Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 06, Issue: 04 (JULY-AUG, 2026)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Natural Farming in India: Can Traditional Wisdom Build Modern Resilience?

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A farmer standing at the edge of a field after another difficult season. Fertiliser prices have climbed again. The rains arrived late, then too hard, then stopped early. The soil, worked hard for years, doesn't hold moisture the way it once did. The ledger at the end of the season shows a thinner margin than it should for the effort put in. This scene is illustrative not a documented individual case but versions of it are familiar across much of rural India, and they sit behind a question researchers and extension scientists are now asking with real urgency. **What if some of the solutions to tomorrow's agricultural challenges are already present in the knowledge farmers have carried for generations? But can traditional wisdom alone meet the demands of modern agriculture?** That tension between an inherited, low-cost, locally adapted way of farming and the scale, consistency and yield demands of a modern food system runs through the rest of this article. The short answer, based on the evidence compiled in recent research, is neither romantic nor dismissive: traditional knowledge contains potentially valuable solutions for resilience, but using it well requires scientific validation, correct application, context-specific adaptation, and integration with modern agricultural science.

What Exactly Is Natural Farming?

Natural farming is best known in India today through **Zero Budget Natural Farming (ZBNF)**, an approach popularised by Subhash Palekar and rooted in traditional Indian agroecological practice (Laishram et al., 2022; Manoharmayum et al., 2025). At its core, ZBNF tries to remove purchased, market-dependent inputs from the farming system and replace them with practices built from on-farm or locally available materials. Four terms recur throughout this body of work, and it's worth understanding what each one is *for*, without turning this into a preparation manual.

- **Jeevamritha** is a fermented microbial culture, applied to soil as a way of stimulating biological activity the idea being that a living, active soil does more work for the farmer than dead soil propped up entirely by synthetic inputs (Smith et al., 2020; Deb & Bhowmick, 2024).
- **Beejamritha** is a seed treatment, intended to protect seed and support crop establishment before the plant even breaks the surface.
- **Acchadana** refers to mulching and soil cover keeping the soil surface protected, which matters for both moisture retention and the microbial life underneath it.
- **Waaphasa** describes a soil moisture–air balance: the idea that plant roots do best in a soil environment that is neither waterlogged nor bone-dry, but appropriately aerated.

Taken together, these practices express a philosophy more than a fixed recipe: build soil biology, protect what's already there, and reduce dependence on inputs that have to be bought season after season. Whether that philosophy delivers on its promises and under what conditions is the real subject of this article.

Why Are Farmers Looking Beyond Input-Heavy Agriculture?

The economic logic is not complicated. Dependence on purchased fertilisers, pesticides, hybrid seeds and other external inputs raises the cash a farmer has to spend before a single rupee of revenue arrives. When input prices rise faster than output prices a pattern many Indian farmers have experienced the squeeze on margins can be severe, and debt tied to input purchases becomes a recurring risk (Daifa et al., 2024; Smith et al., 2020). Farmers practising natural farming have achieved **cost reductions of 14–45%** (Laishram et al., 2022; Manoharmayum et al., 2025). That is a wide range, and it should be read as exactly that a range across different studies, crops, and regions, not a guarantee available to any farmer who switches systems. Reported experiences indicate that the primary saving is straightforward: money that would have gone to purchased chemical inputs and seed simply isn't spent, because the farm is producing its own biological inputs instead.

Can Farming Become More Profitable by Spending Less?

This is where a distinction that often gets lost in agricultural conversations becomes important: the difference between **higher yield** and **higher net return**. Yield is output per unit area how much a field produces. Net return is what's left after costs are subtracted from revenue. A farming system can, in principle, produce a *lower* yield than a conventional system and still leave the farmer *better off*, if the cost savings are large enough. Equally, a system that boosts yield modestly while cutting costs sharply can outperform a high-yield, high-cost system on the bottom line. The clearest evidence for this in the source material comes from Himachal Pradesh, where a vegetable-based natural farming cropping system generated **19.68% higher net return in the Kharif season and 24.64% higher net return in the Rabi season**, compared with conventional monocropping in the cited study (Laishram et al., 2022). The advantage was linked specifically to savings from avoided chemical purchases and additional revenue from intercrops not simply to higher yields.

