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Augmentation of Zero Budget Natural Farming For Sustainable Agriculture

Pallavi Mohanapure and Meghraj Chavhan
M.Sc Research Scholar, M.Sc Research Scholar
Dr. Panjabrao Deshmukh Krishi Vidyapeeth
P.O. Krishi Nagar, 444104 Akola, Maharashtra (India)
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Abstract:

The 'Green Revolution' due to conventional farming succeeded due to adoption of improved varieties of seeds, synthetic and chemical fertilizers, pesticides and farm machineries incorporation. Owing to this it lead a serious concerns related to human health and soil texture and fertility. Thus, there's a need to move towards the sustainable farming which is economically viable and environmentally acceptable. This article enlightens chaos caused in agriculture and health due to current conventional farming and its adverse effects. It gives the present fact, scenario, and solutions, an alternative to completely destroy rising crises in Indian agriculture. Exploring an alternative solution, Zero Budget Natural Farming (ZBNF) is found the only way to deal with this problem in the integrated and sustainability of natural resources. The method of ZBNF in present-day agriculture enlightened several ideas, concepts, and processes to be effectively utilized for the long term sustainability of Indian farming. ZBNF's system of approach is primarily based on the natural ecosystem which includes seed rotation, compost and green manure, biological pest control, and mechanical cultivation. The four wheels of ZBNF's are most common and cost-effective namely Jivamrita, Acchadana, Bijamrita, and Whapasa. The importance and practicability of ZBNF is though time memorable but their benefits are never-ending. Therefore efforts are made to describe the ZBNF system, utility, and sustainability for Indian farming practices.

Keywords: Agriculture, sustainability. Zero Budget Natural Farming (ZBNF).

Introduction

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In recent decades, the presence of toxic chemicals in the atmosphere has been subject of serious debate (Bao et al., 2015). The latest WHO reports documents that more than 50 percent of eatables have chemicals of a carcinogenic nature (Prasad, 2016). Food that we eat to sustain our lives is a gradual poison as everyone is known to the fact that in agriculture synthetic pesticides are commonly used to monitor harmful pests and to avoid crop yield losses or damage to goods. Pesticides can have adverse effects on human health and the environment, resulting in high biological activity and, in certain cases, a long duration in the climate. Farmers are regularly exposed to high levels of chemicals, typically much higher than customers (Damalas and Koutroubas, 2016). Exposure to growers happens especially during much of the preparation and implementation of chemical spray solutions and during the spray system clean-up. Pesticides and other foreign substances in foodstuffs and drinking water along with harmful air pollution present an imminent danger to public health (Fig 1), although other toxins eventually grow in the ecosystem and in the human body and induce disease far after the first contact (Gavrilescu et al., 2015).

