वर्ष 17 अंक 3 सितम्बर 2021
Vol.17 No. 3 September 2021

ISSN- 0976-7177

जैविक खेती सूचना पत्र

Organic Farming Newsletter

Organic Farming Newsletter (OFNL) is a multilingual quarterly publication by National Centre for Organic and Natural Farming. Articles having direct relevance to organic farming technology and its regulatory mechanism, development of package of practices, success stories, news related to conferences, seminars etc., and national and international events are especially welcome. Opinions expressed in articles published in OFNL are those of the author(s) and should not be attributed to the publisher.

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From Editor's Desk …..

Food quality and safety are the two important factors that have gained ever increasing attention in general consumers. Conventionally grown foods have too many adverse effects due to the presence of higher pesticide residue, more nitrate, heavy metals, hormones, antibiotic residue, and also genetically modified organisms. Moreover, conventionally grown foods are less nutritious and contain lesser number of protective antioxidants. In the quest for safer food, the demand for organically grown foods increased during last decade.

National Centre for Organic and Natural Farming (NCONF) is a nodal agency promoting organic and Natural farming across the country. NCONF with its broad activities like Testing, Training and promotion has been taking care of all stakeholders. Human resource development and or capacity building of stakeholders, Quality control of organic inputs, Package of Practices compilation and extension, PGS-India Organic Certification, publicity and awareness creation are some of the focus areas. Integrated nutrient management (INM) Division, DA&FW is a controlling authority to boost up organic farming in the country through timely decisions and policies.

In this perspective most of the agricultural universities and Institutes have made significant strides during the last so many years with multi locational and multidimensional experiments and have proved that organic farming can also yield the optimum and competitive high yields with quality produce provided recommended Package of Practices (PoP) for crops are followed by the farmers. This issue of OFNL therefore focuses mainly on Package of Practice of Mango, organic fertilizers, status of organic farming in India. India Organic News, Global Organic News, National - International Events and NCOF Events are the other topics which may generate enthusiasm among readers. Recent modification in FCO-1985 is also the part of this issue. The area under Organic Farming is increasing and more than 10 lakhs farmers are at different stages of certification through PGS-India programme and are likely to come up with a certified produce available for the domestic consumers at local level.

To commemorate 75 years of progressive and glorious achievements of our great nation on the occasion of 75th anniversary of India's Independence, Government of India under the able guidance of Hon'ble PM has taken an initiative of celebrating आजादी का अमृत महोत्सव. As a follow-up, National Centre for Organic and Natural Farming (NCONF) a subordinate office of Division of Integrated Nutriment Management (INM), Department of Agriculture and Farmers Welfare organized an all India Level webinar showcasing "success stories of outstanding organic farmers".

Editor
Dr. Gagnesh Sharma

जैविक खाद

खेत में बेहतर उपज के लिए अधिक रासायनिक खाद के इस्तेमाल से भूमि की उपज क्षमता ख़त्म होने से मिट्टी बंजर होती जा रही है | भूमि की पानी सोखने की क्षमता भी घटती जा रही है जिससे वह और भी सख्त हो रही है | रासायनिक खाद के उपयोग से तैयार सब्जियाँ खाकर लोग कई तरह की बीमारियों का भी शिकार हो रहे है | एक समय था जब फसल की उपज व पैदावार को बढ़ने के लिए वैज्ञानिको ने रासायनिक खाद के इस्तेमाल को महत्ता दी थी | किन्तु खेती में अधिक रासायनिक खाद के इस्तेमाल से भूमि में होने वाली नमी में काफी कमी देखने को मिली है, जिससे भूमि में काफी सख्ती आ गई है | इससे बचाव के लिए कृषको का जैविक खाद की ओर रुचि देखने को मिली है | यदि आप भी जैविक खाद (Organic fertilizer) कैसे बनता है, घरेलु आर्गेनिक खाद (जैव उर्वरक) बनाने की विधि के बारे में जानना चाहते है तो यहाँ पर इसकी जानकारी दी जा रही है |

जैविक खेती करने के लिए अति आवश्यक है कि किसान के पास पर्याप्त मात्रा में जैविक खाद उपलब्ध हो। इसके लिए किसानों को चाहिए कि वे जैविक खाद बनाने के बारे में सम्पूर्ण जानकारी प्राप्त करके ही जैविक खाद बनायें क्योंकि यदि खाद बनाने का तरीका सही नहीं होगा तो अच्छी खाद नहीं बनेगी और इस कारण फसल उत्पादन में कमी आ जायेगी।

हमारे आस-पास के वातावरण में मौजूद ऐसा कोई भी पदार्थ जो कि आसानी से गल-सड़ सकता हो जैव पदार्थ कहलाता है। जैसे पेड़-पौधों की पत्तियां, जड़, तना, रसोई व घर का कूड़ा-कचरा, रद्दी कागज, राख, गन्ने की मैली, पशुओंका गोबर-मूत्र आदि।

जैविक खाद क्या है ?

जैव पदार्थों को गला-सड़ाकर तैयार की गयी ऐसी खाद जिसमें सूक्ष्म जीवों की संख्या व पौधे के लिए आवश्यक पोषक तत्व पर्याप्त मात्रा में मौजूद हों, जैविक खाद कहलाती है। वो किसान जो खेती करते है और साथ ही पशुओ को भी पालते है वह पशुओ से निकलने वाले मलमूत्र, गोबर या फिर बचा हुआ चारा, घास व पेड़ – पौधों के अवशेषों से तैयार खाद को जैविक खाद कहते है | यह खाद फसल की उपज और पैदावार के लिए भी अच्छी मानी जाती है, इससे फसल भी काफी अच्छी और विषमुक्त होती है | इससे भूमि की पैदावार क्षमता भी बढ़ती है | प्रकृति द्वारा उत्पन्न सूक्ष्म जीव तथा जीवो का तंत्र हमारी खेती के लिए काफी सहयोग का कार्य करती है |

जैविक खाद क्यों बनाएं ?

प्रौधे मृदा से अपनी वृद्धि के लिए आवश्यक पोषक तत्व लेते रहते हैं इस कारण मृदा में पोषक तत्वों की कमी हो जाती है। इन पोषक तत्वों की पूर्ति करने के लिए हम अपने खेतों में इन खादों का प्रयोग करते है। जैविक खाद बनाने की अनेक विधियां है ।

1. नाडेप :

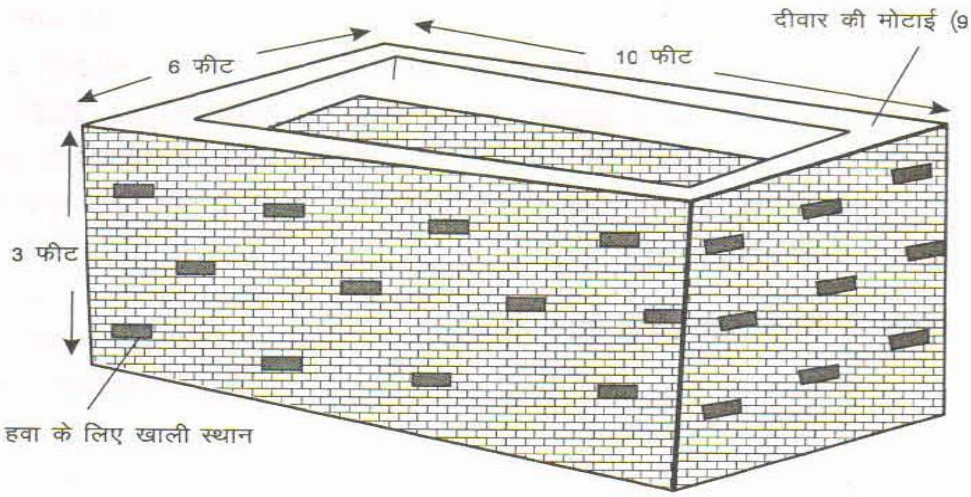
जैविक खाद बनाने की इस विधि को महाराष्ट्र के किसान नारायण देवराव पण्डरी पांडे ने विकसित किया। इस विधि से खाद बनाने के लिए किसान के पास उपलब्ध जैव पदार्थ जिसको आज तक वह कूड़ा-कचरा समझता है उपयोग में लाया जाता है। नाडेप को एक दिन में ही भर लेना चाहिए| इसमें तीन से चार माह पश्चात अच्छी गुणवत्ता की जैविक खाद तैयार हो जाती है जिसको खेत की तैयारी के समय खेत में डालकर मिट्टी में मिला देना चाहिए।

नाडेप को भरने के लिए आवश्यक सामग्री :

- पशुओं का गोबर - 2 टन
- पेड़-पौधों की पत्तियां - 2 टन
- खेत की मिट्टी - 4 टन
- ताजा पानी - 5000 लीटर

नाडेप खाद तैयार करने की विधि: नाडेप बनाने के लिए एक घनाकार ईटों का 40 फीट लम्बाई, 6 फीट चौड़ाई व 3 फीट ऊंचाई के आकार का जालीदार ढांचा जमीन की सतह पर बनाया जाता है। इस ढांचे में पेड़-पौधों की पत्तियां, खरपतवार, गोबर व खेत की मिट्टी की परत दर परत बिछाई जाती है। इसकी प्रत्येक परत पर पानी का भरपूर छिड़काव किया जाता है। ताकि जैव पदार्थ शीघ्र गल-सड़ सके। इस प्रकार नाडेप को ऊपर तक झोपड़ीनुमा आकार में भर कर मिट्टी से ढक दिया जाता है ताकि इसमें नमी एवं पोषक तत्वों की मात्रा संरक्षित रहे और खाद बनने की प्रक्रिया शीघ्र पूरी हो सके। नाडेप को भरने का कार्य दो आदमी 8 घण्टे में आसानी से कर सकते हैं। नाडेप से तैयार खाद में 2 से 1.5 प्रतिशत नाइट्रोजन, 1.5 से 1 प्रतिशत फास्फोरस एवं 1.5 से 1 प्रतिशत पोटाश होता है। एक नाडेप से तीन से चार माह में 30-35 कुन्तल जैविक खाद आसानी से तैयार की जा सकती है जो एक एकड़ खेत में एक बार देने के लिए पर्याप्त होती है।

नाडेप कम्पोस्ट रेखाचित्र



नाडेप का ढ़ांचा बनाने के लिए आवश्यक सामग्री (10'x6'x3')

* एक बैग सीमेंट
* आधा बोगी रेत
* खेत की मिट्टी
* ईटें एक हजार
* अनुमानित लागत तीन हजार रुपए

2. केंचुआ खाद :

केंचुआ व किसान खेती के आरम्भ से ही एक-दूसरे के पूरक रहे हैं। केंचुआ मृदा में मौजूद मृत जैविक पदार्थों (जोकि पेड़-पौधों की पत्तियों से प्राप्त होते हैं) को खाकर अपना जीवन चक्र चलाता है। केंचुए जैव पदार्थ को खाकर मल के रूप में जो पदार्थ बाहर निकालते हैं उसे केंचुआ खाद कहते हैं। केंचुआ खाद से मृदा की उर्वराशक्ति, जलधारण क्षमता व संरचना में सुधार होता है। इस कारण पौधों की जड़ों का अच्छा विकास होता है। किसान केंचुए से अच्छी गुणवत्ता की जैविक खाद बनाकर रासायनिक खाद व उर्वरकों से मुक्ति पा सकते हैं। केंचुआ खाद में पौधों के लिए आवश्यक सभी पोषक तत्व मौजूद होते हैं, इसमें लगभग 2 से 2.5 प्रतिशत नाइट्रोजन, फास्फोरस 2 से 1.5 प्रतिशत व पोटाश 1 से 1.5 प्रतिशत होता है | केंचुआ खाद बनाने के लिए केंचुए की सर्वोत्तम प्रजाति आइसीनियां फैटिडा है, जो प्रतिदिन अपने वजन के बराबर खाद बनाता है। इसके अलावा भी केंचुए की अनेक प्रजातियां है

जोकि मृदा में लगभग 6 फीट की गहराई तक रहकर कार्य करते है, इनमे कुछ ऐसे केंचुए भी हैं जो कि केवल मिट्टी ही खाते हैं, और कुछ ऐसे हैं जोकि मृदा की ऊपरी सतह पर रहकर सड़ा-गला कचरा खाकर मृदा की उर्वरा शक्ति को बढ़ाने का कार्य करते रहते हैं। केंचुए की कई प्रजातियां जमीन में ऊपर से नीचे और कुछ समानान्तर चलकर कार्य करती रहती हैं।किसान ने इतने उपयोगी जीव को जाने-अनजाने में अधिक व गलत तरीके से जुताई कर रासायनिक खाद व दवाईयां डालकर खेतों से समाप्त कर दिया है। अतः हम ऐसे कार्य न करें जिससे केंचुए को हानि पहुंचती हो। बल्कि केंचुए को बढ़ाने का कार्य करें, इससे हमारी खेती सस्ती व सरल हो जायेगी |