The Soil Is Not Just Dirt

A healthy soil is not simply a medium for holding a crop; it is a living system. Natural farming's central ecological argument rests on that idea that soil organic matter, biological activity, water retention and a functioning microbiome interact with each other, and that building one tends to support the others.

The comparison presented in the source literature's summary figure sets conventional-farming concerns against reported natural-farming outcomes:

Dimension	Conventional farming (reported concerns)	Natural farming (reported outcomes)
Soil health	Degradation, water pollution, biodiversity loss (Patel et al., 2020; Manoharmayum et al., 2025)	Improved organic matter, water retention, microbiome (Ghosh, 2019; Bharti et al., 2025)
Input costs	High debt from purchased chemicals and seeds (Daifa et al., 2024; Smith et al., 2020)	14–45% cost reduction; on-farm input production (Laishram et al., 2022; Manoharmayum et al., 2025)
Climate resilience	Vulnerable to climate variability (Singh et al., 2019; Smith et al., 2020)	Diverse polycultures and hardy indigenous seeds (Patel et al., 2020; Behl et al., 2025)

ZBNF specifically promotes polycultures that keep soil continuously covered with biomass, and the literature reports improvements to soil microbiome activity via indigenous, cow-based bioinoculants, alongside better water-holding capacity (Ghosh, 2019). None of this means soil health problems are solved on contact, it means the mechanism proposed is biologically coherent and has some field-level support, which is a different and more modest claim.

Diversity May Be Agriculture's Insurance Policy

Mixed cropping, crop rotation, polycultures, agroforestry and the deliberate use of diverse crop varieties are old practices with a very current justification: they may help a farm absorb shocks that would otherwise hit a single-crop system hard. Traditional mixed cropping, crop rotation and agroforestry to climate resilience through what it frames as **spatial and sequential diversity** different crops sharing space at the same time, and different crops cycling through the same field over time (Patel et al., 2020). The intuition is close to a familiar one from outside agriculture: a diversified farm may function more like a portfolio than a single bet, where a bad season for one crop doesn't necessarily mean a bad season overall. That is an analogy, not a finding from the source, but it captures the underlying mechanism reasonably well. It's also worth flagging a trade-off the source material notes elsewhere: while multiple cropping and alley cropping can enhance household resilience to natural hazards, mixed cropping can also complicate recovery efforts after a disaster, since restoring several intermingled crops is logistically harder than restoring one (Utami et al., 2024). Diversity is not free; it trades some operational simplicity for reduced concentration risk.

The Forgotten Climate Technology: Indigenous Seeds

Seeds are easy to overlook as "technology," but they are one of the oldest and most locally tuned technologies farmers possess. Indigenous varieties carry generations of local adaptation to a specific rainfall pattern, a specific soil type, a specific pest pressure as well as cultural significance and, in many households, a direct role in food security. The Himachal Pradesh evidence in the source literature is instructive here. Farmers in that study reported that hybrid seeds they had adopted lacked climate resilience and required continued agrochemical support to perform, whereas indigenous seeds retained cultural and practical advantages tied to food security (Behl et al., 2025). That is a meaningful, documented finding but it comes from one region and one set of crops. It would be a mistake to generalise it into a blanket rule that indigenous seeds are always superior to hybrids. Seed performance is context-dependent: a hybrid bred for irrigated, input-rich conditions may underperform in a rainfed, resource-constrained field, while the same hybrid could outperform a local variety somewhere better suited to it. The honest conclusion is narrower and more useful: locally adapted seed can be a genuine resilience asset under particular conditions, and that possibility deserves more systematic testing than it currently receives.

Traditional Knowledge Is Not the Same as Old Knowledge

It's worth being precise about what **Indigenous Technical Knowledge (ITK)** actually is, because the phrase is sometimes used loosely. ITK refers to practical solutions developed over generations through observation, trial, and adaptation to local conditions a knowledge *system*, not simply a collection of old farming tricks. Green manuring, traditional irrigation systems such as **Khadin** structures, and climate-adapted crop varieties, all cited as supporting ecological sustainability and resource conservation (Barman et al., 2024). What unites them is that each represents an accumulated, locally tested response to a real constraint water scarcity, soil fertility, climate variability rather than an arbitrary custom. Treating ITK as a knowledge system rather than folklore is what opens the door to testing it scientifically, refining it, and deciding where it genuinely applies.