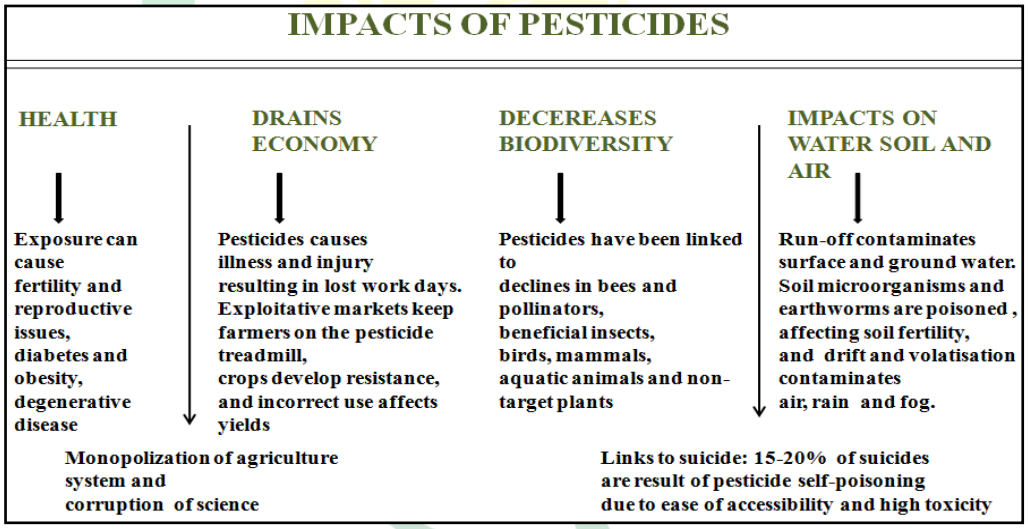

Fig 1. Imapcts of pesticides on health and other factors

In 2017, 20 farmers died from pesticide poisoning in the Yavatmal district located in Maharashtra state's Vidarbha area, more than 700 were in the hospital. A farmer figurehead reported that even more than 700 farmers have been hospitalized and 25 lost eyesight due to chemical spraying infection. Cocktails of highly hazardous pesticides after that year's

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incidents, the Yavatmal government hospital introduced acetyl cholinesterase serum tests to detect organophosphate poisoning. Added chemicals are being used in Vidarbha, however. Pertaining to the report called "Of Rights and Poisons, Accountability of the Agrochemical Industry (Pesticide Action Network Asia Pacific 2018)", Polo pesticide contains the active ingredient of the insecticide 'diafenthiuron.' Diafenthiuron is a compound called the thiourea and not an organophosphate. This finding is disturbing because all cases of poisoning cannot be treated with one remedy. About 200k farmers in India alone committed suicide in 2016 because of the heavy debts they had to bear to finance the costly and deadly crop growth enhancers.

Question arises, solution to such crises?

The newly adopted farming strategy among farmers, after seeing the adverse effects of chemical cultivation, is (ZBNF) classified scientifically as Zero Budget Natural Farming, as it is called by the United Nations Food and Agriculture Organization. Zero budget farming is a collection of farming practices requiring zero agricultural credit and the use of artificial fertilizers. The zero budget farming seeks to bring the farmers out of the debt trap they've found themselves in with Indian economy liberalization. The zero budget farming model aims to dramatically slash agricultural expenses and eliminates loan dependence. It also decreases reliance on imported products, as it facilitates the use of own seeds and natural fertilizers available locally. However, the concept of natural agriculture is not something that is brought from Japan. Similar theories have been commonly practiced over thousands of years of Indian agriculture. Natural agriculture is also referred to in India as 'Rishi Kheti,' based on ancient Vedic farming concepts such as the use of animal waste and herbal juices to combat pests and foster plant production (Kulrajan 2018). The four wheels of ZBNF - Jivamrita, Acchadana, Bijamrita, and Whapasa.

Defining the ZBNF System

Zero Budget Farming, as the name suggests, is an agricultural cycle in which the plant growing and processing costs are null with an evolving range of farming practices intended to drastically minimize farmers' direct costs ('zero budget') though increasing yields

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and farm productivity through the use of non-synthetic inputs generated locally ('natural agriculture'). Like Agroecology, which is a research discipline, collection of practices, and a zero-budget (Wezel et al. 2009), the agricultural social revolution implies both a collection of practices and a social movement too. This means farmers do not have to buy fertilizers and pesticides to ensure nutritious production of the crops. The method governs organic biodegradable materials attainable locally, filled with the technical knowledge of nature and modern technologies with sustainable farming methods based on naturally occurring biological processes. Shri Subhash Palekar who is regarded as the "Father of zero budget natural farming" all over the country dragged this idea into the light, for which he was awarded Padma Shri in 2016 (Anon., 2016).

Is zero budget natural farming working?

One of Budget 2019's main declarations was a huge promotion of zero budget natural agriculture (ZBNF). Terming it as 'returning to fundamentals,' the Minister of Finance made a clear case for ZBNF adoption. The reaction to this initiative has been mixed, however, with some analysts hailing it as a landmark move that would rejuvenate the beleaguered farming industry.

It has achieved wide-ranging popularity in southern India, especially in Karnataka where it first emerged (Kumar N., 2012). Now, it is spreading across India, very quick and dynamic. ZBNF is making headlines in Andra Pradesh, where the methodology has already been adopted by more than 500,000 farmers as part of a state government-led initiative in the State which plans to scale up to 6 million by 2024. ZBNF supporters believe that the soil already provides all the nutrients required to grow plants and that the activity of microbial crops applied to the soil removes certain nutrients from the soil itself. But if only nitrogen were produced by stimulating release from the topsoil, the resulting depletion of organic matter would result, and all organic matter would be removed from the topsoil within 20 years. That would contribute to a rapid decline in crop production and make soils less vulnerable to droughts, the scientists argued.

