DFPCL is one of India’s most reputed manufacturers of Nitro Phosphate fertilisers (nitrogen in both nitrate and ammoniacal forms) called **Mahapower 24:24:0** and speciality fertilisers like **Sulphur Bentonite (90%)** – called **Bensulf**. One of the larger manufacturers of Nitro Phosphates in India with an installed capacity of 2.29 lakh MTPA, DFPCL guarantees consistent and high purity Nitro Phosphate fertilisers, through the world’s finest technology from Stamicarbon b.v. Netherlands. With its manufacturing facility located at Taloja (Maharashtra), DFPCL’s fertilisers are marketed under the prominent Mahadhan brand umbrella in Maharashtra, Karnataka, Gujarat, Madhya Pradesh, Punjab Haryana and Uttar Pradesh. DFPCL has been serving the farming community for over 30 years by improving farm productivity and increasing the farmer’s income through a wide network of more than 4,500 dealers, sales staff and agronomists.

### FERTILISER PRODUCTS

#### Bulk Fertilisers
The bulk fertilisers are marketed under Govt.’s subsidy on fertilisers approved under NBS (Nutrient Based Subsidy)
Bulk fertilisers can essentially be categorized into the following sections:

- Manufactured Fertilisers
- Imported Fertilisers
- Traded Fertilisers

#### Manufactured fertilisers
- Mahadhan Mahapower (24:24:0) – Nitro Phosphate Fertiliser

#### Imported Fertilisers
- Mahadhan Chetak - Di Ammonium Phosphate (DAP)
- Mahadhan Potash (Muriate of Potash MOP)
- Mahadhan (20:20:0) – Urea Ammonium Phosphate

#### Traded Fertilisers
- Bhoodhan Granulated Mixture Fertilisers
  - 18:18:10
  - 20:20:0
  - 20:10:10
  - 17:17:17
  - 12:32:06
- Mahadhan Sulphate - Ammonium Sulphate (21% N and 24% S)
- Mahadhan Super – Single Super Phosphate
Speciality Fertilisers

Speciality fertilisers segment is non-subsidised. Moving beyond selling bulk fertilisers, the Company plans to expand into the total nutrient management segment by strengthening its core abilities in techno commercial research based services. The Speciality Fertilisers segment covers market environment for various speciality fertilisers’ viz. water soluble fertilisers, secondary nutrients and micronutrient fertilisers, Natural / bio fertilisers and similar products.

- **Mahadhan Bensulf (90 % Elemental Sulphur & 10 % Bentonite clay)**
- **Mahadhan Amruta (Water Soluble Fertilisers for application through drip & foliar methods))**
  - Mahadhan Amruta 19:19:0
  - Mahadhan Amruta 12:61:0 (Mono Ammonium Phosphate (MAP)
  - Mahadhan Amruta 13:40:13
  - Mahadhan Amruta 13:0:45 (Potassium Nitrate (KNO3)
  - Mahadhan Amruta 0:52:34 (Mono Potassium Phosphate (MKP)
  - Mahadhan Amruta 0:0:50 + 18% S (Sulphate of Potash (SOP)
  - Mahadhan Amruta Calcium Nitrate (CN) N 15.5% and CA 18.8%
- **Mahadhan Kranti (Crop Specific Blend of Micronutrients)**
  - Mahadhan Kranti - Zinksulf - 21% (Zinc Sulphate 21%- Heptahydrate)
  - Mahadhan Kranti – Zinksulf 33% (Zinc Sulphate Mono-hydrate 33%)
  - Mahadhan Kranti for Field Crops (Maharashtra & Karnataka)
  - Mahadhan Kranti for Fruit Crops (Maharashtra & Karnataka)
  - Mahadhan Kranti for Vegetable Crops (Maharashtra)
  - Mahadhan Kranti for Sugarcane Crops (Maharashtra)
- **Mahadhan Tez Chelated Micronutrient Fertiliser**
  - Mahadhan Tez Combi (Maharashtra) Grade 2
  - Mahadhan Tez Combi (Gujarat) Grade 4
  - Mahadhan Tez Chelated Fe -12%
  - Mahadhan Tez Chelated Zn-12%
  - Mahadhan Tez Boron (DOT)-20%
- **Mahadhan Shakti (Secondary Nutrient & Soil Conditioner)**
  - Calcium Magnesium Sulphur / Ca-10%, Mg-5%, S-10%
- **Mahadhan Magnesium Sulphate (Magsulf / MgSO4)**
  - Secondary Nutrient (Mg- 9.6 %, S-12 %)
- **Mahadhan Natural Fertilisers- Granules (for soil application)**
  - Mahadhan Natural Phosphorous
  - Mahadhan Natural Potash
  - Mahadhan Natural Josh
- **Mahadhan Natural -Liquid ( for foliar/fertigation )**
NEW MARKET EXPANSION

- Mahadhan Natural Phosphorus
- Mahadhan Natural Potash
- Mahadhan Natural Josh
- Mahadhan Natural Cotton Special
- Mahadhan Natural Pulses Special

DFPCL Networking in India

New Market Expansion

Existing DFPCL marketing territory

Through Our operations
Manufactured Bulk Fertilisers:

**MAHADHAN MAHAPOWER 24:24:0 (Nitro phosphate Fertiliser)**

<table>
<thead>
<tr>
<th>The Only Four In One Fertiliser</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Prilled Fertiliser- Adulteration impossible</td>
</tr>
<tr>
<td>• Nitrogen in both Nitrate and Ammoniacal form- Ensure uniform Nitrogen availability during growing period.</td>
</tr>
<tr>
<td>• High Water Soluble Phosphate - Gives boost to crop and improves quality and yield</td>
</tr>
<tr>
<td>• Acidic in nature- Improves pH of soil.</td>
</tr>
</tbody>
</table>

Imported Fertilisers:

<table>
<thead>
<tr>
<th>1. Mahadhan Chetak – Di Ammonium Phosphate (DAP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Highest Nutrient Containing Fertiliser- 18% N and 46% P2O5</td>
</tr>
<tr>
<td>• N and P ratio are best suited for Pulse and Oilseed crop.</td>
</tr>
<tr>
<td>• High Water Soluble Phosphorus - Enhances root growth and in turn good crop stand.</td>
</tr>
<tr>
<td>• Well Suited for calcareous and alkaline soil</td>
</tr>
</tbody>
</table>

**MAHADHAN POTASH:**

<table>
<thead>
<tr>
<th>2. Pottassic fertiliser to increase crop quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Contains 60% Potash.</td>
</tr>
<tr>
<td>• Easily water soluble form of Potash and is less prone to leaching.</td>
</tr>
<tr>
<td>• Can be applied to crop independently on the basis of soil test.</td>
</tr>
</tbody>
</table>
**MAHADHAN 20:20:0 (UREA AMMONIUM PHOSPHATE):**

- A 1:1 grade NP fertiliser suitable during initial growth period of plant. Hence recommended at the time of sowing/ planting.
- Contain Nitrogen in Ammoniacal and Amide form- Keep the plant green for longer period of time.
- Contains higher water soluble phosphate- ensures proper root development, seed production and quality yield.
- Being granular in size, it can be easily applied through sid drill uniformly.
- It is suitable for short as well as long duration crop.

**Traded Bulk Fertilisers**

**BHOODAN: 18:18:0 / 20:20:0 / 20:10:10 / 17:17:17 / 12:32:06**

3 **BHOODHAN - GRANULATED MIXTURE FERTILISERS**

- These mixtures contain Nitrogen, Phosphorus and Potash in various nutrient combinations as per the soil and crop suitability.
- They are convenient to use due to its granulated and uniform size.
- Available in attractive and quality packing.
- **Following grades of Bhoodhan mixtures are marketed by DFPCL in Maharashtra, Karnataka & Gujarat:**
  1) 18:18:10  
  2) 20:20:0  
  3) 20:10:10  
  4) 17:17:17  
  5) 12:32:06

**MAHADHAN SULPHATE – AMMONIUM SUPLHATE 21% N, 24% S**

- Ammonium Sulphate is quick acting acidic fertiliser.
- It is resistant to leaching. Hence more suitable at the time of planting.
- Most preferred Source of nitrogen in Paddy crop.
- Suitable for top dressing to other crops.
- It contains 23% Sulphur which helps in increasing quality and yield of the crop.
- Suitable for Saline and alkaline soil.
**MAHADHAN SUPER – (SINGLE SUPER PHOSPHATE):**

- Single Super Phosphate contains 16 % Phosphorus, out of which 91% phosphorus is water soluble.
- Besides vigorous root growth, it helps in improving soil texture. SSP contains 11 % Sulphur that increases oil content in oil seed crop.
- It also contains 21 % Calcium which increases stiffness of straw that increases pest resistance.
- It helps to increase root nodules on the roots of oil seed crop to improve nitrogen fixation in soil.
- This product is available in both granular and powder form.
Speciality Fertilisers:

The Indian agriculture is undergoing total transformation. This is due to the fact that there is growing demand for exports as well as retail malls especially for various fruits and vegetables. But these buyers expect much higher quality produce, which require better nutrition management. This has created demand for Speciality Fertilisers, which are normally not entitled to any subsidy from Government of India. These are precision and specific fertilizers, which are required by high quality cash crops for precision application.

