Jeevatu-based Compost[1]

Compost treatment and soil fertilizing in Nepal

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Key facts

- Beneficial microorganism-rich product for integrated plant nutrient management.
- Suitable for various crops.

What is Jeevatu-based compost?

- In Nepal, increasingly intensive cropping has degraded soil fertility and pushed some farmers into cultivating highly unfertile and scattered pieces of land, sometimes close to urban areas. The demand for cheaper, healthier, non-degrading and eco-friendly alternatives to mineral fertilizer and manufactured organic amendments is increasing.
- Jeevatu is a consortium of beneficial and naturally occurring microorganisms[2] in liquid form to prevent and treat crop diseases, preferably in organic farming systems. It has also been used to control foul odour from city waste and prepare value added compost.
- It contains mixed cultures of naturally occurring microorganisms[3], like yeast, *Trichoderma* spp., *Penicillium* spp., *Aspergillus*, *Azotobacter* spp., *Lactobacillus* spp., *Bacillus* spp., *Pseudomonas* spp. and *Proteus* spp.
- Jeevatu-based organic compost can be used as a fertilizer as part of an integrated nutrient management strategy. It improves soil fertility by increasing the quantity of nutrients in the soil and their uptake by plants, thereby intensifying crop production. It also aims to improve plants' resistance to pathogens and pests.
- By applying Jeevatu to compost, the fermenting time can be shortened and the amount of compost necessary for crop fertilization can be reduced by 25 to 50 per cent.
- The bottle of Jeevatu has to be kept at room temperature and the expiry period of one year after manufacturing should be respected.
- No health or environmental hazards have been reported by the Central Microbiology Department of Tribhuvan University, Nepal. Yet, further analysis and scientific experiments are needed to eliminate any risks and validate the technology's effectiveness on different soil-plant environments and under various climatic conditions of South and South-East Asia.
- Does not contain genetically modified organisms (GMOs) nor is it derived from GMOs.

History

- The concept of Effective-Microorganisms (EM) was developed in the 1970s by Japanese researcher, Dr. Higa. The main principle is the use of a large variety of beneficial and compatible microorganisms that use diverse modes of action on the plant-soil ecosystem, as opposed to single microbial inoculants such as Bacillus thuringiensis (Bt). EM are produced under different brand names worldwide. While the nature and mode of action of effective microorganisms is known, the large range of beneficial microorganisms is not yet completely understood.
- Jeevatu inoculant and practices have been developed by the Nepalese non-profit company, the Nepalese Farming Institute (NFI). It is manufactured in Kathmandu by Nepalese Natural Bio-products Pvt. Ltd.
- NFI has organized several practical training courses for users in different agroecological zones in Afghanistan, Bhutan, India and Nepal.
- Jeevatu is not internationally patented and is registered temporarily by the Ministry of Agriculture Development, Nepal. It is in the process of being homologated in Nepal.

Where it works

- Adopted and promoted by farmers, farmer cooperatives and NGOs as part of integrated organic farming systems such as mixed vegetable-crop systems, cereal crops like maize and paddy, and in fruit orchards.
- Generally used in combination with Jeevatu-based crop treatments.
- Commercialized by NFI in the Higher, Middle and Low Hills and the Terai administrative zones of Nepal, ranging in altitude from 3,200 to 60 m above sea level.

[1] Note: The scientific proofing of the effects of Jeevatu crop treatments and their underlying causes and the homologation of the product is still ongoing. Therefore, no composite sustainability indicator is calculated and this fact sheet has not undergone a scientific external review.

[2] Beneficial microorganisms, as defined by Higa and Parr (1994), are “a large group of often unknown or ill-defined microorganisms that interact favourably in soils and with plants to render beneficial effects which are sometimes difficult to predict”. In comparison, effective microorganisms (EM) are defined as “specific mixed cultures of known, beneficial microorganisms that are being used effectively as microbial inoculants” (Higa and Parr, 1994).

[3] At 2.7 x 107 colony-forming units (cfu)/ml, according to a laboratory report, Ashta Scientific Research Service Pvt. Ltd, Dillibazar, Kathmandu, 2012.

Technological aspects

- Compost should contain a balanced mixture of green and dry plant material and animal manure from the farm (e.g. 50 per cent crop residues, 40 per cent cattle dung and 10 per cent kitchen waste). Some wastes that are normally difficult to degrade (e.g. pine needles) can also be added for composting.
- The compost heap should be covered to maintain high temperatures and protect it against rain. Use a plastic sheet (e.g. Silpauline) of 20 m^2, if needed. Alternatively, to avoid the use of large amounts of non-degradable plastic, a thatch shade can be constructed. Placing the compost heap in the shade, such as under a tree, helps in maintaining good moisture content (see Figure 1).
- One litre of Jeevatu mixed with 19 l of water is sufficient for 3 tons of compost. One third of this mixture is sprayed on the compost heap every four weeks for a period of three months. For one rice production cycle, 10 ton of compost should be treated with 10 l of Jeevatu and 190 l of water.
- During the soil preparation phase (once per crop cycle), compost can be applied in gulls between the crop rows, in holes or in circular holes around the plants/trees.
- Jeevatu compost can also be used in seed nurseries, greenhouses and plant pots.

