

Natural Farming: A Way for Sustainable Development

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Abstract: *Agriculture is an important sector in India for the sustenance and growth of the Indian economy. Using conventional techniques in agriculture is like cancer to our soil and health, as well. It does not only make the soil barren but eventually, the farmer goes under debt. Hence, the only way to deal with this ever rising problem is Zero Budget Natural Farming (ZBNF). The word 'budget' refers to credit and expenses, thus the phrase 'Zero Budget' means without using any credit, and without spending any money on purchased inputs. 'Natural farming' means farming with Nature and without chemicals. Zero budget farmers use mulching, soil protection techniques, natural pesticides and fertilizers. The principal methods of ZBNF include crop rotation, green manures and compost, biological pest control, and mechanical cultivation.*

Keywords: natural farming, zero budget, Natural farming, Zero input, ZBNF

1. Introduction

On an average half the country's population today depends on agriculture and allied services for their livelihoods and it contributes around 17 per cent of the gross value added to the national economy (Chen et al, 1995). Continuous as well as overuse of chemical fertilizer, crop residue burning, and pesticide application lead to environmental pollution worldwide. These decreased the soil micro and macro-fauna which directly affect C-N ratio and nitrification activity (Shaikh & Gachande, 2013). Most of the farmers in India are marginal and small landholding category, the major problem with them is that if they will invest more money to purchase inputs and not get satisfactory yield due to failure in managing the incidence of pests and diseases or due to unfavourable climatic conditions lead to an increase in production cost. There are four pillars of ZBNF i.e. Jivamrita, Bijamrita, Acchadana and Whapasa. Farmers are depended on inorganic or external chemical inputs like fertilizers and pesticides which lead to contamination of groundwater as well as other water associated ecosystems. It also leads to reduction in soil fertility over time. Overuse of pesticides, fertilizers or other chemical inputs is a serious problem for the health of farmers across India. In order to ensuring food security by reviving Indian agriculture in environmentally safe way and to release farmers from debt cycle, zero budget natural farming (ZBNF) can be a viable solution. It discards use of all the chemical inputs and depends on natural way (Bishnoi and Bhati, 2012).

The concept of zero budget natural farming (ZBNF) was given by Subhash Palekar, for which he was honoured with 'Padma-Shri'. He met with the Japanese philosopher Fukuoka. They both came with methods of natural farming and encouraged the method of natural farming widely in Karnataka as zero budget natural farming. Zero Budget means without using any credit, and without spending any money on purchasing inputs such as fertilizers and pesticides. It is a natural way of farming without any capital investment. It basically goes back to use of only rich a natural resource on which ancient

agriculture was fully depended. Expenditure on purchased inputs is completely excluded in this system (Ranjan and Sow, 2010). If some cost is incurred, then it is reimbursed by the profitable production. ZBNF is gaining momentum as it maintains soil health for sustainable crop production through diversification, microbial activities, nutrient recycling, interaction of beneficial microorganisms (Khadse et al., 2014).

Zero budget natural farming means no money is spent to purchase inputs such as fertilizers and pesticides. Zero budget farming promises to exorbitantly reduce production costs. Zero budget farmers rely on mulching, soil conservation techniques, natural pesticides and fertilizers. Due to continuous retention of crop residues replenishment the soil fertility, it helps in maintaining the soil health. Management of pest and diseases is a key component in zero budget natural farming crop production systems. In ZBNF, formulae for fungicides i.e. sour buttermilk (*khatti lassi*), 'Sonthastra' for pest management 'Agniastra', 'Brahmastra', 'Neemastra', 'Dashparni ark'. ZBNF allows farmer to grow chemical free as well as healthy and safe food.

Zero Budget Natural Farming (ZBNF)

It is perhaps the most successful agrarian movement in the world in terms of its reach. There are several advantages of shifting modern day agriculture to basic or traditional approach by adopting zero budget natural farming. ZBNF reduces the need of taking loans for farming purpose as it completely depends on the use of internal or naturally available inputs. Therefore, it can be a measure to decrease indebtedness and case of suicide by farmers especially of small and marginal categories. Further, by eliminating chemicals such as fertilizers, pesticides from farming activities, ZBNF can check further degradation and can restore the soil health. It also helps in sovereignty of traditional land races, encourages soil aeration, bunds and top soil mulching, intercropping and less water application which do not bring sudden increase in productivity but helps in increasing farmers' income by

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developing self-sustaining system after at least 3 years of conversion period.

