



The role of organic/bio inputs in Non-chemical sustainable agriculture

UMESH MISHRA
JGM (MKTG), KRIBHCO

Sustainable Agriculture



Sustainable agriculture can be defined in many ways, but ultimately it seeks to sustain farmers, resources and communities by promoting farming practices and methods that are profitable, environmentally sound and good for communities. Sustainable agriculture fits into and complements modern agriculture. It rewards the true values of producers and their products.

Sustainable Agriculture key areas :

1. **Economically Viable**
2. **Socially Supportive**
3. **Ecologically Sound**

Organics in Sustainable Agriculture

Many Practices are followed and wide varied of Non Chemical input options are available for Sustainable Agriculture, but the most prominent amongst them are :

1. Bio Fertilisers

2. Compost

The above mentioned both the inputs are most widely used currently.

However, the adoption and acceptance of these products varies across different regions of our country.

Biofertilizers

- ▶ Bio-fertiliser are the **low-cost source of plant nutrients, environment-friendly and have auxiliary role with chemical fertilizers**. Historically, the bio-fertilizers were initially identified by a Dutch scientist in 1888 there after bio-fertilizer use started with the launch of Nitragin by Nobe and Hiltner with a laboratory culture of Rhizobia in 1895
- ▶ Bio-fertilizer contains micro-organisms which promotes the adequate supply of nutrients to the host plants and ensure their proper development of growth and regulation in their physiology
- ▶ Biofertilizers differ from chemical and organic fertilizers in the sense that they do not directly supply any nutrients to crops and are cultures of special bacteria and fungi
- ▶ Biofertilizers helps improve Physical, Chemical and Biological Properties of the Soil which are being damaged due to the Indiscriminate use of Fertilisers.
- ▶ Biofertilisers helps in Bio Dynamic Agriculture and helps maintain ecological balance of the Soil

Important Bio Fertilisers used Commercially

- ❖ Rhizobium
- ❖ Azotobacter
- ❖ Azospirillum
- ❖ Phosphate solubilising bacteria (PSB)
- ❖ Phosphate absorbers (mycorrhiza)/Vesicular arbuscular mycorrhiza (VAM)
- ❖ Plant growth promoting rhizobacteria (PGPR)
- ❖ Zinc solubilizers
- ❖ Potash Mobilising Bacteria

How Bio Fertilisers are useful

- ❖ Bio-fertilizer enriches the soil and is well-suited for long-term sustainability. Chemical fertilizers are used to increase the crop productivity and thus added in soil to cover the deficiency of inorganic nutrients such as N and P, which results in environmental pollution and is also costly
- ❖ Increased use of chemical fertilizer also damages the soil texture. Thus, bio-fertilizers opened a new alternative to overcome these problems
- ❖ Microbial activity has vital role in agriculture because they are very important in the movement and availability of minerals essential for plant growth and ultimately lower the requirement of synthetic fertilizers and increases the crop productivity by 20-30%.
- ❖ Bio-fertilizers reduce the requirement of chemical fertilizers. The government's fertilizer subsidy had touched a record Rs 1,38,500 crore in 2020-21. Use of Bio Fertilizers can lead to a substantial savings in the amount of Subsidy.
- ❖ Bio-fertilizers improve root proliferation due to the release of growth promoting hormones. They help in increasing the crop yield by 10-25%.

Economics of biofertilizer use (Liquid)

Biofertilizer/ crop	Quantity required lit/ha	Cost of application (Rs/ha)	Amount of nutrient mobilized kg/ha
Rhizobium in legumes	0.2-1.0 lit	40 - 200	25 – 35 kg N
Azotobacter/ Azospirillum in non- legumes	0.5 – 2.0 lit	80 - 400	20 - 25 kg N
Azoto+Azosp+PSB	0.5 – 2.0 lit	80 - 400	20 kg N + 12 kg P
Mixed inoculants	0.5 – 2.0 lit	80 - 400	25 kg N +15 kg P
Mycorrhiza	2.00 – 5.00 kg	200-500	20-25 kg P + micronutrients+ moisture

Compost in Agriculture

Compost

Compost has been considered as a valuable soil amendment for centuries. Most people are aware that using composts is an effective way to increase healthy plant production, help save money, reduce the use of chemical fertilizers, and conserve natural resources.

