ISBN: 978-81-973427-5-2

9. Natural Farming: Let's Go Beyond Organic Farming

Usha N., Karthik A. N., Kotresh D. J.

Ph. D Scholars, Department of Agronomy
University of Agricultural Sciences,
GKVK, Bengaluru.

Abstract

The agricultural sector is facing significant challenges due to the adverse effects of conventional chemical farming practices, including soil degradation, groundwater pollution, and health risks from pesticide residues. This has led to a resurgence of interest in environmentally friendly and sustainable farming systems like natural and organic farming. Natural farming emphasizes working with nature to create self-sustaining agricultural systems that promote soil health, biodiversity, and resilience against pests and diseases. Subhash Palekar's Natural Farming (SPNF) has gained popularity in India, particularly in Andhra Pradesh and Karnataka, offering a cost-effective and sustainable alternative to conventional farming. Key practices in natural farming include Jeevamrutha, a fermented microbial culture; Beejamrutha, a seed treatment; Panchagavya, an organic growth promoter; Ghanajeevamrutha, a solid form of Jeevamrutha for dryland areas; and Mulching, which improves soil moisture and fertility. These practices enhance soil fertility, reduce the need for chemical inputs, and promote crop resilience, making natural farming a promising option for achieving sustainable food production and conserving natural resources.

Keywords:

Natural farming, Jeevamrutha, Beejamrutha, Ghanajeevamrutha, panchagavya.

9.1 Introduction:

The relevance of natural farming is growing as a result of conventional Chemical farming is either experiencing higher or lower production. Repetition of monoculture farming on the same land, such as growing cotton, rice, and wheat, etc., depletes the topsoil, soil life, groundwater purity, and beneficial bacteria.

The crop plants are now susceptible to infections and parasites as a result. Chemical pesticides and fertilizers are seriously endangering the environment all over the world. The beneficial soil microflora may be destroyed by their continued use. Excessive application of inorganic chemical pesticides and fertilizers caused heavy metal buildup and hazardous chemical contamination of soil, surface, and ground water. Plant uptake of heavy metals such as Cd, Cu, Mn, and Zn is correlated with rising soil pollution levels. Individuals who eat these plant products run the risk of experiencing negative health outcomes.

The metals of greatest concern are lead and cadmium because of their propensity to accumulate and their harmful effects on both plants and animals. Tissues from crops including spinach, lettuce, carrots, and radishes can get contaminated with heavy metals. Higher yields from intensive farming methods necessitate the massive use of expensive, environmentally harmful chemical fertilizers. In the future, the use of chemical pesticides and fertilizers-which are non-renewable energy sources-will significantly reduce agricultural output. Farmers cannot afford chemical fertilizers due to rising energy costs. In addition to generating pollution in the environment, the overuse and imbalance of chemical fertilizers have a negative impact on the physical, chemical, and biological qualities of soil, which affects crop output sustainability. As a result, natural and organic agriculture systems that are sustainable and kind to the environment have recently gained relevance worldwide. Promoting organic agriculture is one of the promising options for achieving sustainable food production and conserving the natural resources. The crop productivity under natural and organic production systems can be improved through optimizing the availability of nutrients required by crops at different stages. This can be achieved through crop residue management, legume crops, integrated organic nutrition by using different sources of nutrients those have different nutrient release pattern and efficiency. Integrated application of organic manures mainly compost, vermicompost, ghanajeevamruth and gliricidia green leaf manure produced higher yield along with improving soil health. Further, foliar and soil application of liquid organic manures mainly Jeevamrutha meet the nutrient demand of crops with greater nutrient use efficiency. Subhas Palekar's Natural Farming (SPNF) is another significant agricultural movement. It is a grassroots peasant movement that has extended to several Indian states and consists of a set of farming practices. In southern India, particularly in Andhrapradesh and Karnataka, where it originated, SPNF has experienced great success. Due to the high expenses of production, Indian farmers are becoming caught in a never-ending cycle of debt; in the past 20 years, over 25,000 farmers have committed suicide in India. Debt has been connected in many studies to farmer suicides. In such circumstances, "SPNF" claims to break the cycle of debt for desperate farmers by eliminating a dependency on loans and drastically reducing production expenses. Farmers in SPNF don't need to buy pesticides or fertilizers to ensure that their crops grow healthily. "Natural farming" refers to farming that uses only natural resources and no chemicals. The three primary activities of SPNF are mulching, Beejamruth, and Jeevamruth. The addition of jeevamruth to the soil effectively activates the microorganisms there. The cow dung used to make jeevamruth contains microorganisms like Pseudomonas fluorescence, which is a phosphorus-solubilizing bacteria, Bacillus silicus, which is a potash-solubilizing bacteria, and nitrogen-fixing bacteria, Azotobacter, and Azospirillum. These agricultural practices have the potential to improve and maintain crop output in rainfed areas by improving soil structure and optimizing nutrient and water availability. The Green Revolution's initial exhilaration is currently wearing off, and it's becoming more and more apparent that technology as a whole has had negative consequences. Our pursuit of optimizing agricultural yield seems to have distracted us from the detrimental effects of green revolution technologies on the environment. The extensive and frequently indiscriminate application of pesticides and fertilizers severely damaged the biological activity of the soil, making large parts of it nearly devoid of life. Numerous health risks are presented by persistent pesticides that are not readily degraded and have gotten into the food chain. In broad portions of command areas, indiscriminate use of irrigation water has resulted in issues with salinity, alkalinity, and water logging. Forests, soil, and water resources are being depleted despite lack of coordinated efforts to restore them enough**.**