केंचुआ खाद बनाने की विधि : केंचुआ खाद बनाने के लिए 11 फीट लम्बाई व 4 फीट चौड़ाई के आकार में जमीन की ऊपरी सतह पर पक्का फर्श बनाकर इस पर 10 फीट लम्बाई व 3 फीट चौड़ाई में क्यारी बना लेते हैं | इसके पश्चात् 50 किलोग्राम पेड़-पौधों की पत्तियां अथवा अन्य कोई जैव पदार्थ जो गल-सड़ सकता हो बिछाकर उसके ऊपर 15 दिन पुराना ठण्डा तीन कुन्तल बारीक गोबर फावड़े से काट कर लगा देते हैं। इसके पश्चात प्रति क्यारी में पांच किलोग्राम केंचुए छोडकर पानी का छिड़काव करते हैं। पानी इतना छिड़कें कि क्यारी पानी से तर हो जाए लेकिन ध्यान रखें कि पानी क्यारी से बाहर न निकले | तत्पश्चात उसे पुराल या टाटपट्टी से ढक देते हैं। मौसम के अनुसार पानी का छिड़काव करते रहते हैं| केंचुआ खाद की क्यारी में हमेशा 35-40 प्रतिशत नमी तथा 15-30 डिग्री सेन्टीग्रेड तापमान बना रहना चाहिए। क्योंकि केंचुए को भली प्रकार कार्य करने के लिए इस प्रकार का वातावरण जरूरी होता है। तापमान जानने के ल् केंचुआ खाद की क्यारी में हाथ डालकर देखने पर हाथ को गर्म महसूस नहीं होना चाहिए | इसी प्रकार केंचुए के शरीर पर यदि खाद चिपकी है तो समझना चाहिये कि नमी की कमी है। इस प्रकार एक माह पश्चात केंचुआ खाद की क्यारी तैयार खाद उतार कर उस पर पुनः पुराना गोबर लगा देना चाहिए।

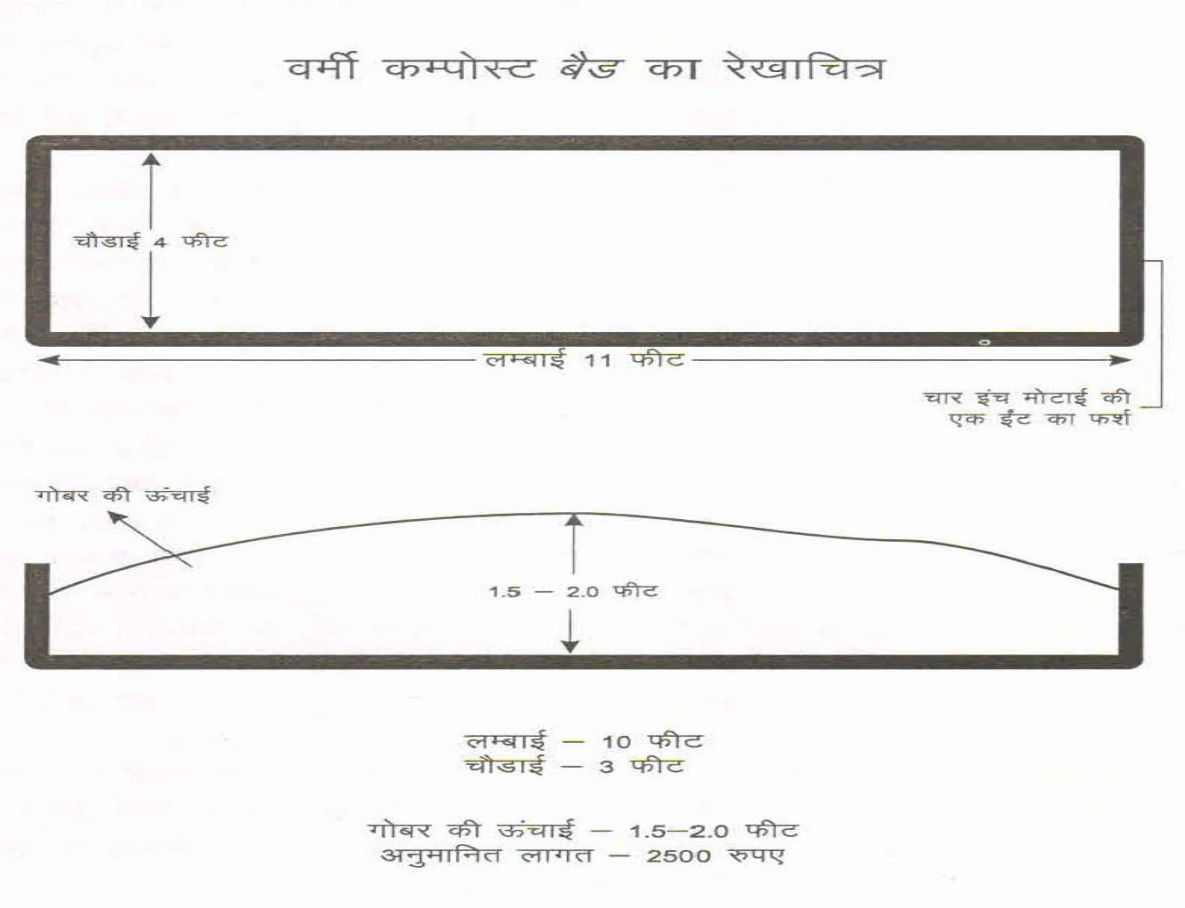
प्रयोग करने की विधि: केंचुआ खाद को चार से छः माह वाली फसलों में 25 से 30 कुन्तल तथा एक वर्ष वाली फसलों में 35 से 40 कुन्तल प्रति एकड़ की दर से, दो या तीन बार में बुआई के समय तथा पहली व दूसरी सिंचाई के समय खेत में देने पर फसलों को अधिक लाभ होता है।

कम्पोस्ट खाद (Compost Manure)

फसलों के अवशेष, घास इत्यादि को जानवर से प्राप्त कचरा व गोबर को एक साथ एक निर्धारित गड्ढे में सड़ाकर बनाई गयी खाद को कम्पोस्ट खाद कहते है। इसके लिए 10 फिट × 5 फिट × 4 फिट लंबाई, चौड़ाई व गहराई का गड्ढा बनाकर उसकी चुनाई अंदर से ईट द्वारा कर दी जाती है। इसके बाद फसलों के अवशेष, सड़ा भूसा, पुआल व घास एवं पशुओं से प्राप्त गोबर को एक के बाद एक तल के रूप में लगाकर गड्ढा भर लिया जाता है। गड्ढा भर जाने के बाद मिट्टी से ढक दिया जाता है। इस प्रकार 6 माह में खाद सड़कर तैयार हो जाती है।

हरी खाद (Green Compost)

हरी खाद की अनेक प्रकार की फसलों की उत्पादन क्षमता जलवायु, फसल वृद्धि तथा कृषि क्रियाओं पर निर्भर करती है । इसमें ढैंचा, सनई, उड़द, मूंग इत्यादि के पौधों को हरी अवस्था में खेत में पलटकर सड़ा दिया जाता है| जिससे मृदा को जैविक खाद प्राप्त होती है । खरीफ मौसम शुरू होने पर खेत में पलेवा करके ढैंचा व सनई की बुआई करनी चाहिए । ध्यान रहे बुआई करते समय यदि खेत की उर्वरा शक्ति कम हो तो रासायनिक उर्वरकों का प्रयोग करना चाहिए तथा फसल जमाव के बाद कम नमी की अवस्था में सिंचाई करते रहना चाहिए । बुआई के लिए ढैंचा 60-70 कि.ग्रा. प्रति हैक्टर तथा सनई 60 कि.ग्रा. प्रति हेक्टेयर के अवस्था की हो जाये उस समय पाटा लगाकर फसल को गिराकर मिट्टी पलटने वाले हल से जुताई करके मिट्टी में मिला देना चाहिए । यदि ट्रैक्टर से पलटाई करनी है तो हैरो से जुताई करके सनई, ढैंचे को सड़ाकर मिला चाहिए ।



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2. श्री किशोर रा. शेडगे (कनिष्ठ विज्ञान अधिकारी, क्षेत्रीय जैविक एवं प्राकृतिक खेती केंद्र, गांधीनगर)

Organic POP of MANGO (*Mangifera indica* L.)

Mango belonging to Family *Anacardiaceae* is the most important commercially grown fruit crop of the country.

Climate

Mango is a tropical fruit, but can be grown upto 1100 m above MSL. The ideal temperature range for successful mango cultivation is between 24 0 to 27 0 C . It can be grown best in regions with a rainfall of 25 cm and 250 cm. High humidity, rain or frost during flowering is detrimental to mango cultivation. Higher temperature during fruit development and maturity gives better quality fruits. Regions with bright sunny days and moderate humidity during flowering are ideal for mango growing.

B. Soil

Mango can grow well in all types of soil from alluvial to lateritic, except the black cotton soils, which are considered as poor. The only prerequisite is a deep (2 to 2.5 m) and well drained soil.

Land preparation

The land is prepared by usual ploughing, harrowing and leveling. A gentle slope is provided to facilitate proper irrigation and prompt drainage to avoid the harmful effects of water stagnation. After marking of the points for the plants, pits of 90X90X90 cm are dug during summer months. This operation is done by utilizing a planting board so that precise location of the plants in the middle of the pit remains undisturbed. While digging of pits, it is essential to keep the topsoil and subsoil separately in two heaps near each pit for two to four weeks.

This helps in exposing the harmful soil organisms to weathering agencies, providing better aeration to the root zone and in making provision for nutritional requirements for healthy development of the soil. The pit is filled with 20 kg of FYM, 5 kg of vermicompost and Biofertlizers (Azospirillum and Phosphobacteria). Green manuring is also done with the onset of SW monsoon in July/August with Daincha and Sun hemp. Growing of leguminous green manuring crops helps in Nitrogen fixing besides providing excellent green cover to entire field, which in turn prevents moisture loss.

Spacing

Spacing varies from 7 m to 10 m either way.

Planting material

Mango is propagated by inarching and veneer grafting, but of late, epicotyl and softwood grafting replacing these two methods. As regards, selection of root stock, research trails shows that polyembroyonic cultivar Vellaikolambam significantly reduces the canopy size by half without reducing production. Planting material is procured from nurseries, which propagate the planting material either by organic or chemical means. However, it is preferable to procure planting material from organic sources.

Varieties

The varieties as recommended for mango for agro climatic conditions by KVKs and Agricultural Universities.

Planting
It is done with the advent of monsoon. The planting season could be July to December, depending upon the monsoon and availability of irrigation facilities.

Water Management
The water requirements mainly depend on the age, soil type and climate. However, young plants upto 2 years should be watered regularly. The newly planted grafts need about 25-30 l of water every day. Irrigating the grown up trees after fruit set at 10-days interval increases their yield.

Mango growers commonly practice drip irrigation so as to control over watering and also to irrigate a larger area with better management practices.

Cultural practices
Weeding
It is preferable to select a site, which is free from serious weed problems. Mulching with straw during the first few years of establishment may be useful in controlling weeds. In older mango orchards, weed management is less problematic due to shading and leaf litter.

Pruning
Pruning mango tree is important for tree size control and to improve the fruit colours. Essentially, tree pruning and canopy management is same for organic or conventional production. Pruning is done to open up the structure to allow good airflow and adequate internal light. It also minimizes disease risk and assists in good fruit coloursation. Internal pruning to remove dead wood can be very important to help reduce the incidence of disease like stem end rot.

Rootstock sprouts and low-lying branches have to be removed. Overlapping, intercrossing, diseased, dried, weak branches are removed to get good sunlight and aeration. For internal branches, pruning may be done during August- September, once in three years. Flowering should not be allowed upto three years. Among the crowded terminal shoots, weak shoots are trimmed to retain two healthy shoots during August- September annually.

Manuring
Green manuring with the common crops, like sun hemp (Crotolaria juncea) and dhaincha (Sesbania aculata), shrubs and trees like glyricidia, karanj, subabool etc. Biofertlizer like Rhizobium, Azospirillum, Azatobactor, Phosphate solubilizing bacteria – Phosphobacteria (PSB), Blue Green Algae (BGA) can be used to improve the soil nutrient condition.

Mulching with materials like bark, nut shells, weeds, grass, wood chips, silage, paddy/wheat straw, rice husk, coir dust, banana, sugarcane leaf trashes etc. improves water holding capacity, Nutrient condition of soil and controls the growth of weeds to certain extent.

Applying PSB and Azospirillum during the pit preparation and also as soil application during the crop growth period.
Application of Organic manures (10-20 kg/tree) through NADEP, Vermi, Biodynamic Compost (BD) or Microbe Mediated Compost in descending moon period

Growing of legume for green manuring or as inter/cover crops as per requirement as per moon constellation Mulching after application of 100 g Cow Pat Pit (CPP), Spray of cow horn manure (BD 500) and release of earthworms in presence of proper moisture as per calendar.

Need based foliar spraying of biodyanmic liquid manures/vermin wash/ (CPP) in ascending phase.