Compost provides a stable organic matter that improves the physical, chemical, and biological properties of soils, thereby enhancing soil quality and crop production. When correctly applied, compost has the following beneficial effects on soil properties, thus creating suitable conditions for root development and consequently promoting higher yield and higher quality of crops

Advantages of Compost

- ❖ **Improve the soil quality:** Organic matter improves the workability of the soil and soils rich in organic matter are likely to give a good harvest. Mainly useful in improving Soil Physical, Chemical and Biological Properties
- ❖ **Cheaper in cost:** Market development assistance would lower MRP of city compost for farmers
- ❖ **Environment-friendly:** Compost from city garbage would not only provide carbon and primary/secondary nutrients to the soil but also help in keeping the city clean
- ❖ **Reducing waste volume:** Composting can reduce the volume of waste to landfills
- ❖ **Prevention from harmful gases:** This also prevents production of harmful greenhouse gases (especially methane) and toxic material that pollutes groundwater apart from polluting the environment
- ❖ **Generate employment:** City Waste composting would also generate employment in urban areas.
- ❖ **Economic and Social Benefits are associated with composts** - Organically grown crops are in high demand and fetch a premium price in the market

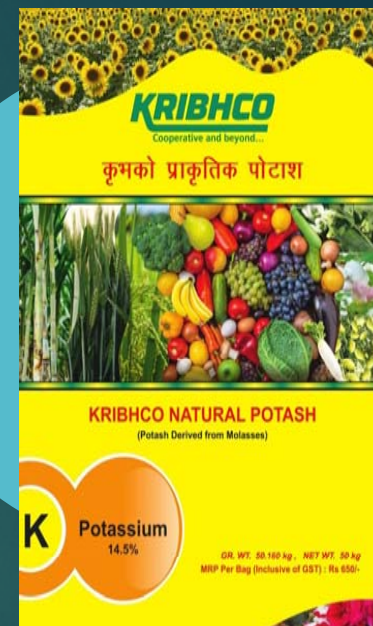


KRIBHCO's Role in the Bio Fertilizer/Compost Segment of Agri Inputs

KRIBHCO's Product Profiles in the Bio Input Segment

1. Liquid NPK Consortia
2. Phosphate Solubilizing Bacteria
3. Acetobacter
4. Azospirillum
5. Azotobacter
6. Rhizobium
7. Potash Mobilising Bacteria
8. Zinc Solubilising Bacteria
9. City Compost
10. Natural Potash





KRIBHCO's Production of Liquid Bio Fertilizers

(In Kilo Litre)						
Year	2015-16	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Azotobacter	61.01	48.87	32.79	23.45	16.81	6.95
PSB	176.33	171.70	91.92	109.25	71.14	46.65
Rhizobium	7.35	7.80	8.55	5.23	5.41	4.77
Acetobacter	41.21	7.56	11.32	20.97	5.25	4.65
Azospirillum	11.70	0.10	7.40	6.00	2.00	0.0
KMB	21.71	11.61	9.41	14.94	10.58	11.67
ZSB	35.20	11.95	15.44	15.30	11.30	18.30
Liquid Consortia - 1	309.85	202.19	247.18	374.96	457.32	536.09
Liquid Consortia - 2	119.60	110.09	88.45	130.20	175.75	211.80
Liquid Consortia - 3	-	3.60	1.80	0.50	3.26	10.00
Total	783.96	575.47	514.26	700.85	758.82	850.88
Capacity	2500	2500	2500	2500	2500	2500
% Capacity Utilization	31	23	21	28	30	34

