

# Perspectives.

Issue No. 37

**UN**   
environment  
programme

**Zeroing in on  
farm budgets  
or zero budget  
natural farming?**

A perspective from India

Nandula Raghuram



# Zeroing in on farm budgets or zero budget natural farming?

## A perspective from India

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The recent growth in traction for zero budget natural farming (ZBNF) in India should be considered within the context of the growing agrarian crisis, as the gap worsens between input costs (including fertilizers, pesticides, agrichemicals, seeds, water, electricity, labour and farm loans) and the final prices that farmers (especially small-scale farmers) receive for their produce. This provided the ground for the ideological polarization of farmers against moneylenders and sellers of fertilizers, pesticides, seeds and other inputs on the one hand, and against the alleged scientific apologists of monoculture and the status quo on the other hand. The moot question therefore not only addresses which farming method is superior (if there even is a universal solution), but also what combination of scientific (including scientifically sound traditional practices) and socioeconomic solutions are required and whether they are customizable for different farming situations to end India's current crop farming crisis. This article puts into perspective the debate on ZBNF and affords readers the opportunity to determine their own answer to the question posed.

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The critique of the status quo has resulted in many organic farming models that have grown in size and popularity in different parts of India without causing any major rift with modern agricultural scientists and policymakers and even garnering their support in many cases. However, ZBNF has rejected all such models and is seeking to replace them entirely with the support of the Indian Government and international organizations. This binary approach has worried both organic farming enthusiasts and green revolutionists alike. Based on the surveys on ZBNF by government-funded agricultural universities and institutions of the Indian

Council of Agricultural Research (ICAR) and a brainstorming session organized by the National Academy of Agricultural Sciences in August 2019,<sup>1</sup> the President of the Academy wrote a sharp-worded letter to the Prime Minister of India on 2 September 2019, stating:

"The Academy is of the considered opinion that there is no scope for an incremental value gained by the farmer or the consumer through ZBNF that represents one of the many practices followed in India prior to the 1950s when no more than 60 million tons of food grains were produced, making ZBNF a technology that



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*A farmer harvests this season's cauliflower crop near Kullu town, Himachal Pradesh, India.*

lacks rationale or acceptability as a production technology. Therefore, it is recommended that the Government of India should not needlessly invest capital, efforts, time and human resources towards promoting ZBNF on the grounds of technical infeasibility for India to explore this unproven and unscientifically proposed technology.”

**Agrarian crisis as the root cause:**

Agriculture is very important for the Indian economy and an agrarian crisis has been building for the last two decades. In addition to sustaining food security, agriculture provides direct and indirect employment to up to two thirds of India’s workers and contributes about 10 per cent of the country’s export earnings. Most Indian farmers are poor; according to the last agricultural census, small and marginal holdings (below two hectares) constituted 86.21 per cent of the total land holdings in 2015–2016, which represented an increase of 1.2 per cent since 2010–2011. However, the area in use – which includes any agricultural land, provided that part of it is used

for production – has declined by around 1.5 per cent, though the proportion of women farmers has increased, indicating the growing importance of family farms. More than three fourths of Indian agricultural land is rain-fed and remains unreached or underserved by the Green Revolution, producing one or, in some rare cases, two food crops per year. Crop losses often occur, even in river-irrigated states due to flooding (especially in eastern India), increasingly shifting the entire burden of the country’s food security to very few riverine districts in northern and southern states. However, these states also face issues, as cereal cultivation is often supported by groundwater irrigation, with intensive cereal-cereal rotation practices using fertilizers and pesticides in an unbalanced manner, leading to groundwater depletion, soil health deterioration and chemical residues in groundwater and crop produce.

