



## **Integrated Nutrient & Pest / Disease Management in Organic Farming**

*Some Easy To Use & Natural Solutions*





## Introduction

Modern crop production has considerably raised output but has created various problems which are now known to all. With continued stress on Macro Nutrient management and symptomatic pest/disease management techniques, soil fertility has gradually reduced and incidences of pest/disease attack have increased. This has resulted in increased cost of cultivation and reduced profitability.

Nutrient recycling and its restoration for on-farm fertility and pest management under organic cultivation practices are emerging as the only alternative solution to tackle the above problems.

Organic farming techniques thus give renewed emphasis on integrated nutrient recycling and management, integrated pest management and a probiotic approach to tackle all pest/disease problems. Organic farming systems also give high emphasis on management and multiplication of soil microbes for increased availability of macro and micro nutrients to the plants.

The basis of organic farming is a living soil and this can only be achieved through proper cropping pattern, crop rotation, crop residue management and intercropping. This will result in optimum productivity without any loss of fertility.

A sincere effort is being done through this publication to identify and develop locally available natural inputs and recycle it into high grade organic manure or pest management solution on farm level so that farmers can get the real benefits of it.



## Pest & Disease Problems

S. N.	Main Crops	Main Pest and Disease
1.	Maize	Winter Blight, Stem Borer, Root Borer.
2.	Potato	Red Ant, Late Blight, Winter Blight.
3.	Raddish	Root Rot, Red Ant, Leaf Miner.
4.	Cabbage	Diamond Back Moth, Rust, Powdery Mildew
5.	Tomato	White Fly, Leaf Miner, Blast, Leaf Curl Virus Fruit Borer, Stem Borer, Neemtode.
6.	Pineapple	Wilt, Anthracnose, Pink Disease
7.	Naga Chilli	Mosaic Virus, Powdery Mildew, Leaf Curl
8.	Ginger	Root Rot, Powdery Mildew, Aphid
9.	Ladyfinger	Root Rote, Powder, Mildew, Aphid
10.	Peas	Leaf Boren Stem Boren, Legume Borer

## Symptoms of Main Pest & Disease



Leaf Miner in Tomato



Forky in Big Cardamum



Late Blight in Potato



Root Rot in Ginger



Red Ant



White Fly

## **1. Some Common Complaints in Organic Farming**

### **1.1 Loss of Productivity**

Most of the farmers complaints that Organic Farming reduces the production capacity. Morarka Foundation is working since last 15 years to solve this problem. It is said that if organic farming is done with proper planning then this problem can be well taken care of. We have studied various natural resources deeply and have found out some, Bio-inputs which are used by our ancestors for doing natural farming. We have mixed Biotechnology with Natural Farming Techniques and found out some easy to use, cost effective and sustainable solutions.

### **1.2 Poor knowledge on Pest & Disease Management techniques**

Currently many of the farmers have some basic idea on some or other natural nutrient management solutions. However, there is a complete lack of knowledge when it comes to Pest / Disease Management in Organic Farming. Morarka Foundation has undertaken 17 years of research on this and has been able to identify more than 140 varieties beneficial plants having pest or disease management capacity. A sincere effort has been undertaken through publication to bring the benefit of the research to the farmers in need.

## **2. How to address loss of productivity:**

Loss of productivity can be addressed by efficient fertility management methods by applying following practices.

### **2.1 Integrated nutrient management for soil**

- Farm waste recycling
- Crop rotation
- Intercropping
- Field preparation in advance
- Application of Biological cultures

### **2.2 Foliar fertility management**

- Foliar sprays for additional nutrient supply in different stages of growth

### **2.3 For future scope of discussions, the farmers' population has been divided into following categories:**

**2.3.1 1<sup>st</sup> level - Normal soil:** For this category of farmers the soil has normal value of pH, total bacterial count and nutrient level. They also have least problem regarding pest and diseases.

**2.3.2 2<sup>nd</sup> level Worse soil:** The soil is good but has little imbalance for any one or two of the above factors. i.e. either pH is not normal, or the bacterial count is below average, or nutrient level is less than average. They have

**2.3.3 3<sup>rd</sup> level Worst soil:** The soil is in worst condition and most of the above factors are not under normal parameters.



