

3.112 Effect of atmospheric sulphur dioxide fumigation on photosynthesis by determination of ascorbic acid content in plants.

Early Career Scientist

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Abstract:

Well lighted plants contain considerable amounts of ascorbic acid (AA). AA is indispensable for photosynthesis and influences detoxification of plants like reducing SO_2 . If the concentration of SO_2 in atmosphere increases above $400 \mu\text{g}/\text{m}^3$, it can result in disruption of photosynthesis. SO_2 is emitted from fossil fuel combustion, roasting of sulphide ores, volcanic eruption, sea spray etc. SO_2 puts a serious threat to the ecosystem by forming other sulphur oxides and H_2SO_4 leading to acid rain and particulate matter pollution. As a phytotoxicant, SO_2 causes tissue damage, leaf chlorosis etc. It readily diffuses into the leaves and dissolves in the moisture available in mesophyll cells forming sulphite, free oxygen & hydroxyl radicals and H_2O_2 . These free radicals promote oxidation of ascorbic acid, thereby reducing the AA content in plants and obstructing photosynthesis. The main objective of this project is investigating the response of AA in plants to fumigation of SO_2 and finding out SO_2 sensitivity of plants. For this project, plants of three different species will be selected & subjected to continuous fumigation of SO_2 with 0.05, 0.1 and 0.2 ppm concentrations in a glass chamber for 2 hours daily for several weeks. The plants will be kept in both normal daylight & complete darkness for more than 80 hours. There will be three replicates for each treatment. The percentage reduction of AA in sun exposed and shaded leaves will be calculated from mean values of different replicates. The AA content will be determined colorimetrically by using 2,6-dichlorophenolindophenol method. I will present the result showing the distinct drop of AA content in plants under the influence of SO_2 and establish a positive correlation between concentration of SO_2 and reduction in AA content. The diminution of relative rate of photosynthesis will be graphically represented. The injury caused to the plants will also be observed.