9.2 Ill Effect of Green Revolution:

- Chemical corporations chose to focus on the chemical control of insects, illnesses, and undesired plants after developing extremely poisonous, life-damaging compounds for use in warfare.
- The soil's natural fertility is reduced, and its aeration, structure, and water-holding capacity are all destroyed.
- Reservoir silting
- decreasing input return
- The deliberate destruction of beneficial insects, microbes, and predators that inherently restrain excessive crop damage caused by insect pests.
- Producing more resilient and virulent pest species.
- Diminished genetic variety among plant varieties.
- Pesticide residues that is extremely hazardous, poisoning the food.
- Nutritious food crops are being replaced by cash crops.
- Chemically altering the food's inherent flavour.
- High input costs are driving up agriculture expenses.
- Increasing the workload and stress of farmers.
- The finite supply of fossil fuels.
- Increasing the land's requirement for irrigation.
- Depleting the reserves of groundwater.

Problems Due to Use Of HYV:

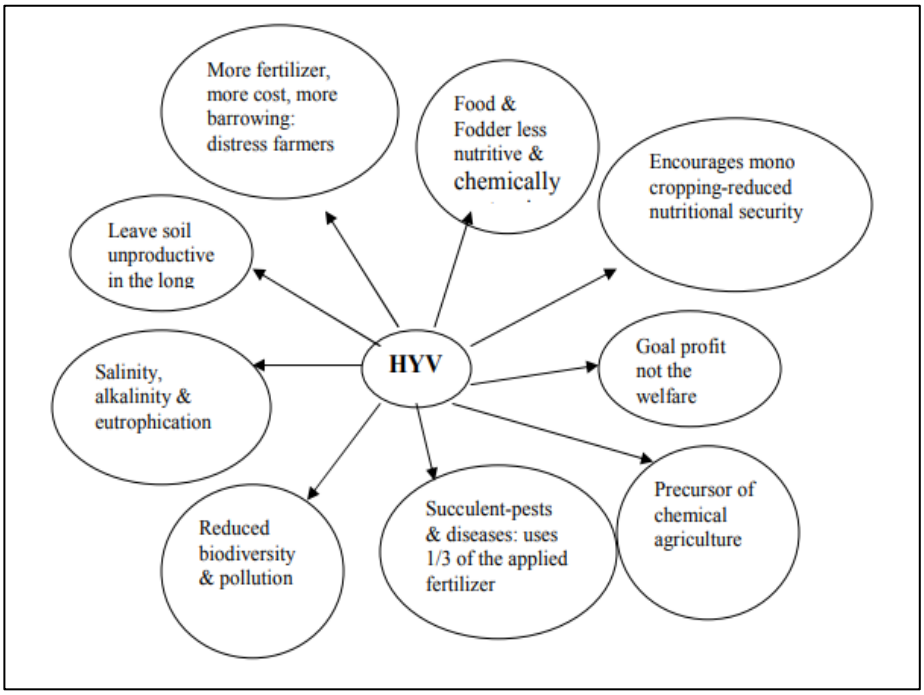

Figure 9.1: HYV

Farmers are frequently forced to take out loans from non-institutional lenders due to the high cost of inputs; if their crops fail, this can place them in a debt trap. Furthermore, a bumper crop does not always bring in a good price. The WTO's regulations, which require member countries to permit unlimited imports up to 5% of GDP, frequently exacerbate this issue.

