

Phytorid Technology Sewage Treatment Plant (STP)

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In News: The Council of Scientific and Industrial Research-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur has developed an efficient Phytorid Technology Sewage Treatment Plant (STP) for wastewater reuse.

About Phytorid Technology

- Phytorid is a self-sustainable technology for wastewater treatment that works on the principle of natural wetland. It uses certain specific plants that can absorb nutrients directly from wastewater but do not require soil.
- These plants act as nutrient sinkers and remover.
- Using Phytorid Technology for the treatment of sewage, it is possible to recover and reuse the treated water for gardening purposes.
- It is a zero energy and zero operation and maintenance sewage treatment technology.

The process involves following steps:

- Primary Settling Cell
- Secondary Advanced Filter Cell
- Tertiary Biological Wetland Cell
- Collection tank
- Irrigation
 - **Primary Settling Cell** : in this water is stored and sedimentation process is allowed to take place.
 - **Secondary Advanced Filter Cell**: It consists of pebbles / stones of different sizes arranged in the form of a layer through which waste water is allowed to pass. Thus it acts like a natural

filter. It consists of various baffles that allow the passage of water through the chamber.

- **Tertiary biological Wetland Cell(TBWC)** : It consists of a layer of gravel/stones/pebbles and layer of mud with plants planted like Elephant grass(*Pennisetum purpureum*), Cattails (*Typha* Spp.), Reeds(*Phragmites* Spp.), Cannas pp., Yellow flag iris(*Iris pseudacorus*) that are normally found in natural wetlands with filtration and treatment capability. Furthermore some ornamental as well as flowering plants species such as Golden Duranta, Bamboo, Nerium, colosia etc. can be used for treatment.
- The process involves biological , physical and chemical action of plants on the waste water.
- The plants supply oxygen from the atmosphere through plants to the root zone where particles of effluent / waste water get attracted towards the roots and are absorbed by roots as nutrients.
- Thus the process of aeration that is aerobic reaction takes along with anaerobic in a natural way.
- The processed water is later collected after passing through various baffles to the collection tank.
- This collected water is later used for purposes like municipal gardens, fountains, irrigation excetra as non potable water.

About Phytoid Technology Sewage Treatment Plant

- The system is based on the specific plants, such as Elephant grass (*Pennisetum Purpureum*), Cattails (*Typha* sp.), Reeds (*Phragmitessp.*), Cannas pp. and Yellow flag iris (*Iris pseudacorus*), normally found in natural wetlands with filtration and treatment capability. Some ornamental as well as flowering plants species such as Golden Duranta, Bamboo, Nerium, Colosia, etc. can also be used for treatment as well as landscaping purposes

- The phytorid technology can be constructed in series and parallel modules / cells depending on the land availability and quantity of wastewater to be treated
- The phytorid technology treatment is a subsurface flow type in which wastewater is applied to a cell / system filled with porous media such as crushed bricks, gravel and stones. The hydraulics is maintained in such a manner that wastewater does not rise to the surface retaining a free board at the top of the filled media
- The system consists of the following three zones:
 - Inlet zone comprising of crushed bricks and different sizes of stones
 - Treatment zone consisting of the same media as in inlet zone with plant species
 - outlet zone
- The reduction in the treated effluent for the total suspended solids (TSS) varied from 70% to 80, BOD from 78% to 84%, nitrogen from 70% to 75%, phosphorus from 52% to 64% and fecal coliform from 90 % to 97%
- The treated effluent is useful for municipal gardens, fountains and irrigation
- The total area required for the system is approximately 35 sq. m. for 20 m³/day.

Advantages

- Cost-effective
- Negligible operation and maintenance expenses
- Minimum electricity requirement
- Smaller footprint
- Facilitates recycle and reuse of water
- No foul odor and No mosquito nuisance