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# Participatory Action Research in Agriculture: An Introduction[1]

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## Abstract

Participatory action research (PAR) offers a transformative approach to agricultural research by integrating the lived experiences and knowledge of farmers and community stakeholders into every phase of the research process (Baum et al., 2006). Distinct from traditional research methodologies, PAR emphasizes collaboration, mutual learning, and context-specific solutions. This is the first article in a six-part PAR series that introduces a phased framework for implementing PAR in agricultural settings, including stages of problem identification, co-design, implementation, observation, reflection, and iteration. Emphasizing the importance of empowerment, reflexivity, and the democratization of knowledge, this publication outlines how Extension professionals can integrate PAR into their work to foster innovation and resilience in farming communities. Tools, principles, and real-world applications are provided to guide practitioners in effectively adopting and scaling PAR for sustainable agricultural development.

## Introduction

Participatory action research (PAR) is a collaborative research methodology grounded in the principles of inclusivity, shared knowledge production, and action-oriented inquiry (Chevalier & Buckles, 2019). Developed as an alternative to top-down research paradigms, PAR positions community members — including farmers, agricultural workers, and Extension professionals — as co-researchers in a process that aims to address real-world problems through collective inquiry and experimentation (Cornish et al., 2023; Chevalier & Buckles, 2019).

Unlike conventional research, which often isolates scientific inquiry from its application, PAR seeks to produce knowledge that is immediately useful, context-sensitive, and co-owned by those most directly affected (Chevalier & Buckles, 2019). The methodology is rooted in democratic ideals and has been widely adopted in fields ranging from education and health to rural development and agriculture (Reason & Bradbury, 2008). In agricultural settings, where variability in environmental conditions, market forces, and labor dynamics is a constant challenge, PAR enables research that is adaptable and grounded in the day-to-day realities of farming (Aare et al., 2021; Snapp et al., 2019).

At its core, PAR combines systematic inquiry with practical action. It proceeds through iterative cycles of identifying problems, planning interventions, implementing actions, collecting data, reflecting on outcomes, and adapting strategies. This cyclical process not only generates empirical insights but also builds the capacities of participants to critically engage with and influence the systems around them (Elder & Odoyo, 2018; Frisby et al., 2005). As such, PAR is not simply a method for doing research; it is a framework for cultivating agency, trust, and long-term community resilience.

This publication draws on foundational literature in PAR and agricultural research to present a clear and accessible introduction for Extension professionals and agricultural practitioners. It outlines each phase of PAR — problem identification, planning, action, observation, reflection, and iteration — while emphasizing key principles such as participation, empowerment, and reflexivity. Through this structure, this publication aims to provide a practical and conceptual foundation for integrating PAR into agricultural Extension and community-based research efforts.

## Theoretical and Conceptual Foundation of PAR

Participatory action research is grounded in critical theory and emancipatory pedagogy. Scholars such as Paulo Freire (1970) and Orlando Fals Borda (Fals Borda et al., 1986) emphasized the role of education, reflection, and action in enabling marginalized communities to interrogate and transform the conditions of their lives. Unlike traditional research approaches that treat participants as subjects or informants, PAR positions them as co-researchers who are capable of contributing local knowledge and co-producing solutions. Developing human capacity through education and training constitutes a fundamental dimension of agricultural development. To strengthen such initiatives, educators should actively engage with and incorporate local and Indigenous knowledge systems. These systems

represent complex sociocultural constructs, encompassing distinct ontological and epistemological perspectives, worldviews, and cultural practices shaped by specific socio-ecological contexts. Meaningful engagement with local knowledge requires educators to critically reflect on power relations, positionality, and privilege; cultivate a nuanced understanding of both learners and themselves; adopt participatory pedagogical strategies; and remain receptive to multiple and emergent forms of knowledge (Roberts et al., 2023).

Central to PAR is the recognition that knowledge is socially constructed and often contested. By bringing varied voices into the research process, PAR challenges dominant narratives and redistributes power in knowledge production (Hall, 2005; Reason & Bradbury, 2008). This is especially critical in agricultural contexts where systemic inequalities — based on race, gender, social class, immigration status, and labor — have historically shaped whose knowledge is valued and whose concerns are addressed (London, Sze, & Strauss, 2013).