## 2.4 Comparisons between Organic and Chemical Technology

Chemical technology	Organic technology
<ul style="list-style-type: none"><li>• Complex and difficult to manage</li><li>• If dose of input becomes higher, the crop gets burnt or damaged</li><li>• Very difficult to learn and apply on field</li><li>• The nutrients remain available for very less time</li><li>• The base of chemical farming is Chemistry</li><li>• Higher incidences of pest disease attack as the plant sap gets diluted and the plant becomes more vulnerable.</li></ul>	<ul style="list-style-type: none"><li>• Management is very simple</li><li>• No loss or adverse effect if input is applied at a higher rate</li><li>• Very easy process and an unskilled man can also learn</li><li>• The soil works as a bank for organic inputs and releases it slowly as per the requirement of plants</li><li>• The base of organic farming is biology</li><li>• No such dilution effect of plant sap. The plant thus shows higher resistance to pest/disease attack.</li></ul>

The role of beneficial Micro Organisms is very vital in organic farming. If any farmer wants to do organic farming then he has to arrange 1000 kg of cow dung / farm waste per H.A..

## 2.5 How to do Integrated Soil Nutrient Management

Basically every farmer has some animal dung and / or crop waste with him. They can recycle the same by some by any of the following composting methods to produce good quality compost/humus i.e.

- Herbal Compost
- NADEP Compost
- Vermi Compost
- NS-DL Compost

Normally, the nutrient value for most of the raw compost lies between 1% for N,P & K. Through extensive research, we have found out that, some natural ingredients like - Dolomite, Rock Phosphate, Wood Ash and some beneficial micro-organisms can enhance the nutrient value of i.e. N,P & K up-to 2-2.5%. By application of the enriched compost, crops will get more organic nutrients and their pest/ disease resistance capacity will also increase due to balanced availability of all 16 nutrients.



## 2.6 Process of preparing NS-DL Compost



### I<sup>st</sup> Stage

Prepare a bed  
of animal dung  
& horticulture waste  
 $20 \times 3 \times 1.5$  ft.



### II<sup>nd</sup> Stage

Spray 5% water  
solution of NS-DL



### III<sup>rd</sup> Stage

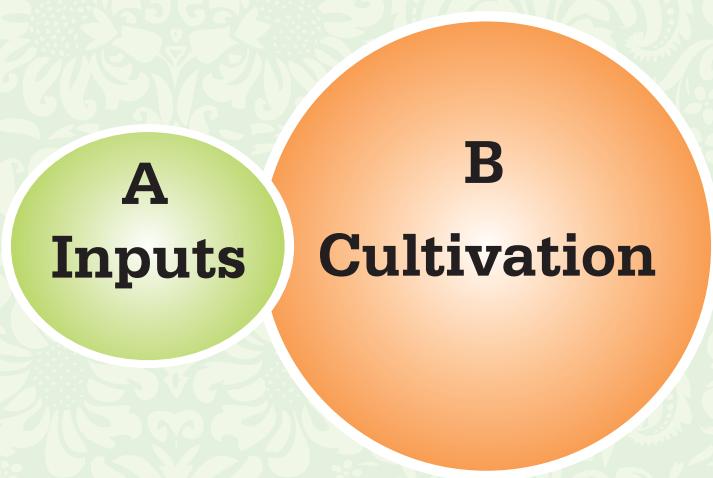
Cover the bed  
with Leaves or available  
Horticulture Waste