Plant protection

Pests

The important pests are hopper, mealy bug, stem bores, fruit fly. Pest management practices for each pest are described below:

1. Fruit Fly

Adult and larvae maggots cause fruit damage. Egg laying females puncture the fruits leaving scars and holes on the fruit surface. Larval feeding causes premature fruit drop and destroys the pulp of the fruit. The fruit eventually rots making it unsuitable for harvesting and human consumption. Fruit fly attack is controlled by harvesting the crop early when fruits are mature green. This is the stage of maturity when crops are not susceptible to fruit fly attack. Removal of fruits with dimples and oozing clear sap, collection and destruction of fallen and damaged ripe fruits and practicing field sanitation helps in controlling fruit fly attack.

2. Mango Mealy bugs

The mealy bug affected plant leaves are distorted (rolled or folded), stunted and yellow. Heavy infestation causes drooping of leaves and flowers and reduces fruit setting and attacked fruits drop prematurely. Mealy bugs excrete large quantities of honeydews, which promote sooty mold that causes blackened malformed leaves, stems, and fruits. Infested fruits are unmarketable.

Spraying steady stream of water on the host plant to knock off mealy bugs, hand picking of the bugs from the affected plants to reduce populations and pruning the affected plant parts to remove mealy bugs, applying chilli and soap sprays are the suggested control measures.

Removal and destruction of heavily infested plant will help in cutting down the infested sites and reducing its future population.

3. Mango leafhopper

Both the nymphs and adults feed on the plant sap of the flowers, leaves, tender shoots and newly formed fruits. They then suck out the liquid contents leaving behind the dead empty cells, which are small white spots. The affected flower heads turn brown and dry up. Leafhoppers produce large amounts of sugary liquid waste called honeydew, on which sooty mould develops. The appearance of sooty mold on plants is an indication of leaf hopper infestation. Spraying garlic oil and neem oil are recommended as control measures.

4. Mango shoot caterpillar

The larvae feed on the growth flushes of nursery stock, young trees, and top-worked trees. Occasionally, the fruit stalks and young fruits are damaged. The sudden death of a part of a branch, cracked branch and falling off a branch are indications of the attack. It is controlled by applying ginger, garlic and chilly extract and neem leaf extract. Pruning the affected plant parts and burning or burying them helps in controlling their population. Central Institute for Subtropical Horticulture (CISH) Lucknow, recommends the following practices for controlling pests in mango:

Spraying of Biodynamic pesticide prepared from cow urine, neem, karanj (Pongamia glabara), castor, Thevtia nerrifolia, Vitex spp.

Spraying Nettle leaf extract sprays to control hard pests like mango hoppers, mealy bugs, etc. Nettle spray is prepared by soaking 250 g of nettle leaf powder in 4-5 l of water for 24 hrs. Filter the extract and mix in 20 l of cow urine. Dilute to 200 l in water and spay on foliage to control pests.

Disease management:
The important diseases of mango are Powdery mildew, Anthracnose, Stem-end rot, and Sooty mould. Suggested measures are as follows:

1. Powdery mildew
It is a fungal disease caused by Oidium mangiferae and can destroy the crop. Its incidence is favoured by high humidity accompanied by cloudy weather and low night temperatures during the period between panicle development and fruit set. It is characterized by the appearance of greyish white powdery bloom on the flower buds and fruits. Need based spraying of Horsetail / Casuarina extract helps in controlling the disease.

2. Anthracnose
It is a fungal disease and occurs especially in humid and high rainfall areas. The characteristic symptom is the appearance of black necrotic areas on the affected parts. The affected young shoots finally show die back symptoms. As the fungus survives on dead or dried twigs, these should be pruned and burnt at the earliest. Good canopy management and tree nutrition / soil management, close monitoring and application of copper hydroxide & potassium bicarbonate sprays help in controlling the disease.

3. Anthracnose Stem end rot
Removing dead wood, good canopy management and tree nutrition / soil management helps in controlling the disease. It is reported that application of calcium to the soil in the form of gypsum at low rates, 2-4 kg per tree prior to flowering reduces the severity of internal fruit disorder significantly. Farmers are also applying some commercially available bio-pesticides such as Pseudomonas fluorescens, Verticillium lecanii, Beauveria bassiana as foliar sprays, besides neem oil spray in controlling the disease. CISH findings on disease management:

Two sprays of Cow Horn Silica (BD-501) at flowering and fruit development stage
Biodynamic tree paste/cow dung paste for control of gummosis and die back
Spraying of Horse tail (Equisetum arvensis)/Casuarina leaves extract for control of fungal diseases in ascending moon period.

It is reported that in Uttar Pradesh, application of cow dung paste has almost replaced the spray of Copper Oxychloride for the control of die back in rejuvenated old mango orchards. It is also effective in controlling anthracnose and control of stem borer.

Harvesting
Mango fruits need 120 to 140 days after fruit set to mature. The fruits should be harvested at the correct stage to obtain the characteristic taste and flavour of the variety. Harvesting is traditionally done when a few semi-ripe fruits fall from the tree. However, it is not a scientific method. The accurate method of finding maturity is by sinking the fruits in water and when fruits fully sink in water, they are considered to have attained full maturity.

Fruits sinking in water have specific gravity of less than 1.02. The fruits will give best taste and flavour when the shoulders outgrow the stem-end and colours is olive green or when the colours become light. Harvesting of fruits should be done before 10 AM or after 04 PM to keep fruits fresh, turgid for longer shelf life. Harvest only matured fruits as frequently as possible in about 4-6 rounds. Injury to the fruits during harvesting brings down their quality and makes them prone to fungal attack.

Harvest fruits with sharp secature keeping 3-5 cm pedicel. It is important that all fruits should have pedicels intact to avoid oozing of latex on fruit surface

spoiling appearance, development of black spots and paving way for entry of pathogens. Harvested fruits should be kept in shade and not in open sun and transported to the pack house for post-harvest operations.

Post Harvest treatment

Dip the fruits in 520C hot water immediately after harvest for 5 minutes followed by 8% plant wax to reduce anthracnose disease in mango during storage. In general fruit requiring only short term storage before retail sale are unlikely to suffer from fungal break down and post harvest fungicides may not be necessary. For longer storage of mangoes a fungicide treatment is usually required. However, effective organic treatment for post-harvest fungal breakdown is yet to be established. The important pre and post-harvest practices are:

Produce from a healthy tree in a well managed orchard with good hygiene

Grow with adequate calcium and other elements

Do not subject to excessive N during fruit development and ripening

Pick at the correct stage of ripeness

Do not subject to bruising or damage

Maintain at ideal temperature

Clean, pack and transport.

Generally grading of fruits is done by farmers manually according to size of the fruits. Grade will vary with variety. The prevailing grading standards for Alphonso are given as an example;

A + Grade - > 300 gm
A Grade - 250 –299 gm
B Grade - 200-249 gm
C Grade - 150-199 gm
D Grade - < 150 gm

14. Yield

Initial yield is reported to be 30 kg per tree and attaining the peak yields of 100 kg/tree in the 10th year after planting.

Reference:

1. Organic Package of Practices Horticultural Crops, IIHR, Banglore.

Compilation:

1. Dr. Gagnesh Sharma, (Director I/c, National Centre for Organic and Natural Farming, Ghaziabad.)
2. Sri Vinay M. (Junior Scientific Officer, Regional Centre for Organic and Natural Farming, Bhubaneshwar)

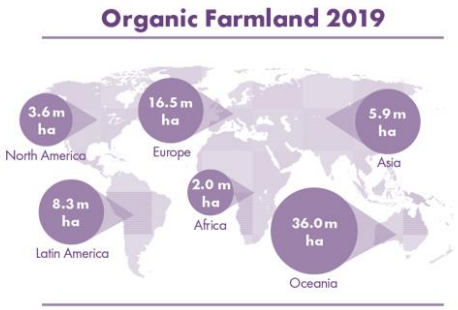
Status of Organic Farming with Statistical back-up

Introduction

Organic farming ensures that nature stays clean and rich. If we visit an organic farm and we will notice a buzz of animal, bird, and insect activity. Research shows that there are around 30 percent more wildlife and plants near ecological production fields compared to conventional farming. This is because there are no pesticides, and fertilizer is used far less. Covid-19 pandemic has changed the perception of organic food, with spotlight now on safety and healthy food that is nutritious to build a strong immune system. It is time to talk about nutritional security not of food security only (which consist only carbohydrates). Among the host of healthy food options available, organic food is perceived as the preferred choice. Therefore, organic food witnessed an uptake since the onset of pandemic. Organically grown foods generally contain higher levels of antioxidants, certain micronutrients, no harmful chemicals, pesticides and fertilizers, better taste and most important thing is organically grown produce aids in the sustainability of the planet and in maintaining ecological balance.

According to FiBL survey 2021 India holds a unique position among 187 countries practicing organic agriculture. India is home to 30% of total organic producers in the world having 2.30 million ha. Total organic cultivation area, 27, 59,660 total farmers (11, 60,650 PGS and 15, 99,010 India Organic), 1703 total processors and 745 traders. A major relative increase of organic agricultural land was noted in recent past throughout the country.

World Scenario of Organic Agriculture



Organic agriculture is practiced in 187 countries, and 72.3 million hectares of agricultural land were managed organically by at least 3.1 million farmers. With the most organic agricultural land in Australia (35.69 m hectares) followed by Argentina (3.63 m hectares) and the Spain (2.35 m hectares). There has been an increase in organic agricultural land in all regions. The global sales of organic food and drink reached more than 106 billion euros in 2019. According to the latest FiBL survey on organic agriculture worldwide, organic farmland increased by 1.1 million hectares, and organic retail sales continued to grow. Apart from land dedicated to organic agriculture, there are further areas of organic land dedicated to organic activities. The largest part of these is wild collection areas and areas for livestock and beekeeping. Further non-agricultural areas include aquaculture, forest and grazing areas. These are totaled 35 million hectares. And all the organic areas together summed up to 107.4 million hectares (Organic World 2021).

0.76 million ha of area under organic cultivation — that is over 27 per cent of

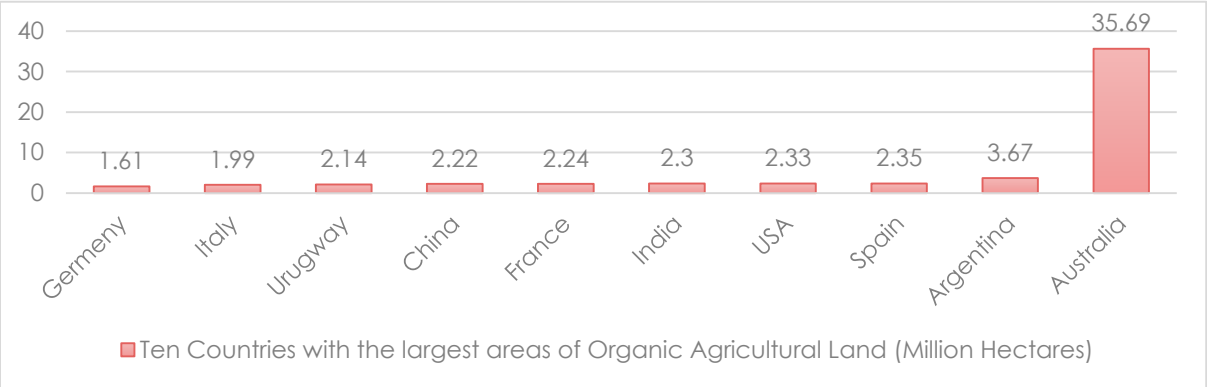


Figure 01: Top Ten Countries in terms of largest certified organic area

Source: FiBL Survey 2021

The No. of Organic Producer increasing worldwide

In 2019, 3.1 million organic producers were reported. India continues to be the country with the highest number of producers (13,66,000), followed by Uganda (2,10,000), and Ethiopia (2,04,000). Most small-scale producers are certified in groups based on an internal control system. (FiBL Survey 2021)

Present Scenario of Organic Farming in India

Organic farming is in a nascent stage in India. About 2.30 million hectares of farmland was under organic cultivation as of March 2019. This is two per cent of the 140.1 million ha net sown area in the country. A few states have taken the lead in improving organic farming coverage, as a major part of this area is concentrated only in a handful of states. Madhya Pradesh tops the listwith India's total organic cultivation area.

The top three states — Madhya Pradesh, Rajasthan and Maharashtra — account for about half the area under organic cultivation. The top 10 states account for about 80 per cent of the total area under organic cultivation.

Need for Organic Farming in India

The Green Revolution in the year 1960 changed the whole scenario in the field of agriculture where the farmers were introduced to high yielding seeds and fertilizers to maintain food security. Increasing productivity ensured profit but ultimately the land was turning barren due to the excessive usage of fertilizers making the soil infertile and pesticides turning the product dangerous to consume.

There are reasons for the need of the Organic Farming in India –

- The organic food industry is rising and is growing very fast ensuring high profitability.
- Food security needs to be addressed with the growing

population and decreasing supply of resources which is why there is a need to increase the production but in a feasible and sustainable manner.