## Phases of PAR in Agricultural Practice

Participatory action research operates through a dynamic, iterative process rather than a linear progression (Reason & Bradbury, 2008). The methodology typically unfolds in a series of interconnected phases, each contributing to the co-production of knowledge and action. In agricultural settings, these phases must remain flexible to accommodate seasonal variability, local resource availability, and the evolving needs of stakeholders. Below, each phase is described with practical examples and supported by relevant literature.

### Phase 1: Problem Identification and Relationship Building

The first phase involves jointly identifying the issue or opportunity to be addressed. Unlike conventional research, where problems are often defined solely by academic researchers, PAR requires that local stakeholders — especially farmers and agricultural workers — play a central role in defining research priorities (Cornwall & Jewkes, 1995).

This process begins with trust building and open dialogue. Extension professionals must engage community members, including those historically marginalized or underrepresented, to ensure that the issue reflects lived experiences and shared priorities (Chambers, 1994; Franz et al., 2010). Participatory tools such as community mapping, focus groups, or semi-structured interviews can be used to reveal local concerns and values.

The strength of this phase lies in its ability to democratize the research agenda. As Cornish et al. (2023) emphasize, PAR aims to center the voices of those with firsthand experience of systemic challenges, setting the stage for co-learning and shared ownership throughout the research cycle.

### Phase 2: Co-Design and Planning

Once the problem is defined, the co-design phase involves jointly developing a research plan that includes goals, methods, timelines, and measures of success. This planning must reflect the capabilities and interests of all participants and be grounded in local realities (Chevalier & Buckles, 2019).

Researchers and community members collaboratively determine how knowledge will be generated. This includes selecting appropriate data collection tools, ranging from soil sampling and crop yield tracking to qualitative surveys or participatory mapping, and deciding how responsibilities will be shared. The plan should remain open to adjustments, recognizing that agricultural systems are subject to change due to climate, pests, or shifting market demands (Snapp et al., 2019). This phase also includes ethical considerations such as informed consent, shared decision-making authority, and clarity about how data and results will be used and disseminated (Herr & Anderson, 2005).

### Phase 3: Action and Implementation

In this phase, the agreed-upon strategies are implemented through collaborative effort. In agricultural contexts, this often involves on-farm experimentation, such as testing new crop varieties, pest control methods, or soil fertility techniques. These actions are designed to be context-specific, combining scientific rigor with local knowledge to ensure practical relevance (Aare et al., 2021; Kerr et al., 2007).

Farmers and other stakeholders are not passive recipients of interventions; they are active co-implementers. This shared action creates opportunities for hands-on learning, adaptation, and ownership of the process (Frisby et al., 2005). For example, in a UF/IFAS Extension initiative, tomato growers co-developed pest management strategies and adjusted them based on seasonal pest pressures and field observations, leading to high adoption rates and community-wide knowledge sharing (Leppla, 2007).

### Phase 4: Observation and Data Collection

Observation is integral to the action process and involves collecting both qualitative and quantitative data to evaluate progress. Community members are often trained to carry out monitoring activities, such as recording pest counts, measuring soil properties, or conducting visual assessments of plant health (Snapp et al., 2019).

This phase strengthens data literacy among participants and democratizes the scientific process. According to Reason and Bradbury (2008), observation in PAR involves both empirical tracking and reflective insight, enabling

communities to evaluate change not only through numbers but also through shared experience. Tools such as photo diaries, GPS mapping, participatory video, and drone imagery can enhance engagement and support transparent, multimodal documentation (Elder & Odoyo, 2018; Marzi, 2023).

### Phase 5: Reflection and Adaptation

After data collection, participants engage in structured reflection to evaluate what worked, what did not work, and why. This phase is a hallmark of PAR, ensuring that the research remains grounded in lived realities and is responsive to change (Greenwood & Levin, 2007; Schön, 1983). Participants often rely on practical knowledge that is largely unspoken or intuitive. In the midst of their work, they are sometimes able to pause and reflect on this intuition, using it to manage situations that are unpredictable, complex, or filled with tension. The practice of reflecting together in the midst of action has the potential to turn occasional instinctive responses into a consistent and deliberate element of professional practice (Schön, 1983).

