# *M. R. Morarka GDC-Rural Research Foundation*

Vermiculture

## Vermicast specifications

**PHYSICAL, CHEMICAL & BIOLOGICAL SPECIFICATIONS...**

### Physical

- Vermicast is a dark brown/black humus like coarse material, soft in feel and free from any foul smell, live weed seeds and other contaminations.
- Mucus type substance coated on each particle that increases aeration in the soil provides excellent water retention properties and improves the drainage in heavy soils.
- Contains sufficient moisture (25-35%) at the time of packing.

### Chemical

| | |
|---|---|
| • pH | 6.5-7.5 |
| • Organic Carbon % | 20.43 – 30.31 |
| • Nitrogen % | 1.80 – 2.05 |
| • Phosphorus % | 1.32 – 1.93 |
| • Potassium % | 1.28 – 1.50 |
| • Carbon : Nitrogen | 14-15 : 1 |
| • Calcium % | 3.0 – 4.5 |
| • Magnesium % | 0.4 – 0.7 |
| • Sodium % | 0.02 – 0.30 |
| • Sulphur % | Traces to 0.40 |
| • Iron % | 0.3 – 0.7 |
| • Zinc % | 0.028 – 0.036 |
| • Manganese % | Traces to 0.40 |
| • Copper % | 0.0027 – 0.0123 |
| • Boron % | 0.0034 – 0.0075 |
| • Aluminium % | Traces to 0.071 |
| • Cobalt, Molybdenum | Present in available form |

### Biological

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Total bacter count of $2.5 \times 10^6$ comprising of Azotobacter, PGPR, PSB, Actinomycetes. Also contains Gibberalline, Auxins & Cyctokinine in sufficient quantities.

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## VERMICAST Vs. CHEMICAL FERTILIZERS IN SOIL...

| Criteria for Comparison | Chemical Fertilizers | Vermicast |
|---|---|---|
| *Macro nutrient contents* | Mostly contains only one (N in urea) or at the most two (N & P in DAP) nutrients in any one type of chemical fertilizer | Contains all i.e. nitrogen (N), phosphorus (P) & potassium (K) in sufficient quantities |
| *Secondary nutrient contents* | Not available | Calcium (Ca), magnesium (Mg) & sulphur (S) is available in required quantities |
| *Micro nutrient contents* | Not available | Zinc (Zn), boron (B), manganese (Mn), iron (Fe), copper (Cu), molybdenum (Mo) and chlorine (Cl) also present |
| *pH balancing* | Disturb soil pH to create salinity and alkalinity conditions | Helps in the control of soil pH and checks the salinity and alkalinity in soil |
| *EC correction* | Creates imbalance in soil EC affecting nutrients assimilation | Helps in balancing the EC to improve plant nutrient adsorption |
| *Organic carbon* | Not available | Very high organic carbon and humus contents improves soil characteristics |
| *Moisture retention capacity* | Reduces moisture retention capacity of the soil | Increases moistures retention capacity of the soil |
| *Soil Texture* | Damages soil texture to reduce aeration | Improves soil texture for better aeration |
| *Beneficial bacteria & fungi* | Reduces biological activities and thus the fertility is impaired | Very high biological life improves the soil fertility and productivity on sustainable basis |
| *Plant growth hormones* | Not available | Sufficient quantity helps in better growth and production |

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## ECONOMIC EVALUATION
## VERMICAST Vs. CHEMICAL FERTILIZERS...

Generally cost comparisons for different fertility inputs are carried out on per unit of cultivated area basis. However, the correct methods for comparison should be either the cost per unit of output or the cost per unit of fertility inputs. Here a comparison has been made on the basis of cost per unit of fertility inputs provided through chemical fertilizers Vs. vermicast.

1. **Cost of Chemical Fertilizer Use:** Presently chemical fertilizers are used for providing nutrients such as nitrogen, phosphorous and potash. The cost of these chemical fertilizers in the context of their plant uptake i.e. fertilizers use efficiency are estimated as follows.

**UREA**

- Say 100 kg of urea is used per hectare, containing 46% nitrogen.
- Cost of urea is Rs.4.50/- per kg and thus cost of nitrogen is Rs.9.80/- per kg.
- Plant uptake i.e. use efficiency is 15-40 percent (average 20%) for nitrogen.
- Therefore, the cost of nitrogen actually used by the plants is Rs.49.00 per kg.

**DAP**

- Say 100 kg of DAP is used per hectare.
- This contains 18 percent nitrogen and 46 percent phosphorus.
- Cost of DAP is Rs.8.50/- per kg and thus the cost of nutrients (combined for nitrogen plus phosphorus) is Rs.13.30/- per kg.
- Plant uptake i,.e. use efficiency is 15-40 percent for nitrogen (average 20%) and 10-25 percent for phosphorus (average 15%).
- The cost of nutrients actually used by the plants from DAP is Rs.75.94/- per kg.

**SSP**

- Say 100 kg of SSP is used per hectare, containing 16% phosphorus.
- Cost of SSP is Rs.2.60/- per kg and thus cost of phosphorus is Rs.16.25/- per kg.
- Plant uptake i.e. use efficiency is 10-25 percent for phosphorus (average 15%).
- The cost of phosphorus actually used by the plants is Rs.108.82/- per kg.

**CAN**

- Say 100 kg of CAN is used per hectare, containing 20% nitrogen.
- Cost of CAN is Rs.4.20/- per kg and thus the cost of nitrogen is Rs.21.00/- per kg.
- Plant uptake i.e. use efficiency is 15-40 percent (average 20%).
- The cost of nitrogen actually used by the plants is Rs.1005.00/- per kg.

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2. **Cost of Vermicast Use:** In case of vermicast, over 70 percent is consumed by the farmers through their in-house production. For remaining, the farmers are buying vermicast from commercial production units at an average price of Rs.2000/- per metric tone.

- The average nutrients contents reported for vermicast are nitrogen-1.5 to 2.5 percent (average 2%), phosphorus-1.25 percent (average 1.75%), potash-1.00 to 2.00 percent (average 1.5%).

- In addition vermicast contains all micronutrients and trace elements, that would also add up to atleast one percent equivalent of nutrients.

- The vermicast has active biological life containing Azatobactor, PSB, PGPR, etc. During 90-100 days of crop duration they also add up to 1.5 to 2.5 percent nutrients (average 2%).

- Say 1000 kg of vermicast is used per hectare.

- The total nutrients provided by 1000 kg of vermicast will add up to 82.50 per kg (8.25%) and at an average plant uptake i.e. use efficiency of 65 percent will provide 53.60 kgs of nutrients.

- At an average cost of vermicast at Rs.2000/- per MT per hectare, the cost of nutrients is Rs.37.00/- per kg.

In addition to nutrients, vermicast will also provide better aeration, water retention capacity and many other benefits. Some of the major advantages of vermicast use are also the lower cost of labour (saving due to less weeds in the field) and saving from the cost of treatment for termites.

Vermicast on subsequent use has been found to provide at least 20-30 percent more nutrients. This ability can continuously reduce the quantities of vermicast used in the field over long durations.

***From the above the actual nutrient used and the cost incurred for various chemical fertilizers, it clearly indicates that the chemical fertilizers are more expensive than vermicast.***

***The use of chemicals has also been promoted by large amounts of subsidies that enabled them to be used as nutrients for crops.***