The various input subsidies, farm loans and government-supported prices do not reach most farmers of small and marginal holdings, forcing them to borrow cash from

exploitative moneylenders who humiliate and violently intimidate those impoverished by crop failures. Since the mid-1990s, 0.25 to 0.3 million farmers are estimated to have committed suicide in India, though the Government does not keep any official records of farmer suicides.<sup>2</sup> According to Palagummi Sainath, a Ramon Magsaysay Award-winning journalist and founding editor of

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the People’s Archive of Rural India (PARI),<sup>3</sup> farmer suicides are highly underreported. The United Nations Development Programme (UNDP) is supporting PARI in documenting how climate change is affecting people’s lives, including its contribution to the agrarian crisis. Over 40,000 farmers marched 182 kilometres from Nashik to Mumbai in March 2018, with a similar protest taking place in November

2018 when farmers from all over the country marched into Delhi to demand a three-week special session of parliament on the agrarian crisis, the efforts of which were in vain.

Even the National Academy of Agricultural Sciences, a product of India's Green Revolution, acknowledges the agrarian crisis and the Government's attention to it, stating in a policy paper that "food production records have been broken year after year with the net cultivated area remaining  $140 \pm 2$  million hectares (Mha) since 1972. However, despite impressive gains in farm productivity, farmers' income remained low in comparison to those working in non-farm sectors. The liberalization of the Indian economy further led to an agrarian crisis that made small and marginal farms unviable. In the meantime, realizing the declining total factor productivity and profitability of the farmers in general, and small and marginal farmers in particular, the Government of India, particularly NITI Ayog (formerly Planning Commission), has been looking for alternative farming systems that could be more profitable with reduced input and cost".<sup>4</sup>

**Are Green Revolution practices to blame?:** While criticism of the Green Revolution for its uneven reach and impact is not new<sup>5</sup> and the concerns on its environmental sustainability and agroecology are indeed legitimate,<sup>6</sup> there are many other factors that have contributed to the agrarian crisis, including the policies of successive governments. For example, according to the Indian economist Ashok Gulati, direct and indirect taxes take away whatever benefits the Government offers farmers. According to Sainath, agribusinesses, including big retailers, receive most farm loans and loan waivers meant for distressed farmers, which only adds to the stress of government banks, as evidenced in the case of Mumbai City and its suburbs, from where 53 per cent of agricultural credits were disbursed. Some

others say that futures trading in agricommodities is playing havoc with the prices that farmers receive for their produce, as government procurement pricing is not yet a good enough deterrent against it. As a result, large-scale farmers and traders are benefiting the most. The recommendations of the Swaminathan Commission appointed by the then Indian Government to address the agrarian crisis are yet to be fully implemented, which has been the case since 2006. The recent demonetization of Indian currency is said to have squeezed the cash out of the rural economy, lowering consumer demand and decelerating the entire national economy by about 3 per cent in terms of gross domestic product (GDP).

However, the narratives of alternative farming methods are increasingly being built around the critiques of the Green Revolution or 'chemicalized agriculture'. These often do not distinguish between critiquing its practices from policies that go well beyond agronomic practices and affect agriculture and farmers' incomes as a whole. Various organic farming models have gained considerable traction in India over the last few decades, with several states declaring themselves as exclusively committed to organic farming. In practical terms, these models vary from little or no use of fertilizers and pesticides to more integrated approaches that rely on mixed cropping or inter-cropping with legumes or agroforestry to including livestock farming and forage crops as part of the overall farming system. While these approaches may not always boost yields, they promise better or more consistent margins for farmers as well as better quality produce for consumers. Such approaches are also more sustainable and are therefore certainly welcome to that extent.

Governments at the state and national levels have not taken any action to stifle these models and have even encouraged them in different states with

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or without specific incentives attached. However, such models remain affected by other policies, including those previously mentioned, though their impact may vary depending on model, crop, place or time, meaning that limited successes or failures can be easily cited either to promote or deride any model in the short term. Some of these models may overcome initial problems or policy hurdles in the medium to long term and become established as true alternatives to the dominant model in line with the preferences of farmers and consumers. At present, it seems premature to claim that one of these particular models can offer a complete comprehensive solution replacing most, if not all the other models, as ZBNF seems to attempt. The bigger question is whether it is possible or necessary to have a single pan-India model or to take a more inclusive approach that celebrates diversity.