Reflection sessions are facilitated to promote open dialogue, critical thinking, and mutual learning. These can take the form of group discussions, field walks, or workshops where findings are reviewed and interpreted collectively. Farmers and other stakeholders are encouraged to articulate their interpretations, draw conclusions, and propose adjustments for the next cycle. This phase also provides a space for addressing power dynamics, challenging assumptions, and identifying unintended consequences of the interventions (Baum et al., 2006).

### Phase 6: Iteration and Knowledge Sharing

PAR is inherently cyclical. Insights from the reflection phase inform subsequent planning, leading to new or refined interventions. This iterative process allows the research to evolve in response to changing environmental conditions, stakeholder feedback, and emerging knowledge (Kemmis et al., 2014; Reason & Bradbury, 2008).

Over time, this repetition strengthens community ownership, enhances skill development, and embeds resilience into the system. In agricultural projects, iteration often leads to the emergence of locally tailored best practices, which can then be shared with other farmers through peer-to-peer learning, field days, or farmer-led videos (Skinkis, 2019).

Additionally, iteration supports scale-up and adaptation of successful models to new contexts. As knowledge is transferred across geographies and stakeholder groups, the process remains participatory and grounded in local leadership.

## Core Principles of PAR

Participatory action research is defined not only by its cyclical methodology but also by its foundational principles. These values guide the conduct of PAR in agricultural and other applied settings, ensuring that the process remains ethical, inclusive, and action-oriented. Below are the key principles that underpin effective PAR.

- **Participation**: Active participation of those directly affected by the issue is the cornerstone of PAR. Community members such as farmers, farmworkers, and local Extension agents are involved throughout the entire process, from problem definition to data interpretation and dissemination. This ensures the research reflects local realities, enhances buy-in, and generates more practical and sustainable outcomes (Cornwall & Jewkes, 1995). Participation extends beyond token inclusion to genuine collaboration. It is built through sustained dialogue, shared leadership, and transparent decision making (Fals Borda, 1987). When participants help shape both the research questions and the methods, the resulting knowledge is more likely to be accepted, adopted, and shared.
- **Action-oriented inquiry**: Unlike traditional research that may prioritize theory building or publication, PAR is oriented toward real-world impact. Research is not an end in itself but a means to generate meaningful improvements in the systems being studied (Greenwood & Levin, 2007). In agricultural settings, this could mean enhancing soil fertility, increasing yields, reducing pesticide use, or improving labor conditions. Furthermore, PAR integrates inquiry with direct experimentation and application. For example, a collaborative soil fertility trial not only examines outcomes but also immediately informs farming decisions and resource allocation.
- **Reflexivity**: Critical self-reflection is integral to PAR for both researchers and participants. Reflexivity involves recognizing one's own biases, positionality, and influence on the process. This is particularly important in cross-cultural or community-university partnerships, where power imbalances may otherwise go unexamined (Baum et al., 2006; Elder & Odoyo, 2018). Reflexive practice ensures that the research remains adaptive and ethical. As Marzi (2023) notes, the process of reflection itself can be transformational, enabling participants to question existing assumptions and build more equitable research relationships.
- **Democratization of knowledge**: PAR challenges the notion that valid knowledge comes only from academic institutions. It values multiple forms of knowing, including cultural, experiential, and practice-based knowledge (Hall, 2005). In agriculture, this means that farmers' experiential insights are treated with the same respect as agronomic data or

scientific models. This principle ensures that research outcomes are not just theoretically sound but also socially and culturally grounded. By integrating local expertise, PAR produces knowledge that is more holistic and more likely to be accepted and used (Reason & Bradbury, 2008).

- **Empowerment**: One of the central goals of PAR is to build individual and collective agency. Participants gain new skills in communication, observation, analysis, and strategic planning. Over time, this capacity building enhances community resilience and the ability to organize around future challenges (Freire, 1970; Maguire, 2000). Empowerment is both a means and an end in PAR. When communities co-create knowledge and take part in evidence-based decision making, they become better equipped to challenge societal issues and pursue long-term sustainability.