The basic method of ZBNF is given by Palekar, progressive farmers of the Vidarbha region and pioneer of zero budget agriculture in the Nation is used. In his experiment-based over six

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years of dedicated research, Palekar came up with some solutions and methods. (Bishnoi and Bhati 2017). ZBNF has essentially four wheels Jivamrita, Bijamrita, Acchadana, and Whapasa (Palekar, 2014).

Important component of Zero budget farming

Bijamrita (a seed treatment) and Jivamrita are reservoirs of beneficial bacteria that have plant defence qualities and stimulate plant growth (Sreenivasa, Naik, and Bhat 2009). Jivamrita consists of jaggery (20 kg), cow-dung (20 kg), urine (5-10 liters), and dicot flour (2 kg) and is added directly to crops with each Irrigation cycle. Bijamrita consists largely of water (20l), cow dung (5 kg), urine (5l), lime (50gm), and just a handful of soil. Contrary to traditional agriculture, Palekar suggests that the soil already has all the nutrients required for plant production and that no additional inputs need to be added; rather, the current nutrients need to be "unlocked" and made bio available by Jivamrita (Palekar 2005) - this concept by Palekar is called Annapurna.

In ZBNF mulching takes various shapes. "Live mulching" is encouraged with a combination of monocotyledons (like millets) and leguminous dichotylledons (like beans) to cover crops. The monocots provide nutrients such as potash or phosphate, while the nitrogen-fixing dicots support (Palekar 2006). Straw mulching is also promoted, using residue from dry crops. Acchadana may be made by soil mulch, straw mulch or live mulch.

Waaphasa stands for water vapour. Palekar maintains the roots contain water vapour rather than water. He supports a microclimatic state around the roots where there is a combination of molecules of air and water and opposes overwatering. For optimum Waaphasa formation, he prescribes watering only when the sun is high at noon. Irrigation should be minimized and in substitute furrows, irrigation should be done only at midday. Palekar believes that ZBNF activities will minimize water use by up to 90 percent, making it suitable for rain-fed farming (Palekar 2006).

Other essential concepts are the intercropping, furrow cropping process, contour and bunds scheme, and the use of local earthworm organisms. Palekar also provided the pest control formulae (Table 1) that he called, Agniastra, Brahmastra, and Neemastra (Palekar, 2014).

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Table 1. Name, Composition, and Controls

Sr. No.	Name (Management formulae)	Composition	Controls
1.	*Agriastra*	It consists of 10 liters of Local Cow Urine, 1 kg of Tobacco, 500 grams of Local Garlic, 500 gm of Green Chili, 5 kg of Neem leaves pulp (crashed in urine). The 2l Brahmastra is taken in 100 l of water for spraying.	This works well against pests such as Leaf Roller, Stem Borer, Fruit borer, Pod borer
2.	*Brahmastra*	It is prepared by leaves of neem, custard apple leaves, lantern camellia leaves, guava leaves, leaves of pomegranate, papaya leaves, and leaves of white dhatura crushed and boiled in the water.	It controls all the sucking rodents, pod borers, fruit borers, etc.
3.	*Neemastra*	It consists of 24 hours fermented local cow urine (5l), cow dung (5 kg), and neem leaves and neem pulp (5 kg).	Using this to suck pests & Mealy worm

Findings and benefits of ZBNFs system adoption in India

Intensive farming activities have significant environmental impacts. Any of the issues related to agriculture are climate change, erosion, genetic modification, irrigation challenges, pollution, soil depletion, and waste. Increased use of chemicals such as urea, nitrate, phosphorous and many other pesticides has compromised the quality of the air, water and soil. Genetically altered crops are herbicide-tolerant and herbicide-resistant 'super weeds' have been produced by their overuse. Non-target trees, birds, fish, and other wildlife were also killed due to the application of pesticides. Soil erosion has changed the soil's microbial population, modifying the soil's nitrogen balance, pest management, and chemical transition properties (Kulrajan 2018).