**Zero budget natural farming:** This is the latest and largest alternative farming method, which includes others such as Vedic farming, Agnihotra farming, Amrutpani farming and Homoeo farming. ZBNF was pioneered by Subhash Palekar, a graduate in modern agriculture who introduced the practice in his father's traditional farm after six years of 'research', following a decline in agricultural production due to 'chemical' farming. Palekar estimated that over 3 million farmers throughout India practice ZBNF in Maharashtra, Karnataka, Andhra Pradesh, Tamilnadu, Kerala, Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Jharkhand, Bengal, Rajasthan and

Gujarat.<sup>7</sup> While these figures need verification, it is widely agreed that ZBNF has been mostly adopted in Maharashtra, Karnataka and Andhra Pradesh.

According to Palekar, the Green Revolution has forced farmers to purchase all inputs and has completely destroyed nature's self-reliant and self-developing system due to the use of 'chemical' and organic farming practices. Such practices, in his opinion, should therefore be abandoned in favour of ZBNF.

**How does it work?:** According to Palekar, ZBNF requires no inputs (farmyard manure, 'chemical' or organic fertilizers, etc.) to be purchased, as everything needed for the plant's growth is available from the root area of the plant. The method involves strictly following four processes (referred to as the four wheels of ZBNF): *bijamrita*, *jiwamrita*, *mulching* and *waaphasa*. *Bijamrita* is a microbial seed treatment formula made from cow urine and cow dung, while *jiwamrita* is a soil enhancement treatment made from a mix of cow urine, cow dung and jaggery. These mixtures should be prepared following the ZBNF protocols. *Mulching* is the well-known practice of covering soil with crops or crop residues. *Waaphasa* is the process of building up soil humus to increase soil aeration. For insect and pest management, ZBNF recommends three methods – *agniastra*, *bramhastra* and *neemastra* – which involve preparing different mixtures using cow urine, cow dung, tobacco, fruit, green chilli, garlic and neem. Cow dung should only be used from local cows and not Jersey or Holstein breeds, which is considered ineffective. If there is limited local cow dung available to farmers, it can be mixed half and half with local bullock or buffalo dung.<sup>8</sup> The main message that ZBNF promotes is that it saves the input costs of farmers and improves their margins, while sparing them from exploitative loans and the adverse impacts of 'chemical' farming.

Since 2015, the State Government of Andhra Pradesh has been implementing a ZBNF programme through Rythu Sadhikara Samstha (RySS), a non-profit organization established by the state's Department of Agriculture. The programme aims to conserve the environment, while enhancing farmer and consumer welfare. Andhra Pradesh has been receiving federal grants worth hundreds of millions of dollars and has been negotiating even higher amounts as loans from foreign banks to conduct large-scale training of farmers in ZBNF methods.<sup>9</sup> The state's ZBNF programme claims to have reached around 1 million farmers and is aiming for the entire state to adopt ZBNF practices within five years. Although not officially verified, it is widely agreed that most of the recent growth in ZBNF has occurred in this state.

According to the ZBNF programme, the practice is a holistic alternative to the high costs of 'chemical' inputs-based agriculture and addresses the negative and uncertain impacts of climate change. ZBNF principles are aligned with the principles of agroecology, with the practice rooted in Indian tradition, while incorporating the latest scientific discoveries in agriculture. In April 2018, the Food and Agriculture Organization of the United Nations (FAO) urged all countries

to move towards the adoption of agroecology to meet the twin goals of global food security and environmental conservation.<sup>10</sup>