Ecological benefits of zero budgets natural farming have been also reported (Pawar et al., 2013). Besides, in present context of labour crisis ZBNF can be a suitable option as it does not encourage various intercultural operations and therefore the involvement of hired manual labours.

The Components of ZBNF

There are four main components of zero budget natural farming:

Jivamrita / Jeevamrutha

ZBNF suggests a kind of bio-fertilizer which adds nutrients to the soil for proper growth of plants. Application of this fermented microbial culture catalyses soil microbial and earthworm's activities. Plant growth promoting rhizobacteria, cyanobacteria, and phosphate solubilising bacteria, mycorrhizal fungi, and nitrogen-fixing bacteria are some important microorganisms present in the product (Chen et al., 1995). It requires 20 kg cow dung, 5-10 litres urine, 2 kg dicot flour are well mixed and these are added in irrigation tank at regular intervals of 15 days till the soil is enriched or spray 200 litres of jeevamruth twice in a month.

Bijamrita

ZBNF suggests treatment of seeds. It is composed of 20 litres water, 5 kg cow dung, 5 litres urine 50 g lime, and a hand full of soil are profoundly and store in a tank. It is used as a seed treatment, contains naturally occurring beneficial microorganisms. Research studies showed that inoculation with bijamrith protects the crop from harmful soil-borne pathogens and young seedlings roots from fungus and a soil-borne and seedborne disease also produces IAA and GA3 (Sreenivasa et al., 2010).

Acchadana / Mulching

ZBNF focuses on several advantages of covering the soil with dust or plant materials (Acchadana/Mulching). It protects the top soil from degradation. Besides, it improves soil aeration and conserves soil moisture by checking water loss through evaporation. Weed emergence is also reduced through mulching.

Whapasa / Moisture

ZBNF involves conservation of water and the precise application of water-based on crop water requirement. Whapasa focuses on improving water use efficiency by decreasing the quantity and frequency of irrigation water applied as only a limited amount of water is needed (in form of vapour) for the crop growth. One method is Irrigation during noon in alternate furrows to make air and water molecules to remain in soil.

Benefits of ZBNF

The cost of production in ZBNF is zero as there is no requirement of buying inputs by the farmers.

1. It consumes only 10% of the water that crops consume in traditional methods.
2. One cow can produce 10-12 kg fresh dung and it is sufficient for 30 acres of land in one month.
3. Higher significant yield found under ZBNF in different cash and food crops. e. g. 11 % and 40 % high yields of cotton and gulli ragi in ZBNF plot than in non-ZBNF plots.
4. Farm input costs are nearly zero as no fertilizers and pesticides are used.
5. ZBNF farms were able to combat a long time under drought and flood situations.
6. Planting more crops and border crops on the same piece of land works as nutrient sources.

Additional Practices of ZBNF

Crop Rotation and Intercropping

Intercropping is cultivation of two or more different crops together on a land at a time. It results in better harvesting of solar radiation, utilization of land and other resources and checking evaporation and erosion etc. It also helps farmers to enhance income or provide subsistence in case of main crop failure. Diversification of cropping system is another important practice of ZBNF as it breaks the habitat and therefore the build-up of pests and diseases.

Plant Protection

Bio-pesticides ('*Neemastra*', '*Agniastra*', '*Bramhastra*' etc.) made through natural or organic or bio-products are only permitted to use in zero budget natural farming during the times of pest and disease outbreaks to protect the plants to reach economic injury levels. They are effective in controlling various seed, soil and air borne diseases and insects such as aphids, jassids, mealy bugs, white flies etc.

Contours and Bunds

Bunds and contours are constructed with the aim to decrease water borne erosion of land and conserve rain water for crop production.

Indigenous Earth Worm Species

In ZBNF, addition of vermin-compost in to the soil is not encouraged according to Palekar, deeper soil has its own indigenous earth worm species which can efficiently enhance soil fertility when any organic matter is added to the soil and there is no particular need of use of external vermin-compost he further stated that exotic earth worm species specially *eisenia foetida* is threatening as it absorbs toxic metals and contaminates from ground water and soil (Mishra et al, 2012).