### IV<sup>th</sup> Stage

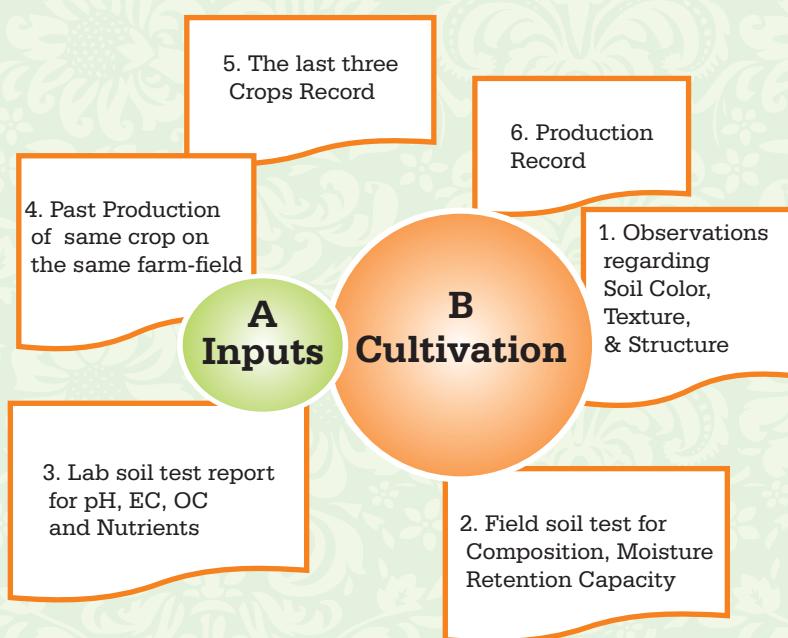
Prepared DL Compost  
in 40-50 days

## **Organic Fertility Management at Farm Level**



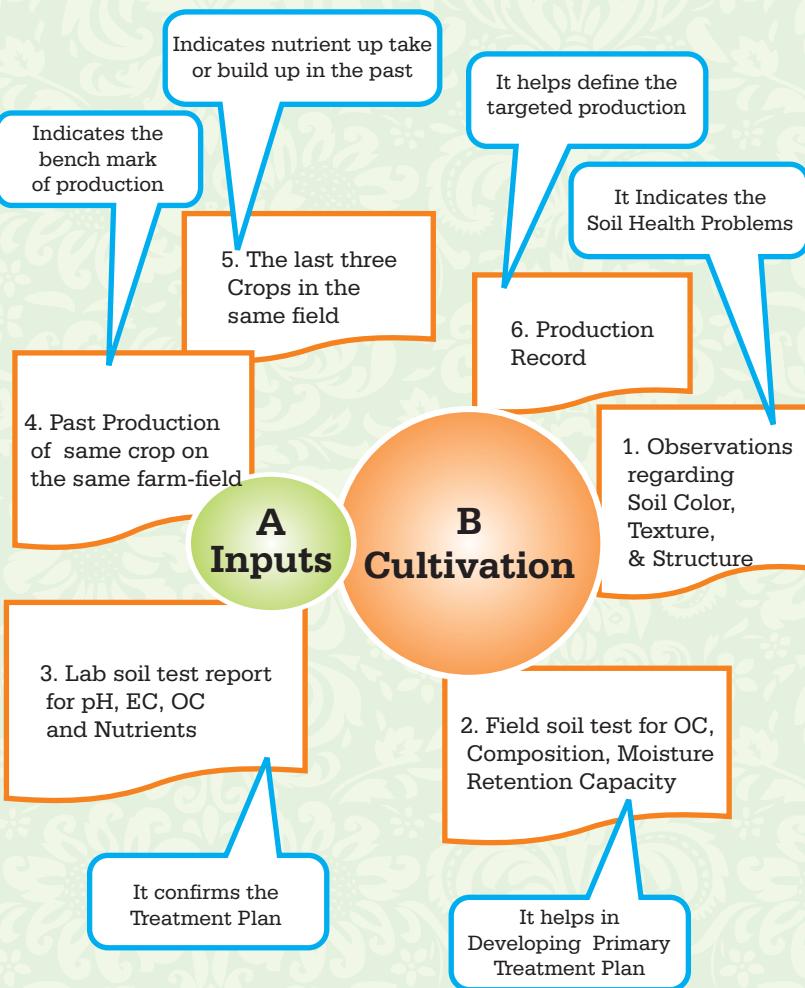
## **Operations Managed at Farm Level**

## Organic Fertility Management at Farm Level



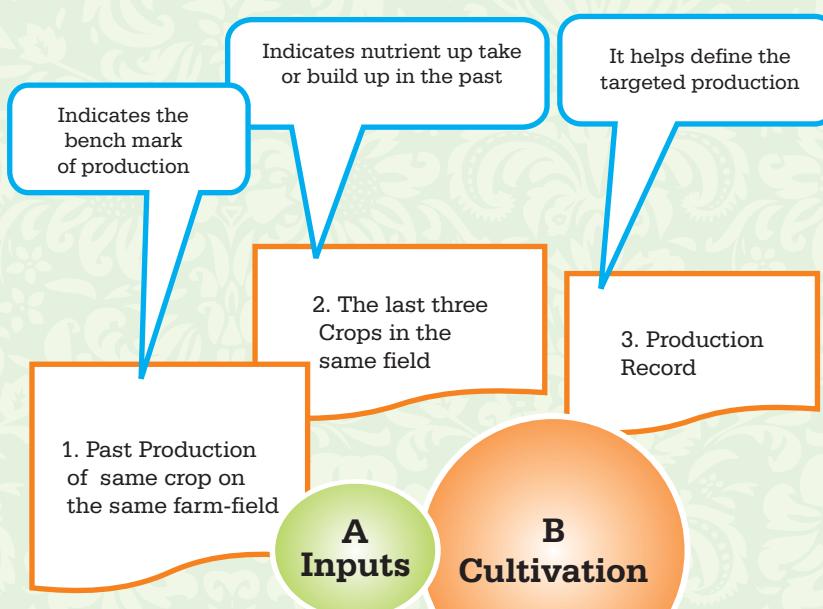
**Field Observations, Field Tests, & Lab Reports  
on Selected Parameters**

