NANO DAP: A LIQUID FERTILIZER

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INTRODUCTION

India is the first country in the world to bring out commercially the nano-DAP that was created by IFFCO. By incorporating it in the Fertiliser Control Order, the Centre had allowed for the commercial distribution of Nano Di-Ammonia Phosphate (DAP), which was produced by IFFCO, a large cooperative. Presenting the second-generation liquid nano-fertilizer: an innovative agricultural solution. This fertilizer, available in 500 ml bottles, is designed for one-acre coverage. With an impressive composition of up to 8% nitrogen and 16% phosphorus, it boasts exceptional effectiveness. Applied through foliar spraying, it leads to a remarkable 8 to 10% increase in crop yield. By reducing reliance on conventional Di-ammonium Phosphate (DAP) by 50%, it not only enhances productivity but also promotes sustainability. The cost per bottle is 600 INR.

The advent of this groundbreaking fertilizer owes its credit to the "Nano Bio-technology Research Centre." This institution, in collaboration with the Indian farmer Fertilizer Co-operative Limited (IFFCO), uncovered this revolutionary formula.

Officially named Nano DAP, it was patented by IFFCO on July 20, 2022. Recognizing its potential, the "Union Ministry of Agriculture" included Nano DAP under the Fertilizer Control order. Rigorous testing conducted by various Agricultural Universities and Krishi Vigyan Kendra (KVK) involving over 1100 crops, primarily gram, pea, lentil, wheat, and mustard, highlighted its effectiveness.

BENEFITS OF NANO DAP

1. **Higher Crop Yield:** The increased surface area to volume ratio of Nano DAP's small size results in increased nutrient availability to crops when it is applied as a seed treatment or in foliar form during crucial periods of plant development. As a result, there is an increase in crop output as a result of an increase in leaf chlorophyll, photosynthesis, root biomass, and the number of effective tillers and branches.
2. **Increase in Farmer's Income:** The decreased cost of inputs, increased crop production, and improved quality of crop produce all contribute to an improvement in farmers' income thanks to IFFCO Nano DAP.
3. **Quality Food:** It was discovered that the protein and nutrient content of the gathered food product was significantly higher than it had been previously.
4. **Reduction in Chemical Fertilizer Usage:** The increased usage efficiency of a single bottle (500 ml) of Nano DAP has the potential to replace the phosphorus demand that is now being met by conventional DAP by fifty percent. As a result of Nano DAP's ability to assist in the fulfilment of nitrogen and phosphorus requirements at crucial periods of plant development, bulk chemical fertiliser can be applied more prudently.

5. **Environment Friendly:** The manufacturing of Nano DAP does not waste much either energy or resources. The application of Nano DAP in the field brings about a reduction in the excessive use of bulk fertilisers like DAP, as well as a reduction in the associated volatilization, leaching, and runoff losses. Because of this, the application of Nano DAP to crops must be precise and targeted in order to contribute to agricultural sustainability and environmental protection through the reduction of pollution in the soil, air, and water.
6. **Easy to Store & Transport:** When compared to other types of phosphatic fertilisers, like as DAP, nano DAP is required in far less quantities. The logistics and warehousing of the fertilisers are both significantly affected as a result of this. In contrast to the cumbersome nature of carrying about bulky phosphatic fertilisers, farmers may physically carry bottles of Nano DAP with ease.

Difference between Nano DAP and Granule DAP

	
It is a liquid fertilizer that is applied to crops as a foliar spray.	It is provided in sol id form as crop top dressing.
It has an accessible form of 16% phosphorus and 8% nitrogen.	It has high concentrations of 46% phosphorus and 18% nitrogen.
It may be purchased in the market in a 500ml bottle, which is enough for 1 acre.	It can be purchased in the market in the shape of a 50kg bag.
The going rate for a bottle is 600 rupees.	One bag costs 1350 Rupees.
Plants quickly use it up to 80 to 90%.	Only 30 to 40% are able to use the plant.
Farmers can purchase it for a modest cost.	It is available on the market, but it costs more.

Time & Dosage of Application

When and how much Nano DAP should be applied to crops

- ✓ **Seed treatment:** 3-5 ml of nano DAP per kilogramme of seeds
- ✓ **Root, Tuber, and Sett Treatment:** 3 to 5 millilitres per litre of water
- ✓ **Foliar Spray:** Apply 2-4 ml per litre of water at the beginning of the good foliage stage (tillering or branching), and repeat at the beginning of the pre-flowering or late tillering stage.