These principles are essential for building relationships and trust and fostering collaborative innovation, especially in agricultural communities that may be historically underrepresented in academic research.

## Why Use PAR in Agriculture?

Agricultural systems are inherently complex and site-specific (Franz et al., 2010). Traditional research often attempts to control for variability, but farmers live with it every day (Pretty, 1995). By involving farmers in research, PAR allows for solutions that are grounded in the unique contexts of soil types, pest pressures, climate variability, and labor availability (Kerr et al., 2007). PAR also supports participation of various actors in the chain of agricultural production such as agricultural workers. This enhances community resilience, especially in the face of global challenges such as global warming, climate change, declining biodiversity, and increasing economic pressures.

In many PAR applications, on-farm trials become collaborative experiments that test new methods in real-world conditions (Snapp et al., 2019). For instance, farmers might work with Extension agents to co-develop experiments testing new pest control approaches or low-input soil fertility strategies. These experiments are designed, implemented, and evaluated together, ensuring that the methods are not only scientifically rigorous but also practical and relevant.

Furthermore, PAR enhances the adoption of innovations. Studies show that farmers who are involved in co-creating a practice are more likely to continue using it and promote it within their networks (Skinkis, 2019). This is because they understand the rationale behind the innovation, have tested the practice in their own fields, and have contributed to its refinement.

## Comparing PAR and Traditional Research Models

To fully appreciate the value of PAR in agriculture, it is helpful to compare it with traditional research paradigms. Conventional research tends to be researcher-led, with hypotheses tested in controlled settings. Results are often generalized and disseminated via academic publications or Extension bulletins. In contrast, PAR is collaborative, context-specific, and focused on application.

Traditional research is well suited to controlled experiments, variable isolation, and hypothesis testing. However, it often struggles to address the complex, place-based realities faced by farmers. PAR, by contrast, excels in contexts where adaptability, relevance, and stakeholder ownership are essential.

In agricultural Extension, this distinction matters greatly. Farmers are more likely to adopt practices they have helped co-design, particularly when the solutions are developed and tested under the real conditions they face daily (Skinkis, 2019; Snapp et al., 2019). Moreover, PAR fosters relationships and mutual respect, which are crucial for long-term impact and knowledge sharing across communities.

## Integrating PAR into Agricultural Extension

Agricultural Extension professionals are uniquely positioned to implement PAR due to their role as both technical advisors and community facilitators. Traditionally, Extension work involved disseminating scientifically validated information to farmers. In PAR, this role shifts toward co-production of knowledge, where Extension agents act as conveners and learners alongside farmers (Franz et al., 2010).

To embed PAR into Extension work, professionals must adopt practices that promote collaboration, trust, and shared leadership. This transition involves several key practices, which are listed below.

- **Stakeholder mapping and engagement**: Early in the process, it is critical to identify and engage a broad spectrum of voices, particularly underrepresented groups such as smallholders, migrant laborers, or Indigenous farmers. Participatory rural appraisal (PRA) tools are helpful in surfacing hidden knowledge and fostering inclusive dialogue (Chambers, 1994).
- **Co-design of research plans**: Working with community members to set priorities, design trials, and select indicators of success ensures relevance and ownership. Plans should be flexible, allowing for mid-course corrections based on seasonal, social, or ecological changes (Franz & Townson, 2008).

- **Collaborative data collection and analysis**: Farmers are trained to collect and interpret data using tools such as field logs, pest monitoring sheets, and participatory mapping. This builds technical capacity and reinforces their role as co-researchers.
- **Capacity building and reflective practice**: PAR includes frequent opportunities for reflection, allowing stakeholders to adapt interventions, reassess goals, and build personal and collective agency (Reason & Bradbury, 2008).

To support these practices, Extension teams may employ multimedia tools such as mobile apps for data collection, participatory video, or drone imagery for visualization of crop health and facilitation of collaborative interpretation (Marzi, 2023). Visual aids and checklists (e.g., a PAR Readiness Checklist) can also help teams prepare for the logistical and relational demands of the work.