## Organic Fertility Management at Farm Level



**Analyses for Developing Fertility Management Plan**

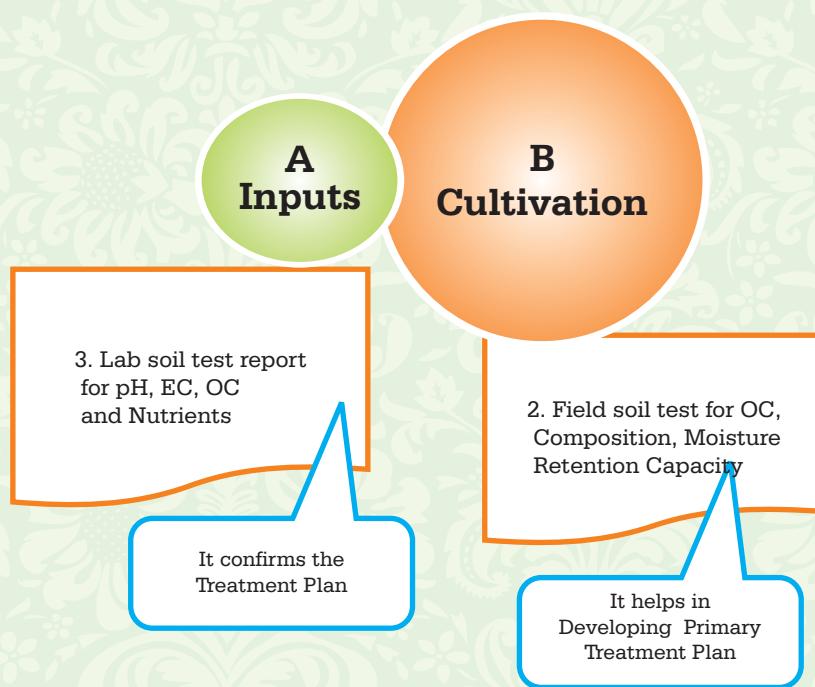
## Organic Fertility Management at Farm Level



S.No.	On the basis of above observations FARMERS can be categorized as	Category
1.	High production performance in the past - Reasonably well endowed and good fertility status	A
2.	Medium production performance in the past - Some problems related to fertility status	B
3.	Very low production performance in the past - Major problems with the fertility status of the soil	C

## Conclusions and Recommendations

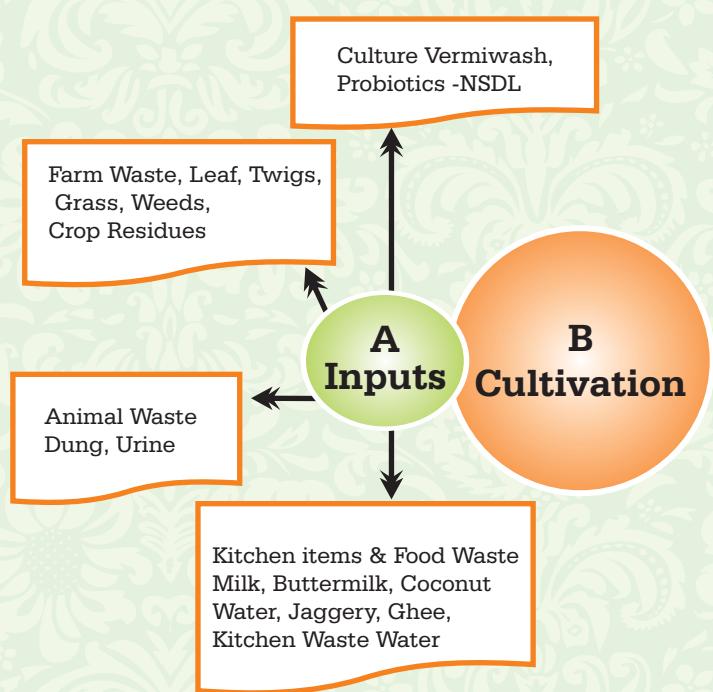
## Organic Fertility Management at Farm Level



