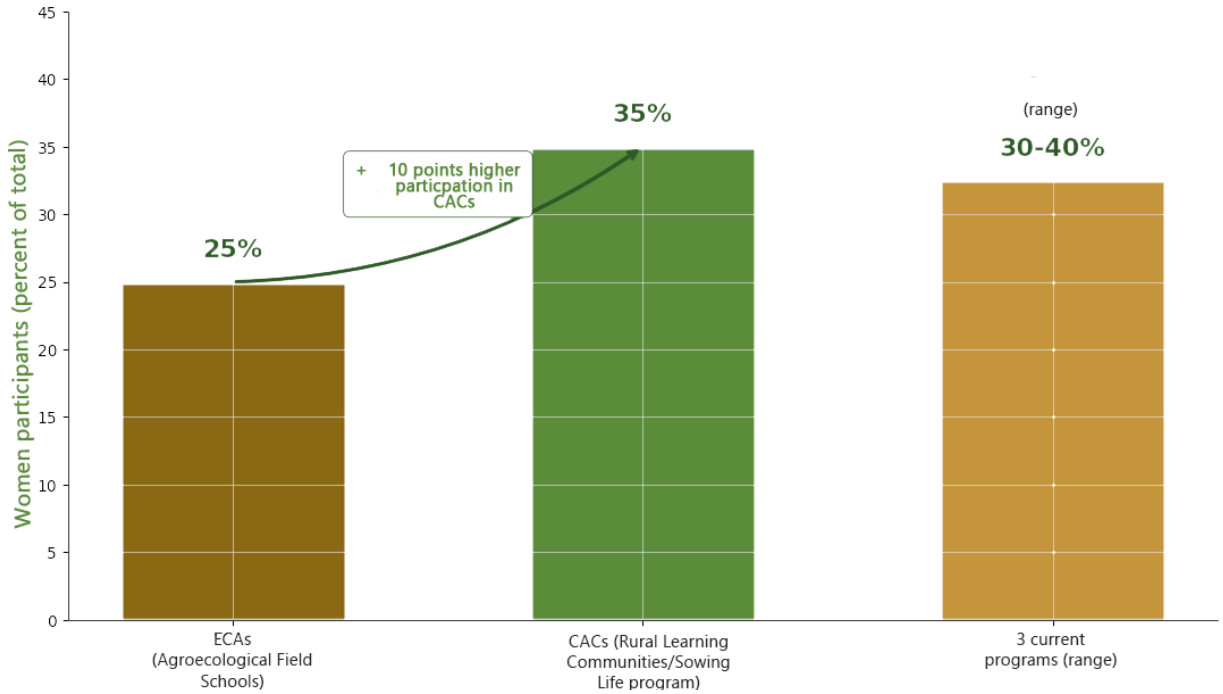
- West: Colima, Guanajuato, Jalisco, Michoacán
- Central: Morelos, State of Mexico, Hidalgo, Puebla
- South: Chiapas, Veracruz, Oaxaca, Guerrero
- North: Tamaulipas, Zacatecas, Chihuahua, Durango, San Luis Potosí

This highly varied mosaic encompasses significant differences in criteria, traditions, customs, patterns, and forms — differences between regions, differences between states, and even differences within a single state. For example, in the state of Guerrero, the way people reach agreements in the high mountain region differs from that on the Costa Chica.

During visits to the ECAs, we observed notable regional differences both in women's presence and their engagement in the ECAs: 40% of the ECA members in the south, southeast, and center of the country were women, compared to 25% in the north. In Oaxaca, the Fortín Alto ECA stood out as a distinctive case, as it is composed primarily of Indigenous women who also involve their daughters through the "Youth Building the Future" program. Their participation manifested itself in different ways depending on the context: in the south and southeast, women were more reserved with outside visitors, and in some schools, they deferred to male leadership when domestic responsibilities prevented them from participating; whereas in the north, they were perceived as more spontaneous and proactive, frequently asking to speak.

In all of the ECAs, hospitality, pride, and satisfaction with teamwork stood out, along with a capacity for practical innovation demonstrated through simple inventions and technological improvements developed by the women themselves. A dynamic of intergenerational respect was also identified, in which older women exercised a moral authority that even

Figure 1: Female participation in government programs



Source: SADER (Secretariat of Agriculture & Rural Development and Secretariat of Welfare of Mexico, 2019-2025)

the men recognized. **Of the 80 ECAs visited, 27 were led by women (33.8%)**, and in all of them, the participants took advantage of the opportunity to voice the problems that weighed on them. When asked if they would continue with the agroecological transition without a program or technical support, the answer was affirmative in all cases, which is considered evidence of a conviction that transcends institutional dependence.

We found that the greatest productive contribution is concentrated in vegetable cultivation and the establishment of milpas, a practice inherited from the ancestral tradition of backyard gardens; participation in the organization of festivities also stood out.

The government programs promoting the agroecological transition document female participation ranging **from 30% to 40%** (Figure 1), with one notable difference: the CACs under Sembrando Vida reach **35%**, while the ECAs under the Technical Support Strategy stand at **25%.** The reasons for these differences merit further in-depth research.