## Supporting the Adoption of PAR in Practice

A concrete example of PAR in action comes from a UF/IFAS Extension project in Florida, where tomato growers were experiencing significant losses due to whitefly infestations. Rather than recommending top-down solutions, Extension specialists collaborated with the growers to co-develop field trials.

Through joint meetings, growers identified companion planting and reflective mulch as potential strategies. Extension agents supported with research on implementation protocols, while farmers contributed local insights about timing, planting densities, and monitoring methods. Participants helped collect data on pest incidence and crop health. Monthly reflection sessions were held to review results and adjust strategies. By season's end, farmers had adopted the most successful strategies and were actively sharing findings with neighboring farms.

This case illustrates how PAR promotes peer-to-peer learning, strengthens local networks, and accelerates the diffusion of innovations. Farmers not only implemented solutions — they became ambassadors for knowledge within their communities (Snapp et al., 2019; Skinkis, 2019).

## Challenges and Enablers

Despite its promise, implementing PAR in agriculture presents several challenges, such as the following.

- **Time and resource intensity**: PAR requires long-term engagement and often moves at a slower pace than traditional research due to its iterative nature. Extension professionals may need dedicated funding and institutional support to sustain efforts.
- **Power dynamics**: Navigating differences in expertise, authority, and privilege — especially in university-community partnerships — can be complex. Reflexivity and transparent communication are essential to mitigate these dynamics (Baum et al., 2006; Elder & Odoyo, 2018).
- **Institutional barriers**: Academic reward systems often prioritize publications over community impact, which can discourage researchers from adopting participatory models. Shifting institutional metrics to value collaboration, equity, and applied impact is critical (Herr & Anderson, 2005).

At the same time, several factors such as the ones below enhance the success of PAR.

- **Shared vision and mutual respect**: Projects that begin with strong relationships and shared goals are more likely to yield transformative outcomes.
- **Flexible methodologies**: The ability to adjust timelines, methods, and roles supports responsiveness to real-world complexity.
- **Capacity and skill development**: Training in facilitation, conflict resolution, and participatory methods helps Extension professionals navigate the relational dimensions of PAR.

When well-supported, PAR offers a powerful alternative to traditional research models — one that aligns science with justice, relevance, and resilience in agricultural systems.

## Conclusion

Participatory action research (PAR) represents a powerful methodology for addressing the complex, context-specific challenges of modern agriculture. By centering collaboration, experiential knowledge, and iterative problem-solving, PAR enables farmers, Extension professionals, and researchers to co-create solutions that are practical, inclusive, and sustainable. The phased model outlined in this publication — beginning with problem identification and culminating in reflection and iteration — offers a structured yet flexible approach for integrating PAR into agricultural research and outreach.

In contrast to traditional top-down methods, PAR promotes empowerment, democratizes knowledge production, and fosters a deeper connection between scientific inquiry and community well-being. Its emphasis on mutual learning, adaptation, and capacity building makes it especially relevant in times of ecological uncertainty and socioeconomic stress.

Extension professionals play a critical role in facilitating PAR. By adopting its core principles and tools, they can help build resilient agricultural systems that are not only more productive but also more equitable and responsive to community needs. As the field of agricultural Extension

continues to evolve, PAR offers a compelling framework for meaningful, long-term impact — one grounded in relationships, reflection, and real-world change.

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## Tables

Table 1. Comparison of different aspects of traditional research and participatory action research. This table, adapted from Pretty (1995) and Tritz (2014), illustrates the philosophical and operational differences between the two approaches.

| Dimension | | Traditional Research | Participatory Action Research |
|---|---|---|---|
| Research control | | Researcher-centered | Shared control with community stakeholders |
| Knowledge production | | Academic experts | Co-produced with local participants |
| Research setting | | Labs or research stations | Real-world field settings |
| Outcomes | | Publications, generalized findings | Local solutions, capacity building |
| Dissemination | | One-way (researcher to practitioner) | Two-way, collaborative interpretation |
| Purpose | | Theory testing, general knowledge | Practical problem solving and social change |

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