DFPCL has started marketing of Speciality Fertilisers from October 2005. This business is expanding very rapidly. Presently, the products include Bensulf, Water Soluble Fertilisers, Micronutrients, Secondary Nutrients and Natural products as mentioned above.

MAHADHAN BENSULF (90% S, 10% Bentonite)- India’s first Sulphur fertiliser in pastille form:

- Helps to increase chlorophyll in plant leaves resulting in high yield.
- Increases oil content in oilseed.
- Increase pungency in Onion and Garlic.
- Increase sugar content and improves juice quality.
- Improves pH of soil. Increases availability of Phosphorus, Iron (Fe), Zinc (Zn) and Boron.
- Helps to improve quality of produce and increase yield and maintains plant health.
- Help plants to develop resistance against fungal diseases.
- Helps to reclaim saline-alkaline and calcareous soils.
- Optimum disintegration - Provide Sulphate as per the crop requirement.
- Minimal leaching losses.
- Uniformly mixes with other fertilisers.
- No adulteration is possible
- Easy to use and safe to handle.

Mahadhan Amruta (Water Soluble Fertilisers)
Mahadhan Amruta is a set of Water Soluble fertilisers containing NPK along with permitted trace elements which can be delivered to plants through micro-irrigation systems viz. Drip, sprinkler and through foliar spray. These fertilisers are chemically refined, free flowing, easy to apply by foliar application at a desired concentration. Different ranges of Mahadhan Amruta are available NPK, NP, NK and Pk combination of nutrients which will facilitate to prepare different fertigation as well as foliar application schedules as required.

Salient Feature of Mahadhan Amruta

- Completely soluble in irrigation water.
- Regular flow of both water and nutrients.
- Can be directly applied to the root zone.
- Save in nutrients by 35-40%
- Acidic in nature, no blocking of drip system
- Free from harmful salts.
- Versatile utility for fertigation, foliar and side dressing.
- Save in time and labour
- Ensure balanced nutrition.
- Improves yield and quality of crop.
- 19 : 19 : 19
- Mono Ammonium Phosphate (MAP/12:61:00)
- Mono Potassium Phosphate (MKP/00:52:34)
- Potassium Nitrate (KNO3/13:0:45)
- Potassium Sulphate (SOP / 00:00:50+17.5 S)
- Calcium Nitrate (CaNO3) (N-15.5%, Ca-18.8%)
- 13 : 40 : 13 (N-13%, P2O5-40%, K2O-13%)

**MAHADHAN AMRUTA 19:19:19**

- Starter grade containing all the three forms of Nitrogen viz.
  1. Amide (NH2),
  2. Ammoniacal (NH4) and
  3. Nitrate (NO3)
- Useful for the initial vegetative growth period of the crop for bud bursting and rejuvenation of vegetative growth.
- Gives the crop early boost. Increases vigour of the crop and makes the crop healthy.

**MONO AMMONIUM PHOSPHATE (MAP) 12:61:0:**

- Mono-ammonium Phosphate, with low Nitrogen in ammoniacal form and rich in water soluble phosphorus.
- Useful for fresh root growth and fast vegetative growth.
- Useful for proper growth of reproductive parts and fertilization.
- Reduce flower drop, increase fruit setting and increases yield and quality of the produce.

**MAHADHAN AMRUTA - 13:40:13**

- Mixed grade with 1:3:1 ratio.
- Useful at early flowering and early fruit formation and fruit development stage where P requirement is more with less N and K.
- Reduce flower drop, increase fruit setting and increases yield and quality of the produce.
- Increase quality and yield of the crop.
### POTASSIUM NITRATE (KNO₃) 13:0:45:
- Potassium Nitrate with low nitrate Nitrogen and high water soluble Potash.
- Useful at post bloom and physiological maturity stage.
- Helps in assimilate translocation and sugar formation.
- Helps to resist abiotic stress situations.

### MONO POTASSIUM PHOSPHATE (MKP) 0:52:34:
- Mono ammonium Phosphate, rich in water soluble phosphorus and potash.
- Suitable for pre-bloom as well as post bloom application.
- Popularly used for proper ripening and attractive colour formation of rind in fruits like pomegranate.
- Improves luster, uniform colour and taste.

### SULPHATE OF POTASH (SOP) 0:0:50 +18% S:
- Sulphate of Potash enriched with Sulphur in available form.
- Suitable for application once the crop reaches physiological maturity.
- Useful for sink filling and proper ripening.
- Increase plant Resistance against pest and diseases.
- Helps to control fungal diseases like powdery mildew when used for foliar application.
- Help to resist abiotic stresses.
MAHADHAN AMRUTA CALCIUM NITRATE (CN) N-15.5%, Ca- 18.8%:

- Unique source of water soluble calcium.
- Acts as a carrier of Nitrate Nitrogen within the plant.
- Reduces the calcium deficiency of the plant which helps to increase the crop growth and vigour.
- Increase the root growth development- Helps to absorb more nutrients from soil.
- Makes the plant healthy and sturdy and fight against pest and diseases.
- Helps to neutralize toxic chemicals within plant.
- Improves pH of soil and increases availability of trace elements.
- Increase fruit setting, Improves rind quality of the fruit gives better market price.
- Increases crop quality and yield.
- Increases shelf life of the produce.
- Reduces blossom end rot in tomato and leaf spot in potato.

MAHADHAN KRANTI- CROP SPECIFIC BLENDS OF MICRONUTRIENTS.

- Plant needs at least sixteen elements for proper growth and development.
- The nutrient elements, which require in large quantities are referred as primary nutrients such as N,P and K.
- While other nutrients are required in small and very small quantities which are referred as secondary (Ca, Mg and S) and micronutrients (Fe, Zn, Cu, B, Mo and Cl) respectively.
- Micronutrients are required in small and very small quantities are to be specially supplied in order to nourish the plant properly.
- The quantity of these nutrients varies from each other as per the crop and soil type.
- In Maharashtra and Karnataka agricultural crops can be broadly categorized as fruit crops, Vegetable crops, and Sugarcane and Field crops.
- These crops are highly sensitive to the availability of micro nutrients and requires in different proportions.
- Mahadhan Kranti supplies micro nutrients in balanced proportion to different crops and is available in different formulations.

Mahadhan Kranti (Micronutrients)

- Field Crop (Maharashtra Grade)
- Fruit Crops (Maharashtra Grade)
- Sugarcane (Maharashtra Grade)
- Vegetable Crops (Maharashtra Grade)
- Field Crop (Karnataka Grade)
- Fruit Crops (Karnataka Grade)
- Field Crop (Gujarat Grade)
MAHADHAN KRANTI (FOR FIELD CROPS) - MAHARASHTARA

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Zn (%)</th>
<th>Fe (%)</th>
<th>Mn (%)</th>
<th>Cu (%)</th>
<th>B (%)</th>
<th>MgO (%)</th>
<th>N (%)</th>
</tr>
</thead>
</table>

MAHADHAN KRANTI (FOR FIELD CROPS) - KARNATAKA

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Zn (%)</th>
<th>Fe (%)</th>
<th>Mn (%)</th>
<th>B (%)</th>
</tr>
</thead>
</table>

- Most suited for calcareous soil with high range of pH (8.0-8.5)
- Increases the availability of N, P and K.
- Prevents general chlorosis in pulses, oilseeds and cotton.
- Prevents little leaf in pulses and oilseeds.
- Supplies balanced nutrition throughout crop cycle.

MAHADHAN KRANTI (FOR FRUIT CROPS) - MAHARASHTARA

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Zn (%)</th>
<th>B (%)</th>
<th>MgO (%)</th>
<th>Cu (%)</th>
<th>B (%)</th>
<th>MgO (%)</th>
<th>N (%)</th>
</tr>
</thead>
</table>

MAHADHAN KRANTI (FOR FRUIT CROPS) - KARNATAKA

- Fruit crops are highly sensitive to the deficiency of Zn, B, Fe and Magnesium.
- This is a Magnesium based micro nutrients fertiliser.
- Enriched with additional Boron (2%)
- Ensures proper fertilization and fruit set.