- Maintaining a clean and green environment is equally important, thus environmental sustainability needs to be maintained which can be achieved through organic farming.
- There needs to be an improvement in the health as the consumption can lead to many diseases such as cancer, infertility which happens when the toxic residue remains in the body, thus the safety of humans and animals are of utmost priority.
- The strike of balance between the environment and the livelihood becomes immensely important due to the risks caused by conventional agriculture practices.

Government Interventions for promotion of Organic Farming in India

Government of India has been promoting Organic farming in the country through dedicated schemes namely Paramparagat Krishi Vikas Yojana (PKVY) and Mission Organic Value Chain Development for NorthEastern Region (MOVCDNER) since 2015-16 to cater to the needs of domestic and export markets respectively. Both the schemes stress on end-to-end support to organic farmers i.e., from production tocertification and marketing. Post-harvest management support including processing, packing, marketing is made integral part of these schemes to encourage organic farmers. Besides these two main schemes Government of India provides assistance for promoting organic farming across the country though different schemes such as Capital Investment Subsidy Scheme (CISS), National Mission on Oilseeds and Oil Palms (MNOOP), National Food Security Mission (NFSM) etc.

Certification System in India

India has two certification systems in place. Both the systems are based on common national standards only difference is both adopt different approach for verification and documentation.

- **National Programme for Organic Production (NPOP)**
- **Participatory Guarantee System for India (PGS-India)**

National Programme for Organic Production (NPOP)

NPOP certification is a kind of third-party certification, in which, the farm or the processing of the agriculture produce is certified in accordance with national or international organic standards by an accredited organic certification agency. NPOP certification is facilitated by Agriculture Processed Food and Export Development Authority (APEDA), Ministry of Commerce and Industries, Govt. of India.

Participatory Guarantee System for India (PGS-India)

Participatory Guarantee Systems are locally focused quality assurance systems, built on a foundation of trust, social networks and knowledge exchange. In the case of organic agriculture, PGS is a process in which people in similar situations (in this case producers) assess, inspect and verify the production practices of each other and collectively declare the entire holding of the group as organic. PGS-India is facilitated by Ministry of Agriculture and Farmers Welfare. Govt. of India through National Centre of Organic Farming (NCOF) as its Secretariat.

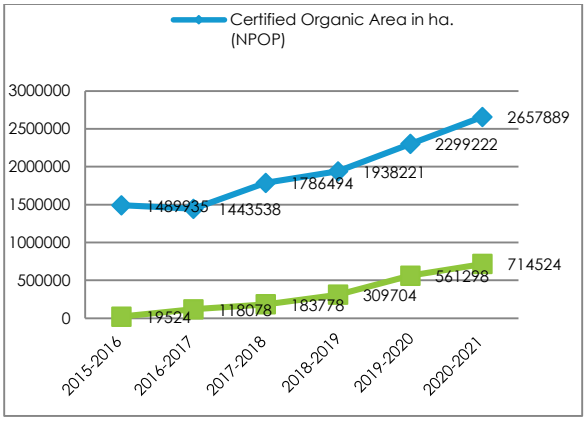
Statistics of Organic Farming in India

According to FiBL survey 2021 India holds 5thposition in terms of certified organic area and ranks 1st in terms of maximum number of farmers among 187 countries practicing organic agriculture.

- Cultivable land area underorganic farming has been increased more than double from 1.2 million ha. in 2014 to 2.30 million ha.in 2019.
- Over the years the organic promotion activities led to development of state specific organic brands, increased domestic supply and exports of organic produce from northeast region.
- As per international resource data from Research Institute of Organic Agriculture (FiBL) and International Federation of Organic Agriculture Movement (IFOAM) statistics 2021, India stands at 5th position in terms of certified agricultural land with 2.30 million ha.
- India produced around 3496800.34 MT (3468991.98 MT farm produce and 27808.36 MT wild harvest) certified organic products which includes all varieties of foodproducts namely Sugarcane, Oil Seeds, Cereals & Millets, Cotton, Pulses, Medicinal Plants, Tea, Fruits, Spices, Vegetables, Coffee, wild harvest products etc.
- Madhya Pradesh ranks first in terms of certified organic area followed by Rajasthan and Maharashtra.

Data of last six years shows that area under certified organic land under both NPOP and PGSD-India is continuously increasing. (Figure-01)

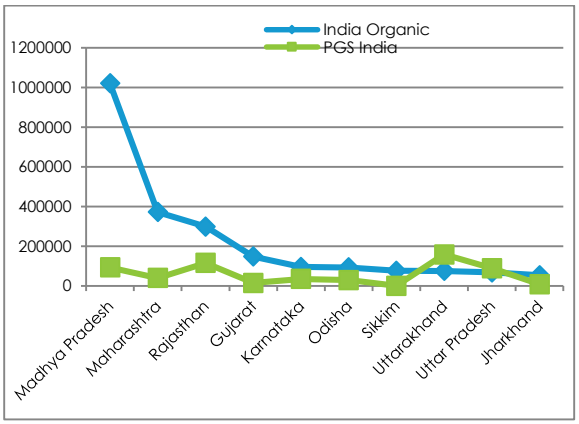
Figure-02: Certified Organic areas under organic certification (NPOP and PGS-India) process during last 6 years



Source: APEDA, PGS-India

Among all the states, Madhya Pradesh has covered largest area under organic certification followed by Rajasthan and Maharashtra under NPOP certification. And under PGS certification Uttarakhand ranks first followed by Rajasthan and Madhya Pradesh. (Table-01)

Figure-03: State wise cultivated farm area under India Organic and PGS-India for 2020-21



Source: APEDA, PGS-India

Table-01: State wise cultivated farm area under NPOP and PGS-India for 2020-21

Sl. No.	Name of State	Cultivated Area (NPOP) ha.	Cultivated Organic Area (PGS-India) ha.
1	Madhya Pradesh	1020017.98	92987.52
2	Maharashtra	371722.62	39414.38
3	Rajasthan	298686.29	115540.7
4	Gujarat	147866.41	14175.07
5	Karnataka	95050.08	34683.42
6	Odisha	92694.81	28900.1
7	Sikkim	75729.66	0
8	Uttarakhand	74826.40	158380.4

9	Uttar Pradesh	67442.61	88715.77
10	Jharkhand	53261.70	7818.3
11	Kerala	45070.38	13610.13
12	Meghalaya	38376.39	914.79
13	Andhra Pradesh	36801.36	5558.32
14	Tamil Nadu	31629.06	8872.84
15	Jammu & Kashmir	30619.82	980.36
16	Bihar	29902.54	12673.83
17	Chhattisgarh	23209.52	61173.66
18	Assam	18470.84	8303.86
19	Nagaland	14790.38	1266.91
20	Arunachal Pradesh	13114.12	4339.01
21	Mizoram	13038.89	754.29
22	Manipur	12724.92	1318.82
23	Goa	12632.32	11011.03
24	Himachal Pradesh	11854.00	8872.23
25	Telangana	6865.56	12145.25
26	Tripura	6521.31	1000
27	West Bengal	6302.61	3355.85
28	Haryana	4903.06	1048.89
29	Punjab	2021.50	3234.25
30	Lakshadweep	895.51	551.65
31	Ladakh	817.85	4985.09
32	Pondicherry	23.65	741.64
33	New Delhi	5.17	8259.74
34	Andaman & Nicobar	0	48.3
35	Daman & Diu	0	579.72
	Total	**2657889.33**	**756216.13**
	Source: APEDA, PGS-India		

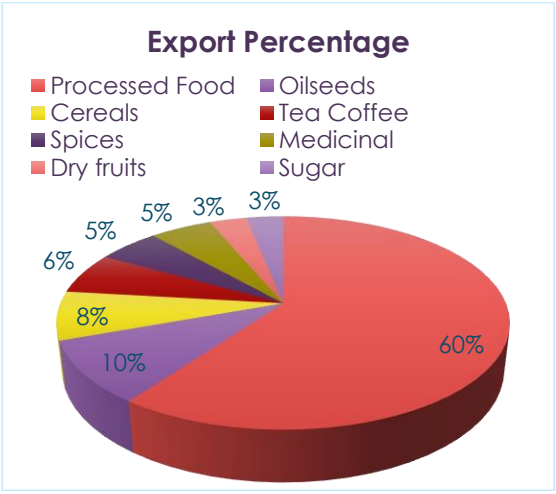
Madhya Pradesh ranks first in terms of organic farm production under NPOP certification followed by Maharashtra and Karnataka while under PGS-India certification Uttarakhand produces highest quantity of certified organic farm produce.

Table-02: State wise organic farm production under India Organic and PGS-India for 2020-21

Sl. No.	Name of State	Farm Production (India Organic) MT.	Farm Production (PGS-India) MT.
1	Madhya Pradesh	1392095.93	179628.51
2	Maharashtra	775774.99	247797.30
3	Karnataka	355718.73	52279.67
4	Rajasthan	256386.15	173293.04
5	Uttar Pradesh	183409.04	566322.11
6	Odisha	131852.01	88089.55
7	Gujarat	117805.73	31245.56
8	Uttarakhand	46645.41	1092216.80
9	Jammu & Kashmir	41043.93	4730.90
10	Kerala	27850.11	38477.18
11	Tamil Nadu	24068.86	68761.18
12	Meghalaya	21753.32	3557.97
13	Chhattisgarh	20630.65	148901.29
14	Andhra Pradesh	20145.27	128187.94
15	Assam	17839.16	25757.83
16	West Bengal	17434.79	6984.95
17	Himachal Pradesh	6368.45	28395.73
18	Haryana	5439.00	1403.97
19	Goa	3115.44	316267.60
20	Telangana	2509.68	6319.47
21	Sikkim	447.27	0
22	Tripura	348.53	0
23	Punjab	264.63	3261.92
24	Manipur	27.74	4859.38
25	Bihar	12.59	242574.54
26	Nagaland	3.50	0
27	Arunachal Pradesh	1.09	0
28	Daman & Diu	0	1901.06
29	Delhi	0	46459.79
30	Jharkhand	0	35740.99
	Total	**3468991.98**	**3543416.22**
			Source: APEDA, PGS-India

Trade in Organic Products

The latest official data available from APEDA indicates total exports at 1040.95 million USD with total export of 888179.68 MT in 2020-21. The United States was the biggest importer of Indian organic products. Other prominent export destinations in 2020-21 included the EU, Canada and Switzerland. The top organic products exported by value are as below.



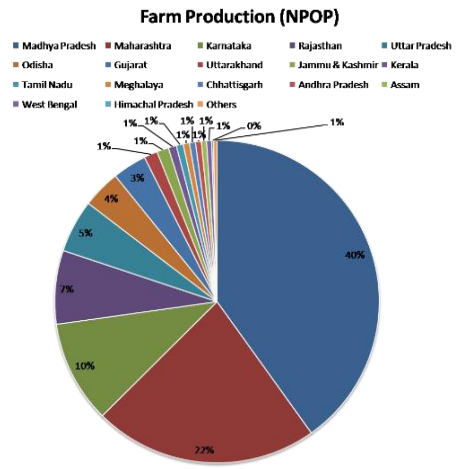


Figure-04: State wise organic farm production under NPOP for 2020-21
Source: APEDA, 2021

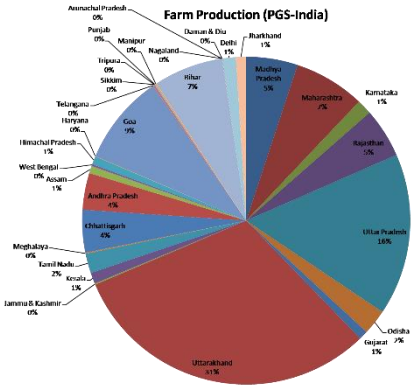


Figure-05: State wise organic farm production under PGS for 2020-21
Source: APEDA PGS-India

Importance of Organic Farming in Indian Economy

The country's exports of organic food products rose by 51 per cent year-on-year to USD 1 billion (Rs7,078 crore) in 2020-21. Ministry of Commerce and Industry introduced Agriculture Export Policy, 2018 with an aim to double farmers' income by 2022 by doubling agricultural exports from India and integrating Indian farmers and agricultural products in India to the global value chain. The export of agriculture is targeted at 60 billion USD by 2022. And organic products share considerable amount of total agricultural export from India. Following table shows the comparison between Total Agricultural Export and Organic Products since 2014-15.

References:

1. https://pgsindia-ncof.gov.in/
2. https://www.apeda.gov.in/
3. https://www.fibl.org/en/

Compilation by :

1. Dr. Gagnesh Sharma, (Director I/c, National Centre for Organic and Natural Farming, Ghaziabad.)
2. Sri Kishor R. Shedge, (Junior Scientific Officer, Regional Centre for Organic Farming, Gandhinagar)
3. Dr. Shrinivas Murthy R, (Junior Scientific Officer, National Centre for Organic and Natural Farming, Ghaziabad)

PGS-India Revised Structure and Certification Process

Strengthening Integrity with simplicity and traceability

PGS-India: Participatory Guarantee System (PGS) is an organic quality assurance system that is locally relevant, emphasize the participation of farmers/producers, stakeholders, and consumers and operate outside the frame of third party certification. The process is very simple where group of farmers verify each other, document it and take collective decision on the organic status of individual producers in compliance of PGS standards. Collective guarantee of organic status decision is then submitted to Regional Council, which in turn on verification approves (or reject) the certification decision. Process/ production standards are the same as of NPOP.

