Recent Trends in Life Sciences for Sustainable Development

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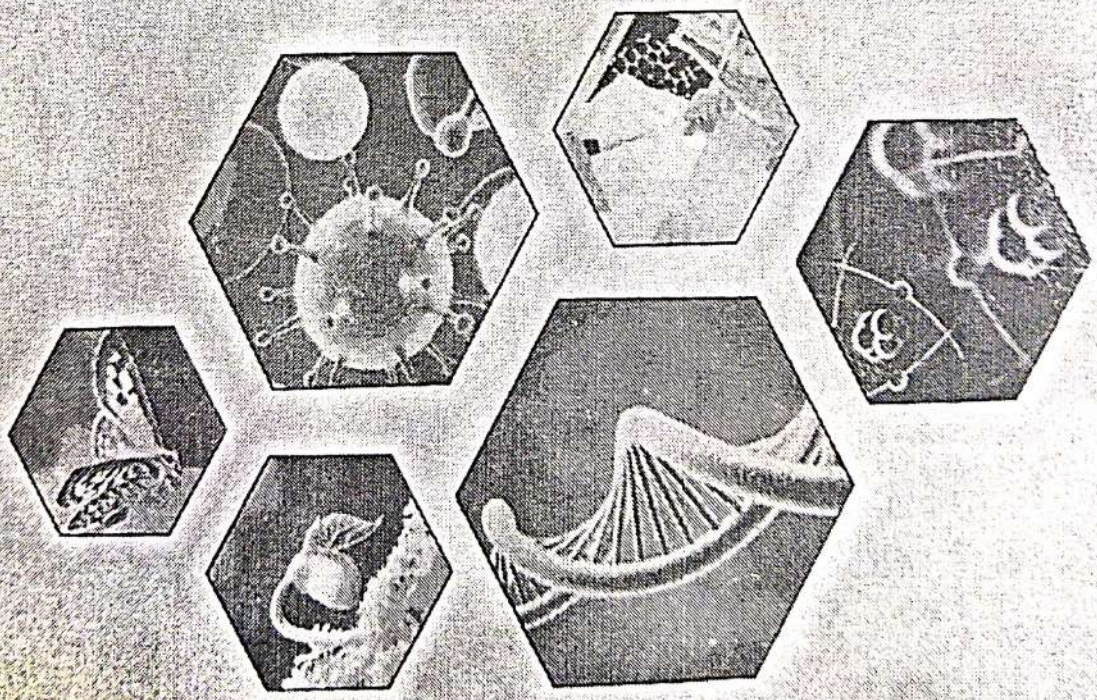
Dr. Navnath G. Kashid



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GREEN WALL- DIVIDER, NEW TOOL FOR COMBATING ROADSIDE POLLUTION

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Abstract:

Roadside pollution is a new threat to the world. It is because of high demand of Roads, Roadside constructions, increasing traffic loads with vehicles. This all causes global warming and pollution problems with health issues. These roadside pollutants are carbon dioxide, carbon monoxide, nitrogen dioxide, sulphur dioxide, benzene, sulphur compounds, suspended particulate matter, dust, volatile organic compounds (VOC), hydrocarbon etc., which can cause air, soil, water, noise pollution and retards health with issues like cancer, asthma , retarding mental health etc. In 2015, as per report placed by the Lancet Commission on pollution and health, India is ranked first in pollution related death in world estimating 28% death Share in world (2.51 million death from 9 million pollution related death of world). Plants like are lungs of the nature which purify air such as *Ficus bengalensis, F. religiosa F. glomerata, F.repens , Azadiracta indica, Mangifera indica* ,etc. are helpful. NASA declared some plants as a natural air purifiers like *Aloe vera*, Sansveria, Areca and Bamboo palm, Fern, Golden pothos, Weeping fig, Dracena sp. Spider plant etc for indoor and outdoor. Green Wall divider is best solution for combating such pollution which is nothing but the modified version of vertical farming. It works continuously in, Extreme climatic conditions. The plants like lichens, mosses and other succulent fast growing plants are mostly favorable for this but regular plants with some modifications also used with this structure to combat roadside pollution.

Keyword: Greenwell- divider, Roadside pollution and pollutants, Plants, etc.

