

Maintenance of Crop Nutrient Status under Natural Farming

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SUMMARY

During green revolution, the synthetic chemical fertilizers were used extensively to meet the fertility requirement of various crops. However, with the passage of time, scientific surveys and evidence indicated a number of hazards associated with their overuse. Chemicals has killed various beneficial macro and microorganisms in the soil and contaminated soil, air, surface and ground water. There is eutrophication of fresh water, meaning that bodies of fresh water become heavily enriched with minerals and nutrients due to runoff from land. This leads to unwanted growth of water plants and algae which can kill off marine animals, as well as overgrowth of Cyanobacteria that produces harmful toxins that can accumulate in the food chain and harm humans. Direct contact with these chemicals can burn skin, damage the respiratory system, aggravate existing health conditions and increase the risk of developing certain diseases. People with existing kidney, liver, urinary or respiratory problems are particularly at high risk. To conquer the noxious effects of synthetic fertilizer, a more sustainable farming system is much needed which could reduce the dependence on such expensive external inputs and simultaneously take care of their ill effects. Natural farming as suggested by Shri Subhash Palekar is a feasible and sustainable alternative. The idea is to let nature play a central role to the maximum extent possible. In natural farming, plant nutrient requirement is fulfilled through application of natural inputs. The farmers supply the nutrients to the crops with the help of natural products prepared easily by them on-farm from local cow-based resources at almost negligible cost.

INTRODUCTION

Zero budget natural farming or natural farming has been originally proposed and promoted by Maharashtrian agriculturist and Padma Shri recipient Subhash Palekar, in India in 2016 as a substitute to the chemical farming; that involves intense irrigation. He asserted that the mounting cost of the external inputs purchased for crop cultivation was the prime cause of indebtedness and suicides among farmers, along with the presence of toxic residues in different components of environment. He propounded that in natural farming, there is no need to expend money on inputs or take loans to buy them. This approach will carve down the cost of production and farming made into a close to “zero budget” exercise, breaking the debt chain for many small farmers. Natural farming is a method of chemical- devoid agriculture drawing from traditional Indian practices.

Natural farming is a set of farming techniques that entails zero credit for agriculture and zero use of chemical fertilizers. It became known as a farming movement in Karnataka resulting from the alliance between agriculturist Subhash Palekar and state farmers association Karnataka Rajya Raitha Sangha (KRRS). Also, states like Andhra and Himachal Pradesh have been espousing this model at hammer and tongs.

Four Pillars of Natural Farming:

Jeevamrita/ Jeevamrutha: It is a fermented microbial culture prepared from mixture of dung and urine of indigenous (*desi*) cow, pulse flour and undisturbed soil which acts as inoculate of native sp. of microbes and organisms. This culture furthers the activity of beneficial micro-organisms, earthworms and increases the quantity of organic carbon in soil. This makes the essential nutrients present in soil available to the plants which were earlier unavailable. It maintains fertility level of soil and helps in preventing the attack of various fungal and bacterial diseases.

Beejamrita /Beejamrutha: It is prepared from dung and urine of *desi* cow and burnt lime. It is used for the treatment of seeds, seedlings and other planting material. It shields the plants from the attack of seed and soil borne diseases and roots from the attack of fungus.

Mulching: Mulch lowers the evaporation. It improves micro-climate in soil, increases humus content, safeguards upper layer of soil, preserves soil moisture, increases the amount of essential nutrients and microbial population in the soil and represses weeds.

Moisture (Whapasa): The roots of plants require both water and air instead of water alone. Whapasa is the condition where there both air and water molecules exist in soil. By adding mulch to soil, whapasa is generated which enables faster production of humus and better water management in the soil. Some scientists suggest to reduce irrigation, irrigating only at noon and in alternate furrows.

Key Aspects of Natural Farming:

- This farming is based on nature, science, spirituality and non-violence.
- This farming abstains from the use of synthetic fertilizers, insecticides, fungicides, weedicides, farmyard manure, biofertilizers, and vermicompost.
- Only 1 indigenous cow is adequate for carrying out natural farming on 30 acres of land.
- This method of farming conserves water and electricity by utilizing just 10 per cent water and 10 per cent electricity.
- The production is more as compared to that obtained through conventional and organic farming.
- The produce so obtained with this farming is poison and residue free of high quality, nutritious and of better taste.
- Natural farming is nontoxic to human beings, birds, animals, water and different components of environment unlike conventional and organic farming.
- Only the dung from local, Indian cows is effective in the re-enrichment of barren soil.
- To get the most out of the cow dung and urine, the dung should be as fresh as possible (upto 7 days old) and urine as stale as possible (more than 5 days).

Principles of Natural Farming:

Intercropping: Intercropping helps to supply nitrogen, phosphorus, potash and other nutrients to the main crop. The nitrogen fixing bacteria present in the root nodules of intercrops help in right development of plants. The main crop is also sheltered from insect-pests attack as the intercrops trap them.

Contours and bunds: These are made in the field to collect rainwater which keep the land moist and make the water available to plants for a long time. These also help in proper drainage of water in fields during rainy season.

Local species of earthworms: Local species of earthworms helps through increased organic matter and opposes the use of vermicomposting that adds foreign earthworms (European red wiggler- *Eiseniafoetida*) to Indian soils. He claims that these worms absorb toxicants and poison groundwater and soil. Earthworms increase the humus content in soil thereby enhancing nutrient availability, drainage and a more stable soil structure, all of which help improve crop productivity.

Cow: Natural farming is completely cow-based. Desi Cow dung consists of crores of beneficial microorganisms as compared to foreign breeds. The activity of earthworms is also more in soil treated with dung and urine of *desi* cow which increases the fertility status of soil with their castings. There are 16 major nutrients in dung of *desi* cow which satisfies the nutrient requirement of plants needed for proper growth and development.

Ploughing: Deep ploughing is avoided as it leads to an increase in soil temperature to a level that the carbon from the soil starts vaporizing; this prohibits the humus production in soil decreasing its fertility level.

Water management: In natural farming, the plants are irrigated from such a distance that only 10 per cent of water is used. This helps to enhance root length and stem width and increase overall plant height.

Plant direction: The plants are grown in north-south direction so that they entrap sunlight for longer span of time. Greater plant to plant spacing triggers better growth of each plant by enhanced interception of sunlight. Thus, the plants become healthy and deter the attack of insect-pests and diseases. The plants accumulate nutrients in desired quantities and the production increases by 20 per cent.

Microclimate: Mulching helps to maintain optimum conditions under natural farming like 65 to 72 per cent moisture, 25 to 32 °C air temperature, darkness, humus and warmth in soil.

Local seed/varieties: The requirement of local seeds/varieties for nutrients is less and also are less susceptible to insect-pests and diseases because they possess characters of wild races. So they are adopted under natural farming and use of hybrids is discouraged.

Nutrient Requirement of Crops

The crop nutrient requirement under natural farming can be met by application of:

Jeevamrita

It is a fermented microbial culture of crores of microorganisms that promotes the activity of beneficial microorganisms and earthworms in soil. This helps in making unavailable essential nutrients in soil, available to plants. It also helps to prevent fungal and bacterial plant diseases and increases the quantity of organic carbon in soil. When we prepare jeevamrit, we add 10 kg of cow dung in 200 liters water, thereby adding 30 lakh crores microorganisms, which multiply and double in 20 minutes and become innumerable after 72 hours.

- For its preparation,
- Keep this solution in shade for 2-3 days for fermentation.
- Stir the solution daily in morning and evening for 2 minutes with a wooden stick in clock-wise direction and cover with a jute bag.
- Filter through the cloth and store.
- Use the prepared solution within 7 days.

Rate of Application in Soil

Field crops: Once or twice a month at the rate of 200 liters per acre along with the irrigation water.

Fruit crops: Apply at noon under the shade of tree at the rate of 2 to 5 liters around the tree.

Rate of Application in Standing Crops as Foliar Sprays

For 60-90 day's duration crop:

First spray: 21 days after sowing @ 5 liters in 100 liters water/acre.

Second spray: 21 days after first spray @ 20 liters in 200 liters water/acre.

For 90-120 days duration crop:

First spray: 21 days after sowing @ 50 liters in 100 liters water/acre.

Second spray: 21 days after first spray @ 10 liters in 150 liters water/acre.

Third spray: 21 days after second spray @ 20 liters in 200 liters water/acre.

For 120-135 days duration crop:

First spray: one month after sowing @ 5 liters in 200 liters water/acre.

Second spray: 21 days after first spray @ 10 liters in 150 liters water/acre.

Third spray: 42 days after third spray @ 20 liters in 200 liters water/acre.

For 135-150 days duration crop:

First spray: one month after sowing @ 5 liter in 100 liter water/acre.

Second spray: 21 days after first spray @ 10 liter in 150 liter water/acre.

Third spray: 42 days after third spray @ 20 liter in 200 liter water/acre.

Fourth spray: 21 days after fourth spray @ 20 liter in 200 liter water/acre.

For 165-180 days duration crop:

First spray: one month after sowing @ 5 liter in 150 liter water/acre.

Second spray: 21 days after first spray @ 10 liter in 150 liter water/acre.

Third spray: 42 days after third spray @ 20 liter in 200 liter water/acre.

Fourth spray: 21 days after fourth spray @ 20 liter in 200 liter water/acre.

Fifth spray: At fruiting stage, spray @ 20 liters in 200 liters water/acre.

Fruit Crops

In fruit crops, spray jeevamrit twice a month. For this, strain 20 to 30 liters jeevamrit through a cloth and mix in 200 liters water and use for spraying.

Precautions

There should be enough moisture in the land at the time of application of jeevamrit

Ghanjeevamrita:

It is the source of millions of beneficial microorganisms. It can be used on rainfed areas for better crop growth. There are two methods of preparing ghanjeevamritha

First method

- For its preparation, 20 kg dung of *desicow* + 02 lit urine of *desicow* + 200 gm Jaggery + 200 gm pulse flour + 5 g of soil collected around the bark of big tree are mixed together and knead well.
- This mixture is then covered with jute bag for 4 days.
- Sprinkle water on it. In winters, keep it for 7-14 days.
- Make *balls* of this mixture when it becomes thick and add cow urine if needed.
- Dry in shade and store them.
- They are ready to use.

Rate of Application

Keep the *balls* of ghanjeevamrita around the transplanted seedlings and cover with dry grass. They can also be placed near fruit plants where they will reach roots.

Second Method

- For this, dry 200 kg cow dung in sunlight, break the clods of dung into finer mixture and pass through sieve.
- Add 200 g *gur* and 200 g gram flour through this mixture and then add 50 g soil collected under big tree and 2 liters cow urine. Protect the mixture from sunlight and rainfall and cover with a jute bag.
- Time of preparation is 4 days in summers and rainy season, 7-14 days in winter season and 12-14 days in severe winters.
- Spread the mixture on tarpaulin sheet in thin layer and dry in sunlight.
- Turn the mixture daily upside-down so that entire mixture receives sunlight.
- Break it into fine mixture and store in a jute bag.

RATE OF APPLICATION

Mix 100 kg ghanjeevamrita with 100 kg cow dung per acre and add in soil at the time of sowing of any crop.

CONCLUSION

For fulfilling the food requirement of ever burgeoning population in a country like India and to assuage the hazardous effects of synthetic chemical fertilizers used in agriculture, a more sustainable, eco-friendly and cost-effective farming is required which will take care of the ill effects of chemical-based farming. The natural farming is one such innovative farming which alleviates all these tribulations. Natural farming fulfills the nutrient demand of crops through application of on-farm produced jeevamrit and ghanjeevamrit with locally available inputs. However, for bolstering this approach, multi- location studies

are needed to scientifically corroborate the long-term impact and feasibility of the model before it can be scaled up and advocated throughout the country.

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