



"EMBRACING THE FOUR PILLARS OF NATURAL FARMING: KEY TO ECO-FRIENDLY AGRICULTURE"

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Introduction:

Natural farming, a regenerative agriculture is advocated and promoted worldwide to produce safe and quality produce and to live in harmony with nature. It is a chemical free or do-nothing farming aims to improve the soil biological fertility without the addition of external inputs. Major strategy is continuous application of cow dung and cow urine-based concoctions (4 wheels of natural farming) beside following effective recycling of crop residues, leguminous intercrops as soil cover, pre- monsoon dry sowing, minimizing the irrigation and balancing the soil, air and moisture by irrigating at noon. The farmer is considered only to be a facilitator - the real work is done by Nature herself. No-tillage and farming without the application of herbicides, inorganic fertilizers and pesticides is practiced. Here, actual physical work and labor has been seen to reduce by up to 80% compared to other farming systems. The essence of natural farming is minimizing the external inputs to the farm land, which degenerate the soil nature and improving the crop yield.

“Natural Farming is considered as an agroecology based diversified farming system which integrates crops, trees and livestock with functional biodiversity”. Natural farming is a system where the laws of nature are applied to agricultural practices. This method works along with the natural biodiversity of each farmed area, encouraging the complexity of living organisms, both plants, and animals that shape each particular ecosystem to thrive along with food plants. Natural Farming builds on natural or ecological processes that exist in or around farms. Another term natural farming is a method of chemical- free agriculture drawing from traditional Indian practices. In other sense, natural farming shows the importance of the synergistic effects of both plant and animal products on crop establishment, to build soil fertility and microorganism.

1. Jeevamrutham

Jeevamrutham is an organic fertilizer and a great replacement of chemical fertilizers. It is a fermented microbial culture. It is a very good source of biomass, natural carbon,

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nitrogen, phosphorous, calcium and other nutrients which are essential for plant growth and development. The microorganisms which are present in the soil are responsible for increasing the fertility of the soil and the productivity of the crops. It provides nutrients, but most importantly, acts as a catalytic agent that promotes the activity of microorganisms in the soil, and also increases population of native earthworms.

Ingredients

Water 200 liters, Jaggery 2 kg, Cow dung 10 kg, Pulse flour 2 kg, Cow urine 10 l, Handful of soil from farm/forest/bund.

Preparation

Take a container of 200 liters capacity. Add 200 liters water into it. Then add 10kgs desi cow dung and mix it thoroughly in water. Mix it well with a stick. Add 10 liters of desi cow urine into it. Mix powdered organic jaggery 2 kgs along with pulse flour 2 kgs mix it well without forming any clumps.

Finally add 1 hand full of bund/forest soil into the container and mix it well with a stick in clockwise direction. Cover the container with a gunny bag. The mixture should be stirred thoroughly daily in the morning and evening in clockwise direction. Incubate the prepared solution for 9 to 12 days. After the completion of the fermentation process Jeevamruth is ready for use. A golden-brown colored layer can be observed on the top of the jeevamruth solution.

During the fermentation process, the aerobic and anaerobic bacteria present in the cow dung and urine multiply as they eat up organic ingredients (like pulse flour and jaggery). A handful of undisturbed soil acts as inoculate of native species of microbes and organisms. Jeevamritha also helps to prevent fungal and bacterial plant diseases.

Application

Apply it to the crops twice a month either through irrigation water or as a 10 %

Chemical characterization of jeevamritha	
Name of the bioactive compound	Uses
Diffractaic acid	Antifungal, secondary metabolites
Retinoic acid	Herbicidal
Isoenanthic acid	Capsule for seed
D- Glucohrptose	Antimicrobtial
Benzoic acid, methyl ester	Herbicidal
Carboxybenzene	Fungistatic compound
Daphnin	Strongest antibacterial activity
Columbianetin, lomatin	Increase seed longevity
Fumaric acid	Pesticidal
1,4- Cyclohexanediol	Insect repellent
Benozic acid	Preservatives- inhibit bacteria
Linoleic acid	Activates peroxisome

foliar spray. This process should continue every 15 days until the soil is enriched. After preparation it should be applied within 15 days.