S.No.	On the basis of above tests FARMERS categorization is confirmed	Category
1.	These lands will show dark color due to high Organic Matter contents, will have reasonably smooth feel, high moisture retention capacity and uniform content of Sand, Silt and Clay	A
2.	Some major problem with few parameters or minor problem with many parameters	B
3.	Major problem/s with most of the parameters	C

### Conclusions and Recommendations

## Inputs for Fertility Management

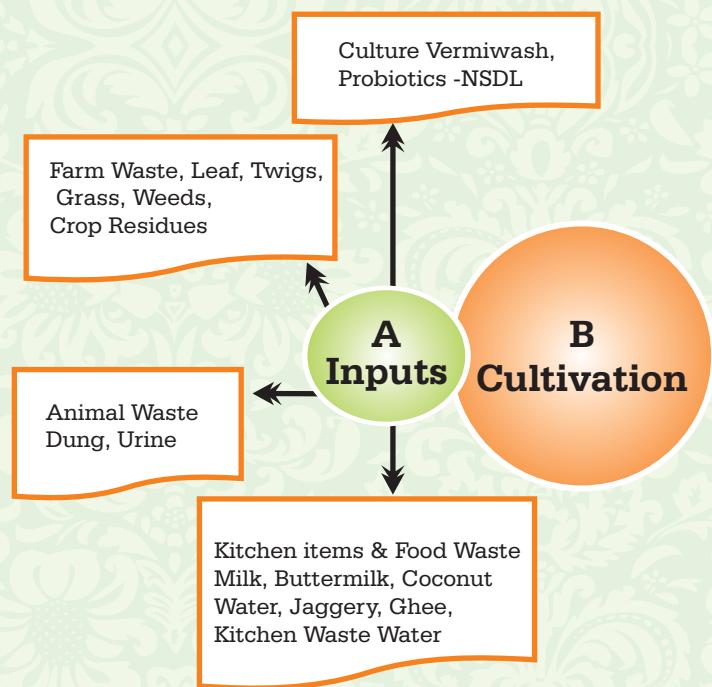


### On Farm Culture

- Cow Dung 10 Kgs
- Vermi Wash 10 Ltrs
- Milk/Buttermilk 2 Ltrs
- Ghee- Waste 500 Gms
- Honey 500 Gms
- Cow Urine 5 Ltrs
- Jaggery/Gud 1 Kgs

## Preparation of Culture for Fertility Management

## Inputs for Fertility Management



### On Farm Compost

- Cow Dung 1000 Kgs
- Farm Waste 500 Kgs
- Food Waste 100 Kgs
- Probiotic 1 Ltrs
- On Farm Culture 20 Ltrs NS-DL
- Wood Ash 50-100 Kgs

- River Sand 200-500 kgs
- Dolomite 200 Kgs
- Wood Coal Dust 20 kgs
- PSB & Trichoderma - etc.