THE HOME KITCHEN AND THE COLLECTIVE BIO-FACTORY

The kitchen, a central space within the home, still plays an important role today as a place for connection and interaction where women can socialize and share knowledge. What happens among women working together in the kitchen doesn't happen only there; it's also taking place in the bio-factories or Bio-Input Production Spaces created as part of the ECAs and CACs.

A bio-factory is a kitchen of sorts — except that in this one, inputs are prepared for use on one's own plots and for sale. Composts, broths, and amino acid formulas are made; leachates are combined with micronutrients; specific beneficial microorganisms are cultivated; and rock flours and plant extracts are used. They don't make enchiladas, but they do produce seed inoculants; they don't prepare delicious lemonade, but they do make "glass water" to combat pests, and so on.

But also, just like in a home kitchen, session participants in bio-factories engage in feedback, reflection, recollection, review, confirmation, organization, planning, agreement, and follow-up. Increasingly, these sessions become a means of preserving cultural and gender identities, as well as challenging and transcending preexisting stereotypes of machismo. The women who participate in the bio-factories speak not only for themselves, but also for their communities and for those who seek to understand and value their experiences in sustainable agriculture.

Just as women pass down their knowledge about making tostadas, they are also sharing the method for making "supermagro" or "bocashi" with their families and communities. They are reclaiming the role that history and patriarchy once took away from them.

Regarding the knowledge and relationships that are woven together among women in the bio-factories, it is evident that there is collaboration both among them and among families, joining forces to produce inputs. This collective effort could ensure not only economic subsistence but also preserve the social fabric and the survival of the community as a value. Collective memory can become a powerful tool for weaving a network of stories that inspire, mobilize, and shape meaningful social change in favor of agroecology.

OBSERVATIONS ON THE IMPACT OF WOMEN'S PARTICIPATION ON AGROECOLOGICAL PROGRAMS

ANEC has observed a rich tapestry of interactions and impacts within the groups with which we have interacted at various times between 2019 and 2024. This is not to say these interactions are always perfect. There can be disputes over leadership, especially when the desire to impose a single voice fractures the community organization and the group's unity. But the achievements are still astonishing.

Diversity of roles and experiences

In cases where there are several tasks to be done, the women organize themselves and choose the activities they will carry out; for example: one group decides to leach, another group decides to package, and another group decides to prepare lime-sulfur broth. To do so they must make various

preparations, while the general coordinator takes on the task of doing the accounting, recording activities or measurements, or taking notes on something that happened.

And the next day, the division of labor could look different. The same is true on an individual level: when it comes to planting, women will often plant different crops, and once the crops are ready they share, exchange, and supplement each other's rations.

Each person decides what role she will play, whether entrepreneurial leader or one who executes the tasks. There will be times when this role changes: the followers take the lead, and vice versa. The age range is also very diverse, from young girls, 14 or 15 years old, to 60 or older; we have found groups where women from many generations — great-granddaughters, granddaughters, daughters, and grandmothers — all participate.

Cohesion and collective identity

One of the effects generated by women's interaction within the groups is that they become more united, more committed, and more engaged — and this ultimately results in a strong, cohesive group. They stand up for and protect one another, help each other, and demonstrate solidarity that can extend beyond the group, fostering relationships between families outside the group setting. The various activities carried out in the groups foster the development of bonds that go beyond a sense of duty that ultimately establish human connections which, in turn, translate into friendship, camaraderie, solidarity, and mutual aid.

For example, at demonstration events or group activities, it is generally the women who staff the booth and explain the items on display or products for sale. Through their voices, attitudes, and ability to persuade or negotiate with listeners, they project and express a specific image of the group. Without actually wearing uniforms, they give the group a collective identity.

Updating and standardizing information

The women constantly update the information shared and discussed in group meetings or sessions, as well as in meetings outside the group — even when not in front of the entire group but rather with subgroups. Discussing the information provided in group meetings involves subjecting it to a feedback process to improve, understand, learn, and apply it.

Courage and boldness

In our observations of ECAs and EPBs across the country, we saw that it is more common to see a woman raise her hand to say, "I didn't understand that; could you repeat it, please?" Generally, men don't tend to voice questions unless there is already a high level of trust among their peers. This happens frequently in groups where the age range is more homogeneous, creating a more level playing field for women to take risks and ask questions, or participate by presenting a topic.

The height of courage is when they notice that one of their peers has acted inappropriately. It is often women who clearly call it out and do not back down, driven by a desire to uphold honesty. And it's not just one woman who does this; one of them may raise the issue, but several others support her and speak up with the same clarity and truthfulness, acting as a united group and working collectively to ensure that every member is mindful of their words and actions.

Solidarity and cooperation

There are two activities carried out in most agroecological groups that are primarily maintained and safeguarded by women. When someone is unable to work or contribute, plans are made for everyone to help that person until they are on the same level as the others, with the goal of maintaining equity or equality. The same applies when it comes to the group functioning as a cooperative: if someone is unable to contribute their share (time, labor, money, or materials), the groups will decide collectively how to make up for what that person was unable to contribute, with each person contributing an equal share. And, generally speaking, it is the women who ensure that everyone contributes equally to guarantee that the benefits of everyone's labor are distributed equally among all members, so that no one feels undervalued simply because they were unable to contribute at some point. That said, this does not happen in every group; it occurs more frequently in some than in others.

