

Zero-Budget Natural Farming in Haryana: A Dangerous Experiment or a Sustainable Future?

Author : Nisha Choudhary
Kids Club School, Jaipur

Introduction

Today more than 70% of agricultural households spend more than they earn and more than half of them are in debt (Drishti IAS). Farmers use high cost inputs like chemical fertilizers and pesticides, seeds which reduces the fertility of soil and productivity. To combat this, the government of India introduced natural farming methods like Zero Budget Natural Farming in order to match their goal of doubling farmers' income by 2022. Zero Budget Natural Farming (ZBNF) is a form of agriculture, inspired by traditional methods which tends to aim at reducing the cost of inputs and increasing productivity. Mainly, it aims to increase the health of farm and soil fertility. In ZBNF, natural fertilizers are used to confirm the working theory of four pillars of farming: *Jeevamrutha*, *Bijamrita*, *Acchadana* and *Whapasa* (La Via Campesina). Although each one of these pillars will be elaborated on later, they all generally agree to use alternatives to fertilizers. Instead of inorganic fertilizers, farmers are encouraged to use low-cost natural inputs like cow dung, cow urine or dried plant matter. It was founded by agriculturalist Subash Palekar, who organised it to further the 'green revolution' India is aspiring towards, moving away from chemical fertilizers, pesticides and intensive irrigation (Jebaraj). There is a need to apply such natural farming methods in India, in order to increase the food production. The government of India is trying to apply ZBNF in many states like Andhra Pradesh, Himachal Pradesh, Karnataka and many more. In this research paper, we are going to see if we can apply the ZBNF method to Haryana by considering the state's encouragement of ZBNF in Andhra Pradesh.

Before commencing basic data collection and analysis, it's important to establish some key background information: (1) Explaining the four pillars of ZBNF farming, (2) the problems currently facing the state of Haryana and (3) the background to the ZBNF implementation in Andhra Pradesh.

The Four Pillars of ZBNF

There are four pillars main that comprise the principles of ZBNF (La Via Campesina):

1. *Jeevamrutha*: It is prepared using cow dung, water, jaggery and flour. It is a fermented microbial culture. It supplies nutrients to the soil and also functions as a catalytic agent that supports the activity of microorganisms in the soil. It also promotes and increases the activity of earthworms. *Jeevamrutha* also helps in protection of fungal and bacterial plant diseases. Subash Palekar recommends that this method is only required for the first 3 years of the time period, after which the soil becomes self-sustaining.
2. *Bijamrita*: *Bijamrita* is a natural mixture of water, local cow dung, local cow urine, soil and lime. It is used to manage the seeds, seedlings or any planting material with a natural mixture to protect the crop from harmful soil borne and seed borne pathogens during the initial stages of growth.
3. *Mulching*: In this method, a specific temperature (25 degree celsius to 32 degree celsius) is created under which microorganisms can develop fully. Also, 65% to 72% moisture, darkness and warmth is maintained in the soil. This protects microorganisms as humidity

of the soil is conserved and the soil gets cool down. It supports humus formation and improves the soil's water holding capacity.'

4. Whapasa: It is the condition in which there are both air molecules and water molecules present in the soil. It brings down the need for irrigation.

Problems Facing Haryana

Before we get to the problems facing Haryana, a little bit of background to the state is needed. Haryana is a state located in the northern region of India. The total geographical area is 4.2m ha, out of which 80% is under cultivation. The main crops of the state are rice, wheat, cotton and Bajra. Here, 62% of the area has poor quality water because of which soil health is declining. Haryana comprises 1.5% of India and has contributed 15% of agricultural produce which has grown seven times since 1996 and has contributed a total of 14% of the nation's agricultural GDP ("Performance of Indian agriculture at state level").

Currently, the state is facing major problems in their agricultural systems. Haryana's farmers have been exploited and driven to abject poverty, forced to take out unfair loans from landlords – resulting in a very high rate of farmer debt and, accordingly, farmer suicide (Merriott). This is largely due to the increasing amount of issues farmers face with regards to their crops. These can be characterised as problems with declining water levels, slow pace of diversification, emphasis on single commodity rather than farming system approach, depleting soil fertility, salinity and alkalinity problems, non-judicious use of fertilizers and chemicals, rising costs and diminishing economic returns, increasing infestation of pests, declining productivity, fragmented smallholdings and inadequate availability of quality seeds. While most of these problems are systemic and cannot be fixed regardless of the type of system of farming. However, the majority of the aforementioned problems can be summed up as problems with the land or economic issues – both of which can be positively affected by ZBNF farming.