## Preparation of Compost for Fertility Management

## 2.7 Process of preparing soil fertility inputs for 1 Acre

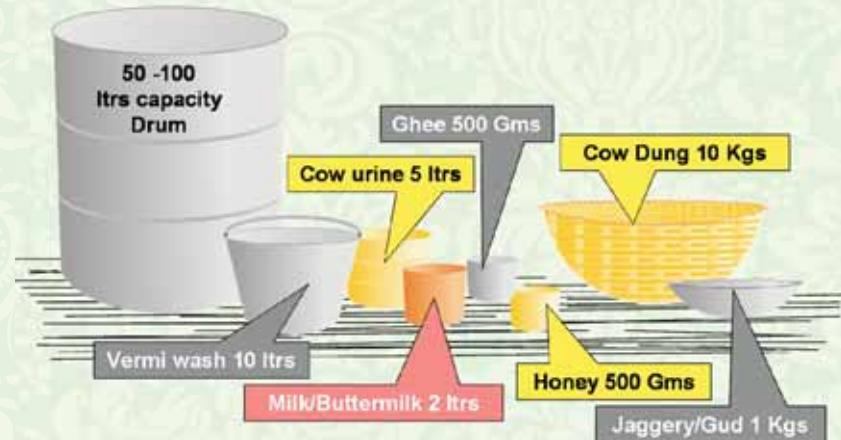
S. N.	Para meters	1st level (Normal)	2nd level (Worse)	3rd level (Worst)
1.	Requirement of bio waste	500 kg	1000 kg	1500 kg
2.	Labor hour required for preparing compost	40 hr	80 hr	120 hr
3.	pH level	6.5 to 7.5 normal	if pH is between 7.5 and 8.5 apply Dolomite @ 200 kg per acre	if pH is between 7.5 and 8.5 apply Dolomite @ 300 kg per acre
4.	Requirement of culture	20 L	40 L	80 L
5.	How to prepare culture	50 kg Cow dung + 1 L vermiwash + 2 L Milk + 0.5 kg ghee + 0.5 kg honey and ferment it for 30 days	as done in 1 <sup>st</sup> level	as done in 1 <sup>st</sup> level
6.	Process of preparing compost	Prepare cow dung bed of 1' height, sprinkle culture, cover it with horticulture waste, loosen beds in every 5-6 days	Take 1000 kg Cow dung instead of 500 kg, 50 kg rock phosphate 50 kg coal dust and repeat process of 1 <sup>st</sup> level	Take 1500 kg Cow dung, 100 kg rock phosphate 100 kg coal dust and repeat process of 1 <sup>st</sup> level
7.	If farmer complains any productivity problem	Repeat above dose after 30-45 days of crop standing	Repeat above dose after 30-45 days of crop standing	Repeat above dose after 30-45 days of crop standing. Might be a third application is required in this case

The following techniques when used apart from using a good soil fertility input also enhances crop production.

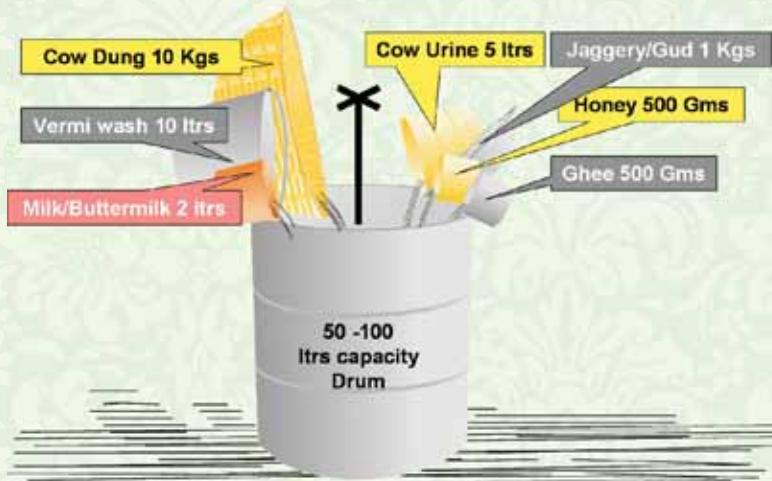
- Crop Rotation.
- Inter Cropping.
- Deep ploughing of fields in summer.
- Sowing at right time.



## Inputs for Fertility Management



## Preparation of Culture for Fertility Management



## **2.8 Foliar Fertility Management**

Mostly, it is found that the nutrients provided through soil is released slowly and may not suffice the requirement of plants during various stages of extra growth like branching, flowering and fruiting. Foliar fertility management thus works symbiotically to provide an easy and faster access of nutrients to the plants in the extra stages growth as mentioned above.

- 1. Cow dung      2. Cow Urine      3. Vermiwash
- 4. Gur (Jaggery) 5. Honey      6. Milk
- 7. Ghee      8. Coconut water      9. Kitchen Water
- 10. Butter milk

### **Preparation and usage guidelines for foliar fertility management inputs**

Take any of the above five materials for example: 10 kg Cow Dung, 10 Liter, vermiwash, 2 Liter Milk, 500 Gms Ghee & 500 Gms Honey. Their mixture should be de-composed for 40-45 days in a plastic drum and may be used as culture.