MAHADHAN KRANTI (FOR VEGETABLE CROPS) - MAHARASHTARA

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Zn (%)</th>
<th>Fe (%)</th>
<th>Mn (%)</th>
<th>Cu (%)</th>
<th>B (%)</th>
<th>MgO (%)</th>
<th>N (%)</th>
</tr>
</thead>
</table>

DEEPAK FERTILISERS AND PETROCHEMICALS CORPORATION LIMITED
- Ensures balanced nutrient supply for vegetable crops.
- Enriched with Magnesium (3%).
- Extra Iron (4% Fe) to sustain good vegetative growth.
- Improves flower formation and root growth.
- Increase the yield and quality.

**MAHADHAN KRANTI (FOR SUGARCANE CROPS) - MAHARASHTRA**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Zn</th>
<th>Fe</th>
<th>Mn</th>
<th>Cu</th>
<th>B</th>
<th>MgO</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(%)</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>0.5</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

- In Maharashtra, Sugarcane is largely grown on calcareous soil where lime induced Fe and Zn deficiency is recurring problem.
- Sugarcane requires Fe, Zn and Mn on large quantity for the healthy growth and higher yield.
- Mahadhan Kranti for Sugarcane supplies Fe, Zn and Mn on large quantity.
- Enriched with Magnesium (3% MgO) to ensure good vegetative growth.
- Ensures thicker stalks and elongated internodes.
- Helps to prevent internal browning.
- Helps to increase sucrose level in the cane juice.
- Avoids pith formation and hollowness of internodes.

**MAHADHAN ZINKSULF (ZnSO4 - Heptahydrate -21%)**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Zn</th>
<th>Fe</th>
<th>Mn</th>
<th>Cu</th>
<th>B</th>
<th>MgO</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(%)</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>0.5</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

- Mahadhan Zinksulf is white crystalline free flowing powder supplies 21% Zinc (Heptahydrate) and 31% Zinc (Mono hydrate)
- Zinc regulates sugar formation.
- Zinc controls photosynthesis and nitrogen metabolism - Increase plant growth and vigour.
- Increase flowers and fruit setting.
- Crops reach maturity in time.
- Increase crop yield and quality.
MAHADHAN TEZ- CHELATED MICRONUTRIENT FERTILISERS
FOR SOIL/FOLIAR APPLICATION
Mahadhan Tez- Fe-EDTA (12%); Mahadhan Tez -Zn- EDta (12%); Mahadhan Tez - Combi grade No. 2 - Maharashtra, Grade No. 4 - Gujarat and

Boron (Di Sodium Octoborate Tetra hydrate) - 20%

MAHADHAN TEZ (COMBI) - MAHARASHTARA- GRADE NO. 2

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Zn (%)</th>
<th>Fe (%)</th>
<th>Mn (%)</th>
<th>Cu</th>
<th>B (%)</th>
<th>Mo (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zn</td>
<td>3</td>
<td>2.5</td>
<td>1</td>
<td>1</td>
<td>0.5</td>
<td>0.1</td>
</tr>
</tbody>
</table>

MAHADHAN TEZ (COMBI) - GUJRAT- GRADE NO. 4

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Zn (%)</th>
<th>Fe (%)</th>
<th>Mn (%)</th>
<th>Cu (%)</th>
<th>B (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zn</td>
<td>4</td>
<td>6</td>
<td>1</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Mahadhan Tez- For Soil application/Foliar spray.

- Chelated Micronutrient Fertilisers for fruit, plantation and field crops.
- Increase the availability of micronutrients and prevents from fixation.
- Increase nutrient use efficiency of the crop.
- Crops become healthy and resistant to pest and diseases.
- Improves crop quality and increase yield.
MAHADHAN SHAKTI (SECONDARY NUTRIENT & SOIL CONDITIONER)  
(CALCIUM MAGNESIUM SULPHUR Ca-10%, Mg-5%, S-10%):  

- Mahadhan Shakti contains secondary nutrients viz., Calcium, Magnesium and Sulphur and act as a soil conditioners which improves soil properties and helps in improving and maintaining soil fertility and productivity.  
- It reduces pH of alkaline soil and their by making availability of micronutrients to the plant.  
- It makes the plant sturdy and healthy, and increases diseases resistance.  
- It enhances root growth and induces better growth of nutrient absorbing roots.  
- It increases greenness in plant as such better crop growth and development.  
- In cotton plant increase number of bolls and receives good quality yield.  
- It prevents from Reddening of leaves in Cotton plant.  
- Reduces Magnesium deficiency in Soybean crop and increases oil and protein content.

MAHADHAN MAGNESIUM SULPHATE (MAGSULF / MgSO4)  
SECONDARY NUTRIENT (Mg-9.6%, S-12 %)  

- Magnesium helps in increasing chlorophyll content in leaves.  
- Magnesium helps in increasing initial vegetative growth of the crop.  
- Helps in increasing productivity of crop.  
- Sulphur in it improves crop quality.  
- Overall increase in crop quality and yield.

MAHADHAN NATURAL FERTILISERS  

Excessive and continuous use of chemical fertilizers results in harmful effect on soil health and it pollutes the environment also. Continuous use of chemicals fertilizer produces imbalance in plant nutrients of soil, which affects the acidity/alkalinity of soils and reduces the fertility and productivity gradually.  

Those problems can be solved by integrated application of chemical and organic manure/fertilizer for the following benefits.  

- Balanced plant nutrition  
- Control of Physical, Chemical and life processes resulting improved soil health.  
- Useful Micro –organisms and their improved activity.  
- Soil becomes porous resulting in better aeration  
- Improvement in water holding capacity of soil  
- Stable productivity and quality improvement.  
- Conservation of environment.
In order to facilitate overall agriculture requirement, Regional Research Laboratory Jammu (C.S.I.R. Govt. of India) has developed unique fermentation Technology for production of organic salts, which are capable of supplying primary plant nutrients and micro-nutrients in absorbable condition by plants at lower dosages. Based on this technology and research programme DFPCL launched the following organic manures/fertilizers for farming community.

Most of the chemical fertilizers presently available are soluble in water but on application to soil they undergo chemical change and convert into low soluble fertilizers which results in their fixation in soil, thus affecting soil structure and inadequate absorption by plants and less availability of trace elements. As a results more and more quantity of chemicals fertilizers are used because of their leaching and fixation in soil. Whereas the organic manure/fertilizers are totally bio available and meets the nutrient requirements of plant with lower doses. Since these bio fertilizers are in chelated form, nutrients in the soil do not get fixed and get available to the plants and their requirement is also less. Chelates are soluble organic molecules. These chelates make bond with nutrients like zinc, Fe, Cu, Mn as such these nutrients are available in available forms and absorbed more by the plant roots.

Above scientists have developed a natural chelate called organic Gluconate and protein hydrolysates chelate. For making gluconate chelate, glucose is used as a raw material. This glucose is mixed with fungi called Aspergillus niger. Oxydase Enzymes secreted by fungi converts glucose into gluconic acid. Compared to EDTA, DTPA, this chelate being developed organically is more effective chelator in soils having high pH. Therefore nutrients are 100% available to the plants. Thus the nutrients are bio available to the plants. Along with gluconate chelates these fertilizers includes 25 amino acids which are essential for plant growth. These amino acids are available freely making bio available to the plants. Apart from amino acids these fertilizers contains natural enzymes and micronutrients. Thus a combine effect of all these, makes the plant to grow and develop better and thereby yield is increase. These fertilizers are easy to apply and are completely safe to the ecosystem.

- **Mahadhan Natural Phosphorus**- Contains 20% phosphorus with protein Hydrolysates along with amino acids and enzymes.
- **Mahadhan Natural Potash** – Contains 14% Potassium in the form of Gluconate-Lactate along with amino acids and enzymes.
- **Mahadhan Natural Crop plus**- Vegetable protein based protein hydrolysates (with amino nitrogen) along with essential Micro-nutritiens and trace elements.
- **Mahadhan Natural Josh**- is a completed plant nutritional product which is also described as in ideal neutraceutical solutions to the plant nutrition. 25 free amino acid and other major and micro nutrients. It increase the size of the fruits and gives higher yield. Josh is giving miraculous results with higher yield.

