

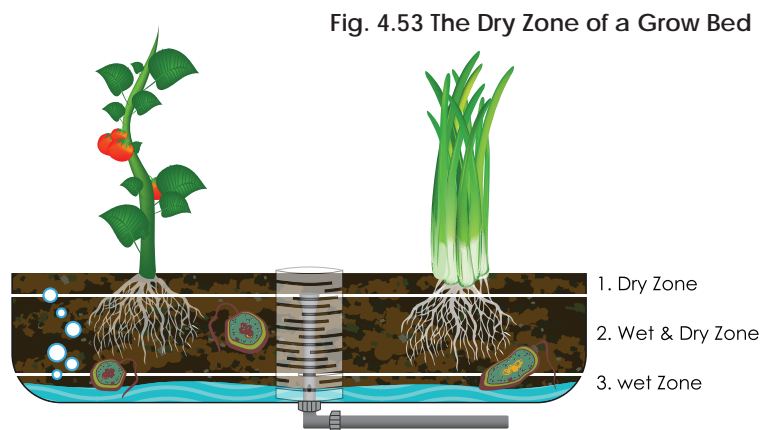
When using timers for larger units a specific rule of thumb should be applied: ensure that at least the fish tank volume is pumped through the whole unit in 1 hour. Also, during warmer months of the year it is vital that you include an air pump into your fish tank to stabilize the oxygen levels as there are no bell siphons creating vast amounts of water aeration when using timer methods. Finally, make sure to flush the beds out once every week by temporarily removing the stand pipe and allowing the water to drain out.

### E) Understanding the 3 Zones in Every Media Bed and Their Processes (Micro Eco-system)

This manual has already discussed the nitrifying bacteria used for bio filtration, however in reality there is a whole ecosystem within every bed involving multiple types of bacteria, micro-organisms and tiny animals that all play their part in the breaking down of fish waste. It is not essential to be aware of all these organisms, but we will briefly explain their role in the 3 different zones of the bed in order to help you fully understand the benefits of this ecological process (Chapter 5: Bacteria, will also explain other key groups of bacteria involved).

#### 1) The Dry Zone:

The first 3cm – 5cm of the bed is the dry zone. This zone functions as a light barrier, preventing the light from hitting the water directly. This helps to prevent the growth of fungus, which can cause collar rot, and other plant diseases. It also removes the threat of algae growing in the bed which can clog pipes and consume large amounts of oxygen during the night. Another reason to have a dry zone is to minimize evaporation from beds by covering the wet zone from direct light. Also beneficial bacteria are sensitive to direct sunlight.



#### 2) The Dry & Wet Zone:

This zone is roughly the 10cm- 20cm space where the Grow Bed intermittently floods and drains. Most of the biological activity will occur in this zone. All the root development, the beneficial bacteria colonies and beneficial micro organisms thrive in this zone. The plants and the animals receive their water, nutrition and oxygen through the flood and drain cycle. As the beds slowly fill with water the plants are irrigated and fertilized and the beneficial bacteria, micro organisms and red worms consume water and nutrition. As the water drains, the beds receive a large amount of fresh air enriched with oxygen. This drainage helps to breakdown the solid waste in the gravel. All of these activities working together prevent the need to clean the media bed (depending on the fish feed rate per day, see *Filtration* section above).