Since its launch of PGS web portal from July, 2015 and introduction of PGS component with launch of PKVY scheme , more than 11 lakh farmers are registered covering an area of about 7.5 lakh ha. PGS-India is the largest PGS initiative in the world.

PGS-India certification is recognized under Food Safety and Standards (Organic Foods) Regulations, 2017 on par with NPOP and All the Organic Food Business Operator shall comply with all the provisions of these Regulations by 1st July, 2018.

There was a provision of group of farmer's registration and certification system was operational under PGS-India web portal since from 2015.

Issues necessitated for Changes

- Certification was only up to farm gate.
- Entire value chain needed to be integrated
- Need for Individual farmers and Large Area Certification felt
- Documentation and data uploading requirement on PGS portal was exhaustive and farmers facing problem.
- Needed simplification
- Many RCs were working as service providers and in some cases were in the business of production, processing and sale. Issues of conflict of interest
- Physical verification by RCs on groups and surveillance of PGS Secretariat on RCs was not defined
- Traceability chain was incomplete
- Provisions for sanctions on default/ non-compliance not defined

Important Changes/ Modification under revised guidelines

a. New certification categories:

- Individual farmers
- Large area certification /Traditional (Default areas)
- Processing and handling up packaging in retail packs

b.

c. Revised Institutional structure

- Secretary DAC & FW is the apex controlling authority
- National Advisory Committee (NAC) headed by AS, as policy making and authorizing body for changes and modifications
- National Executive Committee (NEC) headed by JS INM for all executive decisions.

d. Revised eligibility criteria for RCs

- Agency and its promoters/ personals shall not have any conflict of interest. Means not in the business of

production, sale, trade of inputs/ farm produce or managing Government sponsored projects.

- However, Not-for-profit civil society organizations exempted provided they are not implementing Government projects of organic
- Possess competence and experience in certification management

e. Certification process

- Simplified documentation process, no documents to be maintained at group level
- Mandatory requirement for RCs to physically verify the group, first in 12 months of registration and then once in 2 years
- Mandatory surveillance and monitoring of RCs by the PGS Secretariat and/or as directed by the NEC
- Defined elaborate sanctions catalogue to deal with defaults and appeal procedures
- Defined labeling procedures in tune with Food laws

f. Simplification in PGS Portal

- Data uploading requirements reduced to just 25%. Need for farm history for past 3 years deleted
- Peer appraisals uploading on portal reduced from individual farmer to one summary sheet for entire group
- Introduction of processing, handling and sale module for end to end traceability. All stages to be registered on the portal
- Provisions for actual yield uploading and transaction certificates based on actual yields
- Each transaction to be done through Transaction certificate and chain maintained till the material is packed in final retail packs.
- All transactions and issue of transaction certificate will be only through Jaivik Kheti Portal for real time tracking
- Seamless integration of PGS Portal with Jaivik Kheti portal
- Time restrictions for step-wise data uploading

Transitioning of system from old to new one

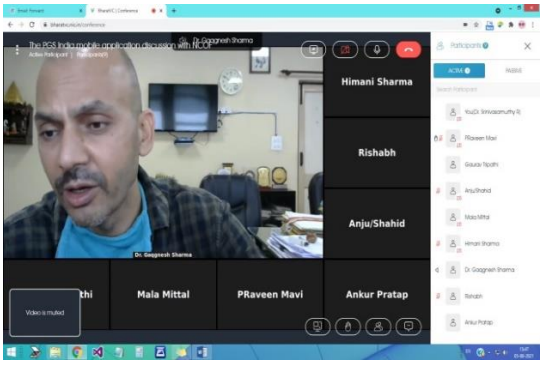
- 51 new RCs selected as per revised eligibility criteria.
- State Govt agencies 15 No., Third party certification bodies-5 No., private/ NGO /others -31 No..
- 23 State and Uts have RCs. 13 State and Uts do not have any RC (among major States Andhra Pradesh , Haryana and Jharkhand not represented)
- All existing groups to be transferred from outgoing RCs to new RCs within 2 months. Groups can choose RC as per their choice. Else secretariat can assign to nearest RC.
- All entries up to Rabi 2021 has been completed and certificates issued up to 15th April 2021. Now old portal is closed for changeover
- New PGS portal being launched in May 2021.
- Entries for Summer and Kharif 2021 to be done in new portal
- Existing RCs (that have not been renewed) having MoUs with state Govts for implementation of PKVY for certification, on request of the state will be kept in transition mode to complete the project till the date of MoU. But they will not be allowed to register new groups/ operators and their continuation will be only up to the date of validity of their MoU. After that states need to ensure that groups are transferred to other authorized RCs in time.

Introduced facilitating Agency / Service Providers to hand hold PGS certification

"Facilitating Agencies are organizations "that may be helping the PGS-India farmers in handholding, cluster formation, capacity building, marketing, implementation of PKVY/other organic farming schemes/programmes etc."

FA/SP will help the PGS farmers in documentation, uploading, collection of data with GPS coordiates , Marketing and branding and facilitating formation of FPOs .

Thera are 51 Service providers empaneled across India from Different States and provided to operate anywhere in India and lead organic farmers to prospective future.



Director, NCONF Ghaziabad / Executive Secretary PGS-India intrectiing and reviewing the newly PGS-India web portal before launching

Launching of new PGS-India web portal by Smt. Neerja Adidam, Joint Secretary, INM Division, DA & FW, Ministry of Agriculture and Farmers Welfare

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Success Stories of Organic Farmers of Gujarat

Sh. Jadav Bhikhabhai Raysingbhai

General Information of farmers : Postal address (Village, Block, District, State), Mobile No., Email etc., :

Sh. Jadav Bhikhabhai Raysingbhai, Gulabpura village, Amodar Panchayat, Waghodiya Taluka, Vadodara District – 390019

Age : 59 Years, 6th Std.

Family members : 6

Animal : 4 Cows, 5 buffaloes

1. Area and Crops taken up by farmer : 2.30 Ha. (Pigion pea, Paddy, Brinjal, Turmeric, Soybean, Fodder)
2. Area and crops taken up under organic farming : 2.30 Ha. (Pigion pea, Paddy, Brinjal, Turmeric, Soybean, Fodder)
3. When started organic farming – Date & Year : April 2017
4. Which Certification System adopted: A. PGS-INDIA certification promoted by NCOF or TPC under NPOP promoted by APEDA : Applied for PGS-India 2021
5. Conversion Status: C1, C2, C3 in case of TCP and PGS-INDIA Green or PGS-INDIA Organic in case of PGS : C1
6. On farm organic inputs prepared and used: Abstract of procedure preparation and application: Dashparni, Vermicompost, Jeevamrut, Compost
7. Off farm organic inputs preparation, If any: Abstract thereof and its application details : Regular monthly application of Jeevamrut and vermicompost with channel irrigation and direct spray.
8. Special Achievements with regard to production

I. How the cultural practices impacted on production: Jeevamrut gave good results for paddy and turmeric crops.

II. How the usage of Agricultural Inputs impacted on production : Soil is improved, becomes soft and need less irrigation. After one month of application of compost and jeevamrut the growth is good in comparison to inorganic crops.

III. What are the package and practices adopted and impact on production: regular use of vermicompost and jeevamrut seems to be very effective, increasing in production after one year.

IV. Any other practices that supported for impact on production: Bhikhabhai is satisfied with the organic practice's applications since past 3 years.

9. Details of increase in production or productivity per hectare or acre : Production of 600 kg paddy, 200 kg pigeon pea, 140 kg Onion, 150 kg gram from 1.6 Ha land
10. Achievements in Marketing

Marketing in local market – local market, selling by himself in Vadodara city.

Tie up with FPOs or Buyers for marketing details – His wife is members of organic FPO in Narmadpura, Waghodiya

Processing and packing details if any – Not done

Brand building – FPO will develop brand

Javikkheti marketing – Not yet started.

Mrs Manju Govindbhai Gajera Established "Sri Kissan Mall"

He belongs to Art of living foundation since last 22 years. He is working with art of living SSIAST as a trainer for kitchen & kids gardening since 2008. Her husband Mr. Govindbhai Gajera is an apex member in SSIAST.

They started natural farming on their farm located at **Majevadi village in Junagadh** district from 2009 and is still continued since 11 years. Product quality and quantity was improved a lot, expenses were reduced and environment became natural.

As an organic farming trainer and experience from their farming practice they **participated** in **"WOMEN OF INDIA ORGANIC FESTIVAL" held in Delhi in 2017 and in 2018** they also participated in the same festival held in Mumbai. They got a very good response and exposure from both places. She was interviewed in **DD National**.

As a result of all these participation and exposure in **2018** they started **"Sri Kissan Mall" with the brand " THE ROOTS"**. Mall is completely based on farmer to customer. Motto was to encourage and provide market to farmers doing cow dung based organic farming so that they can get good cost for there products. These products is for people living in cities who want pure chemical free , trustworthy products . Mall was inaugurated by chairman of "Gau Aayog" Dr. Vallabh bhai kathiriya.

They have **trained 3000 farmers** , more than 500 peoples in cities for kitchen garden and also more than 50 children for kids gardening.

Mrs Varshaben Baldevbhai Valand Establised FPO

She belongs to village **Narmadpura, Waghodiya, Vadodara**. She has 3 bigha land and has 3 family members.

Four years before her husband was doing traditional chemical farming with the cost of INR 25000/- and earning was INR 60000/- In year 2017 she got various trainings on Composting, Vermi-composting, Bio Pesticides, Liquid Manuring, Jivamrut, Nimashtra etc, and learned about organic farming and started Organic Farming with the help of Shrishti Organics. Initially she cultivated Vegetables in back yard and got good success. Since then, she decided for organic farming in farm land as well.

Last year she cultivated and sold following items

Item	Production in Kg	Cost/Kg Total	Total
Basmati Rice	400	100	40000
Gram	700	60	42000
Ajwain	22	200	4400
Rice Guj - 13	2000	17.50	35000

She is recognized as **FEMALE FARMER**. She has gained knowledge on organic farming and established **FPO working as**

Vice President of FPO. Gaining and disseminating knowledge for packaging and marketing of organic produce, organic products yield etc. She is actively engaged in helping other female farmers in getting subsidies via enrolling them with Govt agencies, helping female farmers to establish organic farming cooperatives.

Mr Kalubhai Humal Convergence of mass land into Organic Farming

He is Organic farmer at Lathi village of **Amreli district, Gujarat**. He owns **44 ha agricultural land** and 5 cows. He was growing conventional before 2019 but one day Mr. Rahul kachhad, one of the directors of Akhil Gujarat Vikas Trust, visited his farm and suggested to do organic farming and explained its importance, then the 2nd day of the visit he decided to do organic farming instead of conventional.

He is growing Cotton, Groundnut, Sesame and Pearl Millet in Kharif season, and Wheat (Bansi and Sonamoti), Chickpea and Coriander in Rabi season since many years. He was utilizing his 44-ha land in Kharif and 21 ha in Rabi season with Cropping intensity of 147%. Production was approx. 20 MT Cotton, 68 MT Groundnut, 5 MT Sesame and 9 MT Pearl millet in Kharif season from the area of 9.6 ha, 27.2 ha, 2.4 ha and 4.8 ha respectively. Also in Rabi season there was production of 49 MT Bansi Wheat, 2.4 MT Sonamoti Wheat, 10 MT Chickpea and 5 MT Coriander.

After 1 year of Organic Farming, he observed that very tiny difference (5-7%) of quantity produced from my farm, but noticed that the superior quality of organic quality against chemical (Conventional) Farming.

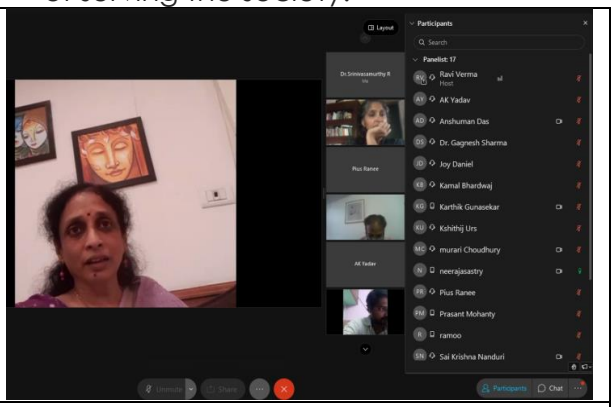
He is also doing value addition in groundnut and making **groundnut oil, selling it (Rs. 3500/ 15 lit.)** to retail customers. Due to organic production locally, there is return relatively more rate of products, he earned Rs. 16 lakhs more than conventional product. Also, he saved Rs. 9 lakh from cost of chemical pesticides and fertilizers.