KRIBHCO's Sale of Liquid Bio Fertilizers

State / Year Wise Sales of Liquid Bio-Fertilizers (In Litre)							
S.N.	State	2020-21	2019-20	2018-19	2017-18	2016-17	2015-16
1	Uttar Pradesh	258880	252248	221017	221819	189105	176808
2	Uttarakhand	10000	10000	9990	9960	12000	12000
3	West Bengal	21000	21000	30000	18000	20000	20500
4	Haryana	31805	25195	9960	27381	16056	26415
5	Punjab	25750	15000	30000	14997	15000	21046
6	Bihar+Jharkhand	20198	23726	17674	1500	14800	24996
7	Rajasthan	16839	19112	9870	5740	16468	11150
8	Gujarat	159605	152974	161159	87367	43770	135910
9	Madhya Pradesh	70307	54493	35820	20000	98173	102150
10	Chhattisgarh	16557	16000	34500	25500	32800	22310
11	Odisha	6000	6000	3000	-	3100	2900
12	Maharashtra	62500	55100	29957	15784	26560	72204
13	Andhra Pradesh	30000	32000	18500	35000	31500	29000
14	Telangana	50000	45000	44900	33980	24000	32550
15	Karnataka	32550	21900	21960	17140	20900	37000
16	Tamil Nadu	18000	12000	21000	12000	12000	12000
17	Kerala	0	0	0	0	0	6000
Total		829991	761748	699307	546168	576232	744939

KRIBHCO's Sale of City Compost

State / Year Wise Sales of KRIBHCO City Compost (In MT)							
S.N.	State	2020-21	2019-20	2018-19	2017-18	2016-17	2015-16
1	Uttar Pradesh	18444	9786	4210	3666	3049	2550
2	Uttarakhand	253	188	156	221	213	160
3	West Bengal	2646	2104	2221	1331	1962	2242
4	Haryana	1921	2044	1851	1432	762	969
5	Punjab	2011	2465	1721	2471	1495	1587
6	Bihar+ Jharkahnd	0	0	0	0	0	0
7	Rajasthan	4238	1069	463	331	0	200
8	Gujarat	16523	13406	10186	6367	7196	5075
9	Madhya Pradesh	2068	1105	536	241	1565	1159
10	Chhattisgarh	0	0	0	0	0	0
11	Odisha	0	0	0	0	0	0
12	Maharashtra	14360	6580	4976	2649	1512	1868
13	Andhra Pradesh	493	193	44	355	385	515
14	Telangana	979	420	588	200	121	469
15	Karnataka	1442	50	275	765	708	1714
16	Tamil Nadu	414	225	65	496	654	1156
17	Kerala	0	0	0	0	0	265
Total		65792	39635	27292	20525	19622	19929

Experimental Farm and Application of Bio-Fertilizers on Crops



Application of Liquid Consortia at Demo Farm



Impact of Biofertilizer on Crop Yield

The National Center of Organic Agriculture (NCOF, GOI) has conducted 1050 Demonstrations cum Trials on Farmer's Field on 53 crops of Cereals, Millets, Pulses, Oilseeds, Sugarcane, Vegetables, Fruit crops, Fibrecrops, Flowers, Tobacco & Plantation crops in various states. The trials consisted of one controlled plot with recommended dose of NPK vis-à-vis second treated plot with half dose of NPK + Biofertilizer (various combinations). It has been observed that Yield has increased in almost all crops.

The results are in the following Slide

Impact of Biofertilizer on Crop Yield

CROP	CONTROLLED	TREATED	%YIELD INCREASE
RICE	4.24	4.72	11.79
WHEAT	3.96	4.30	9.18
GROUNDNUT	1.55	1.79	16.1
SOYABEAN	1.67	1.86	13.31
COTTON	1.29	1.47	13.73
ONION	34.0	40.0	17.65
POTATO	14.55	15.71	8.23
TOMATO	19.19	21.06	12.48
SUGARCANE	79.59	86.56	8.93
ORANGE	2.70	3.0	11.26
BANANA	5.51	5.66	2.41

Source - 1050 Crop Demonstrations on BF, NCOF

Impact Analysis of Liquid Bio-Fertilizer in Gujarat, Uttar Pradesh, Haryana and Rajasthan in Various Crops



Method / Crops	Average Increase Yield in Qtls.	Average % Increase	
Along With Compost	10	14	
Brinjal	10	7	
Cauliflower	5	20	
Garlic	7	11	
Paddy	4	15	
Potato	18	16	
Sugarcane	50	14	
Wheat	2	13	
Drenching	6	13	
Cotton	1	11	
Fenugreek	2	24	
Garlic	1	11	
Paddy	2	12	
Potato	10	10	
Sugarcane	40	13	
Drip Irrigation	1	11	
Cotton	1	11	
Mixed With Compost & Drenching	8	16	
Garlic	11	17	
Wheat	3	16	
Seed Treatment	2	12	

SUCCESS STORIES OF KRIBHCO BIO FERTILIZERS

KRISHAK BHARATI COOPERATIVE LIMITED

SUCCESS STORY: 2020-21


STATE: HARYANA

Farmers Details:	Demonstration Details:
Farmers Name-Shashi Bhushan	Crop-WHEAT
Fathers name-Janardhan	Variety-HD 3086
Village-Barna	Area of Demonstration (acre) - 1 Acre
District-Kurukshetra	Date of Sowing- 10.11.2020
Mobile No. 9671524100	Date of Harvesting-07.04.2021
KRIBHCO Products Used- (Unit/ acre):	Yield Obtained (qt. / acre)- 22.00
*Neem Coated Urea- 2 Bag	Avg. Local Yield (qt. / acre)-21.00
*DAP- 1 Bag	Cost of Cultivation (Rs. / acre)-15000/
*Compost- 5 Bag	Income (Rs. / acre) 43450/
*Certified Seed- 1 bag of 40 Kg	Profit (Rs. / acre) 28450/
*Liquid Bio- Fertilizer- 1 Ltr	Nearby KBSK / Cooperative Society- PACS BARNA
*Zinc Sulphate- 10 Kg	

FARMER'S OPINION / FEED-BACK:

By use of LBF and compost the germination was very good. Crop was luster green and required less urea as compared to nearby plot. Size of grain also good.

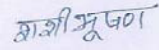
Signature: 

Name of Field Officer-RKS Rathore

Mob. No. 9466126012

Date-15.06.21

E-mail: kribkkr@yahoo.co.in

Signature: 

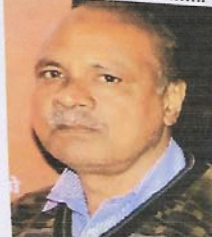

Signature of Farmer

Date- 15.06.21

KRISHAK BHARATI COOPERATIVE LIMITED

SUCCESS STORY: 2020-21

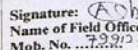
STATE: Haryana

Farmers Details:	Demonstration Details:
Farmers Name Kh. Tiara Raj	Crop - Wheat
Fathers name Kh. Jomchand	Variety - HD-2967
Village - Shimla Patti	Area of Demonstration (acre) - 2.00
District - U.S. Nagar	Date of Sowing - 15.11.2020
Mobile No.	Date of Harvesting - 20.04.2021
KRIBHCO Products Used- (Unit/ acre):	Yield Obtained (qt. / acre) - 23.10
*Neem Coated Urea - 78 kg	Avg. Local Yield (qt. / acre) - 21.22
*DAP/NPK	Cost of Cultivation (Rs. / acre) 15200.00
*Compost - 500kg	Income (Rs. / acre) 48579.00
*Certified Hybrid Seed	Profit (Rs. / acre) 33379.00
*Liquid Bio- Fertilizer - 2 Ltr	Nearby KBSK / Cooperative Society
*Zinc Sulphate	

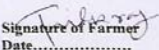
FARMER'S OPINION / FEED-BACK:

कृषि के लिए हमने बहुत अच्छा उपाय किया है। हमारे फसल में अच्छा वृद्धि हुई है। हमने कम उर्वरक का उपयोग किया है और हमारे फसल में अच्छा वृद्धि हुई है। हमने अच्छा उपाय किया है और हमारे फसल में अच्छा वृद्धि हुई है। हमने अच्छा उपाय किया है और हमारे फसल में अच्छा वृद्धि हुई है।

Signature: 

Name of Field Officer-Akhlesh Chauhan

Mob. No. 999204115

Signature: 

Signature of Farmer

Date-

Awards won by KRIBHCO for Bio Fertilisers

FAI Award for High Quality Production, Promotion and Marketing of Bio Fertilizers for the years 1999, 2001, 2002, 2005, 2007, 2009, 2010, 2011, 2012, 2014, 2015, 2016, 2018, 2019 and 2020 was awarded to KRIBHCO.