The Andhra Pradesh Model

62% of the population of Andhra Pradesh is dependent on agriculture for their livelihoods (Mittal). Andhra Pradesh has become the first state to adopt an aim for a 100% Zero Budget Natural Farming program. The program was initiated by the government in 2016-17 with an aim to cover 6 million farmers in the state by 2024. The larger mission of the program is to reduce rural poverty from agriculture and to improve the quality of the ecosystem (Suresh et al.). Rythu Sadhikara Samstha (RySS) – a non-profit organization set up by the government of AP to implement the ZBNF programme – was largely responsible for changing the problems Andhra Pradesh was facing in the earlier half of the decade. There were widening yield gaps, increasing prices of inputs which resulted in increasing cultivation cost, scarcity of water and climate variability. Soil health management was not good resulting in land degradation. Farmers used excess chemical fertilizers which leads to an imbalance in soil nutrients and crop growth (Naidu). There were additionally many small and fragmented land holdings.

The high cost of digging borewells and pesticides were adding to the trend of farmers being pushed into debt. Frequent droughts have caused drinking water shortage, hunger and child

labour (Rao). As we can see from the above information, these agricultural problems are similar to Haryana. To combat this, ZBNF was launched in Andhra Pradesh in 2016-17 by the government with the aim of promoting climate resilient, chemical free farming to provide small and marginal farmers with profitable livelihoods from agriculture. It aimed to enroll 500,000 farmers and 500,000 hectares in 1500 villages spread across all agro climatic zones, in half the mandals of the State in all the districts. It has since covered 704 villages/137 clusters in 2017-18 ("Performance of Indian agriculture at state level"). In my opinion, the switch to ZBNF has been a brilliant way to fix the problems in Andhra Pradesh, both economically and environmentally. It is a climate resilient, natural, low-cost and sustainable agriculture practice promoting the use of plant organic matter, which makes soil rich in nutrients. This solves many soil health problems like soil degradation and erosion resulting in an increase in soil fertility and healthy crops. Good soil fertility and healthy plant growth, in turn, promotes higher yields. To check whether ZBNF can be implemented fully in Haryana, it would therefore be relevant to consider the experiment in Andhra Pradesh – noticing what specifically was improved or worsened with the move.

Economic Results of Implementing ZBNF Farming

It is primarily important to see the results ZBNF farming has had on an economic level, considering both the yield generated and the cost reduction. In Andhra Pradesh, it is fairly clear that both of these factors have clearly changed for the positive. According to the Andhra Pradesh government, as of March 2020, *"0.62 million farmers (10.5 percent of all farmers) were enrolled in the programme. Of the enrolled farmers, 0.44 million farmers (7.5 per cent), were actually practising natural farming on an area of 0.45 million acres, which works out to 2.9 percent of the net sown area spread across 3,011 gram panchayats."* (DownToEarth). It has been observed that, for these ZBNF farmers, there has been a reduction in investment cost and an increase in yield, with ZBNF farmers growing groundnuts and paddy seeing 23% and 6% more yields respectively than non-ZBNF farmers (Suresh et al.). According to a survey conducted by ICAR's National Academy of Agricultural Research Management, Hyderabad, ZBNF in Karnataka and Andhra Pradesh, established that ZBNF has increased farmer income and had ecological and social benefits, with a *"five-tiered cropping model in 1100 square feet (2.5 cents) of land can improve food and nutritional security and add to the family income by ₹1000 to ₹1250 per month."* (Mishra)

Additionally, internal surveys by the RySS in Andhra Pradesh of crop yields maintaining ZBNF conditions also confirmed an increase in farmers income. Experiments conducted for crop-cutting in 2017 of farmers surveyed showed that 88% had prospered from an increase in yields and decrease in costs. Under ZBNF conditions, costs of cultivation were lower and net incomes higher than non-ZBNF for all crops. Irrigated crops accomplished slightly larger reductions in costs relative to rainfed crops (-28% against -24%, determined by calculating total reductions across all irrigated crops versus all rainfed crops) (Suresh et al.). Another paper published at the *Nabakrushna Choudhury Centre for Development Studies* quantitatively mapped out these differences, resulting in the data given below:

Crop	ZBNF Yield (Kg/Ha)	Non-ZBNF Yield (Kg/Ha)	Yield Difference (Kg/Ha)	Net Income for Yield Difference (₹/Ha)	Cost Reduction for ZBNF (₹/Ha)	Net Additional Income for ZBNF (₹/Ha)
Paddy	6416	5816	600	9000	5000-20000	14000-29000
Groundnut (Irrigated)	2868	2233	635	30000	10000	40000
Black Gram	1300	1027	173	13500	3000	16500
Chilly	10240	7740	2500	100000	13000	113000
Maize	12844	11856	988	40459	34086	74545

Note: ZBNF denote Zero Budget Natural Farming or intervention plots whereas non-ZBNF are controls.
Source: GOAP (2017)

Figure 1. Summary of data with results of Yield and Income for Farmers’ in Andhra Pradesh (Mishra)

While some studies insist that the switch to ZBNF is negligible to both cost and yield, this data seems to speak for itself. An extensive investigation of different agricultural outcomes in 2016-17 (shown above) clearly shows a correlation between the switch to ZBNF, higher yield production and increased cost saving. This data can be represented in the column graphs below, clearly highlighting the difference in non-ZBNF and ZBNF farming from an economic lens:

Comparing ZBNF and Non-ZBNF Yield

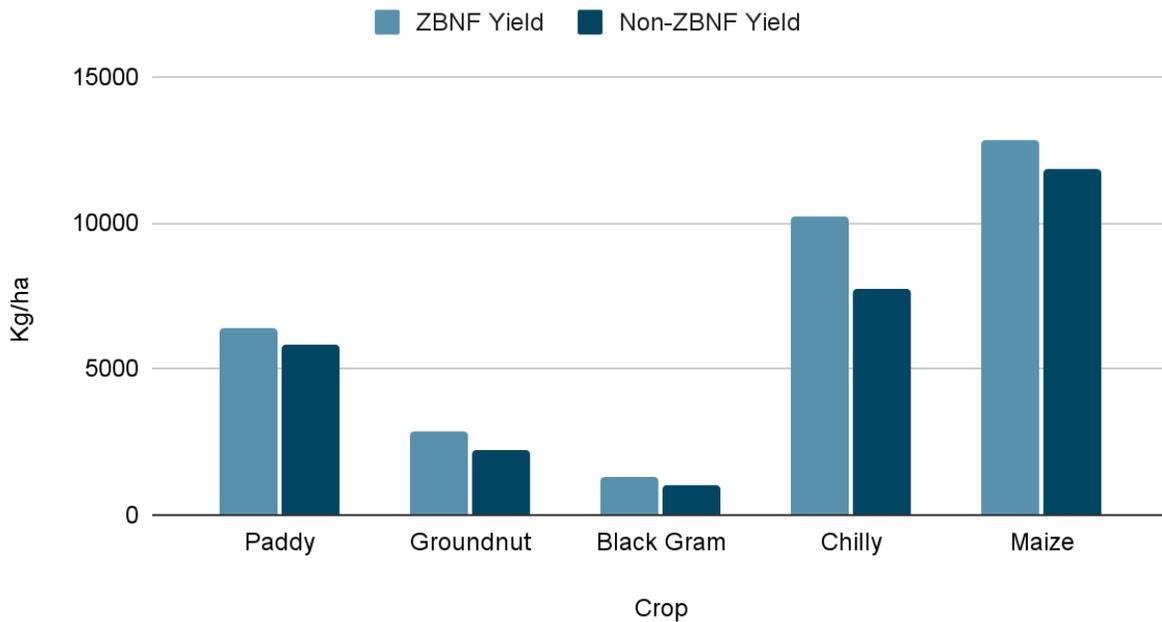


Figure 2. Column Graph representation of Yield Data from Figure 1

One important aspect from the data is the net income gain, solely from the extra yield, that has been added to Andhra Pradesh's farmers' income. This is not a negligible amount and, for some crops like Chilly and Maize, reaches cumulative totals of nearly ₹1,00,000 and ₹50,000 respectively, a very high amount for farmers living on the brink of poverty. Compared to the costs in chemical farming alongside high production cost, high interest rates, market price volatility of crops, increasing costs of fossil fuel based inputs and private seeds, the average Indian farmer is finding it extremely hard to provide economically for their family's wellbeing, a troubling fact. Andhra Pradesh's experiment seems to provide considerable evidence that this does not need to be the case, with the economic analysis carried out clearly pointing to ZBNF as the solution. The original research paper even mentioned a similar quandary, noting that other state governments must acknowledge the positive impacts of ZBNF farming on yield and economic stability for farmers:

“Lessons from Andhra Pradesh point out that to make such alternatives work, there has to be a paradigm shift in the way the agricultural department visualizes and addresses the problem - business as usual will not work.” (Mishra)

Energy and Emissions

The challenges being faced by the agricultural sector in India, however, are not entirely economic in nature. One major challenge of the agriculture sector is maintaining the natural resources and reducing environmental effects for future generations (OECD). The Green Revolution of the 1960s resulted in a diminishing of priorities regarding agricultural waste and environmental degradation. The practices of the revolution were motivated by an extensive use of external inputs (chemical fertilisers) and resources, as well as a poor waste management system. This led to unforeseen results, such as soil degradation, chemical run-off, and extensive use of water. The Green Revolution, or “a period when agriculture in India was converted into an industrial system” (Chakravarti), using more modern technology to speed up agricultural output. Food grain production in 2017-18 surpassed the 2012-13 records by 24.66 million tonnes. Although the practices of the revolution decreased produce prices and aided farmers with land holdings, the environmental damage did not slow. The excessive use of fertilizers and pesticides affected the soil negatively resulting in low soil productivity, decreased soil quality and climate variations. These high cost inputs used in the agriculture sector have become a global concern and require sustainable alternatives (Suresh et al.).

The finance minister declared in the budget to promote ZBNF to bring down the cost of production of farmers and thus, double their incomes. However, he also spoke about the environmental impact of switching to ZBNF. At a moment when chemical intensive farming is evolving into soil and environmental degradation, water depletion and increasing the cost of farm inputs, a zero-cost sustained and environmentally – friendly farming method is certainly a timely initiative. The farming promotes minimal watering, inter-cropping, soil aeration, bunds and top soil mulching and discourage intensive irrigation and deep ploughing. As farmers are not needed to buy any inputs, the cost of production in this farming is zero – leading to lower waste as well. While, there has not been any evaluation of income growth it can result into or its productivity (Alli). There have been some field studies being done at various levels and in various

universities, involving Indian Council of Agriculture Research (ICAR) to comprehend the methods, value and feasibility for farmers in different agro-climatic conditions ("Zero budget Natural Farming"). ZBNF, according to such reports, requires 10 percent of the water and 10 percent of the electricity as compared to its use in chemical and organic farming – a significant drop off. These natural methods and treatments keep the quality of the soil, the underground water and the crops. It prevents any degradation or pollution to the environment and ensures productivity in the long term at a very good level.

In Andhra Pradesh, we can see the real world effects of ZBNF farming. According to a study done by CSTEP, the process of ZBNF requires 50%-60% less water and less electricity than non-ZBNF farms. It needs 45%-70% less input energy (12–50 GJ per acre) and evolved 55%-85% less emissions (1.4–6.6 Mt CO₂e) for irrigated crops. For rainfed-crops, ZBNF requires 42%–90% less input energy (1.1–16 GJ per acre) and results in 85%–99% less emissions (0.5–11 Mt CO₂e). Through significantly many aerations, it has brought down the emissions of methane (Suresh et al.).

Conclusion

In the last two decades, more than a quarter of a million farmers have committed suicide in India. Debt is the main reason for such a high number of suicides. In Haryana, this problem is particularly apparent. Privatised seeds, inputs and markets are expensive, as well as inaccessible to farmers. This, alongside high production cost, high interest rates, market price volatility of crops, increasing costs of fossil fuel based inputs and private seeds, Indian farmers find themselves in a vicious cycle of debt. Such conditions are incredibly unsustainable and harm the most vulnerable stakeholder, our farmers.