NCONF & RCONFs Events / Activities

NCONF, Ghaziaabd

Celebrated Amrut Mahotsava Programme through showcasing success stories of outstanding organic farmers

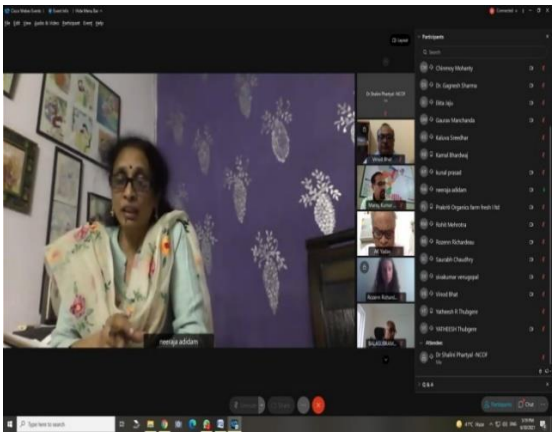
To commemorate 75 years of progressive and glorious achievements of our great nation on the occasion of 75th anniversary of India's Independence, Government of India under the able guidance of Hon'ble PM has taken an initiative of celebrating Azadi ka अमृत महोत्सव. As a follow-up, National Centre for Organic and Natural Farming (NCONF) a subordinate office of Division of Integrated Nutriment Management (INM), Department of Agriculture, Cooperation and Farmers Welfare organised an all India Level webinar showcasing "success stories of outstanding organic farmers" on 7th May 2021 at 3.00 pm.to 6.00 p.m. The programme was presided over and monitored by Smt. Neeraja Adidam JS(INM), executed by Dr. Gagnesh Sharma Director (I/c) NCOF Ghaziabad, co-ordinated by Dr. V.K. Verma RD RCOF Bhubaneswar and NCOF/RCOF Officers. Dr. A.K. Yadav Advisor presented the schemes of Govt. of India. About 250 no. of organic farmers, women farmers, NGO representatives/entrepreneurs, FPO representatives and other stake holders participated on various aspects of organic farming i.e. crop production, certification, Processing and Marketing. About 20 selected progressive famers shared their success stories for promotion of organic farming in the country. The farmer's success stories showed increase in production, decrease in cost of production and achievements of higher profits with innovative marketing. Some of the farmers showed that PGS and Jaivik Kheti marketing portal has been beneficial. In addition, farmers said that this critical situation of pandemic is an opportunity for adopting organic farming practices and provide safe and quality food to the society a unique way of serving the society.



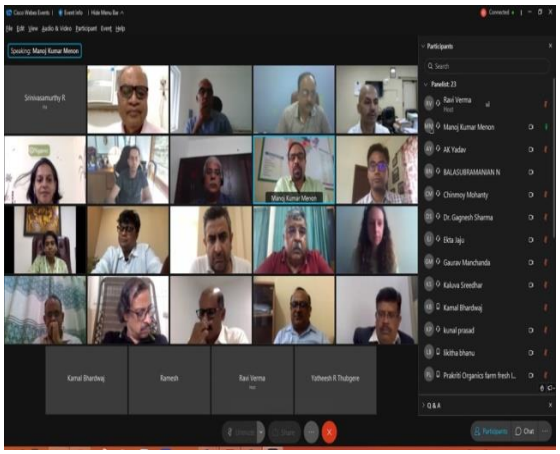
Azadi Ka Amrut Mahotsava (AKAM) Programme through showcasing success stories of outstanding organic farmers through webinar

Series of Brainstorming sessions on "ORGANIC AGRICULTURE MOVEMENT IN INDIA - WAY FORWARD AND FUTURE STRATEGIES" held from 24th to 30th June, 2021

In pursuance to the directions of Secretary Agriculture Govt. of India a series of Brainstorming sessions were organised from 24th June, 2021 to 30th June 2021 by INM Division DAC & FW in collaboration with NCOF Ghaziabad through virtual mode. The interactive platform was hosted by M/s Nuernberg Messe India Pvt. Ltd under the Chairpersonship of Sh. Sanjay Aggarwal Secretary Agriculture DAC & FW Government of India. The Brain storming series aimed to identify policy interventions, strategies and action plan needed to drive the organic agriculture movement in the country during next 10 years.



Smt. Neeraja Adidam J.S., DA & FW (INM) interacted with participants during the series of brainstorming sessions



Brainstorming sessions were attended by various stakeholders of the organic farming from all over the country

Interaction Webinar with Biofertilizers Industry and Labs

The Webinar was organized as a part of the ***"Bharat Ka Amrut Mahotsav"*** to commemorate *75 Years of India's Independence*. The main objective of the Webinar was to make the Biofertiliser /organic fertiliser manufacturing units and notified laboratories aware about the overall scenario, latest modifications in FCO and Govt. initiatives to take forward the availability of quality inputs. The webinar was inaugurated and presided over by Hon'ble Joint Secretary, Smt. Neeraja Adidam INM Division of Department of Agriculture, Cooperation and Farmers Welfare, Government of India on 15-07-2021. A total of 117 participants including about 100 Biofertiliser/ Organic fertilizer Units, State and Central notified laboratories and Officers participated in the webinar organized by NCOF Ghaziabad.

JS, DA & FW (INM) interacting with stakeholders of Biofertilizers Industry and Quality Control Labs

RCONF, Ghaziaabd

Progress for NABL Accreditation:

i. Quality Manual and Procedure Manual have been prepared.

ii. Standard Operating Protocols (SOP) for organic fertilizers as well as biofertilizers have been prepared and SOP preparation for equipments is under process.

iii. Order for calibration of equipments was placed and further calibration of equipments in the laboratory was done.

iv. In order to fulfill NABL Accreditation requirements in the laboratory, registration for proficiency testing of organic fertilizers with NABL authorized PT provider has been done.

Bio-diversity Park:

Work for maintenance of bio-diversity park in the premises is under process. Preparation of suryamandal garden in the biodiversity park of premises is done.

Live Demonstration Plots

Preparation of organic inputs i.e. Vermi-compost and NADEP was done in the field.

Demonstrations of various on-farm organic input production at NCONF Campus developed by RCONF (HQ) Ghaziabad

RCONF, Imphal

Participated in Seminars/ Webinars/ meeting/ training/ Video Conferencing /Workshops Attended /organized:

i. Participated in webinar on 'INDIAN STANDARDS ON BIOFERTILIZERS - Means to Achieve Soil Sustainability'' for RCOFs/Service providers/Facilitating agencies organised by Bureau of Indian Standards on dated July 13, 2021.

ii. Participated in webinar on 'Interactive Session with Biofertilizer units and Notified Testing Laboratories' on dated July 15, 2021 organised by NCOF, Ghaziabad.

iii. Participated in online Discussion regarding Assessors Training on ISO/IEC 17025:2017with NABL on dated July 20, 2021 organized by NABL/QCI , New Delhi

iv. Delivered 2nos. of talk/lecture on organic agriculture system and the role of FPOs for the trainee participants of NABARD organized by BIRD, Lucknow during July 23, 2021.

v. Attended and Participated in Video Conferencing (VC) on Instrument Purchase and Revised SOP for FCO Sample Disposal for officers of N/RCOFs on dated 20.09.2021 organized by NCOF, Ghaziabad.

Live Demonstration Plots

Prepared demonstration unit of organic inputs i.e. Vermi-compost and different ITK's was done in the field.

Live Demonstration Plots in RCONF Imphal Campus

RCONF, Jabalpur

Participated in Seminars / Webinars / meeting / training/ Video Conferencing / Workshops Attended/ organized:

i. Dr A S Rajput, Regional Director delivered a guest lecture on 08th July 2021 on Training Programme for Organic Production and Promotion for Chhatisgarh and Madhya Pradesh organized by APEDA.

ii. RCONF Jabalpur organized and participated in 'Interactive Session with Biofertilizer units and Notified Testing Laboratories', on 15th July 2021.

iii. Dr A S Rajput, Regional Director and Sh. S K Bakshi, Technical Assistant visited M/s Hari Anant Vikas Samiti and M/s Saraswati Shakti Peeth Shiksha Samiti at Gwalior, MP on 11th and 12th Aug. 2021 for Monitoring under Model Cluster Demonstration.

iv. RCONF Jabalpur celebrated Hindi Pakhwada from 14th -17th Sep. 2021.

v. RCONF Jabalpur attended 02 online meetings on 20th Sep. 2021 under the Chairmanship of Director, NCOF on (i) Discussion on revised SOP for FCO Sample Disposal (ii) Discussion with MRC, EPC, BEC, & TEC on Purchase process of Instruments as per meeting circular no. 5-1/2021/NCOF/1984-51 dated 17-09-2021.

Verious field activities by RCONF Jabalpur

Quality Testing of Organic Inputs under FCO,1985

(by Notified RCONF Laboratories under NCONF)

(from April, 2021 to September, 2021)

Notified RCONF laboratory	Biofertilizers			
	No. of Samples Tested	No. of Samples found Standard	No. of Samples found Non-Standard	Standard sample percentage (%)
RCONF (HQ) Ghaziabad	45	18	27	40.0
RCONF Panchkula	11	7	4	63.6
RCONF Jabalpur	18	7	11	38.8
RCONF Bhubaneshwar	0	0	0	NA
RCONF Nagpur	19	0	19	0.00
RCONF Bangalore	0	0	0	NA
RCONF Imphal	0	0	0	NA
Total	93	32	61	34.4

Notified RCONF laboratory	Organic fertilizers & Non Edible de-oiled cakes			
	No. of Samples Tested	No. of Samples found Standard	No. of Samples found Non-Standard	Standard sample percentage (%)
RCONF (HQ) Ghaziabad	48	11	37	22.9
RCONF Panchkula	0	0	0	NA
RCONF Jabalpur	94	57	37	60.6
RCONF Bhubaneshwar	9	1	8	11.1
RCONF Nagpur	15	1	14	6.6
RCONF Bangalore	0	0	0	NA
RCONF Imphal	0	0	0	NA
Total	166	70	96	42.1

India Organic News

Large Area Certification (LAC) Scheme of PGS-India- A&N gets certification

The Ministry of Agriculture and Farmer Welfare recently announced that around 14,491 hectares of land in Andaman and Nicobar Islands have been certified as organic. This is the first large contiguous territory to be certified under government scheme. Background The organic certification was provided under the Large Area Certification Scheme of the Participatory Guarantee System.

Lakshadweep declared 100% Organic

The Union Territory of Lakshadweep has been declared as Organic Agricultural Area by the Ministry of Agriculture and Farmer's welfare. The UT is second after Sikkim to achieve the status of 100% organic region. It is first in the Union Territories of India to achieve the status. The entire 32 sq km area of the UT has been certified as organic under the Union Government's Paramparagat Krishi Vikas Yojana (organic farming improvement programme). Lakshadweep has been separated from the main stream India geographically. There has been no shipment of chemicals and fertilizers to the island group for the last 15 years. The UT administration has been practicing farming only using inputs like compost, poultry manure, green leaf manure. The UT has not made any expenditure for procurement of chemicals.

Global Organic News

India topped the list of number of organic farmers and at ninth place in area under organic farming

India topped the list of the number of organic farmers and in terms of the total area under organic farming, it ranked 9th. North Eastern state Sikkim set a record by becoming the first fully organic state in the world and other states like Tripura and Uttarakhand have set similar targets.

IFOAM Organics Europe General Assembly

The General Assembly of IFOAM Organics Europe gathers members from all over Europe in the democratic pursuit of a common voice for organic. During the GA, members review and decide on the general policy and direction of the IFOAM Organics Europe, including financial matters, Statutes modifications and every three years – the election of the IFOAM Organics Europe Board.

Organic Food Conference 2021

Bi-annual organic food conference (formerly organic processing Conference), takes place from 30 September-1 October online & live from Warsaw, Poland. This edition under the motto 'The future of organic food' is organised by IFOAM Organics Europe in collaboration with the Polish Chamber of Organic Food.

The 2021 edition of the Organic Food Conference was the go-to place particularly for organic food processors, retailers, traders, importers and control bodies, and covers, among others:

The European Green Deal and how to reach the 25% target of organic land by 2030;
Expected changes in the new EU Organic Regulation;
What packaging should look like for organic products; and
An update on the ProOrg project;
Inspiring stories of organic successful business models, examples from Food Shift 2030.

European Organic Congress 2021

The annual European Organic Congress titled "Organic's contribution to the European Green Deal" took place online, live from Lisbon from 16-18 June 2021, organised by IFOAM Organics Europe and our Portuguese parter, AGROBIO.

The congress brought together organic stakeholders from across Europe to talk about policy developments in organic food and farming. We will cover the alignment of CAP Strategic Plans with the EU Green Deal, expected changes in the new EU Organic Regulation, organic's contribution to climate change mitigation, sustainable food systems, and rural development.