**Mahadhan Natural Bio Products**

- **Mahadhan Natural Bio Liquids**
  - Mahadhan Natural Potash
  - Mahadhan Natural Phosphorus
  - Mahadhan Natural Josh
  - Mahadhan Natural Cotton Special
  - Mahadhan Natural Pulses Special

- **Mahadhan Natural Bio Granules**
  - Mahadhan Natural Bio Magnesium
  - Mahadhan Natural Crop Plus
  - Mahadhan Natural Potash
  - Mahadhan Natural Phosphorus
  - Mahadhan Natural Josh
  - Mahadhan Natural Maha Neem
  - Mahadhan Organic- Organic compost made from city waste.
**MAHADHAN NATURAL POTASH - 14-18% K - Available in both granular and liquid form:**

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahadhan Natural Potash is the product based on fermentation technology which is bio available to the plants.</td>
<td>![Image of Potash Product]</td>
</tr>
<tr>
<td>It helps in Nitrogen fixation and increase Nitrogen use efficiency of nitrogenous fertilisers.</td>
<td></td>
</tr>
<tr>
<td>It helps in photosynthesis and chlorophyll formation and helps in synthesis of sugar, carbohydrates, fats and proteins.</td>
<td></td>
</tr>
<tr>
<td>It helps to increase resistance against pest, disease and cold.</td>
<td></td>
</tr>
<tr>
<td>It regulates water movement within plant system and helps the crop to sustain during water stress.</td>
<td></td>
</tr>
<tr>
<td>Improves crop quality in terms of uniform colour, luster, taste, weight and increase yield.</td>
<td></td>
</tr>
</tbody>
</table>

**MAHADHAN NATURAL PHOSPHORUS - Available in both granular and liquid form.**

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amino Nitrogen (Chelated protein hydrolysates) acts as a carrier of phosphorus, there by phosphorus gets bio available to plants. Thus, increase the soil useful bacteria/fungi.</td>
<td>![Image of Phosphorus Product]</td>
</tr>
<tr>
<td>Phosphorus is more soluble in water as such is completely absorbed by the plants.</td>
<td></td>
</tr>
<tr>
<td>It helps in growth and development of roots. As such stiffness of the crop increases.</td>
<td></td>
</tr>
<tr>
<td>It gives boost to the crop and promotes growth and development of crop.</td>
<td></td>
</tr>
<tr>
<td>Improves pest and disease resistance capacity of the crop.</td>
<td></td>
</tr>
<tr>
<td>Reduces flower drop and increase fruit setting, improves germination of seed and crop mature early.</td>
<td></td>
</tr>
<tr>
<td>Increase crop quality and yield.</td>
<td></td>
</tr>
</tbody>
</table>

**MAHADHAN NATURAL JOSH - FOR SOIL APPLICATION**

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural granular fertilisers containing protein hydrolysates (amino Nitrogen), 25 free bio available acids and micro nutrients for all crops.</td>
<td>![Image of Josh Product]</td>
</tr>
<tr>
<td>Better seed germination, and root and shoot growth.</td>
<td></td>
</tr>
<tr>
<td>Crop withstands water stress.</td>
<td></td>
</tr>
<tr>
<td>Eco-friendly, and can be mixed with other chemical fertilisers.</td>
<td></td>
</tr>
</tbody>
</table>
**MAHADHAN NATURAL COTTON SPECIAL - A GROWTH PROMOTER FOR BT COTTON:**

- Magnesium-Gluconate-lactate chelate is 100% bio available to the plant.
- Prevent and correct Magnesium deficiency (reddening of leaves) in Cotton.
- Increases chlorophyll and protein and as a result plants become greener and healthy.
- Reduce flower drop and increase fruit setting and increase size of the fruit.
- Improves quality and increase yield of the crop.
- Can be mixed with commonly used insecticides and fungicides.
- Completely safe to eco-system.

**MAHADHAN NATURAL PULSES SPECIAL - A GROWTH PROMOTER FOR PULSE AND OILSEED CROP WITH ZINC AND BORON:**

- Gluconate lactate chelate with Zinc and Boron acts as a carrier and help to absorb these nutrients completely.
- It helps to increase root nodules.
- Can be mixed with commonly used insecticides and pesticides.
- Reduce flower drop and increase fruit setting and increase size of the pod/fruit.
MAHADHAN NATURAL JOSH - IN LIQUID FORM
COMPOSITION CONTAINING BIO-AVAILABLE AMINO ACIDS AND ENZYMES, TRACE ELEMENTS IN GLUCONATE-LACTATE CHELATE FORM:

- Gluconate-lactate chelate act as carrier of nutrients and is 100% bio available to plants and reduces deficiencies of micronutrients in fruits and vegetable crops.
- Increase chlorophyll contents in leaves and protein content as well. Thus plant become dark green colour and healthy.
- Increases flower numbers and fruit setting, size of fruits and quality.
- Increases yield.
- Plant can sustain water stress.
- Can be mixed with commonly used insecticides/Pesticides.

MAHADHAN NATURAL BIO MAGNESIUM
14-16% MAGNESIUM GLUCONATE-LACTATE, 3-4% AMINO NITROGEN:

- 100% bio available Magnesium in gluconate-lactate chelate form.
- Increases chlorophyll content in leaves. As such dark green colour of crop.
- It acts as a carrier of Phosphorus in oilseed crops thus increases oil content in the seeds.
- Improves soil properties and beneficial bacteria/fungi in the soil
- Gives better crop growth and development thereby increases crop yield and quality.
MAHADHAN NATURAL MAHANEEM- (NEEM POWDER)
Neem oil- 8%, N-0.5%, K2O-1.6%, Ca-1.93, S-1.07%, Proteins-17.09%, Fibre-28.20%, Ash-15.8%, Moisture- 6.8%.

- This is a natural 95% pure Neem powder containing Pest and disease resistant material viz. Azadirectin, Nimbin, Nimbidin.
- Nitrogen available in soil is efficiently absorbed by crop plants.
- It develops resistance against Nematodes, Termites, Red ants, soil borne diseases like root rot, and diseases occurred by Bacteria, Virus and fungus.
- It improves soil physical, chemicals and biological properties and create conducive atmosphere in root zone area, as such there is better root growth and development. Also the nutrients in the soil get released and available to plant.
- Suitable to all the crops and can be mixed with other fertilizers. If applied much deeper in the soil, will become more effective.

MAHADHAN ORGANIC-
COMPOST FERTILISER MADE FROM USING REMAINS OF FRUITS, VEGETABLES, FOOD AND BY PRODUCTS OF AGRO PROCESS INDUSTRY.

- It promotes beneficial microorganisms in the root rhizosphere and also improves soil health
- Is an ideal for improvement of soil properties
- Better transmission ability in the soil for conservation of water & nutrients, for temperature regulation higher microbial activity
- It helps in suppression of plant root disease through pro-biotic effects.
- Also provide resistance to plant leaves against sucking insects
- It absorbs nutrients from chemical fertilizers and releases slowly for long-term feeding of crops, thereby increasing the fertilizer usage efficiency.
- It helps to increase enzymatic activity in plants to detoxify pesticide residues and also increase quality of the produce.
- It helps in reclamation of salt affected or degraded soils through multiple actions in the soil profile.
- Organic fertilisers increase the quality, size & number of leaves, flower & fruits. It is useful for sustainable agriculture.
4. AGRI LAB SERVICES

AGRI-LAB Services and soil testing.
In view of changing scenario globally, and stiff competition within the fertiliser industry, we need to re-look at our Agri-Lab services, to be seen as a service provider with a difference. Over the years soil testing services has been looked upon as a market development support tool by the industry. Through Agri-Lab, it has always been our endeavor to support our Speciality fertilisers by efficient farm advisory services. We have been getting fairly good response from the customers all over.

By going fully commercial we can achieve the following
• Less lead time in despatching the reports, leading to higher customer satisfaction.
• Analysis of specific parameters as per choice of the farmer.
• Better explanation of reports to the customer.
• Advise on best utilization of resources available to the customer,
• Satisfaction and motivation to our team in terms of attaining better customer satisfaction and more qualitative work.
• Increase in profits through Agri-Lab.

Agri-Lab Services offered & revised charges.