Figure 1: Compost heap kept under a tree to maintain moisture

- Regular field evaluation is recommended to ensure high efficiency under local conditions.
- It is advised to avoid contact between Jeevatu and agrochemicals that are toxic for microorganisms. Therefore, it is best suited for organic farming systems.

Economic aspects

Table 1. Total cost for one hectare of rice in Pokhara district, Nepal (NFI)

	Unit	Amount	Rate	Cost ($)
Inputs				
Compost	kg	10 000	0.02	203
Jeevatu	l	10	1.02	10.2
Water	l	190	0	
Subtotal				*213.2*
Labour				
Heap turning – 4 times	person-days	2	3.045	6
Jeevatu application once a month for 3 months	person-days	5	3.045	15
Subtotal				*21*
Total				**234.2**

- The quantity of compost applied to rice without Jeevatu can be reduced by about one third when using Jeevatu-treated compost.
- The cost of the inoculant is equivalent to other organic fertilizers (Green Planet) or much lower – nine times cheaper than the Japanese brand EM®.

Environmental aspects

- The use of Jeevatu-based compost increases the organic matter content of soil. This can help conserve and increase biodiversity, and improves soil water retention capacity and soil structure.
- However, since the content and mode of action of the microorganisms in Jeevatu are not yet fully understood, not all impact (positive or negative) on the environment can be predicted. A rigorous scientific follow-up is, therefore, recommended.
- The carbon footprint of Jeevatu production and sales is said to be lower than that of mineral fertilizer.
- Does not require any energy.

Social aspects

- Applying Jeevatu to compost can save the farmer some time for fermenting.
- The technology is simple but requires some time to learn and apply appropriately.
- Illiterate people can adopt Jeevatu if trained.
- Suitable for both women and men.
- No harm to human health has been reported. But, in the absence of a compete analysis of the product, precaution should be taken.

Issues for replication

- The presence of agrochemicals in the soil can affect the efficiency of Jeevatu.
- Availability of manure and plant material to produce high-quality compost is an issue for farmers who do not rear livestock or use manure as cooking fuel. In livestock production, the availability of feed and straw is an issue for farmers with a limited or unsuitable production area. Low availability and affordability of straw can hamper compost production.
- Since the distribution network for Jeevatu bottles is still limited, farmers might face difficulties finding the product on the market.
- Water scarcity and disruption in the supply of power needed to pump water, can affect Jeevatu use.
- Steep lands and remoteness make transport of Jeevatu-based compost difficult.
- Training and information for preparing good quality compost and proper storage of Jeevatu are very important.
- Recommended communication pathways: organic farming training centres, farmer field days and workshops, distribution of information pamphlets in local languages, press releases and mobile phone advertisements.

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Related topics

- Jeevatu Crop Treatments fact sheet.
- Vermitechnology fact sheet: www.satnetasia.org/database/layout.php?id=7

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SATNET Asia agriculture technology fact sheets

This fact sheet provides information of a sustainable agriculture technology or good practice that has shown its potential to enhance resource efficiency, provide economic benefits, and has a low risk of societal disturbance. The fact sheet is a result of the analytical work conducted by the Network for Knowledge Transfer on Sustainable Agricultural Technologies and Improved Market Linkages in South and South-East Asia (SATNET Asia). In consultation with SATNET Asia participants, the Food Security Center (FSC) of the University of Hohenheim in Germany has led the development of an analytical framework to assess the sustainability- and productivity- enhancing potential of agricultural technology options based on an extensive review of scientific literature. Examples of technology options are collected from various sources, including SATNET participants, experts from outside the region and online knowledge portals and literature. For technologies where sufficient information is available, the analytical framework is used to calculate a sustainability indicator for the technology.

About SATNET Asia

SATNET Asia is a network funded by the European Union. It is implemented by the Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA) of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) in collaboration with the Asian and Pacific Centre for Transfer of Technology (APCTT), AVRDC - The World Vegetable Center, the Food Security Center of the University of Hohenheim and the Trade and Investment Division of UNESCAP.

SATNET Asia was launched in 2012 to support innovation for sustainable agriculture by strengthening South-South dialogue and intraregional learning. Operating in 10 countries of South and South-East Asia, SATNET facilitates knowledge transfer through the development of a portfolio of best practices on sustainable agriculture, trade facilitation and innovative knowledge sharing. Based on this documented knowledge, it delivers a range of capacity-building programmes to network participants who play roles as change agents and innovators, such as farmer organizations, traders, the private sector, the public sector and policymakers. This will enable network participants to transfer this knowledge to those who need it most – smallholder farmers and small-scale entrepreneurs.

Because the public sector no longer predominates agricultural development, SATNET explicitly aims to include the following groups in the innovation process: universities, private companies that develop and sell technology products or provide trade facilitation services, agricultural foundations, farmer organizations and NGOs. For, and together with, these target groups, the project aims to create a knowledge environment that is focused on poverty reduction and conducive to continuous and sustainable innovation.

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