भारत का राजपत्र
The Gazette of India

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CG-DL-E-02072021-228076

EXTRAORDINARY
PART II—Section 3—Sub-section (ii)
PUBLISHED BY AUTHORITY

No. 2473] **NEW DELHI, FRIDAY, JULY 2, 2021/ASHADHA 11, 1943**

MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(Department of Agriculture, Cooperation and Farmers Welfare)
ORDER

New Delhi, the 1st July, 2021

S.O. 2671 (E). — In exercise of the powers conferred by section 3 of the Essential Commodities Act, 1955 (10 of 1955), the Central Government hereby makes the following Order further to amend the Fertiliser (Inorganic, Organic or Mixed) (Control) Order, 1985, namely:—

1. (1) This Order may be called the Fertiliser (Inorganic, Organic or Mixed) (Control) Fifth Amendment Order, 2021.

(2) It shall come into force on the date of its publication in the Official Gazette.

2. In the Fertiliser (Inorganic, Organic or Mixed) (Control) Order, 1985, (hereinafter referred to as the said Order),-

1. in clause (2), in sub-clause (nna), for the brackets and words —(such as Castor, Neem)*", the words*

"including Castor, Neem, Karanj (Pongamia pinnata), Mahua (madhu calongifolia) and Jatrophall shall be substituted;

2. In clause (30), for sub- clause (2) the following shall be substituted, namely :—

—(2) The laboratory shall analyse the sample and forward the analysis report to the authority specified in the memorandum referred to in sub-clause (1) in the following manner, namely :—

- in case of fertiliser, other than biofertilizer, organic fertilizer and de oiled cake fertilizer, the analyzing report shall be in Form L and forwarded within fifteen days;
- in case of the sample of organic fertilizer, the analysis report shall be in Form L1, and forwarded within thirty days;
- in case of biofertilizer, the analysis report shall be in Form L2 and forwarded within forty-five days;
- in case of deoiled cake fertilizer, the analysis report shall be in Form L3 and forwarded within thirty days from the date of receipt of sample in the laboratory.ll ;

(iii) in Schedule III,-

(a) for the brackets, words, figure and letters —[See clause (h) and (q)]ll , the brackets, words, figure and letters —[See clause (q)ll shall be substituted;

(b) for Part A and Part B and the entries relating thereto, the following Parts and entries shall be substituted, namely: —

Part A

SPECIFICATION OF BIOFERTILISER

Rhizobium

Total viable count	CFU minimum $5x10^7$ cell per gram of powder, granules or carrier material/or per gram capsule content in gelatin base or $1x10^8$ cell per ml of liquid.

Contamination level	No contamination at 10^5 dilution.
pH	6.5-7.5
Efficiency character	Should show effective nodulation on all the species listed on the packet and there should be minimum of 25% increase in dry matter yield in test plant, after 25 Days After Sowing (DAS) when tested as per the method given under controlled conditions.

Azotobacter

Total viable count	CFU minimum $5x10^7$ cell per gram of powder, granules or carrier material or per gram gelatin bases capsule content or $1x10^8$ cell per milliliter (ml) of liquid.
Contamination level	No contamination at 10^5 dilution.
pH	6.5-7.5
Efficiency character	The strain should be capable of fixing at least 10 mg of nitrogen per gram of sucrose consumed.

Azospirillum

Total viable count	CFU minimum $5x10^7$ cell per gram of powder, granules or carrier material or per gram gelatin bases capsule content or $1x10^8$ cell per milliliter (ml) of liquid.
Contamination level	No contamination at 10^5 dilution.
pH	6.5-7.5
Efficiency character	Formation of white pellicle in semisolid Nitrogen free Bromothymol blue media.

Phosphate Solubilising Bacteria

Total viable count	CFU minimum $5x10^7$ cell per gram of powder, granules or carrier material or $1x10^8$ cell per milliliter (ml) of liquid.
Contamination level	No contamination at 10^5 dilution.
pH	6.5-7.5 for moist/dry powder,granulated carrier based and 5.0-7.5 for liquid based.
Efficiency character	The strain should be capable of solubilizing at least 30 mg/litre of Phosphorus in liquid broth when tested as per the method given using Tricalcium Phosphate or Aluminium Phosphate or Iron Phosphate as Phosphate source.

Mycorrhizal Biofertilisers

Total viable spores/ gram of product	Minimum 10 viable spore per gram of finished product.
pH	6.0-7.5
Inocculum potential	1200 IP per gram of finished product by MPN method with10 fold dilution.

Potassium Mobilising Biofertilisers (KMB)

Total viable Count	CFU minimum $5x10^7$ cell per gram of powder, granules or carrier material or or per gram of capsule content or $1x10^8$ cell per milliliter (ml) of liquid.
Contamination level	No contamination at 10^5 dilution.
pH	6.5-7.5 for carrier based in the form of powder or granules and 5.0-7.5 for liquid base or capsule in gelatin based.

Efficiency character	The strain should be capable of solubilizing at least 20 mg/litre of Potash in liquid broth when tested as per the method given using Aluminium Potassium Silicate as K source.

Zinc Solubilising Bacteria

Total viable count	CFU minimum $5x10^7$ cell per gram of powder, granules or carrier material or per gram of capsule content $1x10^8$ cell per milliliter(ml) of liquid.
Contamination level	No contamination at 10^5 dilution.
pH	6.5-7.5 for carrier based in the form of powder or granules and 5.0-7.5 for liquid base.
Efficiency character	The strain should be capable of solubilizing at least 20 mg/litre of Zinc in liquid broth when tested as per the method given using Zinc Oxide/ Zinc Carbonate/ Zinc Phosphate as Zinc source.

Acetobacter

Total viable count	CFU minimum $5x10^7$ cell per gram of powder, granules or carrier material or per gram of capsule content $1x10^8$ cell per milliliter (ml) of liquid.
Contamination level	No contamination at 10^5 dilution.
pH	5.5- 6.0 for moist /dry powder, granulated or carrier and 3.0-6.0 for liquid.
Efficiency character	Formulation of yellowish pellicle in semi solid medium N free medium.

Carrier Based Consortia

Individual organism viable Count	CFU minimum in a mixture of any 2 or maximum three of following micro-organisms: CFU minimum Rhizobium or Azotobacter or Azospirillum $1x10^7$ cells per gram (g).
	CFU minimum PSB $1x10^7$ cells per gram (g)
	CFU minimum KSB $1x10^7$ cells per gram (g)
Total viable count of all the biofertilisers in the product	CFU minimum $3x10^7$ cells per gram of carrier/powder.
Efficiency character	The efficiency character of individual microorganisms to be determined as mentioned in case of individual biofertilizers through quantitative estimation methods.

Liquid Consortia

Individual organism viable count	CFU minimum in a mixture of any 2 or maximum three of following microorganisms: CFU minimum Rhizobium or Azotobacter or Azospirillum $5x10^7$ cells per milliliter (ml).

	CFU minimum PSB $5x10^7$ cells per milliliter (ml).
	CFU minimum KSB $5x10^7$ cells per milliliter (ml).
Total viable count of all the biofertilisers in the product	CFU minimum $1.5x10^8$ cells per milliliter (ml).
pH	5.0-7.0
Contamination level	No contamination at any dilution.
Efficiency character	The efficiency character of individual microorganisms to be determined as mentioned in case of individual biofertilizers through quantitative estimation methods.

Phosphate Solubilising Fungal biofertilisers

Spore Count	Minimum $1x10^6$ spores/gram Minimum $1x10^7$ viable fungal spores/ml of the liquid.
Contamination level	Nil for liquid inoculums $1x10^3$ cells per gram for carrier based preparation.
pH	Liquid: 3.5 to 5.5 Carrier: 6.0 to 7.7
Efficiency character	The strain should be capable of solubilizing at least 30 mg/litre of Phosphorus in liquid broth when tested as per the method given using Tricalcium Phosphate or Aluminium Phosphate or Iron Phosphate as Phosphate source.

Part B

TOLERENCE LIMITS OF BIOFERTILIZER

1. In case of Rhizobium, Azotobacter, Azospirillum Phosphate Solubilising Bacteria, Potash Mobilising Bacteria, Zinc Solubilising Bacteria, the total viable count shall not be less than $1x10^7$ CFU/gm of carrier material in the form of powder or granules or $5x10^7$CFU/ml in case of liquid formulations.

2. In case of Consortia, the total viable count shall not be less than $1x10^7$ in case of carrier based and $1x10^8$ in case of liquid formulations.

3. In case of Mycorrhizal biofertilizers, total viable spores shall not be less than 8/gm of finished product. Ⅱ;

(c) in part D, -

(I) under the heading — 1 A Method of Analysis of Rhizobium biofertilizers Ⅱ , in paragraph 5, for sub- paragraph 3, the following sub-paragraph shall be substituted, namely: -

"5.3 Procedure

5.3.1 Immerse the seeds in 70 percent alcohol for 1 minute, drain the alcohol and immerse the seeds in freshly prepared 5% Sodium Hypochlorite solution for 3 minutes or in 0.1 percent Mercuric Chloride solution for 3 minutes in a suitable container such as a screw capped bottle or a test tube with a rubber hung. Drain the Sterilant and wash the seeds several times with sterile water (at least ten times) to get rid of the Sterilant.

5.3.2 Fill earthenware or glazed pot with soil (2 parts soil and 1 part washed coarse sand) (pH 6 to 7) and autoclave for 2 hours at 120^0 C. After two days incubation at room temperature, repeat autoclaving to ensure complete sterility of soil.

5.3.3 Treat surface sterilized seeds with water slurry of inoculant taken from a culture packet @ 1 gm inoculant mixed with 2 ml of sterile water per 50 gm seed and sow the seeds. Keep a set of pots with uninoculated seeds (surface sterilized but not treated with inoculant) as control. Keep minimum of 4-5 pots for each treatment to overcome variations.

5.3.4 Incubate them in a pot-culture house during appropriate seasons for test plants, taking care to separate the inoculated pots from the control pots. Alternatively incubate the inoculated and uninoculated pots in growth chamber/or growth cabinets under controlled environmental conditions having facilities to adjust temperature (28^0C), humidity (65%) and light intensity (10 Kilo Lux) with 16 hours light and 8 hours dark period.

5.3.5 On day 1 of incubation irrigate each pot once to the moisture holding capacity of soil with sterilized growth medium (as specified at 5.1). Subsequently, water the seedling periodically with sterilized water, taking care to prevent splashing of water from inoculated pots to uninoculated ones.

5.3.6 After two weeks of growth, thin down the number of plants in each pot to four uniform plants. At the end of 25 days, separate the plants carefully from the soil under slow running water. Keep inoculated and uninoculated plants separately. Record the number of nodules on each plant, separately from inoculated and un-inoculated pots. Dry the individual plants (shoot + root) in an oven at 60^0C for 48 hours, separately and record dry weight. Calculate average dry weight of inoculated and un-inoculated plants.

5.3.7 Calculate the increase in dry matter yield as under

% increase in dry matter =	$\frac{W1 - W2}{W2}$	x 100

Where W1 = average dry weight of inoculated plant shoot W2 = average dry weight of control un-inoculated plant shoot.

5.3.8 If good nodulation is obtained in inoculated plants together with total absence or sometimes presence of stray nodules in controls and if there is a 25% percent increase in the dry mass of plants over the uninoculated control, it may be concluded that the strain is adequately nodulating and is effective.‖ ;

II. Under the heading‖ 1C Method of Analysis of Azospirillum biofertilizers, ‖-

- before paragraph 1, the following sub-heading shall be inserted, namely: -

—Method of determination of total viable count and Pellicle formation‖

- after Table 1 and entries relating thereto, the following paragraph, shall be inserted, namely: -

B. Method of determination of Contamination

Medium	
KH2PO4	0.5gram
MgSO4.7H2O	0.2 gram
NaCl	0.1 gram
Yeast Extract	0.5 gram
FeCl3.6H2O	0.015 gram
DL-malic acid	5.0 gram
KOH	4.8 gram
*Congo resolution	15.0 ml
Agar	20.0 gram
Water	`1000 ml

Adjust to pH 7 with 0.1N of KOH
*Congo red solution weigh 2.5 g in 1000 ml water

Note 1;- Sterilizing and preparation procedure for plates, serial dilution for plate counts, incubation of plates and counting of colonies – Same as of Rhizobium.

Note 2;- On Rojo Congo medium, Azospirillum (*A. lipoferum* and *A. brasilense*) colonies shall appear as scarlet red colonies with dry consistency, diameter of 1.5 to 2 mm, round or irregular form, undulate edge, and rugose surface with ridges radiating from the center.

III. Under the heading —1. E. Method of analysis for Mycorrhizal Biofertlisers", for paragraphs 3 and 4, the following paragraphs shall be substituted, namely: -

"3. Estimation of total viable spores

Harvesting of spores from finished product

A. By wet sieving and decantation method

(a) Equipment and Reagent: Stalking sieves with nylon or stainless-steel mesh and a large range of pore sizes for isolating spores from the product or sample

1. 40-50 micron (0.04 mm) sieve for small sized spores.
2. 100 micron (0.14 mm) sieve for medium sized spores.
3. 250 micron (0.25 mm) sieve for very large sized spores and sporocarps.
4. 450 micron (0.45 mm) sieve for removing root bits and other debris.
5. 1 mm sieve for removing root bits and other debris.
6. Wash bottles containing water.
7. Jars for collecting the sieving.
8. Stereomicroscope
9. Petri dishes (11 cm) for observing the sieving under stereomicroscope (x) Micropipettes for spore picking.