These actions have several beneficial effects on the group:

1. The group's size is maintained.
2. It maintains the spirit of cooperation.
3. It sometimes encourages the recruitment and admission of more volunteers (members).
4. Trust and attachment to the group are maintained or strengthened.

Innovation and entrepreneurship

Many women in these communities serve as observers during operations and notice when something isn't working; they then take the initiative to propose changes. That change is often an innovation or an improvement, and they apply this not only to the production of bio-inputs but also when engaging in dialogue or interacting in organizational matters or planning, or when maintaining the demonstration plot. In some cases, innovation is a constant and entrepreneurship a daily habit.

At the same time, there are also ECAs that depend too heavily on the technical advisor's judgment, and this can restrict and limit creativity, and with it, innovation; as a result, entrepreneurship remains stifled. Conversely, there are groups that do not need the technical advisor's approval and constantly move forward, creating, innovating, and taking initiative. And in these groups, it is often women who lead the way.

Coexistence and unity

All of the meetings held by agroecological groups — whether for work, review and planning (organization), or training — foster various expressions of camaraderie among members. This has very beneficial effects on morale, internal trust, fellowship, solidarity, and attachment — that is, unity. It is very common for a meeting to include food, which, at a certain time, is shared among everyone; this creates stronger bonds among members, and these bonds help form a stronger network.

This network of shared commitment is what makes it possible to reach agreements, make equal contributions, work with dedication, and "get things done" with enthusiasm and optimism — all of which generates and sustains a sense of community, contributing to the creation and maintenance of vibrant communities. It is often women who foster this sense of fellowship with a natural and genuine attitude toward building and sustaining the community.

Sacrifice and effort

In many cases, the women who are members of these agroecological groups do so on top of their work to keep their homes functional and healthy. They give their time, physical effort, creativity, commitment, and solidarity — the very same elements they use in their own homes.

IMPORTANCE OF WOMEN'S PARTICIPATION IN MEXICO'S AGROECOLOGICAL TRANSITIONS

Women's participation in agroecological transition processes in Mexico is about much more than technical change in the fields; it signifies the revival of ancestral knowledge and a profound transformation of the country's production model toward sustainability, food sovereignty, and gender justice. This process is not limited to replacing chemical inputs with organic alternatives but drives a social and political reconfiguration in rural Mexico. The impact of this transformation is strongly evident in the preservation of biodiversity, technical leadership, community empowerment, and the active defense of territories.

Mexican women have historically been the guardians of biodiversity and food sovereignty, preserving heirloom seed banks in their backyards and family gardens to stem the advance of industrial monocultures. Their leadership is grounded in extensive knowledge of crop rotation, traditional polycultures such as the *milpa*, medicinal plants, and soil health — knowledge that forms the theoretical and practical foundation of agroecology. Likewise, in public programs and cooperatives, women have taken on a leading role in technological innovation through the production of bio-inputs, spearheading community bio-factories and nurseries where they develop alternatives to synthetic fertilizers. By eliminating highly toxic pesticides, women farmers directly protect the health of their families, their communities, and end consumers.

From a feminist perspective, agroecology acts as a catalyst for empowerment. By mastering farming techniques and coordinating training spaces such as the Field Schools and Rural Learning Communities, women transition from the domestic sphere to local assemblies, breaking away from patriarchal structures that have historically relegated them to the role of assistants. As they establish themselves as political and productive actors with a voice and a vote, they rebuild the social fabric through networks of women producers, alternative markets, and cooperatives that foster a solidarity-based economy, improving both family incomes and the nutrition of their communities. This connection to the land also translates into a staunch defense of the territory against extractivism and megaprojects, transforming the sustainable stewardship of natural resources into a collective strategy of resistance against dispossession.

However, for this transition to be complete, it is essential to resolve structural contradictions that still limit rural women. A critical challenge is the lack of legal certainty regarding land tenure, as most ejido and communal land titles remain in the hands of men, which restricts women's access to government support, financial credit, and formal decision-making within agricultural communities. Similarly, because the agroecological transition requires constant physical and organizational work, it is a priority to promote shared responsibility for household and caregiving tasks, ensuring that environmental activism does not result in a triple workday that overburdens and exhausts women farmers.

In this context, the creation of the Field Schools and Rural Learning Communities emerges as a historic opportunity to reverse structural inequalities in the Mexican countryside. Strengthening these spaces allows us to restore centrality to those who, for millennia, have been the expert farmers, healers, and providers who sustained the development of our societies. In the face of the climate crisis, malnutrition, and poverty, the collective strength and knowledge of rural women constitute the most effective antidote. The duty of the rest of society and of institutions is not to grant concessions or permission, but to take on an active responsibility: to break down the barriers that prevent their full development, to guarantee respect for their rights, to join their efforts, and to collaborate on an equal footing in the urgent task of healing the land, recovering local seeds, and cultivating shared hope.