To the detriment of native growers, this frequently keeps market prices low. Numerous farmers nationwide have committed suicide, and these reasons have been attributed to their actions.

Benefits of Indigenous Varieties:

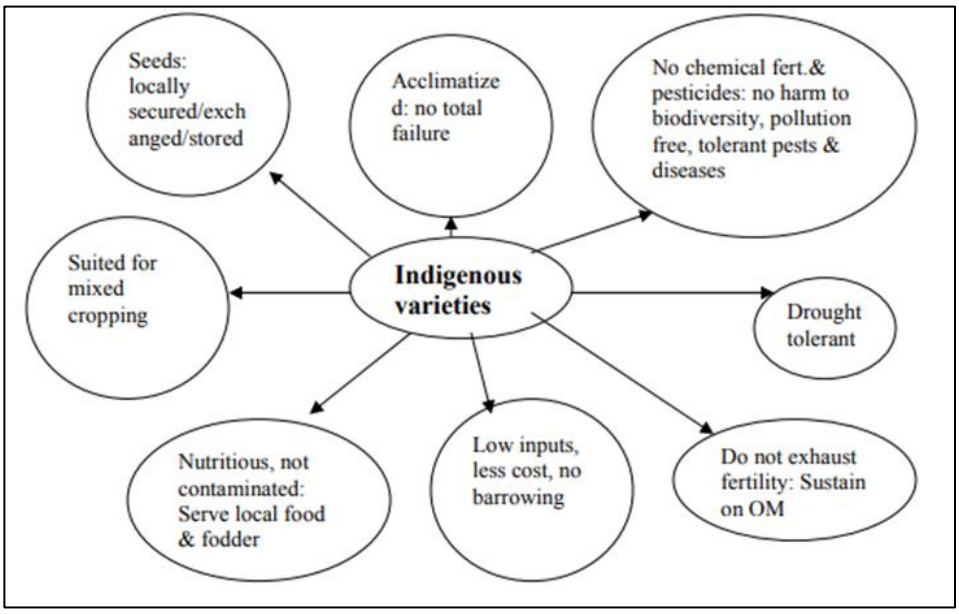

Figure 9.2: Indigenous Varieties

In order to achieve production sustainability, returning to non-chemical agriculture and restoring soil health have become increasingly important. Natural farming is gaining popularity among farmers as an environmentally friendly and farmer-friendly alternative farming strategy.

9.3 Natural Farming A Concept:

The Japanese scientist and philosopher Masanobu Fukuoka, who employed natural farming on his family farm on the island of Shikoku, is credited with popularizing the approach. Prominent farmer Subhash Palekar has contributed to the spread of Natural Farming methods throughout India. Buying essential inputs from the market, such as seeds, fertilizers, and plant protection chemicals, doesn't cost any money when using Natural agricultural, an innovative agricultural technique. Without using pesticides or fertilizers, a farmer can cultivate resilient local crop varieties.

The only cattle the system needs are native breeds, which are already essential to rural farming families. On thirty acres of land, it is stated that one cow is enough to begin farming with this method.