<table>
<thead>
<tr>
<th>S.N</th>
<th>Analysis Type</th>
<th>New Rates / sample wef.April’08</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Soil Routine Analysis- pH, EC.O.C% or N, P, K and S in soil samples.</td>
<td>Rs.100/-</td>
</tr>
<tr>
<td>2</td>
<td>Soil Commercial -- pH, EC. N,P,K. S, Cu, Fe, Mn, Zn</td>
<td>Rs. 300/-</td>
</tr>
<tr>
<td>3</td>
<td>Soil Commercial -- pH, EC. N,P,K. S, Cu, Fe, Mn, Zn, B, Ca, Mg</td>
<td>Rs. 450/-</td>
</tr>
<tr>
<td>3</td>
<td>Soil Special - pH, EC. N,P,K. S, Cu, Fe, Mn, Zn, B, Ca, Mg, CaCO3, O.C</td>
<td>Rs. 550/-</td>
</tr>
<tr>
<td>4</td>
<td>PLANT Commercial N, P, K Ca, Mg, S, Cu, Fe, Mn, and Zn,</td>
<td>Rs.450/-</td>
</tr>
<tr>
<td>6</td>
<td>WATER- pH, E.C, Ca, Mg, Na, Cl, S, Co3, HCO3</td>
<td>Rs.200/-</td>
</tr>
<tr>
<td>7</td>
<td>Soil Water Extract for Poly House pH, EC, NO3,P,K,S, Cu, Fe, Mn, Zn, Ca, Mg, B, Na, CO3, HCO3, Cl.</td>
<td>Rs. 500/-</td>
</tr>
</tbody>
</table>

BASIC AGRONOMY

1. Physiography of Maharashtra

Maharashtra is divided into three natural regions:

Coastal areas (Konkan):
The coastal areas are more rugged in the south than in the north and characterized by hilly topography. Except for the hilly portion near the Sahyadri range, the altitude varies from almost 0 to 100 meters above mean sea level. Heavy rainfall and steep slope cause severe soil erosion. A number of small and rapidly flowing rivers and streams run from the Sahyadri and join the Arabian Sea.
Sahyadri hill ranges (Western Ghats):  
The western edge of the Deccan plateau run parallel to the western coast and rises to great heights forming a number of peaks like Mahabaleshwar (1439 meters above mean sea level). This barrier is responsible for heavy rainfall in the coastal plains.

Deccan Plateau:  
Deccan plateau is a land bounded by Satpuda and Satmala ranges in the north, Sahyadri Ghats in the west and extends in the southeast direction to the State boundary. A number of big rivers like Godavari and Krishna drain this area. The river basins are hilly and narrow in the west and broad and flat in the east. The valley area is flat with long stretches of deep black alluvial soil on the east of the plateau.

2. Soils in Maharashtra

1. Black Soils

These soils (Vertisols and associated soils) occur extensively in Maharashtra. They are found in semi-arid, dry sub-humid and moist sub-humid regions at elevations of 300 to 900 meter above mean sea level with hot summer and mild winter. The vertisols change their volume with the changes of moisture. This induces a slow and steady churning process generally caused by swell shrinkage phenomenon within the pedon and thus inhibits horizon differentiation and develops AC profile. Vertisols generally show open shrinkage cracks of 2 to 5 cm wide tapering and slanting through depth. The dark colour is due to the formation of clay-organic matter complex. Soil characteristics of favourable surface structure, higher water retention capacity and high cation exchange capacity makes these soils potentially productive. However, fine texture and tilth, high bulk density, shrinkage cracks, separating soils into polyhedrons and saturated low hydraulic conductivity in the sub soils are responsible for restricted drainage and pose problems to their management for high productivity. The soils show a great variability in their depth as well as characteristics and, therefore, are generally grouped as shallow, medium and deep black soils.

- Shallow Black Soils (0.0 to 22.5 cm depth): They are mixed with disintegrated coarse partly disintegrated parent material) and form 20-22 per cent of the black soils. These soils have coarse texture and are characterized by low fertility.
- Medium Black Soils (22.5 to 90cm depth): Medium black soils occupy the largest area of Maharashtra (about 65 %). These are mostly found to occur on piedmont plain. These soils are base saturated with Ca as the predominant exchangeable cation.
- Deep Black Soils: These soils are found in vast stretches in river valleys of Godavari, Krishna, Bhima and the Purna and also in the piedmont plains. These soils are more fertile than medium black soils. The clay content ranges from 40 to 60 per cent but may be as high as 70 per cent.

2. Laterite and lateritic soils

These soils are practically devoid of CaCO3, acidic in reaction (pH 5.0 to 6.5) and sandy clay loam to clayey in texture. The sesquioxides constitute more than 95 per cent of the total chemical constituents. Kaolinite is the dominant clay mineral that is sometimes associated with illite.

3. Coastal alluvial soils

These soils are derived from trap and are clay loam in texture, grayish black in colour and alkaline in reaction (pH 7.5 to 8.0). The lime content ranges from 1 to 5.0 per cent.
4. **Saline-alkali soils**

These soils are clay loam to clayey loam in texture and grey to black in colour. Soils contain 0.5 to 5.0 percent lime and pH ranges from 8.5 to 9.5.

5. **Mixed red and black soils, red loam and red and yellow soils**

Nearly 70 per cent of the area in Bhandara district is under these soils. Their physico-chemical properties are more or less similar to medium deep black soils. In addition, very shallow and coarse textured gravely red soils occur in this area. Such soils contain very high percentage of free lime, stones and gravel. The colour of these soils is generally red or yellowish red due to the presence of iron oxides.

---

**Basic Agronomy – Role & Responsibilities of Plant Nutrients**

The plant nutrients taken up by crops during the growing season are N, P, K, Ca, Mg, S, Cu, Fe, Mn, Zn, B, Mo and Cl may come from many sources, including soil reserves, added fertilizer or manure, and crop residues. Nutrients such as Nitrogen, Phosphorus, and Potassium are required in large quantities, while others are required in very small quantities. Nutrients such as Sulphur, Calcium and Magnesium are required in intermediate quantities while soil supplies for nutrients required in small quantities (micronutrients) need not be large, but the micronutrients must be available to the plant.

All the nutrients listed in the table given below are essential for plant growth. The roles and deficiency symptoms of the primary nutrients are discussed below. The symptoms are rarely clear cut, so it is important to use both soil and plant analyses when trying to diagnose a suspected nutritional problem.

**Essential plant nutrients:**

<table>
<thead>
<tr>
<th>Primary nutrients</th>
<th>Secondary nutrients</th>
<th>Micronutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N)</td>
<td>Sulphur (S)</td>
<td>Iron (Fe)</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>Magnesium (Mg)</td>
<td>Manganese (Mn)</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>Calcium (Ca)</td>
<td>Boron (B)</td>
</tr>
</tbody>
</table>

- Nitrogen (N) is a critical component of proteins, which control the metabolic processes required for plant growth. It also is an integral part of the chlorophyll molecule and thus plays a key role in photosynthesis. An adequate supply of nitrogen is associated with vigorous vegetative growth and a plant's dark green color. Nitrogen deficiency is characterized by reduced plant growth and a pale green or yellow color. This yellowing generally begins at the tip of the leaf and goes down the middle of the leaf. If the deficiency is severe, the affected area eventually turns brown and dies. Since nitrogen is mobile in the plant, older leaves show the first symptoms of nitrogen deficiency.

- Phosphorus (P) is a critical component of nucleic acids, so it plays a vital role in plant reproduction, of which grain production is an important result. Considered essential to seed formation, this mineral is often found in large quantities in seed and fruit. Phosphorus is essential for the biological energy transfer processes that are vital to life and growth. Adequate phosphorus is characterized by improved crop quality, greater straw strength, increased root growth, and earlier crop maturity. Phosphorus deficiency is indicated by reduced plant growth, delayed maturity and small fruit set. These symptoms may be accompanied by a purple coloring, particularly in young plants. Like nitrogen, phosphorus is mobile in the plant; therefore, any deficiency symptoms show up first on older leaves.
- Potassium (K) is not an integral part of any major plant component, but it does play a key role in a vast array of physiological processes vital for plant growth, from protein synthesis to maintenance of plant water balance. Potassium deficiency is characterized by reduced plant growth and a yellowing and/or burning of leaf edges. Since potassium is mobile in the plant, the symptoms appear on the older leaves first. Another indication of potassium deficiency is reduced straw or stalk strength, which results in lodging problems, reduced disease resistance, and reduced winter hardiness of perennial or winter annual crops. The secondary nutrients, calcium, magnesium, and sulphur play a variety of roles in plants.

- Calcium (Ca) is an integral part of plant cell walls. It promotes early root development and growth. Calcium is essential to activate growing points, especially root tips. At the same time, it does not move freely from older to the younger parts of plants. This is the main reason why calcium deficiency symptoms are first manifested at the tips of shoots and roots. It improves intake of other plant nutrients specially nitrogen and trace elements such as iron, boron, zinc, copper and manganese by correcting soil pH.

- Magnesium (Mg), a key component of chlorophyll, plays a critical role in photosynthesis. Magnesium deficiency is characterized by white stripes between the leaf veins. Magnesium is best supplied by a limestone that contains this nutrient.