What Happens When Knowledge Disappears?

Traditional agricultural knowledge doesn't survive automatically. It weakens when younger generations leave farming, when monocropping expands and reduces the everyday practice of diversified systems, when local seed varieties disappear from circulation, when practices go undocumented and depend entirely on oral transmission, and when chemical-input dependence grows to the point that biological alternatives are simply no longer part of common practice.

Evidence from Eastern Uttar Pradesh, cited in the source material, shows what a partially eroded knowledge system looks like in practice: roughly 60% of surveyed farmers still used organic fertiliser, but many applied it incorrectly, and the majority of fields remained under monocropping with heavy chemical reliance regardless (Mishra et al., 2026). The practice hadn't disappeared entirely but the knowledge needed to apply it well had thinned enough that its benefits were compromised. The problem is not simply losing traditional practices; it is losing the knowledge needed to apply them correctly. A half-remembered practice, applied incorrectly, can produce worse outcomes than either the full traditional version or a straightforward conventional approach and that gap between awareness and correct application is where a great deal of natural farming's disappointing results likely originate.

But Is Natural Farming Always Better?

No, and treating this article as promotional would do readers a disservice. The scientific limitations deserve the same weight as the potential benefits already discussed. The most significant limitation identified e concerns **nitrogen** that biological nitrogen fixation under ZBNF may supply only **52–80% of the national average fertiliser-nitrogen application**, creating potential yield risk for nutrient-demanding cereals during the transition period, when soil biology has not yet had time to establish itself fully (Smith et al., 2020). This matters for several reasons that extension scientists and farmers alike need to hold in mind simultaneously:

- Reducing dependence on external inputs does not make a crop's underlying nutrient requirement disappear.
- Transition strategies need to be crop-specific a nitrogen-hungry cereal is not in the same position as a legume that fixes its own nitrogen.
- High-demand crops may need particular nutrient-management support precisely during the years when a farm is shifting away from purchased fertiliser.
- "Natural" is not a synonym for "nutritionally sufficient." A biologically active soil is a good foundation, not an automatic substitute for adequate nutrient supply.

The Yield Question Cannot Be Ignored

Closely related is the tension between lower cost and potential yield penalty. A farming system that cuts costs but substantially reduces output cannot be assumed acceptable to a farming household food security and cash income both depend on what actually comes off the field, not only on what it cost to grow it. Whether that trade-off appears, and how severe it is, depends on several interacting factors: the crop in question, existing soil fertility, local climate, how far into the transition period the farm is, the management skill and experience available, market prices for the crop, and the household's own food-security needs. Given how many variables are in play, the fair and evidence-consistent position is to avoid declaring natural farming either universally high-yielding or universally low-yielding. Both claims outrun what the current evidence supports.

From "Traditional vs Modern" to "Traditional + Modern"

If there is one framing, it's the binary of traditional farming *versus* modern science. The evidence reviewed here supports a more useful equation:

Traditional Knowledge + Modern Soil Science + Weather Forecasting + Agronomy + Remote Sensing + Farmer Experimentation + Extension Support = Evidence-Based Resilient Agriculture

The future of Indian agriculture may not require choosing between ancestral knowledge and modern science. It may require validating, adapting and integrating useful knowledge through scientific evidence keeping what demonstrably works, improving what works partially, and setting aside what doesn't hold up once tested.

What Can Agricultural Extension Do?

Agricultural extension sits precisely at the point where this integration has to happen in practice, acting as a bridge between farmer knowledge and scientific knowledge rather than a one-way channel from research station to field. That role is expanding to include documenting local practices systematically rather than anecdotally; validating farmer innovations through proper trials rather than assuming they work; running participatory field trials with farmers rather than only demonstration plots designed elsewhere; identifying which practices suit which local conditions; actively working to prevent the kind of misapplication described in the knowledge-erosion evidence above; connecting ITK to formal scientific recommendations where they align; supporting farmers who want to experiment; and facilitating knowledge exchange between generations, so that what one farming generation has learned doesn't simply end with them. The underlying shift is that extension should not simply transfer technology outward, it should also learn from farmers, treating them as a source of testable hypotheses rather than only as recipients of finished ones.