9.3.1 Natural Farming in India:

A holistic approach to production management, known as "natural farming," aims to improve the health of the agroecosystem by fostering biological cycles, biodiversity, and soil biological activity. Natural farming is farming that is self-sufficient, self-developing, and self-nourishing. Working with nature or using the resources that are already accessible is the foundation of natural farming. By implementing natural farming techniques like mulching, beejamrutha, and jeevamrutha, one can reduce the amount of external inputs used on farmland.

It has been demonstrated that enrichment of soil happens through enrichment of beneficial soil microorganisms, and it raises the amount of soil fertility. It promotes crop plants and soil microflora's natural synergy. Mulching can increase the soil's moisture content, provide cover for earthworms, and reduce the growth and spread of weeds.

The indiscriminate use of chemical pesticides and fertilizers in conventional chemical farming practices alters the chemical composition of the soil, destroys beneficial soil micro-flora, and raises crop production costs.

"Natural farming" refers to chemical-free farming that uses the natural world. Fukuoka pioneered natural farming in Japan by working with the environment and propagating crops using only natural methods. He was able to achieve yields that were comparable to chemical farming without causing soil erosion. Minimizing outside inputs to the farm, which deteriorate the natural state of the soil, is the core of natural farming.

- In India, natural farming has historically been carried out using old Vedic farming practices, which include using animal waste such as cow dung and urine.
- The dried biomass on the soil is broken down by these microorganisms, which release nutrients for the plants, and one gram of desi cow dung contains 300-500 crores of these useful, efficient microbes.
- Cow products such as butter milk, ghee, and milk are beneficial for natural farming, while urine is essential for making Jeevamrutha.
- A little over 1.08 million hectares, or 0.7% of the entire agricultural area, are used for natural farming.
- Based on a government of Andhra Pradesh census, around 0.44 million farmers, or 10.5%, engage in natural farming.

9.3.2 Significance of Natural Farming for Indian Farmers:

- All crops are grown in a variety of agroclimatic zones and cropping circumstances.
- The potential of managing inputs on-farm, such as crop residues, green manures, organic manures, and biopesticides, among others, which act as nutrient stores.

- Every year, India has access to 700 MT of biomass from both rural and urban areas, 2000 MT of excreta from humans and animals (equivalent to 800 MT of animal dung), and 600-700 MT of agricultural waste.
- It is anticipated that the dung will yield around 440 MT of manure annually, which is equivalent to 2.0 MT N, 2.75 MT P_2O_5, and 1.8 MT K_2O/annum, even if two thirds of it is used for biogas generation.
- Small holdings: current farming practices that include horticulture, fishery, forestry, livestock, and agriculture;
- Indigenous technological knowledge and skills, as well as the availability of skilled labour, are growing.
- Scientific thinking, methodology, and government policy support for OF are also growing.
- Expanded domestic market for foods that are organic.

9.4 Four Wheels of Zero Budget Natural Farming:

Along with the Crop residue management, Green leaf manure and mulching other four parts of natural farming like Jeevamrutha, Beejamrutha, Whaphasa and mulching are known as wheels on natural farming. Panchagavya and Ghanajeevamrutha also used to practice in Indian natural farming system.