- Sulphur (S) is a common component of proteins and vitamins. Sulphur-deficient plants have a general yellowing and are very spindly. Symptoms of sulphur deficiency are similar to those of mild nitrogen deficiency, except that they appear sooner in new growth than in old growth, since sulphur is not mobile in the plant.

**Symptoms of Nutrient Deficiencies**

Plants will usually display definite deficiencies if required nutrients are not present in adequate concentrations. The following symptoms may occur if the level of one mineral nutrient is not high enough to be within the range needed for best plant growth. A plant may exhibit a particular symptom for reasons other than a nutrient deficiency. However, if one of the deficiency symptoms occurs, a lack of the proper nutrient may be suspected, and the amount of that nutrient should be increased.

<table>
<thead>
<tr>
<th>Deficient Nutrient</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>Leaves are small and light green; lower leaves lighter than upper ones; not much leaf drop; weak stalks.</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>Dark-green foliage; lower leaves sometimes yellow between veins; purplish color on leaves or petioles.</td>
</tr>
<tr>
<td>Potassium</td>
<td>Lower leaves may be mottled; dead areas near tips and margins of leaves; yellowing at leaf margins continuing toward center.</td>
</tr>
<tr>
<td>Calcium</td>
<td>Tip of the shoot dies; tips of young leaves die; tips of leaves are hooked-shaped.</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Lower leaves are yellow between veins (veins remain green); leaf margins may curl up or down or leaves may pucker; leaves die in later stages.</td>
</tr>
<tr>
<td>Sulphur</td>
<td>Tip of the shoot stays alive; light green upper leaves; leaf veins lighter than surrounding areas.</td>
</tr>
<tr>
<td>Iron</td>
<td>Tip of the shoot stays alive; new upper leaves turn yellow between veins (large veins remain green); edges and tips of leaves may die.</td>
</tr>
<tr>
<td>Manganese</td>
<td>Tip of the shoot stays alive; new upper leaves have dead spots over surface; leaf may appear netted because of small veins remaining green.</td>
</tr>
<tr>
<td>Boron</td>
<td>Tip of the shoot dies; stems and petioles are brittle.</td>
</tr>
</tbody>
</table>
DFPCL AREA OFFICE ADDRESSES

Pune Area Office
Opp. Golf Course
Shastri Nagar,
Yerawada,
PUNE – 411 006.
Tel. 020-26688117 / 66458150
Fax. 020-26687499
Email: puneao@deepakfertilisers.com

Nasik Area Office
Uttam Apartments,
Canada Corner,
Sharanpur Road,
Nashik – 422 002.
Tel. 0253-2578908
Fax. 0253-2571576
Email: dfpclnsk_nsk@deepakfertilisers.com

Aurangabad Area Office
102, D Wing, Tulsi Arcade,
Opp. Dental College,
Cidco, Cannought Town Centre,
AURANGABAD – 431 003.
Tel. 0240-2483233
Fax.0240-2484082
Email: dfpclo4@deepakfertilisers.com

Akola Area Office
Vaishnavi Complex,
Gorakshan Road,
Opp. M.S.E.B. Power House,
AKOLA – 440 001.
Tel. 0724-2400689
Fax. 0724-2400709
Email: akola_office@rediffmail.com

Nagpur Office
C/o. P . N. Kale,
151, Ambazari Hill Top,
NAGPUR – 440010
Tel. 0712-2245187
Fax. 0712-2245187
Email: vgdeshmukh@yahoo.com

Hubli Office
Plot No.33/929, R B Ghanti Building,
Kumbakonam Plot, Behind Gujarat Bhawan, Deshpande Nagar
HUBLI – 580 029.
Tel. 0836-2357697, Fax. 0836-2357697
Email: ao_hubli@yahoo.co.in

Ahmedabad Office
805, Mahakanta Complex,
8th floor, Opp. VS Hospital,
Ashram Road,
Ahmedabad -380007
Phone -07926575820
email -dfpcl_gujarat@yahoo.in
Fax. 0261-2291630
Email: gsb_dfpclbrd@yahoo.com

Chandigaad
Mr. Pramod J. Lahane
Booth No. 53, Sector 11
Panchkula, Haryana
Mobile: +91 9216879345
Email: pjlahane@rediffmail.com

M.P . A.O. (INDORE)
Mr.S.K.Panchariya
C/o- Mr. H.N.Vyas,
16, Dilip Singh Colony,
Near Marimata Chowk,
Shankar Baug,
Indore (M.P.) – 452001
Mobile- 09425069339
Email: Sujit_kumar74@yahoo.com

AGRA
Shri. Prashant Bhadange
C/O Agarwal Clearing Pvt. Ltd.
9. MIG, New Market
Jeewan Mandi
Agra (U.P.)
Phone: +91 562 2621413 / 15
Mobile: +91 7500241051
**Fertiliser Glossary**

**Acid-forming fertiliser:** A fertiliser, which leaves acid residue in the soil when applied.

**Alkaline (basic) fertiliser:** A fertiliser capable of increasing the residual alkalinity or reducing the residual acidity of the soil.

**Ammonia (liquid or anhydrous):** A material mostly produced by the synthetic process and obtained in the liquid form. It is used in the fertiliser industry for ammonization of superphosphate, in making base mixtures, in making mixed fertiliser, or for conversion into salts such as sulphate, phosphate, chloride, nitrate etc. It is also applied directly into the soil by suitable mechanical means. Fertiliser-grade anhydrous ammonia contains about 82 % nitrogen.

**Ammoniated super phosphate:** A product obtained when super phosphate is treated with ammonia or with solution, which contains ammonia or other compounds of nitrogen.

**Ammoniacal nitrogen:** Presence of nitrogen in the form of ammonia that is denoted as NH4 –N from reduced or submerged conditions.

**Ammonium chloride (salt ammonia or NH4 Cl):** Ammonium salt of hydrochloric acid containing 25 % of nitrogen in ammoniacal form.

**Ammonium citrate:** A term used to express the soluble phosphate content of fertilisers, to describe various extraction solutions of given concentrations of ammonium citrate and aqueous ammonia.

**Ammonium nitrate (NH4 NO3):** The ammonium salt of nitric acid containing 33 % nitrogen, half of which is in the ammonium form and the other half in the nitrate form. It is in granular or prilled form.

**Ammonium phosphate sulphate:** A material produced by neutralizing a mixture of phosphoric acid and sulphuric acid with ammonia.

**Ammonium phosphate:** A product obtained when phosphoric acid is treated with ammonia, it consists principally of mono-ammonium phosphate, di-ammonium phosphate or a mixture of these two salts.

**Ammonium Sulphate [(NH4)2 SO4]:** Ammonium salt of sulphuric acid containing 20.6 % of nitrogen in ammoniacal form. Comes as powdery or crystalline material in varying colours. Fully water soluble. Has specific gravity of 1.77, bulk density of 720-1044 kg/m3. An acid forming fertiliser in soils.

**Ammonium Sulphate nitrate:** A double salt of ammonium sulphate and ammonium nitrate containing 26 % of nitrogen.

**Ammonia volatilization:** Loss of N from the soil or water into the atmosphere in the form of ammonia gas. A major mechanism of N loss. Particularly severe from surface-applied urea in coarse textured, neutral-alkaline, relatively dry soils. Reduces fertiliser efficiency.

**Ammonification:** Production of ammonia as a result of the biological decomposition of organic nitrogen compounds. Part of mineralization of organic N in soils.

**Anhydrous ammonia:** Contains 82 % nitrogen in liquid form obtained by compressing ammonia gas. It is highly acidic, with 148 equivalent acidity. It requires special equipment to apply to the soil.

**Balanced fertiliser:** A soil additive containing suitable proportions of each necessary mineral element to grow a plant or a crop.

**Band placement:** Fertiliser placement in bands on one side or both the sides of the row about 5 cm below the seed and 5 cm to one side of the seed or plant grown, or around each plant.

**Basal dose:** Amount of manures or fertiliser applied to the soil just before or at the time the crop is sown or planted or transplanted.

**Basic slag:** A by-product of steel industry obtained from phosphate iron ores. It can contain 10-18 % P2O5, part of which is citrate soluble, 35 % CaO, 2-10 % MgO and 10 % Fe. Potential useful source of P and Ca, also as a soil amendment.

**Bisulphite:** A condensation product of 2 molecules of urea and is toxic to many plants. Its content in the commercial fertiliser should not exceed 2 %.

**Blanket recommendations:** Fertiliser recommendation given for a large area without taking into account the field-to-field differences.

**Blended fertiliser:** Uniformly sized granules of different fertilisers physically mixed together under dry conditions so as to provide a compound fertiliser, usually tailor made for specific situations such as a large farm or plantation. Same as bulk blends.
**Calcium ammonium nitrate (CAN):** A commercial nitrogenous fertiliser consisting of ammonium nitrate and powdered limestone or dolomite, containing 20.0 % nitrogen. One half of the nitrogen is in the nitrate form and the remaining half in the ammonia form.

**Calcium cyanamide (CaCN₂):** A commercial product consisting principally of calcium cyanamide and carbon. It contains not less than 20 % of nitrogen that is not immediately plant-available.

**Calcium metaphosphate [(Ca(PO₃)₂]:** A product obtained by treating phosphate rock with gaseous phosphorus pentoxide (P₂O₅) at high temperature.

**Calcium nitrate [Ca(NO₃)₂]:** The calcium salt of nitric acid. It is an excellent source of the nitrate form of nitrogen and of water-soluble calcium. The commercial product contains about 15 % nitrogen and 28 % CaO.

**Calcium sulphate:** CaSO₄ 2H₂O. Common name gypsum. Contains 13 – 18 % Sulphur. Active ingredient of mineral gypsum, phosphogypsum and also the source of S in SSP fertilisers. Widely used as soil amendment, as a raw material and a sulphur fertiliser.

**Citrate-soluble phosphoric acid:** That part of the total phosphoric acid in a fertiliser that is insoluble in water but soluble in a neutral solution of citrate of ammonia.

**Citric acid-soluble P₂O₅:** That part of the total P₂O₅ particularly in basic slag and bone meal that is insoluble in water but soluble in 2% citric acid solution.

**Closed formula mixed:** The fertiliser grade is disclosed on each bag of such fertiliser mixture but the ingredients or straight fertilisers used in formulating the mixture are not disclosed. In India, fertiliser mixtures sold to the cultivators are usually of the closed formula type.

**Coated fertiliser:** Fertiliser, the granules of which are covered with a thin layer of a different material in order to improve the behaviour and or to modify the characteristics of the fertiliser.

**Complete fertiliser:** A product obtained by mixing different fertiliser stock materials, containing 3 major plant nutrients, namely, nitrogen, phosphorus and potassium.

**Complex fertilisers:** The commercial fertilisers containing at least 2 or more of the major nutrients, made by a chemical reaction between the nutrient containing raw materials.

**Cropping intensity:** The frequency with which a piece of land is used for growing crops. Normally 100 % intensity refers to one crop/year, 200 % intensity to 2 crops/year one after the other and so on.

**Declarable content:** The content of a nutrient that, according to national legislation, may be given on a label or document associated with a fertiliser or soil conditioner.

**Deep placement:** Inserting, drilling or placing the fertiliser or nutrients below the soil surface or furrow at a depth of 20 cm or more to supply nutrients before planting of crop.

**Di-ammonium phosphate (DAP):** (NH₂)₂HPO₄. An important fertiliser as well as intermediate in the production of complex fertilisers and bulk blends. Produced by treating rock phosphate with phosphoric acid. Contains 18 % N + 46 % P₂O₅ mostly water-soluble and in granulated form.

\[ 2 \text{NH}_3 + \text{H}_3\text{PO}_4 \rightarrow (\text{NH}_2)_2\text{HPO}_4. \]

**Dicalcium phosphate (CaHPO₄):** A product containing not less than 4 % of P₂O₅ in citrate-soluble form, which is available to plants.

**Equivalent acidity:** The number of parts by weight of CaCO₃ required to neutralize the acidity resulting from the use of 100 parts by weight of fertiliser.

**Equivalent basicity:** The number of parts by weight of CaCO₃ that corresponds in acid neutralizing capacity to 100 parts by weight of the fertiliser.

**Essential Commodities Act (ECA):** Under this act of 1955, the Fertiliser Control Order of India has been issued. This makes fertiliser an essential commodity.

**Fertiliser broadcaster:** A fertiliser distributor with a spreading width substantially greater than the width of the machine.

**Fertiliser distributor:** A machine that distributes fertiliser at regulated and selected rates.

**Fertiliser drill:** A machine to deposit fertiliser in soil at regulated and selected rates and at predetermined depth.

**Fertiliser grade:** An expression showing the legal guarantee of its available plant nutrients expressed as percentage of plant nutrients in a fertiliser.
Fertiliser legislation: This refers to laws and regulations enforced by the Government to regulate the quality of fertilisers or fertiliser mixtures sold to consumers. According to the Fertiliser Control Order of the Govt. of India of 1957, each brand and grade of commercial fertiliser and fertiliser mixture is to be registered and each bag of fertiliser to be labeled with fertiliser grade clearly written on that.

Fertiliser mixture: A product obtained by physically mixing different fertilisers so as to contain more than one of the three major nutrients, viz. nitrogen, phosphorus and potassium.

Fertiliser ratio: The fertiliser ratio designates the relative proportion of 3 major plant nutrients as N:P:K (where K = 1).

Fertiliser requirement: The quantity of certain plant nutrient elements needed in addition to the amount supplied by the soil, to increase plant growth or crop yield to a designated optimum.

Filler: Any material mixed with fertilisers for any purpose other than the addition of available nutrients, such as for conditioning to give anti-caking properties and for increasing the weight to bring the percentage of nutrients to desired values.

Foliar fertilization: Fertilization of plants, or feeding nutrients to plants, by applying chemical fertilisers to the foliage usually in the form of a spray.

Formula (mixed fertiliser): The amount and grade of fertiliser materials used in making a mixed fertiliser.

Grade (fertiliser): The minimum guarantee of plant nutrient content expressed as whole numbers in terms of total nitrogen (N), available phosphoric acid (P₂O₅) and water-soluble potash (K₂O).

Granular fertiliser: A fertiliser composed of particles of roughly the same composition and about one-tenth of an inch in diameter. This kind of fertiliser is superior in efficiency compared to the fine or powdery fertiliser, due to ease in handling and less fixation in soil.

Granulation: Techniques using a process such as agglomeration, accretion or crushing, to make a granular fertilizer.

Green manuring: A practice of ploughing or turning into the soil undecomposed green plant material for improving the physical condition of the soil or for adding nitrogen when the green-manure crop is a legume.

Ground phosphate rock: Material obtained by grinding naturally occurring phosphate rock to fineness meeting relevant legislation or accepted custom.

High analysis fertiliser: A fertiliser containing not less than 25 % of the major plant nutrients, namely nitrogen, phosphorus (as P₂O₅) and potassium (as K₂O).

Hygroscopicity of fertiliser materials: Some fertiliser materials absorb moisture from the air, which causes them to become sticky. Such hygroscopic fertilisers are calcium ammonium nitrate, ammonium chloride and urea.

Inorganic fertilisers: Fertilisers prepared from inorganic minerals, compounds and consisting of non-organic compounds. Common fertilisers are often included in the category of inorganic or mineral fertilisers although strictly speaking urea is an organic compound.

Integrated fertility management: Technologies for management of fertilizing the crops with the objective to produce optimum crop yields with minimum fertiliser inputs taking into consideration ecological and socio-economic resources available for supply to the crop under a given ecosystem, without deteriorating the soil fertility, such as application of organic manures, green manures, blue-green algae and bio-fertilisers along with use of inorganic fertilisers for higher yields and improving the soil productivity.

Kainite: A mineral composed of potassium chloride and magnesium sulphate (KCl, MgSO₄·3H₂O). The crude potash ore sold as kainite has varying contents of sodium chloride, and contains not less than 12 % K₂O.

Kieserite: Magnesium sulphate (MgSO₄·H₂O) containing 27 % MgO and 22 % S.

Leaching: Removal of a nutrient by downward movement with percolating waters out of reach of plant roots. A route of fertiliser loss in coarse-textured soils under high rainfall or heavy irrigation. Most important for nitrate, sulphate, chloride.

Liquid fertilisers: Commercial fertilisers in liquid form. Such fertilisers are chiefly anhydrous ammonia, aqueous solution of nitrogen, and some mixed fertilisers. Liquid fertilisers are applied to the soil through irrigation water, as starter solutions, and with the help of special equipment.

Liquid fertiliser distributor: A machine for applying mineral fertiliser in liquid form which either spreads the fertiliser on the surface of the ground or injects it into the soil.

Localized placement of fertilisers: This refers to the application of fertiliser into the soil close to the seed or plant. This method is specifically adopted with Phosphatic fertilisers for 3 reasons, viz. restricted contact of fertilisers with...
soil lessens fixation of phosphate, necessary plant food is placed within each reach of plant roots, and application of fertilisers in a band along the rows does not readily furnish nutrients to weeds growing between the rows.