Semi-solid state jeevamrutham

Requirements - 100kg desi cow dung, 5 litre urine, 1kg jaggery, 1kg pulse, one handful of soil from the same land.

Preparation:

Mix all of them with a small amount of water. Make the small balls out of the mixture. Keep these balls in full sunlight to dry them. Now, these dried balls can be kept near the mouth of a dripper or near the sprinkler. When the waterfalls on the semi-solid Jeevamrutham, the microbes get activated again.

Ghana jeevamrutham

Spread 200kg of cow dung on ground uniformly in the form of layer and add 20 liters of liquid jeevamrutham on it and mix it. Now, make a heap of treated cow dung and cover it using jute bag for 48 hours allow it for fermentation then spread on the floor, dry in the sunlight. After drying is completed, store it in jute bags in the room. Ghana jeevamrutham can store for 6 months.

Application - At the sowing period, use the 200kg Ghana Jeevamrutham per acre. For example, two hands of Ghana Jeevamrutham with each seed. Again, during the flowering period of the crop, add 50kg of Ghana Jeevamrutham in between two crop

lines on the soil per acre. Amazing yield will be produced.

2. Beejamrutha

Beejamrutha is a traditional seed treatment technique that originated in ancient Indian agriculture. It involves the preparation of a nutrient-rich mixture that is applied to seeds before sowing. The name “Beejamrutha” is derived from the Sanskrit words “Bheej” meaning seed and “Amrutha” meaning nectar, emphasizing its potential to revitalize and nourish seeds.

Bijamrita/ Beejamrutha is a treatment for plants, seedlings or any planting material before sowing. it's effective in protecting young roots from fungus along side soil-borne and seedborne diseases which regularly affect crops after the monsoon period. It is a preparation of organic agriculture and serves as the 2nd pillar of Zero Budgeting Natural farming.

It is prepared by process of fermentation of ingredients available at agricultural farm itself. These organic preparations are rich sources of beneficial micro flora which support, stimulate the plant growth, help in recuperating vegetative growth and also good quality yield.

Requirement- It is basically made up of water (20l), cow dung (5kg), urine (5l), lime (50gm) and just a handful of soil.

Preparation

Take 5 kg of cow dung in a cloth and bound it by small rope as a small bundle and hang it for a night (12hr.) in 20 litre of water. In another container dissolve 50 g of lime in 1litre of water and keep it for a night. Next day morning squeeze the cow dung in water add handful of soil and stir well. To the solutions add 5 litre of Desi cow urine and lime water and stir well.

Usage

Add beejamrutha to the seeds of any crop, coat them, mixing by hand, dry them well in shade and use for sowing. For leguminous seeds, just dip the seeds quickly (5 minutes) and dry them well in shade and use for sowing. While transplanting, the roots of the seedlings/setts/cuttings may be dipped in beejamrutha solution for five minutes and then planted/ transplanted.

Role of beejamrutha

It protects the crops from harmful fungus, bacteria and other pathogens of soil borne diseases. It has hormones, alkaloids, which enhance the germination and gives protection to seeds and seedlings. Improved seed germination and increasing seedling vigour.

Microbial load in beejamrutha

Higher microbial activity is observed in 10-12 days after beejamrita production.

S. No.	Organisms	Colony count (cfu/ml)
1	Bacteria	15.4 x 10 ⁵
2	Fungi	10.5 x 10 ³
3	Actinomycetes	6.8 x 10 ³
4	Phosphate solubising organisms	2.7 x 10 ²
5	N ₂ - fizers	3.1 x 10 ²

The average nutrients content			
Parameter	Beejamrit	Jeevamrit	Ghanjeevamrit
pH	7.08	5.01	7.20
Organic Carbon %	0.93	1.53	17.29
N %	2.38	0.90	2.00
P%	0.13	0.15	0.46
K%	0.49	0.35	0.10
Na %	0.02	0.05	0.15
Ca (mg/l)	549	100	132
Mg (mg/l)	12.00	54.2	61.75
S (mg/l)	0.12	245	112
Mn (mg/l)	0.08	1.11	2.03
Zn (mg/l)	0.66	0.81	0.99
Iron (mg/l)	1.23	2.00	34.30
IAA (µg ml ⁻¹)	5.28	4.77	6.38