(xi) Centrifuge

(b) Procedure

Mix 100 gram Mycorrhizal biofertiliser in a substantial volume of water and decant through a series of sieves arranged in descending order of mesh size. Roots and coarse debris are collected on coarse sieves (1mm and 450 micron), while spores are captured on one or more finer sieves. Vigorous washing with water is necessary to free spores from aggregates of clay carrier material or organic materials. Collect the sieving in jars. Transfer the sieving on to the gridded Petri dishes/plate and observe under stereomicroscope. Count the number of spores in plate/dish and express it as spores/gram of the sample.

(B) By Sucrose gradient centrifugation (optional)

1. Collect the sieving by the method described above. Transfer the sieving into centrifuge tubes and centrifuge for 5 minutes at 1,750 rpm in a horizontal rotor.
2. Decant the supernatant liquid carefully and resuspend pellet in 60% sucrose solution. Again centrifuge for 2-5 minutes.
3. Pour the supernatant (with spores) onto a 45-micron sieve and rinse with water to remove the sugar. Transfer the sieving onto the gridded Petri dishes/ plate and observe under stereomicroscope. Count the number of spores in plate/ dish and express it as spores/gram of the sample.

3.2 Spore staining

(a) Equipment and Reagent

1) Equipment and reagents for spore extraction as described previously
2) 2,5-diphenyl-2N-tetrazolium bromide (MTT)
3) Distilled water
4) Eppendorf tubes
5) Stereomicroscope
6) Petri dishes

(b) Procedure

1) Prepare 0.25% solution of MTT (2,5-diphenyl-2N-tetrazolium bromide)
2) Avoid exposure of MTT solution to light, as the stain is light sensitive
3) Add freshly collect AMF spores (approximately 50 in number) collected by any of the two methods described above to the staining solution and incubate at 27^0 C in sterile Eppendorf tubes in dark (iv) Observe the spores for different colour reactions using stereomicroscope under dark field after 24 hours, 48 hours and 72 hours of incubation.
   (v) Spores, which stained red or pink, are treated as viable, as per the following formula:

$$\% \text{ Spore viability} = \frac{\text{Number of spores which stained red or pink}}{\text{Total number of spores}} \times 100$$

1. 1 Assessment of Inoculum Potential

1) Materials needed:

- Disposable paper/ plastic cups (250 ml) or PVC tubes (15 cm long; 3.2 cm dia.)
- Plastic bags (30 cm x 20 cm)
- Sterilized diluents (sand: soil mix 1:1)
- Onion or Finger millet (ragi) seeds

2) Procedure:

- Weigh 30 gram of sample in a plastic bag and add to it 270 gram of sterilized diluents (sand: soil mix 1:1). Shake thoroughly to get 10^{-1} dilution.
- Remove 30 gram from the 10^{-1} dilution and place it into another bag containing 270 g of sterilized diluents. Shake thoroughly to get 10^{-2} dilution. Make a tenfold series dilution up to 10^{-4} dilution. (or higher dilution if needed).
- Distribute substrate from each dilution into paper/ plastic cups or PVC tubes. Use five replicate cups/ tubes per dilution.
- Sow seeds of onion/ Finger millet into each cup.
- After emergence, thin down to only one plant per tube/cup and let plants grow in a green house or growth room for 45 days (in paper/ plastic cups) or 25 days (in PVC tubes).
- At harvest, wash roots free from substrate and stain them with Trypan blue (see the staining procedure given below.
- Under a dissecting microscope, determine presence or absence of mycorrhizal colonization in each replicate. Counts of positive tube (those containing mycorrhizae) in different dilutions are used to calculate MPN values.
- Use MPN tables of Cochran (1950) given at 1C, 5.3.3 Table 1 under Method of Analysis of Azospirillum Biofertilizers.

Note: Using PVC tubes is advantageous as it gives the result in 25 days with less substrate.

4.2 Methodology and explanation for estimating MPN:

1. To exemplify the calculation, let's consider that in the 5 replicates (tubes) in each of the four dilutions (10^{-1}, 10^{-2}, 10^{-3} and 10^{-4}), one obtains a combination of number of positive tubes like: 5,5,3,2;
2. This means that all 5 replicate tubes are positive for mycorrhizal colonization at 10^{-1} and 10^{-2} dilution, 3 replicate tubes are positive at 10^{-3} dilution and 2 replicate tubes are positive at 10^{-4} dilution. For the calculation of MPN, only last three dilutions of a given combination are required;
3. The first number (P1) corresponds to the least dilution in which all (or the highest number of) tubes are positive for mycorrhizal colonization. The two other numbers (P2 and P3) are those corresponding to the next two dilutions. In the example above, the combination would be: P1=5, P2=3 and P3=2;

4. Now find the row of numbers in MPN Table in which P1 and P2 correspond to the numbers observed experimentally. Follow that row of numbers across the table to the column headed by the observed vale of P3. The figure at the point of intersection is the most probable number of organisms in the quantity of original sample represented in the finished product sample. Calculate total IP/gm as follows: -

$$\text{Total IP/gm} = \frac{\text{Value from MPN Table x Dilution level of P2}}{\text{Dry mass of product sample taken}}$$

[Example - Using the MPN table, the value given for this combination of positive values is 1.4. To obtain the MPN of infective propagules of Arbusicular Mycrrohizal Fungus (AMF) in the sample, this value has to be multiplied by the middle dilution(in this case 10^{-3}). Therefore, the soil has 1.4×10^3 infective propagules/g sample (1.4×10^3 IP/g or say 1400 IP/g)].

1. Staining roots to observe Mycorrhizal colonization

Colonization of root cortex cells by Arbusicular Mycrrohizal Fungus does not alter root morphology. Therefore, to detect and measure mycorrhizal colonization, roots are subjected to a clearing and staining procedure.

- Materials needed:

1. 10% KOH solution (Potassium Hydroxide)
2. 1% HCl solution (Hydrochloric acid)
3. Lacto Glycerol solution (20 ml Lactic acid, 40 ml Glycerol, 40 ml distilled water) (iv) 0.05% Trypan Blue in Lacto Glycerol solution (0.5g/L)

- Procedure:
  - Wash roots free from soil debris and rinse in several changes of tap water.
  - Soak roots in 10% KOH at 90^0C for 1 hour or at 120^0C for 15 minutes. 3. Remove KOH and rinse roots with water (2-3 times) to remove KOH

1. Soak roots in 1% HCl solution for 5 minutes.
2. Remove HCl. Do not rinse roots after this step as they must be acidified for proper staining.
3. Stain roots in acidic glycerol solution containing Trypan blue at 900C for 1 hour or at 1200C for 5 minutes.
4. Discard stain and keep roots in lacto glycerol till observation.
5. Cut the root into about 1 cm pieces and mount in microscopic slides with Lactoglycerol, place cover slip and observe under the microscope for mycorrhizal colonization.

(iv). in schedule IV,-

(a) in Part A,-

(A) in paragraph 1‖ City compost‖ ,-

1. in item (v), for the symbol and figure < —1.0‖ , the symbol and figure — < 1.20‖ , shall be substituted;
2. in item (xi), for the figures — 6.5- 7.5‖ , the figures —6.0 -8.0‖ shall be substituted; III. in item (xii), for the figure —4.0‖ , the figure —6.0‖ , shall be substituted;

1. in paragraph 3,-
1. in item (iv) , for the figure —7.9‖ , the figure —10.0‖ , shall be substituted;
2. in item (vi) , for the figure —10.4‖ , the figure —8.0‖ , shall be substituted; III. in item (ix) , for the figure —8.2‖ , the figure —10.0‖ , shall be substituted;
2. in paragraph 4, in item (xi), for the figure —4.0‖ , the figure —5.0‖ , shall be substituted.

(b) for Part B and the entries relating thereto, the following Part and entries shall be substituted, namely:—

"Part B
TOLERENCE LIMIT OF ORGANIC FERTILIZERS

A sum total of Nitrogen, Phosphorus and Potassium nutrients shall not be less than 1 per cent. in case of City Compost, 2.5 % in case of Vermicompost, 2.8% in case of organic manure. In case of PROM the Phosphate content in terms of P2O5 content shall not be less than 7.8%.‖

(c) In Schedule IV, in Part D —METHODS OF ANALYSIS OF ORGANIC FERTILIZERS‖ , in serial 3. —Estimation of Bulk Density‖ , for paragraph with heading _Calculation', the following paragraph shall be substituted, namely:—

—Calculation:

Bulk Density =	Weight of sample (W2-W1)
	Volume (V2)

Where

W1 = Weight of 100 ml dry cylinder

W2 = Weight of the cylinder along with the sample upto 100 ml mark

V1 = Volume of sample in cylinder before compacting (up to 100 ml mark) V2 = Volume of sample in cylinder after compacting.‖ ;

(V). in Form _J',-

1. in serial number (3), after entry (iv) , the following entry shall be inserted namely:—

—(v) the date of expiry of the batch product‖ ;

2. in serial number 13, for the words —Name and Address‖ , the words —Name, Address and e-mail ID‖ shall be inserted.

[F.No.2-5/2020 Fert.Law]
NEERAJA ADDIDAM, Jt. Secy.

Note: The principal order was published in the Gazette of India *vide* GSR number 758(E), dated the 25th September, 1985 and was last amended *vide*. number S.O 2333 (E) dated 14th June, 2021.

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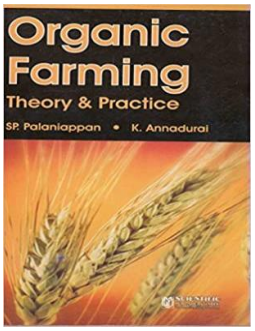
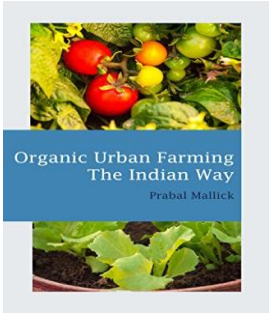
Books on Organic Farming

Organic Farming: Theory and Practice, Scientific Publishers Journals Dept, 225 pages, Price: 800/-



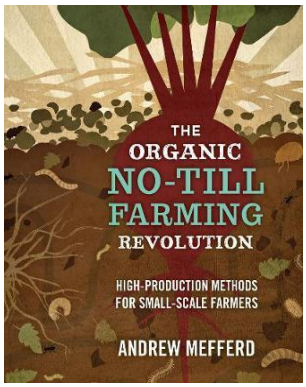
As the unjust distribution of resources and pollution of agriculture escalates, the fate of food security of millions lies on a hinge. While it's impossible to completely give up chemicals in farming, a certain amount of regulation and alternative methods need to be incorporated. Even though, organic farming seems to be the best sustainable alternative, the air of confusion around the topic continues to exist. This book brings to the limelight, all the topics related to this practice in an easily understandable manner. The book contains chapters on organic manures (including green manures), recycling of organic wastes, vermiculture, biofertilizers, organic methods of pest and weed management, integrated nutrient management, farming systems and case studies of organic farming.

Organic Urban Farming, The Indian Way: Comprehensive Guide to Organic Gardening for Urban Spaces in India, Kindle Edition, 103 pages, Price: 500/-



With ever-increasing quantities of chemical in agriculture and subsequent dip in quality of food crops, many are shifting to growing their own food. While several books on this sustainable practice have been penned to those settled in urban and semi-urban areas, only a few talk exclusively in the Indian context. Read this book to get a comprehensive guide not only on how to start your own kitchen garden, but also several easy hacks and tricks for its maintenance. The book is backed by several photographs for reference.

The Organic No-Till Farming Revolution : High-Production Methods for Small-Scale Farmers by Andrew Mefferd, Published by New Society Publishers, United States; 336 pages; Price ₹2,861.42



The Organic No-Till Farming Revolution is the comprehensive farmer-developed roadmap showing how no-till lowers barriers to starting a small farm, reduces greenhouse gas emissions, increases efficiency and profitability, and promotes soil health.

Farming without tilling has long been a goal of agriculture, yet tilling remains one of the most dominant paradigms; almost everyone does it. But tilling kills beneficial soil life, burns up organic matter, and releases carbon dioxide. If the ground could instead be prepared for planting without tilling, time and energy could be saved, soil organic matter increased, carbon sequestered, and dependence on machinery reduced.

A decision-making framework for the four no-till methods : occultation, solarization, organic mulches grown in place, and applied to beds. Ideas for starting a no-till farm or transitioning a working farm. A list of tools, supplies, and sources.

This is the only manual of its kind, specifically written for natural and small-scale farmers who wish to expand or explore chemical-free, regenerative farming methods.