**Low analysis fertiliser materials:** The fertilisers containing a low percentage of plant nutrients, usually less than 30%.

**Magnesium sulphate:** Usually the product known as kieserite (MgSO₄·H₂O). The highly hydrated form Epsom salts (MgSO₄·7H₂O) is suitable for foliar application.

**Mixed fertilisers:** Mixed fertilisers consist of individual or straight fertiliser materials blended together to permit application in the field in one operation. Mixed fertilisers supply 2 or 3 major plant nutrients.

**Multiple-nutrient materials:** The fertilisers containing more than one nutrient element. When fertilisers supply 2 major plant nutrients they are called binary fertilisers, e.g., ammonium phosphate and nitro phosphate. Fertilisers supplying 3 major plant nutrients are termed ternary fertilisers, e.g., ammonium potassium phosphate.

**Muriate of Potash (KCl):** Commercial potassium chloride salt containing 60% K₂O and is readily available to the plants. It contains about 48% chlorine. It has higher salt-index than sulphate of potash. Recommended for most crops but not for crops sensitive to high chloride (tobacco, potato, grapes).

**Naptha:** A light distillate fraction produced during petroleum refining. Typical analysis, 79% paraffin, 14% napthane, 6% aromatics and rest others. Calorific value 10, 400 – 11, 400 K Cal/kg. Used as a raw material in production of nitrogenous fertilisers.

**Nitrophosphates:** Products obtained by treatment of phosphate rock with nitric acid alone or in admixture with sulphuric or phosphoric acid, without subsequent treatment with ammonia.

**Nitrification:** Conversion of ammonium to nitrate. Accomplished by Nitrosomonas and Nitrobacter in soils under aerated conditions. A two-step transformation. Nitrification is an acid forming process.

$$\text{NH}_4 \rightarrow \text{NO}_2 \rightarrow \text{NO}_3.$$  

**Non-acid forming fertiliser:** One that is not capable of increasing the residual acidity of the soil.

**Open-formula mixed fertilisers:** Fertiliser mixtures of which the composition and the complete make-up are disclosed by manufacturers. Thus the fertiliser grade, the straight fertilisers and the filler used are disclosed on each bag.

**Organic manures:** Carbonaceous materials manly of vegetable and or animal origin added to the soil specifically for the nutrition of plants.

**Organic matter:** Fraction of a soil, usually 1-5%, made up of organic materials of different types at various stages of decomposition. Usual composition of soil organic matter is 47% C, 44% O, 7% H and 2% N. Important for soil structure, tilth, moisture retention, cation exchange, nutrient supply, transformation and microbial activity.

**Organic nitrogen (soil):** Nitrogen in the form of organic compounds, e.g. amino acids, amino sugar, purine and pyrimidine bases.

**Organic nitrogen fertiliser:** Fertiliser containing nitrogen associated with carbon in organic combination.

**Organic phosphorus:** Phosphorus present as a constituent of an organic compound or a group of organic compounds, e.g., glycerophosphoric acid, inosital phosphoric acid, cytidylic acid.

**Percentage of phosphorus derived from fertiliser (Pdff %):** It is calculated by using the formula:

$$\text{Pdff} \% = \frac{\text{Specific gravity of plant sample}}{\text{Specific gravity of fertiliser standard}} \times 100$$

**Phosphate Rock:** A natural rock containing one or more calcium phosphate minerals of sufficient purity and quantity to permit its use directly or after concentration in the manufacture of commercial phosphorus fertilisers.

**Phosphates:** Various salts of phosphoric acid applied to the soil as Phosphatic fertilisers to supply phosphorus to crop.

**Placement (fertiliser):** Inserting, drilling or placing the fertiliser below the soil surface by means of any tool, implement or equipment at desired depth to supply plant nutrients to crop before sowing or in the standing crop.

**Plant food ratio:** The ratio of the number of fertiliser units in a given mass of fertiliser expressed in the order NPK.

**Plough sole placement:** A method of fertiliser application in which fertiliser is placed in a continuous band at the bottom of the furrow, in the process of ploughing each band is covered as the next furrow is turned.

**Polynutrient fertiliser:** A fertiliser containing more than one major plant nutrient. It is synonymous for multiple nutrient material and complex fertilisers.
**Polyphosphate**: It is the most concentrated form of Phosphatic fertiliser and is very suitable for making liquid fertilisers. It is obtained by neutralizing super phosphoric acid (about 75 % P₂O₅) with ammonia; the product being called ammonium polyphosphate (containing 15 % N and 58 % P₂O₅). It keeps micronutrients in soluble forms by complexing some metallic ions and is as effective as water-soluble orthophosphate.

**Potash (Potassium oxide, K₂O)**: The potassium content of a Pottassic fertiliser. Generally observed with N but opinions on its significance are divided.

**Potassium Chloride**: Commercial potassium chloride is a potash salt that contains not less than 48% potash, chiefly as chlorides. Normally, potassium chloride or muriate of potash sold as fertiliser in India contains 60 % K₂O.

**Potassium magnesium sulphate**: A double salt of potassium and magnesium containing about 21 % K₂O.

**Potassium sulphate (K₂SO₄)**: A potassium fertiliser containing 50 % K₂O and also supplying 17-20% of sulphur.

**Prill**: Particle obtained by solidification of falling droplets of fertiliser.

**Priming effect**: Increase in the availability of soil nutrients caused by application of that nutrient through fertiliser. Generally observed with N but opinions on its significance are divided.

**Residual effect of manure (fertiliser)**: This refers to the residual beneficial effect of application of organic manure or fertilisers on the succeeding crops due to unutilized plant nutrients left-over by the preceding crop.

**Reverted phosphoric acid**: The part of the water-soluble P₂O₅ in a fertiliser which as a result of some reaction has become insoluble in water.

**Secondary fertiliser elements**: Calcium, Magnesium and Sulphur which are next in importance to major nutrients for optimum crop growth.

**Semi-organic fertiliser**: Product in which declared nutrients are of both organic and inorganic origin obtained by mixing and or chemical combination of organic and inorganic (mineral) fertilisers.

**Side-dressing**: The application of commercial fertiliser along the side of a row or around a plant.

**Single Superphosphate (SSP)**: Fertiliser produced by reacting rock phosphate with sulphuric acid. Contains 14-22 % P₂O₅ but 16 % is common. Also contains 12 % Sulphur. Produced in granular or powder form. Patented by J.B. Lawes in 1842. First fertiliser product to be produced in a factory (in UK) about 150 years ago in 1843. Granular SSP has a bulk density of 961 kg/m³, critical relative humidity of 93.7 per cent.

**Slow-release fertiliser**: Fertiliser whose nutrients are present as a chemical compound or in a physical state such that their availability to plants is spread over a period of time.

**Solubility of a fertiliser nutrient**: The quantity of a given nutrient which will be extracted in a specific medium under specified conditions, expressed as a percentage by mass of the fertiliser.

**Solution fertiliser**: Liquid fertiliser free of solid particles.

**Starter solutions**: The term refers to solutions of fertilisers generally consisting of N-P₂O₅-K₂O in the ratio of 1:2:1 and 1:1:2. These solutions are applied to young vegetable plants at the time of transplanting to help the plants to establish.

**Straight fertiliser**: Qualification generally given to a nitrogen, phosphorus or potassium fertiliser having a declarable content of 1 primary nutrient only.

**Sulphur-coated urea (SCU)**: It has been developed as a slow-release nitrogen fertiliser and is basically urea with a coating of elemental sulphur, including a binding agent, a sealant and a microbicide. The N content of SCU ranges from 10 to 37 % depending on the thickness of the sulphur coating.

**Top-dressing**: The application of manure or commercial fertiliser to a crop that is already established.

**Triple Super Phosphate**: A commercial product obtained by treating phosphate rock with phosphoric acid and containing about 46 % P₂O₅, mainly water-soluble.

**Unit value of fertiliser ingredients**: One % of N, P₂O₅ and K₂O present in 1 tonne of a fertiliser is called 1 unit. The unit value of a plant nutrient in a fertiliser is the price of 1 tonne of the fertiliser divided by the percentage content of that nutrient.

**Urea [CO (NH₂)₂]**: A synthetic, non-protein organic compound, crystalline or made into granules or prills for fertiliser use and containing 46 % nitrogen.

**Urea formaldehyde**: Slow-release nitrogen fertiliser produced by reaction between urea and formaldehyde.

**Urea Gypsum**: An adduct of urea and gypsum containing 36.8 % Nitrogen.