Introduction: Roadside pollution is a new threat to the world. As day by day population of human is increased with more demand of vehicles and roads. Construction of roads, roadside buildings and Industrial corridors causes pollution. Also, rising demand of vehicles leads more traffic and exerts high pressure on roadside pollution. These factors released pollutants like carbon dioxide, carbon monoxide, nitrogen dioxide, sulphur dioxide, benzene, sulphur compounds, suspended particulate matter, dust, volatile organic compounds (VOC), hydrocarbon etc. (Thomas Karl *et al,* 2010), which can cause air, soil, water, noise and mental pollution along with global warming issue, health problem is more problematic (Kumar *et al,* 2013). In 2015, as per report placed by the Lancet Commission on pollution and health, India is ranked first in pollution related death in world estimating 28% death Share in world (2.51 million death from 9 million pollution related death of world) (Prasad, R., 2017) .Plants and forests are lungs of the nature which not only gives food, shelter, cloth and other economical products but also helps in removal of all kinds of pollution problems. They are world's natural sink. All plants are take part in combating such pollutions up to some extent but some of them are more helpful than others. The plants like *Ficus bengalensis, F. religiosa F. glomerata, F.repens , Azadiracta indica, Mangifera indica* ,etc.

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are helpful. NASA Clean Air Study, led by the National Aeronautics and Space Administration in association with the Associated Landscape Contractors of America (ALCA), established in 1989 declared some plants as a natural air purifiers like Aloe vera, Sansveria, Areca and Bamboo palm, Fern, Golden pothos, Weeping fig, Dracena sp, Spider plant etc for indoor and outdoor Wolverton *et al* (1989). Mosses and lichens are fast growing sturdy and more valuable to control pollution.

In India less attention was given to combating roadside pollution. Green Wall divider is best solution for combating such pollution. The structure is like a Green wall which installed on divider, building wall, bridges, flyover and crossover walls. The structure has six components i.e. Green wall divider frame, succulent plants which reduce roadside pollutions, continuous drip irrigation system, water recycling and purifying and filtering system, sensor system and solar panel to provide electricity to run all system continuously. This Green Wall divider are easy to installed and less maintenance required with high amount of pollutants and sound absorbing capacity. It also beautify roads and to make calming effect of driving.

Objectives:

1. To combat roadside pollutions
2. To recycled water
3. To maintain biodiversity and increase awareness.
4. To increase survival rate of plant populations
5. To beautify the road side area
6. To make driving on roads pleasing effect.
7. To get additional income from medicinal and economical pants.
8. Hassel free maintenance.

Materials

The green wall divider is one of the concepts of vertical garden which widely used from some of the last few decades. The Greenwell divider is a special structure made and installed in the middle or along roadside divider. The frame panels are made from either woven steel wire or using long durable plastic materials with some modifications. It has following sub components

1. Green wall framework
2. Underground water tank
3. Solar panel to run the electric system
4. Sensor system
5. Special plants which combat pollution

1) Green wall framework: Green wall framework is the main component of the green wall divider system. It has rectangular frame with measuring 10 feet long, 3 feet height, and 2 feet width (Dig. 01). The measurement can also vary according to the special requirements. The media used in such rectangular frame for filling are cocopeat, leaf mould, coconut shreds, easily degradable composting or organic materials, compost, vermicompost, loamy soil (red lateritic soil) , sand and special design foam materials (Used in flower decoration) etc. This all media has different properties so they are giving best result when used in appropriate scientific combinations. Such as 2 part of cocopeat, ½ part of fine sand, 1 part of loamy soil (red lateritic soil) , 1 part leaf mould and 1 part of vermicompost or compost etc . Single

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Greenwall divider system is run on its own automatic and installed sensor system. This can decrease labour requirement and increase the survival rate of plant populations. In declined roadside pollutions such as, air pollution, noise pollution, water pollution and others. This also recycled water so no need of extra water so save the water. This small framework not only maintains roadside pollution but also adds beauty, knowledge, biodiversity. So Greenwell divider in future becomes as a lungs of the roads which help to human for living in pure, cleaned natural world.

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media such as cocopeat or foam sponge are also suitable for some plants which not only hold the water but also drain excess water but for nutrient requirement we need water soluble fertilizers to survive plants. The frame has lower drawer (Dig. 01 and 02) to collect excess and percolated water of drip irrigations, which supply by drip irrigation and that percolated due to gravitational force. This drawer tray has end outlet which open in ground installed water tank system of Section A. The gap of one feet is maintained between the Part A and Part B (Right side and Left side of road divider) of Greenwell framework.

2) Underground water tank: Second important part of this system is underground water tank. This tank is constructed in the middle of road divider. The measurement of this tank is either same of green wall or we can extend it for every two Greenwell i.e. (10 feet long, 3 feet height and 5 feet length) which used for Part A and Part B. Each tank has two sub section which divided by concrete wall but it has pipe to transfer cleaned water in another sub sections i.e. from section A to B (Dig. 2) . In part A the excess and percolated water is collected from Greenwell divider framework lower tray this can be filter in this part A. The water is passed through sand filter, charcoal filters, and special designed water purifying systems. Clean water should be transferred and pumped to section B and sludge or sewage should be drained in ground drainage hole. The clean water in part B is again pumped with addition of required water soluble fertilizers and chemicals (Fungicides.) and lifted to upper drip irrigation system.

