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Farming with Nature: Can Zero Budget Natural Farming Work in Fruit Orchards?

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INTRODUCTION

1. A farmer's story, and the question behind it

In Bijalpur village, Haryana, a farmer is reported to have not ploughed his land for three years. He grows cowpea between his banana plants and irrigates with a home-made fermented mixture called jeevamrut. By his own account, his eight-acre mixed farm now brings in a surplus of about ₹4 lakh a year. It is an intriguing story. But can the same approach work for other fruit growers?

The question matters because orchards are long-term investments. Their productivity depends not only on this season's inputs but also on soil structure, water, nutrient balance and the health of the orchard ecosystem. Zero Budget Natural Farming (ZBNF) offers one way to manage these resources while spending less on purchased inputs. Its promise deserves attention, and so do its limits.

2. Why India went looking for another way

For about sixty years, Indian agriculture has been shaped by the Green Revolution. Between 1991 and 2003, a "Golden Revolution" lifted fruit and other horticultural production sharply. Fertilisers, pesticides, high-yielding varieties and wider irrigation all helped. But heavy and imbalanced use of agrochemicals has a price: gradual decline in soil health, harm to the environment and to non-target organisms, pest resistance, food-safety worries and rising costs of cultivation. That is why many growers and policymakers are now looking at alternatives such as natural farming.

3. What does "zero budget" really mean?

ZBNF is associated in India with farmer and educator Subhash Palekar. It emphasises locally prepared biological inputs, soil cover, reduced soil disturbance, crop diversity and less dependence on purchased fertilisers and pesticides.

The word "zero" should not be read literally: labour, livestock care, preparation, transport and application all have costs. A more practical reading is that farmers aim to cut cash spending on external inputs by using resources available on or near the farm.

Natural farming is also not the same as certified organic farming. Organic production follows defined standards and certification, while ZBNF is an approach built around a set of practices and locally prepared inputs. Neither label, by itself, guarantees a particular yield, quality or profit.

Palekar teaches that 98–98.5% of a plant's nutrition comes from air, water and sunlight. The science is more nuanced. Plants do obtain most of their carbon from atmospheric carbon dioxide, and hydrogen and oxygen mainly from water, while sunlight supplies energy rather than minerals. But essential mineral elements, including nitrogen, phosphorus, potassium, calcium, magnesium and micronutrients, must still come from soil reserves, biological processes or other inputs. Orchard managers therefore need to monitor nutrient status instead of assuming that the soil will replenish everything on its own.

4. Four practices at the heart of ZBNF

ZBNF is commonly explained through four practices: jeevamrut, beejamrut, acchadana and whapasa. Farmers often combine them with intercropping and other locally suitable measures.

A. Jeevamrut: a fermented biological preparation

Jeevamrut is traditionally made from cow dung, cow urine, jaggery, pulse flour, farm soil and water. One commonly described recipe mixes 10 kg of cow dung, 10 litres of cow urine, 2 kg of jaggery, 2 kg of pulse flour and about 30 g of farm soil in 200 litres of water. After several days of fermentation, it is filtered and sprayed at about 10%, or applied with irrigation water (Bishnoi and Bhati, 2017).

Jeevamrut is best described as a fermented biological preparation, not a complete fertiliser. Analysis at the Organic Farming Research Centre, Shimoga, found about 1.4% nitrogen and very little phosphorus or potassium. Its composition and microbial population vary with ingredients, water quality and fermentation conditions, and a high microbial count in the laboratory does not automatically mean higher fruit yield in the field. Panchgavya is a related preparation made from cow-derived materials with milk, curd, ghee, jaggery, tender coconut water and ripe banana; its effects also depend on how it is prepared and used.

What have fruit trials found? In Alphonso mango, six sprays of 55% cow urine gave about 90 kg of fruit per plant against 65 kg in the water-sprayed control (Damodhar and Shinde, 2010). That tested cow urine alone, not the whole ZBNF package. In Himsagar mango, biofertilisers combined with 3% panchgavya gave 42.1 kg per plant against 36.4 kg in the control and 38.1 kg with chemical NPK (Sau *et al*., 2017). In banana, farm residue with 2% jeevamrut gave 68.3 tonnes per hectare against 49.3 for residue alone, although a 100% organic-manure treatment did slightly better at 72.8 (Kaswala *et al*., 2017).

These results are useful examples, but they belong to particular cultivars, sites and treatments. The practical message is not that one preparation can replace every nutrient input. It is that biological preparations can be one component of an integrated orchard plan, with nutrition checked through soil and leaf analysis.

B. Beejamrut: a good start for seeds and grafts

Beejamrut is a seed-treatment preparation generally made from cow dung, cow urine, water and lime. It is used before sowing or planting to support early establishment. The treatment must match the crop: a seed soak, a stone treatment and a graft dip are not interchangeable.

Nursery results look promising. In khirni, a 12-hour cow-urine soak followed by 12 hours in cow-dung slurry raised germination from 28% to 66% (Shinde and Malshe, 2015). Not every natural soak worked: in the mango graft study, cow urine and cow dung alone performed poorly. Concentration, soaking time and crop all matter, so follow the original protocol.

C. Acchadana: a protective cover for orchard soil

Mulching is one of the most practical ideas in natural farming, and it has a wide evidence base beyond ZBNF. A layer of straw, leaves or other plant residue reduces evaporation, moderates soil temperature, suppresses weeds and protects the surface from raindrop impact. Palekar describes soil mulch, straw mulch (about 6–8 inches thick) and live mulch from intercrops.

Fruit trials are encouraging. Paddy-straw mulch gave 47 kg of guava per plant against 28 kg without mulch (Das *et al*., 2010). In litchi cv. Bombai it raised soil moisture from 9.7% to 22.8% and yield from 75 to 94 kg per plant (Das *et al*., 2016). In aonla it lifted yield from 37.5 to 41.5 kg per plant and vitamin C from 478 to 498 mg per 100 g (Singh *et al*., 2010). In another aonla trial in Jammu, black polythene gave the heaviest fruit (Iqbal *et al*., 2015), a reminder that mulch need not always be organic.

Mulch should suit local conditions. Keep it away from direct contact with the trunk, maintain drainage, and watch for rodents and termites.

D. Whapasa: balancing moisture and air

Whapasa stresses that the root zone needs both water and air. The principle is sound: prolonged waterlogging restricts root respiration, while excessive drying limits uptake. Palekar describes ideal soil as holding roughly equal air and water in its pores, and recommends light irrigation around noon in alternate furrows. In practice the balance varies with soil texture, structure, rainfall and irrigation system, so scheduling should follow crop demand, soil type, root depth and weather instead of a fixed rule.

5. Intercropping: using the space between trees

Young fruit trees leave open space between rows, and intercropping can diversify production there. Combinations reported include aonla with turmeric, mango with cowpea or black gram, and jackfruit with cowpea. Legumes can add nitrogen through biological fixation, while cover crops protect the soil and provide extra produce or biomass.

The choice must change as the orchard matures. Canopy, root spread, water, nutrient demand and market access all matter, and a crop that suits a young orchard may compete with mature trees for light, water and nutrients. Monitor both the fruit crop and the intercrop, and do not judge success from the intercrop harvest alone.

6. What does wider research say?

Evidence on ZBNF is still developing, and findings differ with location, crop and the comparison system. Duddigan *et al*. (2022) ran twenty field-plot experiments across six districts of Andhra Pradesh and found no short-term yield penalty under ZBNF compared with conventional and organic treatments, though responses differed among agro-climatic zones.

Smith *et al*. (2020) raised an important caution: biological nitrogen fixation may not supply all the nitrogen that higher-yielding systems need, and it cannot replace phosphorus, potassium or other minerals. That matters for fruit trees, which remove nutrients in every harvest and may stand for decades.

A landscape-level study of the large ZBNF programme in Andhra Pradesh found, on average, comparable yields and much higher profits than agrichemical farming (more than double), along with higher densities of some bird groups (Berger *et al*., 2025). The authors also reported variation among farms and urged care when rolling out ZBNF in already high-yielding regions.

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Policy interest is growing too. The Government of India approved the National Mission on Natural Farming in November 2024 as a centrally sponsored scheme to promote natural farming through awareness, training, demonstrations and local bio-input resources. For fruit growers, the opportunity is to adapt suitable practices to perennial horticulture instead of transferring field-crop recommendations directly to orchards. Agricultural universities, Krishi Vigyan Kendras and horticulture departments can help with demonstration orchards that measure yield, fruit quality, soil health, water use, pest incidence, labour and net returns over several years.

7. The reality check

Natural farming should not be presented as cost-free or automatically productive. Preparing formulations and managing mulch and intercrops take time and labour, and livestock may not be available to every farmer. Productivity may fall in the first two to three years if methods are not followed properly. Many farmers doubt that commercially viable yields are possible without chemical fertilisers after decades of use, and rural areas often lack guidance and a market that rewards natural produce.

The evidence also has gaps. Most fruit-crop studies test one treatment at one site over a short period. A trial of cow urine, panchgavya or mulch is not the same as a long-term comparison of a complete ZBNF orchard with a well-managed conventional or integrated one. More multi-location, multi-year trials are needed in perennial fruit crops.

A sensible approach is to track soil organic carbon, pH, electrical conductivity and available nutrients, along with leaf nutrient status, tree growth, yield, fruit quality, irrigation use and total cost. If deficiencies appear, correct them with locally recommended and legally permitted inputs. The goal is a healthy, productive orchard, not loyalty to a label at the expense of the trees.

8. What fruit growers can take away

- **Start small.** Test selected practices on a few trees or one block before expanding.
- **Mulch the tree basin** where straw or residues are available, keeping the trunk clear and drainage good.
- **Treat jeevamrut, beejamrut and panchgavya as crop-specific tools,** not universal replacements for nutrient management.
- **Use legumes and cover crops** where competition for water and light can be controlled.
- **Keep a control.** Compare treated trees with existing practice over more than one season.
- **Record every cost,** including labour, livestock, preparation, transport and irrigation.
- **Test soil and leaves** regularly so that nutrient depletion is not missed

CONCLUSION

Zero Budget Natural Farming offers fruit growers ideas worth testing: keep the soil covered, recycle farm resources, encourage biological activity, diversify the orchard and reduce unnecessary dependence on purchased inputs. Mulching and some biological treatments show encouraging results, and wider studies suggest outcomes depend on local conditions and management.

The strongest path is neither blind acceptance nor blanket rejection. It is to combine traditional knowledge with sound horticultural science, monitor the orchard carefully, and keep the practices that prove themselves locally. A sustainable orchard must protect its soil and biodiversity while staying productive and profitable for the farmer.

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