Natural agriculture is the alternative to that all such hazards. Often known as 'do-nothing farming' or 'no-tillage farming' is this sustainable method of cultivating. It was first popularized in Japan in the 1940s, by Masanobu Fukuoka. The aim is to encourage nature to play a dominant position in as far as possible. The farmer is considered a pure facilitator of

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natural farming, and the actual job is performed by nature itself. There are no good or poor species in a natural farm; all of these are important to a healthy environment.

The fundamental principles of natural agriculture

- No-till farming – soil plugging changes the soil's natural ecosystem and encourages plant production.
- No-tillage weeding or herbicides-weeds are not removed but can be prevented by spreading straw over freshly sown soil and increasing soil cover.
- No chemical fertilizers – it's because introducing chemical fertilizers makes the plant expand but not the soil, which begins to worsen.
- No reliance on toxic pesticides-the juggling act of nature itself stops any animal from acquiring the upper hand.

Benefits of zero budget natural farming

In turn, this approach lets farmers get out of debt and increases soil fertility, yield, and product quality. Earthworm demolishes the plants and animals, thereby enriching the soil with humus. It also increases the soil aeration and the capacity to retain water by creating micro and macro pores in the soil. Pest prevention approach used in this not only works us get rid of pest destruction but also defends us from the amusing side effects of chemical processes such as distortion, contamination, carcinogenic substances, and food poisoning. Unlike chemical fertilizers, soil and water degradation and their depletion are not caused by this. Rotation and intercropping of crops protect the soil from drought and nutrient depletion. Mulching, though, reduces the evaporation and retains sufficient soil moisture. It provides the microorganism present in the soil with a favourable climate. By the term, drug consistency, it means nowadays free from unnoticeable disease causing contaminants, which is a serious concern. For a brief, ZBNF is unquestionably a revolutionary strategy, politically, psychologically, biologically, and physiologically.

Constraints in zero budget natural farming

A recent study has reported that wider adoption of zero-budget natural farming (ZBNF), which the central government is trying to encourage as a way to help farmers double their incomes, could potentially lead India to failure to fulfill its food requirement for all its

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population in the coming decades. There are, however, a few critics who doubt ZBNF's feasibility and have discounted the initiative outright, saying that ZBNF is far-fetched in helping boost farmers' revenue, let alone doubling it. In addition to livestock health expenses, cattle feed prices are still relatively high. In recent years, feed costs have skyrocketed making it as pricey as milk because of the reduced grazing lands and the depletion of small water bodies. The cattle feed wholesale price index (WPI) rose from 106.7 to 159.3 between 2012 (April) and 2019 (November), a rise of around 50 percent.

ZBNF, above all, supports the need for an Indian breed cow, whose numbers are decreasing at a rapid rate. How can the optimistic dream of doubling farm income by 2022 be fulfilled, considering the declining numbers of Indian breed cows? The preliminary figures of the 2019 Livestock Census show that the overall indigenous and non-described cattle population in the country has dropped by 8.1 percent, while that of exotic and cross-breeds has soared by 29.5 percent over that of the previous 2012 Census.

The coalition-requirement in all ZBNF projects declined over time relative to chemical farming. Farmers interviewed therefore clarified that the labour requirement depends on farm size and crop type; sugarcane and paddy are labour intensive. A small farm, below 1–2 ha, can be handled with the farm family's own labour and according to a survey many families who relied solely on their own extended support for the property. Farmers with greater holdings of land (above 2 ha) will employ labour. In Karnataka, (Satishkumar and Umesh 2018) the availability of farm labour, particularly during peak seasons such as harvest, has deteriorated sharply and farmers across the board are adopting strategies to cope with labour shortages such as the farm mechanization, alternative crops, leasing out the land, and leaving land fallow among others.

Conclusion

The common consciousness and laid bare the hundreds of thousands of farmers who lost their lives because of helplessness we as a community refuse to imagine and react. Let us not be in any doubt about the Indian agriculture crisis. It is under this that the Zero Dependent Natural Farming, which resonates with agroecology concepts and answers the

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issues of the twin-dimensions of the risk one, sees a way out. A majority of respondents indicated that they have seen changes in yield, soil fertility, seed diversity, and product quality, household food autonomy, revenue, and health over time, by implementing ZBNF.

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