3) Sensor system: For continuous operation and detecting the water level, fertilizer requirement and to clean polluted water specially designed sensor should be installed. The sensor installed in Greenwell divider detects the water level, if low it can start and if high it stops the water pump. So water is continuously applied when it needed. It also installed in part A which can add the fertilizers and chemicals as per plants requirements. In part B system sensors detect the water quality and purify the water as per the needs, automatically. These sensors will help to maintain all system and alert if any problem is exist.

4) The drip irrigation: The drip irrigation with sensor and fertilizer tank and other chemical addition system is helpful to run this system in minimum water. It also recycled water with underground tank.

5) Solar panel: Solar panel is installed not only providing the light to the road corridor but also it helps to run this green wall divider irrigation and water purifying system. So, labour requirement for doing all such operations and to run this system is minimized.

6) Plants: The plants which are planted vertically on Greenwall divider are special to combat roadside pollution. The plants are having specific characters i.e. it should be hardy, succulents, low water requirement, growing habit must be horizontal, control roadside pollutions, disease, pest, adverse climate resistant and not eaten by animals and survive for hard pruning and training operations. They also add beauties so traveling on these roads are feeling like a pleasure. The plants like Ale vera, Senesevaria, Areca and bamboo palm, Pepromia, Golden pathos Weeping fig, Dracena, Fern, spider plant, mosses, lichens are most popular. But we can also plant regular plant like Rose, Bougainvillea, Chinese rose, Chrysanthemum , Acalypha etc. Regular plants like Banyan tree, Pimpal, Umbar, Neelmohar, Amaltas or Golden shower, Gulmohar etc also plant with some modifications. This all plants required frequent training and pruning so they should not obstruct the traffic.

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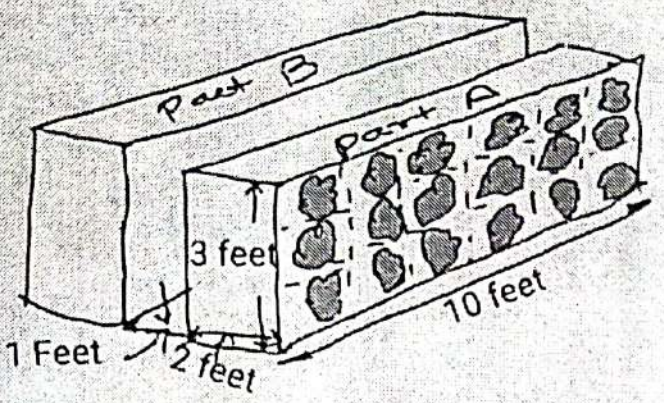
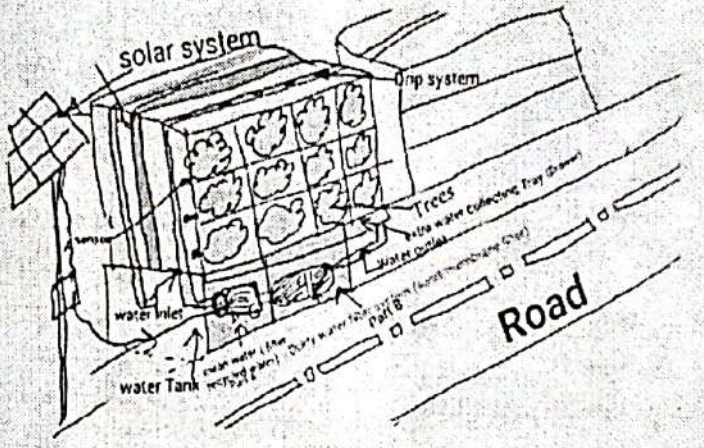
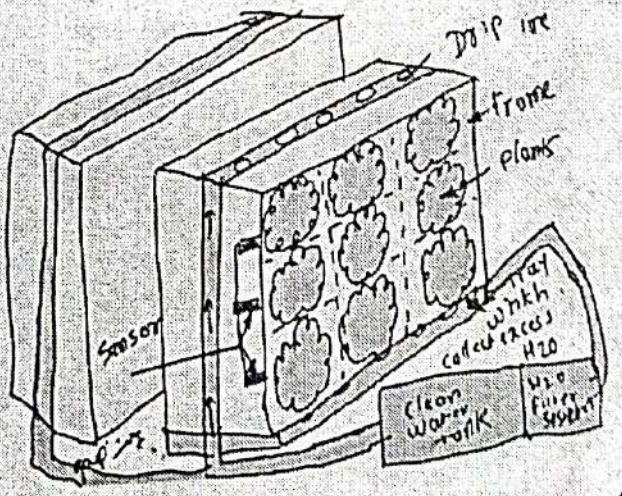


Dig: 01 Measurement of Green wall – Divider



Dig: 02- Details View of Greenwall Divider



Dig: 03- Closed View of Green wall Divider structure

Conclusion: