

Zero Budget Natural Farming (ZBNF) for Sustainable Agriculture: A Review

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Abstract

Environmentally focused solutions have raised the sustainable intensification and agro-ecology.

Agriculture was, by default, organic throughout the world before the technique of manufacturing synthetic nitrogenous fertilizer was discovered in 1903. Agriculture is an important sector in India. Most of the farmers heavily depend on inorganic Agrochemical inputs such as fertilizers and pesticides. These agrochemicals contaminate groundwater and reduce soil fertility over time. The continuous use of pesticides and chemicals is a serious problem for the health of farmers across India. Synthetic fertilizers were introduced in India during 1965-66 and their use grew rapidly. However, by the end of the twentieth century the ill-effects of such chemical-based farming were very well understood by the common Indian people and demand for organically produced food started growing. The word "budget" refers to credit and expenses, thus the phrase "zero budget" means without using any credit and without spending on inputs. "Natural farming" means farming without using the chemicals. Zero Budget Farmers use natural pesticides and fertilizers. The principal methods of ZBNF include crop rotation, green manures and compost, biological pest control.

Introduction

For the first zero budget was introduced by Japanese Agriculturist M Fukuoka and same trend was made in India by Subhash Palekar, the explorer of ZBNF, introduces many principles and methods of ZBNF [1]. Andhra Pradesh planned to become India's 1st state to practice 100 % natural farming by 2024. It aims to phase completely removal of chemical farming over 80 lakh hectares of land, converting the State's 60 lakh farmers to ZBNF methods. Modern chemical-based agriculture now a day's increased the cost of production or reduced crop yield due to various reasons [2, 3]. Growing of commercial same crop year after years such as rice, wheat, cotton, and sugarcane results in the depletion of soil fertility, topsoil infertile, soil vitality, groundwater, and mostly on soil beneficial microbes population. Zero budget farmers use mulching, soil protection techniques, natural pesticides and fertilizers. The principal methods of Zero budget natural farming has basically four pillars Jivamrita, Bijamrita, Acchadana (Mulching) and Whapasa. By using ZBNF farmer will be able to grow chemical free food [4]. Most of the Indian farmers belong to marginal and small landholding category. If they invest more money to purchase inputs and not get satisfactory yield due to enabling to manage the incidence of pests and diseases and also adverse climatic conditions lead to an increase in the cost of production. "Zero Budgets" farming also promises to end a reliance on loans and cut production costs, ending the debt cycle for farmers [5]. The principles of natural farming are focused on environmental biodiversity and soil health and follow the laws of nature in agricultural production. Natural Farming positively affects soil quality and microbial community composition within sustainable farming systems [6]. Natural farming minimizes the external inputs to farmland which degenerate the soil nature, increases microbial aeration and good water retention capacity [7].

Methodology

Zero budget natural farming (ZBNF) consist of four pillars Jivamrita, Bijamrita, Acchadana-Mulching, Whapasa moisture [8] refer (Table 1). Other important principles are intercropping, contour and bund system, local species of earthworm. Palekar also gave formulae for Fungicides i.e. Sour butter milk, Sonthastra mentioned in (Table 2). For pest management i.e. Agniasthra, Brahmastra, Neemastra, Dashparni ark which is mentioned in (Table 3) [9]. Jungle kikandi used

as gibberellic acid while Saptdhanyankur ark used for shining in fruits, vegetables and seeds as mentioned in (Table 4).

Discussion

Use of Beejamrutha, a mix of cow dung, cow urine, water, lime and a handful of soil has been given importance in sustainable agriculture since age old days. It is also one such organic product helpful for the plant growth. The beneficial microorganisms present in beejamrutha are known to protect the crop from harmful soil-borne and seed-borne pathogens [10]. An initial yield reduction is commonly observed when converting from conventional agriculture to organic farming [11, 12, 13]. The 'chemical free' parallels in organic farming and ZBNF have called into question whether replacing intensive conventional farming with ZBNF will provide enough food to meet the growing requirements of the large and growing Indian population [14, 15]. Initial findings from our research, however, suggest that there will not be a short-term yield penalty when converting land from conventional agricultural practices to ZBNF methods in small scale systems, regardless of crop selected [16,17]. Who reported that bacteria present in panchagavya acted as biocontrol agent [18]. Reported that the combined application of beejamrut, jeevamrut and panchagavya increased yield and drymatter production in chilli. The yield of brinjal could be increased by 33 % by the application of organic promoters like panchagavya [19, 20]. Observed that application of a combination of beejamruth, jeevamruth and panchagavya (1:1:2 ratio) at 75 DAS and 160 DAS increased tomato yield. The effectiveness of floral and foliar application of PGPR on yield improvement of apple was reported

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Table 1: Basic Pillars of ZBNF.

Sr. No	Methods	Preparation	Benefits
1	Jivamrita	It is made from cow-dung (20 kg), urine (5-10 l), jaggery (20kg) and flour (2kg) and is applied to crops with each irrigation cycle.	It provides nutrients, but it also acts as a catalytic agent which promotes activity of microorganisms in soil, as well as increases earthworm activity. It also helps to prevent from fungal and bacterial diseases.
2	Bijamrita	It is basically made up of water (20l), cow dung (5kg), urine (5l), lime (50g) and a handful soil.	It is a seed treatment, equipped in protecting young roots from fungus as well as from soil-borne and seed-borne diseases.
3	Acchadana (Mulching)	It can be done by soil mulch, straw mulch.	It conserves soil moisture, by reducing evaporation.
4	Whapsa (Mositure)	The irrigation should be reduced and irrigation should be practiced at noon in alternate furrows.	It is condition where air molecules and water molecules present in soil.

Table 2: Fungicides in ZBNF.

Sr. No	Name of fungicide	Composition	Benefits
1	Sour Butter Milk	For (1acre) It is made from Sour Butter Milk (5 litres), Water (200 litres) then mixed and applied to crops by irrigation.	It acts as a fungicide
2	Sonthastar	Dry Sonth 200 gram, Desi cow milk (5 litre), Water (200 litre)	It acts as a fungicide

Table 3: Pest Management in ZBNF.

Sr. No.	Name of Pest Management Formulae	Composition	Benefits
1	Agniastra	It composed of 20 litres Local cow urine, 500 gm Tobacco, 500 gm of Green Chilli, 500gm of Local Garlic, 5kg Neem leaves pulp (crushed in urine). For 1acre spraying, 6-8 litres Agniastra left after boiling is taken in 200 litres water.	It is effective against the pests like leaf roller, stem borer, fruit borer, and pod borer
2	Brahmastra	It composed of 10 lit local cow urine, 5 kg Neem leaves, Guava, Mango, Neem and Castor (Eranda) leaves pulp crushed (2-2 kg each). It is prepared by crushed and boiled in desi cow urine. For 1acre 2.5-3 litres solution mix in 200 lit water and used as spray.	It is used to control all of sucking pests, fruit borer, and pod borer.
3	Neemastra	It is made up of local cow urine (5 litres), cow dung (5 kg) and neem leaves (5 kg) water (100 litres). It is prepared by mixing all materials and use after 48-72 hours for 1acre	It is used for sucking pests and mealy bug.
4	Dashparni ark	It composed of 200 litres Water, 20 litres local cow urine, 2 kg Cow Dung, 500 gm Turmeric powder, 500gm ginger paste, 200 gmAsafoetida (Heeng) Powder, 1kg Tobacco powder, 1 kg of Green Chilli paste, 1 kg Garlic paste, 2-2 kg Leaves of 10 plants Castor (Eranda), Neemkarang, Custard apple, Bael, aak, datura, mango, guava, marigold, turmeric. Then mix all material then use this solution for 1acre after 28 days.	It is used to control all of sucking pests and borers.

Table 4: Other formulations in ZBNF.

Sr. No.	Name of Formulae	Composition	Benefits
1	Jungle kiKandi	One year old cow dung cake 15 kg and 50 litres of water. Mix well in drum and place in shade for 4 days and spray the solution for 1 acre after four days in 200 litres of water.	It acts as growth promoter (gibberellic acid).
2	Saptdhanyankur ark	100 gm of each sesame, green gram, black gram, lobia, coffee, mash, wheat seeds. Soaked and sprouted seeds of these are crushed in 200 litres of water & place it for 2 hrs. After 2 days drain out solution out of it and spray within 48 hrs in 1 acre area in 200 litres of water.	It develops shining in fruits, vegetables and seed crops

by [21]. According to [22]. This moisture and temperature regulation may account for the higher yields in the ZBNF system.

Conclusion

Overall concerning about ZBNF, there is reduced use of water and electricity, improved farmers health, maintenance of local ecosystems and biodiversity, without leaving any toxic residue in the environment. Thus, the social status of farmers can be improved without compromising on mother Earth.

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