

Use of a water-boost rocket for the exposure plate method

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The atmosphere of the earth is divided into layers as troposphere, stratosphere, mesosphere and thermosphere. Each of these layers contains different types of airborne microorganisms owing to their physical and chemical characteristics such as types of gases, temperatures and atmospheric pressure. These microorganisms may have the ability to tolerate low O₂ conditions, high temperature levels and survive even under UV rays. Therefore, isolation of these microorganisms can be useful in identifying the microbial diversity. Therefore, a 'water-boost rocket' method was developed to collect air samples from different layers of the atmosphere, where it can be used to isolate beneficial microorganisms from different layers of the atmosphere.

The water-boost rocket consists of two main parts: the main rocket and the sample collecting part. The rocket is powered by water and compressed air. It is made out of a 1.5 L capacity plastic bottle. Four fins were attached to the bottom of the bottle using a plastic board. These fins help the rocket for its flight on a straight line. The nosecone of the rocket was made by using another 1.5 L plastic bottle. The neck and the bottom part of the bottle was removed to preserve the cone shaped part of the bottle. Then 50 g of clay was pasted on the top of the cone shaped part. This adds weight to the nose cone and the center of gravity is moved higher, thus making it more stable. The prepared nosecone was attached to the top of the rocket by gluing and taping. The nozzle of a size of 0.6 cm was prepared using a PVC pipe. The rocket launcher was made up of wood. A separate pipe line was used to fill air to the rocket. The rocket can be filled with water through the nozzle. To launch the rocket, it has to be placed on the launcher and air should be pumped to the rocket by air pump or compressor. After pumping air, the launcher can release the rocket.

Normally this rocket flies up to 100 m of height. This height can be extended up to around 500m, if it is prepared with several stages by joining several bottles together. If we can use another type of gas instead of normal gas, it also can increase the height. The volume of water in the bottle and the pressure decides the maximum height that it can fly. A petri plate can be attached to the rocket using another nosecone, which can be attached over the pre-attached nosecone. Between two nosecones medium containing petri plate was placed. Then a timer circuit is placed on the first nosecone. This circuit helps to open and close the secondary nosecone at a specified time. When the nosecone is opened the plate is exposed to the environment and then it should be closed within a pre-determined time period (3 sec.). After the rocket is landed, we can take the plate, incubate it and isolate the microorganisms. Different types of media can be used to isolate diverse groups of microorganisms.

Keywords: Water-boost rocket, Exposure plate method, Airborne microorganisms