3. Acchadana: Mulching

Three types of mulching have been suggested under ZBNF:

Soil mulch

This protects topsoil during cultivation and does not destroy it by tilling. The aeration and soil moisture are essential for the roots and soil micro-organisms, then the cultivation should be practiced in that soil layer, in which these feeding roots and micro-organisms are

active. Therefore, deep ploughing should be avoided. It is necessary to create the microclimate under which micro-organisms can well develop. Mulching promotes humus formation, suppresses weeds and maintain the water requirement of crops.

the favorable condition is created to decompose the godown roots and to prepare the humus stock in the soil for future new crop generation as a reserve bank. Fourth, the soil moisture is conserved in the soil and transpiration of soil moisture is restricted for

Various crops combinations under Natural Farming		
Particulars	Kharif	Rabi
Vegetables	Tomato + Beans + Cucumber	Cauliflower + Pea + Radish
	Tomato + Beans	Cauliflower + Pea + Fenugreek
	Tomato + Beans + Capsicum	Cauliflower + Pea + Coriander
	Tomato + Beans + Chilli	Cauliflower + Pea + Spinach
	Tomato + Beans + Bottle Gourd	Cauliflower + Pea + Potato
	Tomato + Bean + Okra	Cauliflower + Pea + Onion
	Tomato + Beans + Brinjal	Onion + Pea + Fenugreek
	Capsicum + Beans	Cauliflower + Pea
Vegetables - Cereals	Tomato + Maize + Beans	Potato + Wheat + Pea
	Capsicum + Maize + Beans	Cauliflower + Wheat + Pea
	Bottle Gourd + Maize + Beans	Colocasia + Wheat + Pea
	Tomato +Maize + Beans	-
Vegetables-Pulses	Tomato + Soyabean	Cauliflower + Chickpea
	Tomato + Soyabean + Cucumber	Cauliflower + Kidney Beans + Potato
	Tomato + Soyabean + Chilli	Cauliflower + Chickpea + Coriander
	Okra + Beans	Cauliflower + Chickpea + Fenugreek
Vegetables-Oil seeds	-	Cauliflower + Mustard + Fenugreek
	-	Cauliflower + Mustard + Cabbage
	-	Cauliflower + Mustard + Coriander
	-	Cauliflower + Mustard + Radish
	-	Cauliflower + Mustard

Straw mulch

The cover of dried straw biomass of the previous plants or crops is called straw mulching. By this straw mulching cover, the nature has achieved so many targets. First, the seeds are covered by this straw mulching to save from birds, insects and animals. Second, the microclimate is created to activate the micro-organisms and local earthworms. Third,

the continuous soil micro-organisms utilization. Fifth, the humus saturated soil particles and soil biota in the upper most 10 cm layer of soil surface are saved from the severe heat waves of sunlight in summer, from cold winds in Winter and from heavy stormy rain drops of pre-monsoon and monsoon raindrops.

Live mulch

Live mulching means that intercrops and mixed crops, which give the symbiosis to the host main crop. In the nature there is a symbiosis. The mixed crop pattern of Monocot in Dicot & Dicot in Monocot helps to supply the essential elements to the crops. The Dicot supplies Nitrogen by means of nitrogen fixing bacteria & Monocot supplies other elements like Potash, Phosphate, Sulphur etc.

4. Whapasa/ moisture

Whapasa means the mixture of 50% air and 50% water vapour in the cavity between two soil particles. According to Palekar, what roots need is water in the form of vapours. Whapasa is the microclimate in the soil, by which the soil organisms and roots can live freely with availability of sufficient air and essential moisture in the soil. It increases water availability, enhances water-use efficiency and builds resilience against drought. Most of the micro – organisms and root hair (which absorb water and nutrients) are active in the top 10 – 15 cm of soil layer and it is important to maintain Whapasa in that zone of soil.