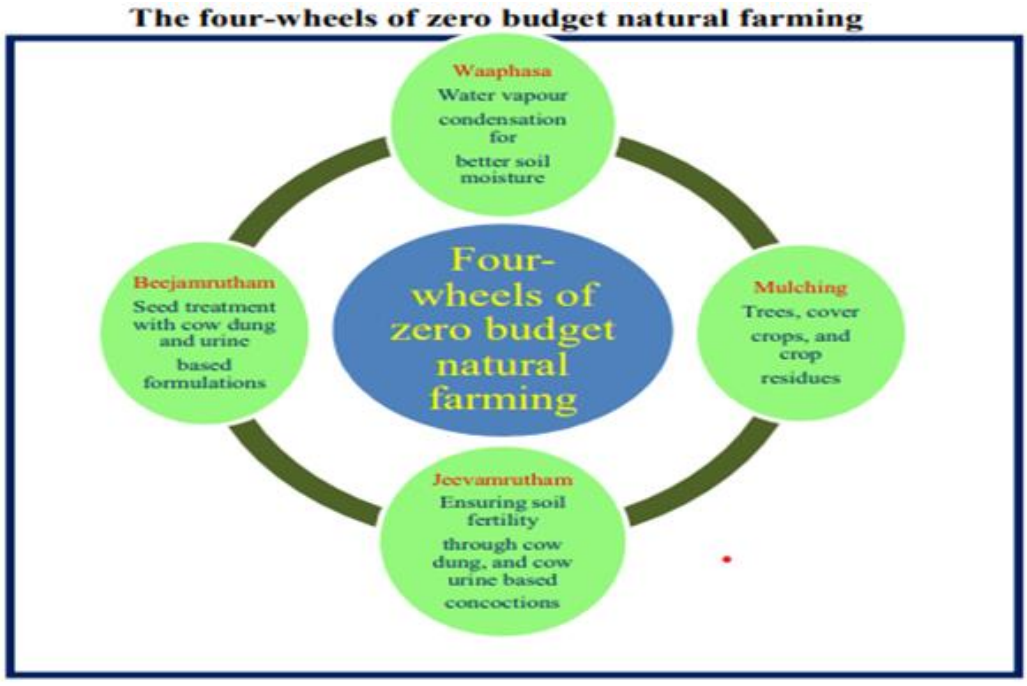

Figure 9.3: Four Wheels of Zero Budget Natural Farming

Rajesh *et al.*, 2019

9.4.1 Jeevamrutha:

Jeevamrutha is a fermented microbial culture. It provides nutrients, but most importantly, acts as a catalytic agent that promotes the activity of microorganisms in the soil.

Raw materials used are:

- Desi cow dung
- Desi cow urine
- Jaggery
- Pulse flour

Table 9.1: Procedure for Jeevamrutha Preparation

Ingredients	Quantity
Fresh desi cow dung	10 kg
Fresh desi cow urine	10 ltr
Jaggery	2 kg
Pulse flour (Gram)	2 kg
Native soil	One handful
Water	200 ltr

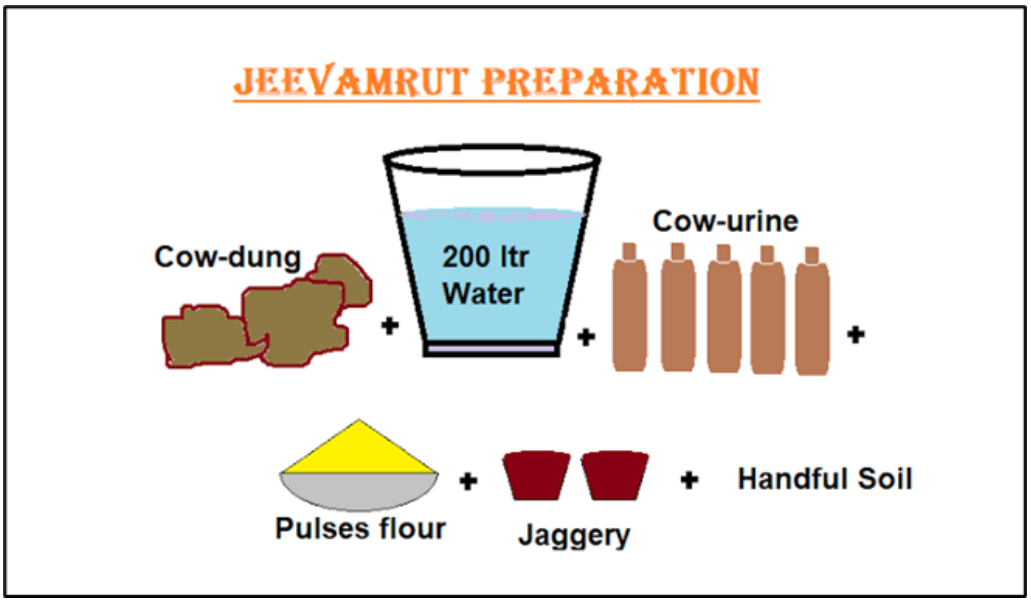

Figure 9.4: Jeevamrutha Preparation

Table 9.2: Nutrient Content of Jeevamrutha

Samples	Content in percent					
	N	**P**	**K**	**pH**	**Mn**	**Cu**
Jeevamrutha	1.47	0.104	0.084	4.92	46	51.00
Jaggery	0.84	0.209	0.290	6.37	9.1	28.80
Flour	1.47	0.622	0.910	6.70	12.6	12.40
Cow dung (desi)	0.70	0.285	0.231	8.08	9.33	3.60
Cow urine (desi)	1.67	0.112	2.544	8.16	6.3	20.00

Navile, Shivamogga

Devakumar *et al*. (2014)

9.4.2 Beejamrutha:

- It's a treatment used for seeds, seedlings or any planting material.
- It is effective in protecting young roots from fungus as well as from soil borne and seedborne diseases.
- By preventing seed and soil borne diseases, beejamrutha increases the germination rates

Procedure for Beejamrutha Preparation:

- Take 20 liter Water, 5 kg Local Cow Dung, 5 liter Local Cow Urine, 50 Gram Lime & Handful soil from the bund of the farm.
- Take 5 kg Local Cow Dung in a cloth and bound it by tape.
- Hang this in the 20 Liter water up to 12 hours.
- Take one liter water and add 50 gm lime in it, let it stable for a night.
- Then next morning, squeeze this bundle of the cow dung in that water thrice continuously, so that all essence of cow dung will accumulate in that water.
- Then add a handful of soil in that water solution and stir it well.
- Then add 5 liter Desi cow urine in that solution & add the lime water and stir it well

Table 9.3: Procedure for Beejamrutha Preparation

Ingredients	Quantity
Water	20 ltr
Cow dung	5 kg
Cow urine	5 ltr
Lime	50 gm
Soil from bund	Handful

Table 9.4: Nutrient Content of Beejamrutha

Samples	Content in per cent					
	N	**P**	**K**	**pH**	**Mn**	**Cu**
Beejamrutha	2.38	0.127	0.485	8.02	16	36
Cow dung (desi)	0.70	0.285	0.231	8.08	9.33	3.60
Cow urine (desi)	1.67	0.112	2.544	8.16	6.3	20.00

Navile, Shivamogga

Devakumar *et al*. (2014)

A. Panchagavya:

- It is an organic product having the potential to play the role of promoting growth and providing immunity in plant system.
- Contain almost all macro and micronutrients and growth hormones (IAA, GA) required for plant growth.
- Predominance of fermentative microorganisms such as yeasts and Lactobacillus helps to improve the soil biological activity and promote the growth of other microorganisms.
- Panchagavya has also been found to be reducing nematode problem in terms of gall index and soil nematode population.
- The formulation act as tonic to enrich the soil, induce plant vigour with quality production**.**
- Due to application of panchagavya, a thin oily film is formed on the leaves and stem, which reduces evaporation losses and ensures better utilization of applied water.

Procedure for Panchagavya Preparation:

- Mix cow dung and cow ghee thoroughly in a pot and keep it for 3 days.
- After 3 days, mix cow urine and water and keep it for 15 days with regular mixing twice a day.
- After 15 days, mix the remaining ingredients like cow milk, curd, tender coconut water, jaggery and rotted banana.
- After 30 days, panchagavya will be ready for the spray

Table 9.5: Procedure for Panchagavya Preparation:

Ingredients	Quantity
Cow dung	7 kg
Cow urine	10 ltr
Cow milk	3 ltr
Cow curd	2 ltr

Ingredients	Quantity
Cow ghee	1 kg
Coconut water	3 ltr
Rotten banana	1 dozen
Jaggery	3 kg
Water	3 ltr

Table 9.6: Chemical and Biological Properties of Panchagavya:

Parameters	Content
Total N (ppm)	1000
Total P (ppm)	175.4
Total K (ppm)	194.1
Zn (ppm)	1.27
Fe (ppm)	29.71
Mn (ppm)	1.84
Bacteria CFU/ml	$26.1*10^5$
Fungus CFU/ml	$18*10^3$
Actinomycetes CFU/ml	$4.20*10^3$
PSB CFU/ml	$5.70*10^2$
Auxin (µ g/kg)	9.15
GA (µ g/kg)	4.0

Source: https://agritech.tnau.ac.in/org_farm/orgfarm_ofk_soil.html

B. Ghanajeevamrutha:

It is solid form of jeevamrutha prepared by cow urine and cow dung for dryland area. This is recommended for dryland/rainfed areas where there is shortage of water to apply Jeevamrutha. While ploughing or before ploughing for every acre 200 kg Ghana-Jeevamrutha broadcast in soil at equal proportion.

Figure 9.2: Ghanajeevamrutha preparation

9.4.3 Mulching:

Vegetables, weeds, and white clover cover the ground beneath robust orchard trees and grain crops. Straw mulch increases soil moisture content and promotes earthworm and microorganism growth.

Plus, it enhances seed germination without requiring tillage. Effective weed control is achieved by the growth of covering plants such as white clover. Growing cover crops, such as legumes, improves the soil's ability to fix nitrogen.

The area occupied by agricultural weed is decreased and the soil's organic matter content is increased when weeds are harvested before they flower and are covered. Herbicide usage can be reduced by using this technique.

There are three types of mulching:

A. Soil Mulch:

- Light cultivation upto 10-15 cm
- Purpose: Air circulation in soil, conservation of rain water and weed management.

B. Straw Mulch:

- It is the cover of dried straw biomass of the previous plants or crops
- Improves soil moisture content and conducive to the growth of microorganisms and earthworm.

C. Live Mulch:

- It means that intercrops and mixed crops, which give the symbiosis to the main crop
- Complimentary effect with respect to sunlight, moisture and soil nutrient availability

Figure. 9.3: Different Types of Mulches

9.4.4 Whapasa (Moisture):

When both air and water molecules are present in the soil, the situation is known as whapasa. It promotes cutting back on irrigation and solely irrigating in alternating furrows at noon

A. Intercropping:

This Growing two or more crops in a same piece of land simultaneously is known as intercropping, a multiple cropping technique.

To put it another way, intercropping is the practice of growing two or more crops concurrently on one field.

There are several varieties of intercropping that change the temporal and geographic mixture to some extent; nonetheless, both parameters must be met for a cropping system to be considered an intercrop.

The degree of spatial and temporal overlap in the two crops can vary somewhat.

Here are a few of the most important kinds:

- **Mixed intercropping**- when two or more crops are planted and grown concurrently on the same piece of land, it's known as mixed cropping. Conversely, intercropping is a sort of crop cultivation where two different product types are cultivated on the same piece of land, but they are farmed in a particular pattern.
- **Row cropping**- When two or more crops are cultivated in the same field at the same time, row intercropping occurs when some of the crops are planted in separate rows. Row intercropping yield is dependent on the particular crop combination, spacing, and planting dates.
- **Temporal intercropping**- A crop that grows quickly and a crop that grows more slowly are cultivated together in temporal intercropping. Consequently, the fast-growing crop is harvested before the slow-growing crop reaches maturity. The cultivation of several crops with considerable growth cycle overlap is known as relay type temporal intercropping.
- **Crop rotation** is related, but is not intercropping, as the different types of crops are grown in a sequence of growing seasons rather than in a single season.

9.5 Succes Stories:

A. Succes Story: Actor Kishor and Vishalakshi:

- Kishore and his wife Vishalakshi cultivating many fruits and vegetable like tomato, mango, capsicum, drumstick, guava, coconut etc. crops naturally in his piece of land near Bannerghatta, Banglore.
- They also started "The Buffalo Back" which is a farming collective which aligns the needs of the urban with the traditional knowledge of the rural

Source: Deccan Herald Source: The logical Indian 2.

B. Succes Story:

T. Suryanarayana Raju A farmer from Andhra Pradesh T. Suryanarayan raju from Gollalagunta (V), Jaggampeta Mandal, East Godavari District. Practicing natural farming system using beejamrutja ,jeevamrutha and mulching practices. During 2011, he stopped application of fertilizers and pesticides and started Natural farming applying only Jeevamrutham. In the first year he got only 14-15 bags (75 kg each) of paddy per acre. Many of his fellow farmers laughed at his results but he didn't care. Slowly year after year yield started growing. After stopping pesticide application, few seasons he did not apply any botanical extracts also. His idea is that let the Insects also eat some produce.

Later on he started using Neemasthram once or twice during crop season to control Paddy stem borer, leaf roller etc. 2015-16 is the fifth year of conversion of his land to Natural farming. Now he is getting 25-27 bags of Paddy variety BPT-5204 during *Kharif* season. Cost of Cultivation reduced to about 12000/- per acre.

He gets about 1125 kgs of Rice from his produce and sells it at Rs.1100/- per bag of 25 kg each. He gets a total income of Rs. 49000/- and there by a net income of Rs. 37000/- per acre. Now he abandoned paddy cultivation during Rabi and started Gingelly, Pulses to maintain soil fertility in a balanced manner and to maximize income from his land during Rabi season also. Besides he gets a good yield of 10.000 MTs fruit yield per acre per year from Oil palm also. After expenses on Oil palm maintenance (Rs. 8000/- per acre per annum), he gets a net income of Rs. 70000/- per acre per annum from Oil palm.

C. Succes Story: Malleshappa Gulappa Biserotti:

Malleshappa Gulappa Biserotti a progressive farmer from Hiregunjala village of Kundgola taluk from Dharwad (District), Karnataka. He has been continuously practicing zero budget farming since the last 5-6 years. He started farming practice by using cow dung, Farm Yard Manure (FYM) and compost. Over four years of usage, he noticed improvement in field and better yield. He started using liquid & solid Jeevamrutha which reduced cost and yield better and now getting remunerative income from agriculture. He growing more than 20 different crops in his 8-10 acres of land like Ajwan Cotton, Sorghum, Wheat, Groundnut, Millets, Chilli and other crops.

Figure.9.4: Malleshappa bisherotti preparing Ghanajeevamrutha

9.6 Conclusion:

- The concept of natural farming by relying on nature will definitely help in improving our ecosystem as well as the socio economic condition of farmers and it encourages biodiversity of micro and macroflora favarable micro climate for crop.
- Among the sources, liquid formulations like jeevamruth and panchagavya in combination with organic fertilizers directly enhance the crop growth and yield by providing both macro and micronutrients along with other growth promoters and enriches soil fertility.
- The practice of this natural farming system over a large-scale might affect the nation's production levels and even question the food security for burgeoning population of India. But, farmers who can't afford costly inputs and also don't want to fall in to debt cycle can adopt Natural farming method.
- Even though Natural Farming renders many benefits like replenishing soil health and reduced cost on inputs somewhere we have to sacrifice for total crop yields due to higher pest and disease incidence.

9.7 Reference:

1. Devakumar N, Shubha S, Gowder SB and Rao GGE. 2014. Microbial analytical studies of traditional organic preparations beejamrutha and jeevamrutha. Building organic bridges, 2: 639-642.
2. https://agritech.tnau.ac.in/org_farm/orgfarm_ofk_soil.html
3. https://khetikibaat.com/index.php/2023/12/11/mr-malleshappa-gulappa-biserotti/
4. https://rkvy.nic.in/Uploads/SucessStory/ANDHRA%20PRADESH/2016/2016102137 Organic_farming_success_story.pdf
5. https://thelogicalindian.com/exclusive/vishalakshi-padmanabhan/
6. https://www.deccanherald.com/india/karnataka/bengaluru/for-kishore-farming-is-as-important-as-acting-752505.html
7. Palekar S. 2006. Text book on Shoonya Bandovalada naisargika Krushi, published by Swamy Anand, Agri Prakashana, Bangalore.
8. Rajesh V, Wagh Sharad K and Auti. 2019. Zero Budget Natural Farming (ZBNF) is Key towards Sustainable Agriculture Development. Online Int. Interdiscip. Res. J. 9(2): 86-93.