

Thesis on the effects of latrunculin b, methyl viologen and antimycin a treatment...

[Environment](#), [Animals](#)



Latrunculin B, methyl viologen and Antimycin A treatments on plant mitochondria which is the powerhouse of the cell. They all cause respiratory and metabolic inhibition directly or indirectly. Hence some are employed as herbicides and some used mainly experimentally to inhibit the respiration process in plants

The cell is the smallest unit of all living things. Both plants and animals are made up of cells which is the centre of control of all activities. These cells in turn are made up of several organelles like the nucleus, the cytoplasm, the nucleolus and the mitochondria all working as a team. Both plants and animal cells have some organelles in common. While the animal cell lacks chlorophyll, the plant and animal cells are both blessed with nucleus and mitochondria. The Mitochondria in plants is an important organelle present in plant cells. It is saddled with the task of respiratory and various metabolic processes in plants. It is the main producer of ATP through the oxidative phosphorylation pathway. In addition the mitochondria in plants play critical roles in their performances, development, protein function and gene regulation. Mitochondria also serve as calcium stores in the plant cells. The dynamics and positioning of the mitochondria depend largely on the interactions within the membrane cytoskeleton. Hence various biological and chemical agents like Latrunculin B, methyl viologen and Antimycin A have profound effects on the mitochondria; often referred to as the powerhouse of the cell. The Lantruculins are used a lot of times to disrupt the actin and cytoskeleton of plant cells experimentally. They cause concentration dependent changes in the actin organization and shapes of cells. Lantruculin B especially inhibits F-actin assembly and sequesters G-actin. Lantruculin B

is used more for short term studies more than Lantruculin B, though Lantruculin A is more potent than Lantruculin B, Lantruculin B has fewer unwanted effects and is inactivated gradually by serum. Treating Mitochondria with Lantruculins caused disruption of actin filaments which resulted in irreversible opening of mPTP leading to the release of calcium ions into the cytoplasm.

Antimycin is a potent mitochondrial and electron transport inhibitor in plant cells. It inhibits electron transport in the mitochondria between cytochromes b and c. It is capable of generating reactive oxygen species in biological systems. In the respiratory system, it is involved in energy coupling in the mitochondria. Antimycin A causes inhibition of between 70% and 80% of stage 3 respiration in the mitochondria. Though, Antimycin A has effects on the mitochondrial inhibition of stage 4 respiration also, it is not as profound as that of stage 3 respiration. However, various studies on the application of Antimycin A on plant mitochondria revealed that unlike other inhibitors like cyanide and azide, Antimycin A does not cause complete inhibition and leakage of electrons to oxygen occurs before the site Antimycin inhibition.

Methyl viologen (1, 1'-Dimethyl-4, 4'-bipyridinium dichloride) is also known as Paraquat. It is a widely used herbicide because of its devastating effect on plant chlorophyll. It is non selective, fast acting and kills green plants with ease. When a plant is exposed to methyl viologen in the presence of sunlight, superoxides are produced, which damages photosynthetic apparatus and many other cellular and metabolic processes. Methyl viologen penetrates rapidly the outer membrane of chloroplasts. It has a very high affinity for oxygen which results in the production of free radicals thus

causing autoxidation. Hydrogen peroxide is produced by the inhibition of the carbon dioxide dependent oxygen evolution. Hence, the devastating effects noticed on the mitochondria. Once plant foods are not produced through the disruption of photosynthesis, the respiration and metabolism of the plant is affected adversely, leading to the death of the plant.

In conclusion, methyl viologen, Actimycin A and Lantrunculin B are all inhibitors of respiration and metabolism in plants, they cause oxidative stress by producing free radicals and suproxides.

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