To solve many of these problems, this paper considered the introduction of ZBNF farming. ZBNF promises to cut production costs, end a reliance on loans and end the debt cycle for farmers. ZBNF has worked very well in Andhra Pradesh. Andhra Pradesh has targeted 6 million farmers to train them in ZBNF through state-led programmes, led by various private groups. As shown by the results of many research articles, the ZBNF model has both increased yield and subsequent farmer income but also lowered the energy emissions in Andhra Pradesh, with the state having received good results and production. Currently, Haryana also faces the same problems in agriculture as Andhra Pradesh and, if a similar model was to be implemented, the chances of it working are significantly high. Having visited a farm experimenting with both ZBNF and chemical farming setups, I personally verified the multiple benefits of such a scheme by talking to Colonel Sarjeet, the owner of the farm. Apart from the empirical data collected, the results showcased by this paper highlight the encouraging impacts Zero-Budget Natural Farming can have on Haryana.

References

- “Agriculture and the Environment.” OECD, www.oecd.org/agriculture/topics/agriculture-and-the-environment/.
- Alli, A Narayanamoorthy / P. “Is Zero BUDGET Natural FARMING WORKING?” @Businessline, The Hindu BusinessLine, 13 Sept. 2019, www.thehindubusinessline.com/opinion/is-zero-budget-natural-farming-working/article29410335.ece.
- Chakravarti, Aravinda K. "Green revolution in India." *Annals of the Association of American Geographers* 63.3 (1973): 319-330.
- Drishiti IAS. “Zero-Budget Natural Farming.” Drishiti IAS, 14 Sept. 2019, www.drishitias.com/daily-updates/daily-news-editorials/zero-budget-natural-farming#:~:text=It%20was%20originally%20promoted%20by,that%20relies%20%20on%20Agro%2d%20Ecology.
- “Indian States Step up Natural Farming Adoption.” Down To Earth, www.downtoearth.org.in/blog/agriculture/indian-states-step-up-natural-farming-adoption-73281.
- Jebaraj, Priscilla. “What Is Zero BUDGET Natural Farming?” The Hindu, The Hindu, 28 July 2019, www.thehindu.com/sci-tech/agriculture/what-is-zero-budget-natural-farming/article28733122.ece.
- La Via Campesina. (2016). Zero budget natural farming in India. 52 Profiles on Agroecology: Zero Budget Natural Farming in India. FAO Agroecology Knowledge Hub. Retrieved from <http://www.fao.org/agroecology/detail/en/c/443712/> [Crossref], [Google Scholar]
- Merriott, Dominic. "Factors associated with the farmer suicide crisis in India." *Journal of epidemiology and global health*, 2016, 6.4: 217-227.
- Mishra, Srijit. “Zero Budget Natural Farming: Are This and Similar Practices The Answers.” Nabakrushna Choudhury Centre for Development Studies, June 2018.
- Mittal, Surabhi. “Andhra Pradesh Priorities: Agriculture, Mittal.” Andhra Pradesh Priorities: Agriculture, Mittal | Copenhagen Consensus Center, www.copenhagenconsensus.com/publication/andhra-pradesh-priorities-agriculture-mittal.
- Naidu, N Chandrababu. “Agricultural Issues and Challenges in Andhra Pradesh during 2004 to 2014.” Business Standard, Business-Standard, 29 Dec. 2018, www.business-standard.com/article/economy-policy/agricultural-issues-and-challenges-in-andhra-pradesh-during-2004-to-2014-118122900494_1.html.
- “Performance of Indian Agriculture at State Level.” *The State of Indian Agriculture: Agricultural Productivity, Food Security and Climate Change*, 2020, pp. 188–206., doi:10.4135/9789353885953.n9.
- Rao, Bhanupriya. “Losing Their Fields and All Hope, Andhra Farmers Turn Daily Wagers.” Indiaspend, Indiaspend, 6 Apr. 2019, www.indiaspend.com/losing-their-fields-and-all-hope-andhra-farmers-turning-daily-wagers/.
- Suresh, N S, et al. “LIFE CYCLE ASSESSMENT OF ZBNF AND NON-ZBNF.” Center for Study of Science, Technology and Policy (CSTEP), Feb. 2020.
- “Zero Budget Natural Farming.” NEO IAS Current Affairs Plus, 26 Sept. 2019, neoiasp.com/2019/09/26/zero-budget-natural-farming/science/.