Cow Dung

Faeces of local Indian cows *bos indicus* are only recommended in ZBNF activities as Indian species contain more advantageous microbes around 35 crores as compared to foreign breeds according to Palekar lots of harmful bacteria fungus and other pathogens are present in dung of foreign breeds and Indian breed is found to be effective for crop cultivation one local indigenous cattle breed can cultivate 30 acres of land ZBNF promoters therefore suggest not mixing the faeces between Indian and foreign cattle breeds and ask farmers to use dung and urine of local Indian cow in ZBNF and those of foreign breeds for biogas or fuel generation

Why Necessary?

According to National Sample Survey Office (NSSO) data, almost 70% of agricultural households spend more than they earn and more than half of all farmers are in debt. In States such as Andhra Pradesh and Telangana, levels of indebtedness are around 90%, where each household bears an average debt of ₹1 lakh. In order to achieve the Central government’s promise to double

farmers income by 2022, one aspect being considered is natural farming methods such as the ZBNF which reduce farmers’ dependence on loans to purchase inputs they cannot afford. Meanwhile, inter-cropping allows for increased returns. The Economic Survey has also highlighted the ecological advantages.

Effectiveness of ZBNF?

A limited study in Andhra Pradesh claimed a sharp decline in input costs and improvement in yields. However, reports also suggest that many farmers have reverted to conventional farming after seeing their ZBNF returns drop after a few years, in turn raising doubts about the method’s efficacy in increasing farmers’ incomes. ZBNF critics, including some experts within the Central policy and planning think tank NITI Aayog, note that India needed the Green Revolution in order to become self-sufficient and ensure food security (Table 1). They warn against a wholesale move away from that model without sufficient proof that yields will not be affected. Sikkim, which has seen some decline in yields following a conversion to organic farming, is used as a cautionary tale regarding the pitfalls of abandoning chemical fertilizers.

Table 1: Status of ZBNF in different states of India

S. No.	States	Area under ZBNF (x1000 Ha)	State’s cultivable area under ZBNF (%)
1	Andhra Pradesh	665000	66
2	Karnataka	64000	50
3	Uttarakhand	215	40
4	Himachal Pradesh	175	35
5	Maharashtra	5625	25
6	Kerala	457	22
7	Tamil Nadu	1656	21
8	Chhattisgarh	920	20
9	Assam	600	20
10	Tripura	40	20
11	Mizoram	120	15
12	Manipur	60	10
13	West Bengal	560	10

States Started ZBNF

According to the Economic Survey, more than 1.6 lakh farmers are practicing the ZBNF in almost 1, 000 villages using some form of state support, although the method’s advocates claim more than 30 lakh practitioners overall. The original pioneer was Karnataka, where the ZBNF was adopted as a movement by a State farmers’ association, the *Karnataka Rajya Raitha Sangha*. Large-scale training camps were organised to educate farmers in the method. According to a survey carried out in those early years, ZBNF farmers all owned small plots of land, had some access to irrigation and owned at least one cow of their own. Andhra Pradesh rolled out an ambitious plan to become India’s first State to practice 100% natural farming by 2024 (Fig.1). It aims to phase out chemical farming over 80 lakh hectares of land, converting the State’s 60 lakh farmers to ZBNF methods.



Figure 1: Indian states started practicing ZBNF

The Future of ZBNF

NITI Aayog has been among the foremost promoters of the ZBNF method. However, its experts have also warned that multi-location studies are needed to scientifically validate the long-term impact and viability of the model before it can be scaled up and promoted country-wide. The Indian Council of Agricultural Research is studying the ZBNF methods practiced by basmati and wheat farmers in Modipuram (Uttar Pradesh), Ludhiana (Punjab), Pantnagar (Uttarakhand) and Kurukshetra (Haryana), evaluating the impact on productivity, economics and soil health including soil organic carbon and soil fertility. NITI Aayog has said, if found to be successful, an enabling institutional mechanism could be set up to promote the technology.

2. Conclusions

Zero budget farming is environmentally friendly as well as cost effective it leads to savings on the cost of seeds fertilizers and plant protection chemicals due to continuous retention of crop residues it helps in maintaining the soil health other thing is that management of pest and diseases is a key component in zero budget natural farming crop production systems regardless the controversies and critics points of view there is nothing to contradict the fact that ZBNF has been evolved with very positive mentality to benefit farming community in fact it has been able to revitalize many small-scale farmers of the nation however before its recommendation it needs strong scientific evaluation or validation of its claim for this multi-locational trials by unbiased autonomous bodies such as ICAR to study ZBNF's impacts on soil land and environment health socioeconomic status of farmers and food security of nation are very much needed.

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