National Productivity Awards in the category of "Bio Fertilizers Producers Sector" for the Years 1999-2000, 2000-2001, 2001-2002, 2003-2004 and 2006-2007



Constraints in Adoption of Bio Inputs

The Constraints in adoption of Bio Inputs can be classified under the following heads

- ▶ **Financial Constraints** - Lack of timely availability of finance, Lack of subsidies on Biofertilizers
- ▶ **Technical Constraints** - Lack of Knowledge about biofertilizers, Non-availability of Biofertilizers, Lack of guidance from expert personnel, Inadequate water facility, Lack of Uniform Standard, Availability of Spurious Products in the name of Organics.
- ▶ **Other Constraints** - Lack of Interest , Complicated methods, Lack of confidence towards different biofertilizer practices

Problems faced by Organic Farming Practitioners

- ❖ **Lack of Awareness** - Use of bio-fertilizers and bio pesticides requires awareness and willingness on the part of the farming community. Knowledge about the availability and usefulness of supplementary nutrients to enrich the soil is also vital to increase productivity.
- ❖ **Output Marketing Problems** - It is found that before the beginning of the cultivation of organic crops, their marketability and that too at a premium over the conventional produce has to be assured. Inability to obtain a premium price, at least during the period required to achieve the productivity levels of the conventional crop is a major setback.
- ❖ **Shortage of Bio-mass** Many experts and well informed farmers are not sure whether all the nutrients with the required quantities can be made available by the organic materials. Even if this problem can be surmounted, they are of the view that the available organic matter is not simply enough to meet the requirements

- ❖ **High Input Costs** - The small and marginal farmers in India have been practicing a sort of organic farming in the form of the traditional farming system. They use local or own farm renewable resources and carry on the agricultural practices in an ecologically friendly environment. the costs of the organic inputs are higher than those of industrially produced chemical fertilizers and pesticides including other inputs used in the conventional farming system.
- ❖ **Marketing Problems of Organic Inputs** - Bio-fertilizers and bio-pesticides are yet to become popular in the country. There is a lack of marketing and distribution network for them because the retailers are not interested to deal in these products, as the demand is low. The erratic supplies and the low level of awareness of the cultivators also add to the problem.
- ❖ Higher margins of profit for chemical fertilizers and pesticides for retailing, heavy advertisement campaigns by the manufacturers and dealers are other major problems affecting the markets for organic inputs in India
- ❖ **Low Yields** - In many cases the farmers experience some loss in yields on discarding synthetic inputs on conversion of their farming method from conventional to organic. Restoration of full biological activity in terms of growth of beneficial insect populations, nitrogen fixation from legumes, pest suppression and fertility problems will take some time and the reduction in the yield rates is the result in the interregnum. It may also be possible that it will take years to make organic production possible on the farm.

How to Promote the use of Bio Fertilisers /Compost in Agriculture

- ▶ Proactive support of the Central and State Governments. Exclusive policies and schemes should be earmarked for promotion, Production and Sales of Bio Fertilizers
- ▶ Phase wise and gradual reduction in subsidy of Chemical Fertilisers. At best rationalisation of Fertilisers subsidy should be done, otherwise at current level, the Farmers would not switch to Bio Fertilisers. Simple analogy can be derived A bag of Urea Costs Rs.266.50 whereas 2 Litres of Bio Fertilisers from some reputed brand cost approximately the same, Whereas the aftereffect is clearly visible in case of Urea, but not in case of Bio Fertilisers.
- ▶ The MDA was withdrawn from Compost and now the price of a bag of compost has almost reached the same price as that of Urea. Such Type of anomalies needs to be addressed.
- ▶ Wide scale publicity through Mass Media, Through Agriculture Departments and Agricultural Extension functionaries needs to be done for promotion and positioning of the Bio Fertilisers and compost into the minds of the Farmers.
- ▶ The environmental and ecological benefits to Field in Particular and Ecosystem in general needs to be highlighted for the Farmers.
- ▶ Technologies which promote Cheaper production of Bio Fertilizers needs to be adopted.

THANK YOU