The Farmer Is Not Just a Beneficiary, The Farmer Is a Knowledge Holder

This point deserves to be stated plainly: farmers generate knowledge. They observe local climate patterns over years and decades, experiment with variations on inherited practices, carry oral and community knowledge forward, maintain indigenous seed stocks, read local climate indicators that don't appear in any manual, and manage traditional resource systems that outside researchers often arrive to study only after the fact. The right relationship between that knowledge and formal science follows a specific sequence: **farmer knowledge → documentation → scientific validation → adaptation → wider dissemination.** It is not: farmer knowledge → automatically accepted as scientifically valid. That distinction matters enormously. Respecting farmers as knowledge holders does not mean exempting their practices from testing it means taking them seriously enough to test properly, which is a higher form of respect than uncritical acceptance.

Can Traditional Knowledge Become Climate Technology?

Practices developed long before modern climate science existed indigenous seed selection, mixed cropping, agroforestry, green manuring, traditional irrigation, soil-cover practices are increasingly discussed as potential climate-adaptation tools. Whether that promotion is justified in any given case should depend on a consistent set of questions, not on the age or cultural weight of the practice:

1. Does it work?
2. Where does it work?
3. Under what conditions?
4. For which crops?
5. At what scale?
6. What are the trade-offs?
7. Can farmers afford it?
8. Can it be combined with modern technology?

A practice earns a place in climate-adaptation strategy by answering these questions well, not by virtue of being traditional. That framework applies equally, it's worth noting, to plenty of "modern" recommendations that have never been tested as rigorously as they should be.

The Policy Problem: Who Gets to Define "Good Agriculture"?

The source literature identifies a structural gap in how adaptation policy gets made in India: agricultural adaptation policies can follow a top-down approach, with limited incorporation of farmers' traditional knowledge and insufficient genuine stakeholder co-production (Singh et al., 2021). The distinction worth holding onto is between **policy for farmers** and **policy with farmers**. The first designs solutions elsewhere and delivers them; the second treats farmers as participants in defining what the problem is and what an acceptable solution looks like in their specific context. Farmer participation in designing climate-resilient agricultural programmes isn't a procedural nicety it's plausibly a precondition for programmes that actually match local conditions well enough to be adopted and sustained.

Scaling Natural Farming Is Harder Than Demonstrating It

There is an important difference between a successful farm and a scalable farming system, and conflating the two is one of the more common errors in this space. Scaling runs into labour requirements that a single demonstration plot may not reveal; knowledge requirements that assume a level of training most extension systems haven't yet delivered at scale; the practical burden of preparing biological inputs on-farm across many households rather than one; the fact that crop suitability varies by region; uneven market access for produce grown this way; extension capacity that is not uniformly available; soil fertility starting points that differ from village to village; a transition period that has real costs before benefits appear; and simple regional difference in climate, soil and cropping pattern across a country as large as India. What works beautifully in one village cannot automatically be copied across an entire country. That is an analytical conclusion drawn from the pattern of evidence discussed throughout this article, not a quotation from any single source but it is hard to read the scaling literature and reach a different one.

What Should India Do With Traditional Agricultural Knowledge?

Framed as evidence-informed recommendations rather than existing policy commitments, the following priorities follow reasonably from the evidence discussed above:

1. **Document** — build systematic databases of farmer knowledge and local practices, rather than relying on knowledge that exists only informally and orally.
2. **Validate** — scientifically test promising practices before recommending them widely.
3. **Localize** — identify specifically where a given practice performs well, rather than assuming national applicability.
4. **Integrate** — combine ITK with modern agronomic knowledge rather than treating them as competing systems.
5. **Teach** — bring validated traditional practices into extension training and agricultural education.
6. **Protect** — support local seed diversity and the knowledge systems that maintain it.
7. **Co-create** — involve farmers directly in designing climate adaptation policy
8. **Evaluate** — measure economic, ecological and social outcomes together, not just yield or cost in isolation

Conclusion

India does not have to choose between traditional wisdom and modern science. The real opportunity is to identify what traditional knowledge can teach us, scientifically test it, improve it where necessary, and integrate it with modern technology to build agriculture that is economically viable, ecologically healthier, and more resilient to climate uncertainty. The agriculture of the future may not be about going back to the past. It may be about learning from the past and using that knowledge more intelligently for the future.

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