#### **National and international support for ZBNF:**

An important factor in the growth of ZBNF has been political support from the Indian Government and some state governments ruled by the same party or allies. The Prime Minister and several union ministers have expressed support for ZBNF at various occasions, including international events such as World Environment Day (2018) and the fourteenth session of the Conference of the Parties (COP14) of the United Nations Convention to Combat Desertification (UNCCD) (2019). There has also been growing interest in and even recognition of ZBNF abroad, with the practice mentioned in the new report on agroecological and other innovative approaches by the High Level Panel of Experts on Food Security and Nutrition, which was prepared for the Committee on Food Security.<sup>11</sup> FAO has been supporting the key promoter of the ZBNF programme, Vijay Kumar, and his farmer field school (FFS) development team as part of the mechanism for sharing knowledge on ZBNF in order to scale up agroecology.<sup>12</sup> According to FAO's common vision for sustainable food and agriculture<sup>13</sup> and save and grow guide,<sup>14</sup> ZBNF can be



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considered as one of the many methods that support integrated approaches for achieving sustainable food and agriculture. The common vision provides five comprehensive principles for ensuring sustainability in food and agriculture:

**Principle 1. Improving efficiency in the use of resources is crucial to sustainable agriculture**

**Principle 2. Sustainability requires direct action to conserve, protect and enhance natural resources**

**Principle 3. Agriculture that fails to protect and improve rural livelihoods, equity and social well-being is unsustainable**

**Principle 4. Enhanced resilience of people, communities and ecosystems is key to sustainable agriculture**

**Principle 5. Sustainable food and agriculture requires responsible and effective governance mechanisms.**

These principles are considered crucial for supporting Sustainable Development Goal (SDG) target 2.4 on sustainable food production and resilient agricultural practices “By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality”.

The above principles are applicable to many models of organic and sustainable farming, including ZBNF, though as a practice, ZBNF rejects other models including organic farming, projecting itself as the sole alternative. According to Palekar, all knowledge created by agricultural universities is false and soil testing is a conspiracy. Palekar is critical of the nineteenth century German scientist Justus von Liebig, who is known as the father of the fertilizer industry. He

is also against ‘chemical’ fertilizers and pesticides, cross-bred cows and biotechnology and tractors, all of which he terms “demonic”. In addition, he openly criticizes organic farming, which he believes is “more dangerous than chemical farming” and “worse than the atom bomb”, as well as the vermicomposting process, which involves redworms (*Eisenia fetida*) and Rudolf Steiner’s biodynamic farming approach.<sup>15</sup>

**ZBNF rejects other models including organic farming, projecting itself as the sole alternative.**

**Critiques of ZBNF:** Scientists have legitimate questions concerning ZBNF on the material balance of inputs and outputs as well as the sustainability of yields and soil health, especially in the medium to long term.<sup>16</sup> Independent surveys by Indian agricultural scientists have found that the zero budget approach is not actually zero budget, as farmers practising the method tend to purchase the various inputs needed to make Palekar’s formulations and also have costs related to electricity, pump sets, cow maintenance, wages of hired labour, imputed family labour and land rent.<sup>17</sup> The farmers also seem to use inputs that ZBNF strictly prohibits, such as vermicompost and manure. The claims that yields do not decline on ZBNF plots or that they increase are also disputed, with ZBNF officials and documents found to have made inconsistent claims on yield improvements for different crops. Some statements made by Palekar completely defy science or logic, such as that the soil only provides 1.5–2 per cent of nutrients, with the remaining 98–98.5 per cent provided by the air, water and solar energy. Even if, for example, nitrogen from the air was fixed by soil microbes to support part of the crop requirement (though no data or microbiologists have supported or confirmed how

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much), they cannot obtain phosphorus and potassium (which are major inputs) in this way. About half of India’s soil has low levels of phosphorus and low to medium levels of potassium. It is therefore highly unlikely that the application of 10 kilograms of cow dung and 10 litres of cow urine per acre per month is adequate to support crop nutrition.