This culture is useful for I<sup>st</sup>, II<sup>nd</sup> & III<sup>rd</sup> category of farmers at the rate of 20/40/60 Liters per 200 liter of water and used as foliar nutrient spray for one acre. II<sup>nd</sup> & III<sup>rd</sup> category farmers may use 1 & 2 liter of Nature s' Shakti to get better results.

By this technique of fertility management - we can reduce the probability of pest and disease problems by 50-60%. For balance problem, we can use Integrated Pest & Disease Management techniques as described in the next chapter.



### **3. Integrated Pest & Disease Management**

In chemical farming practices, we can start pest/ disease management only after the incidence of the disease and the damage is started or done. By using organic techniques we can prevent the attack of diseases. By these techniques we can prevent our crops before attack of diseases:-

- 50 % of pest problems can be solved by good soil fertility management.
- Crop rotation techniques reduce 25% of pest problems.
- Rest of 25 % pest problems can be solved by natural pest control techniques.
- Soil related diseases can be treated by preparing good compost.
- There are around 300 types of plants/species that are helpful in pest management.
- Cow urine and butter milk are good solvents and can be used to extract the beneficial properties of these plants.

#### **3.1 Benefits of this extract:**

This solution diluted with water can be used as a preventive/probiotic spray regularly on the crops. This neither has any side effect nor any residual effect and is even very safe for the users.



### **3.2 Plants Helpful in Pest & Weed Management.**

- **Soil Born Diseases :** Datura, Artisemia, Neem, Papaya, Casuarina, Ginger, Aloevera, Basil.
- **Sucking Pest :** Datura, Neem, Onion, Garlic, Rosemary, Equiliptus.
- **Fungus Diseases :** Neem, Papaya, Regurian, Turmeric, Aloevera, Basil, Tea Leaf Oil.

### **3.3 How to use the probiotic solution:**

- **Pest & disease problem of leaves:** : Mix 5 liter probiotic in 95 liter water and spray it
- **Soil Generated Pest & Disease:** 5 liter Pratirodh in 95 liter water. 2 liter Buttermilk, 93 liter water, used this around roots of plants.
- 80% of the balance problem can be controlled with this application.
- For balance problem, mix 1 liter of Natures' Pratirodh in 100 liter of water and spray in an interval of 7-10 days
- For soil born diseases, use the above solution of Natures' Pratirodh for soil drenching.
- **For Root Rot:** Increase quantity of neem
- **Leaf curl :** Turmeric, Coriander leaves and Aloevera should be added and de-composed in cow urine for 7 days. Spray it 2 times in a week
- **For fungal Diseases:** use Trichodarma in compost. Goat dung, cow urine, butter milk can be used in large cardamom to prevent it from fork disease.



#### **4. Proper use of the described techniques:**

- 4.1 **Seed treatment:** Chemically treated seeds can be re-treated in organic way also. For this, prepare a mixture of 10 liter water, 1 liter butter milk and soak 10 kg Seeds for 2-4 hours depending upon the seed coat. For worse soil, 200 ml each of Natures' Shakti and Pratirodh can be added in the above solution for seed treatment. The germination of seeds will improve by this.
- 4.2 **Root Treatment while Transplanting:** During transplanting, dip the roots in the above mixture for two hours and then transplant.
- 4.3 **Growth Stage :** Use of the nutrient solution as foliar spray during germination and branching stage will bring marked improvement.
- 4.4 **Flowering and Fruiting Stage:** Spray of nutrient solution during flowering and fruit bearing stage will enhance crop quality i.e. shape, shine & weight.

#### **5. Some basic knowledge on Inter Cropping:**

- Rice + Pulses
- Cauliflower + Fenugreek
- Mustard + Pulses
- Garlic/Onion + Tulsi
- If marigold is grown in Tomato fields then the incidences of Nemetode and Aphid attack reduces.
- Radish + Cauliflower
- Vegetable + Tulsi (For aphid control)
- Growing of maize around tomato & chilly field controls leaf curl virus.
- Chilly + Brinjal (for aphid control)
- Cabbage + Onion, Fenugreek  
(for control of Moth insects)





### M.R. Morarka-GDC Rural Research Foundation

Vatika Road, Off Tonk Road, Post-Shree Ram Ki Nangal,  
Via-Sitapura RIICO, Jaipur - 302 022, Rajasthan, INDIA  
Phone : +91-141-2771100, Fax 2770031 | E-mail: [info@morarkango.com](mailto:info@morarkango.com)  
Website : [www.morarkango.com](http://www.morarkango.com)