Note

- ✓ One cap of Nano DAP bottle equals 25 ml
- ✓ The amount of Nano DAP (Liquid) needed varies depending on the crop type, seed size, and seed rate.

CROPS SUITABLE FOR NANO DAP APPLICATION

All crops, including cereals, pulses, vegetables, fruits, flowers, medicinal, and other types of plants, are eligible to receive an application or spraying of Nano DAP.

Application Schedule & Dosage One Bottle Cap of Nano DAP Liquid= 25 ml		
Crops	**Nano DAP Seed/ Seedling Treatment**	**Nano DAP Spray @ 2-4 ml/ liter**
Cereals (Wheat, Barley, Maize, Millets, Paddy, etc.)	3-5 ml/ Kg seed or @ 3-5 ml/ liter of water for seedling root dipping	Tillering (30-35 DAG or 20-25 DAT)
Pulses (Chickpea, Pigeonpea, Lentil, Moong, Urd, etc.)	3-5 ml/ kg seed	Branching (30-35 DAG)
Oilseeds (Mustard, Groundnut, Soybean, Sunflower, etc.)	3-5 ml/ kg seed	Branching (30-35 DAG)
Vegetables (Potato, onion, Garlic, Pea, Beans, Cole crops, etc.)	Direct Seeded: 3-5 ml/ kg seed Roots of transplanted seedlings @ 3-5 ml/ kg seed	Branching (30-35 DAG) Transplanting (20-25 DAT)
Cotton	3-5 ml/ kg seed	Branching (30-35 DAG)
Sugarcane	3-5 ml/ kg water	Early Tillering (45-60 Days after Planting)

METHOD OF APPLICATION

Use between 250 and 500 millilitres of liquid Nano DAP for each acre that you spray. The amount of water that must be sprayed depends on the kind of sprayer that is used. The following is a list of the general requirements for the sprayer version of Nano DAP liquid:

- ✓ **Knapsack Sprayers:** 2-3 caps (50-75 ml) of Nano DAP liquid should be used for every 15-16 litre tank; generally, 8-10 tanks should be used to cover 1 acre of crop land.
- ✓ **Boom / Power sprayers:** 3-4 caps of nano DAP (75-100 ml) each 20-25 litre tank; generally, 4-6 tanks cover 1 acre of crop area
- ✓ **Drones:** 250–500 millilitres of nano DAP liquid each tank with a volume of 10–20 litres, in order to treat one acre of land.

SAFETY PRECAUTIONS AND GENERAL INSTRUCTIONS

Nano DAP is non-toxic, which means it is safe for the person using it as well as the flora and fauna in the area; nonetheless, it is recommended that a face mask and gloves be worn while spraying it on crops. Keep away from heat and moisture, and put in a cool, dry area. Please keep out of the reach of both children and animals.

GENERAL INSTRUCTIONS

- Be sure to give the bottle a good shake before using it.
- If you want the spraying on the foliage to be uniform, use flat fan or cut nozzles.
- Apply the spray in the early morning or late evening to prevent getting it on any dew.
- In the event that rain falls within 12 hours of applying Nano DAP, it is recommended that the spraying process be repeated.
- Nano DAP (Liquid) can be easily blended with the majority of the bio stimulants, other nano fertilisers like Nano Urea, 100% Water Soluble Fertiliser's, and agrochemicals; nevertheless, it is recommended to do a 'Jar test' prior to spraying.
- For optimal results, it is recommended that Nano DAP be utilised no later than two years after the date it was manufactured.

CONCLUSION

In conclusion, nano DAP fertilizer presents a promising avenue for enhancing agricultural productivity and sustainability. Its unique characteristics, such as increased nutrient solubility and improved nutrient uptake efficiency, offer potential benefits to crop growth and yield. The controlled release of nutrients at the nanoscale can lead to minimized nutrient losses, reduced environmental impact, and optimized resource utilization. However, while the initial results are encouraging, further research is essential to fully comprehend its long-term effects on soil health, plant growth, and potential ecological implications. Collaborative efforts between scientists, agronomists, and environmental experts are necessary to address concerns regarding nanoparticle toxicity, accumulation, and overall safety for both the environment and human health. Regulatory frameworks should also be established to govern the production, distribution, and application of nano DAP fertilizers. In this context, while nano DAP fertilizer holds great promise, its successful integration into mainstream agriculture requires a cautious and comprehensive approach that balances innovation with environmental stewardship.