However, the scientific community has been accused of favouring a status quo approach and being unable to move away from monoculture practices supported by distorted market forces, as well as failing to engage with associated socioeconomic issues or offering more sustainable alternatives, such as legume–non-legume rotation as the basis for any sustainable cropping system. A widely acknowledged fall out of the Green Revolution was the overemphasis on rice and wheat (not even coarse cereals) and the neglect of legumes, so much so that India has of late been occasionally importing pulses from Africa and elsewhere, while exporting cereals.

Social scientists and organic farming enthusiasts have equally legitimate questions as to whether ZBNF is just a spiritual or ideological rebranding and electoral appropriation of organic farming by political interests, the role of government support and the changing fads of international organizations and markets, which previously supported the Green Revolution and now support organic farming and ZBNF. However, such individuals have not yet considered why zero budget farming has grown mainly in non-Green Revolution states and districts, whether it



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can be scaled up to the state and national levels and sustained (despite government support), whether it should be considered the only national alternative in a binary policy framework and whether it can coexist with other socioeconomic models on its own merits, as well as its suitability to specific agrarian contexts.

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**Sustainability issues:** The most attractive aspects of ZBNF are its low cost (even if this is not zero), low level of inputs and limited reliance on externally purchased inputs, which are all critical for farmers of small and marginal holdings or family-run farms. The importance of family-run farms for sustainable global food security is well recognized by the United Nations. The compatibility of ZBNF with this, aside from agroecology considerations, may explain the interest of governmental and intergovernmental agencies towards the practice. Considering that most farmers of small and marginal holdings in semi-arid zones have remained untouched or underserved by Green Revolution, ZBNF could not offer a sustainable solution in its original form, as is evident from farmers' practices. Many farmers who adopted ZBNF have been reported as using a lot more manure than is recommended under ZBNF to protect their crop yields. Adhering strictly to ZBNF practices is estimated to provide only 52–80 per cent of the average nitrogen

fertilizer application used across India, according to a paper by Smith et al.<sup>18</sup> Using nitrogen, which is quantitatively the largest external nutrient required by crops, the paper further estimates that ZBNF systems are more likely to be nitrogen deficient than conventional farming systems, an issue that can only be addressed by using up to 5 tons of additional manure per hectare.<sup>19</sup> In addition, the ZBNF manure system is only likely to be beneficial when introduced in farming systems that already have low inputs, whereas replacing high-input farming systems with ZBNF could limit the supply of nutrients, thus resulting in yield losses. Replacing all farming in India with strict ZBNF practices (without any additional manure) could decrease crop production by up to half of national average production under a business-as-usual scenario, severely affecting food security at a time when food demand is rising.<sup>20</sup> While the scenario needs to be examined with respect to other nutrients, Smith et al. note that if ZBNF has to be relevant

and sustainable even for farmers of small and marginal holdings and low-input farming systems, it will need improvements and additional inputs. This may lead to ZBNF evolving differently across states and no longer reflecting the practice as originally developed by Palekar, with many hybrid models involving organic or even 'chemical' farming possibly emerging.

The Government's support was key in the growth of Green Revolution practices 50 years ago, as is currently the case for zero budget farming, so it is unclear whether either of these models has any

merit or are simply more favoured as a result of this support. For desperate farmers whose lives depend on season-to-season cycles, aligning with government-backed methods is the simplest and most logical solution, even if it means applying them to only a part of their farm.

A cynical view could be that ZBNF is not necessarily a scientific challenge to the status quo, but largely a political one, by polarizing farmers against Green Revolution practices and parties that supported them in an era that is increasingly witnessing farmers'

unrest and the changing electoral futures of political parties due to farmers' votes. A more optimistic view would be that political attention to the agrarian crisis is long overdue and that farmers' agitations on the one hand and interventions, such as ZBNF, that rely on rejecting green revolution and even organic farming on the other hand are pushing these issues to the forefront. All farming models, including ZBNF, need enabling policies that address the related underlying socioeconomic and environmental sustainability concerns.

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