



IMPACT OF URBAN AIR POLLUTION ON ANATOMICAL TRAITS AND PHYTOCHEMICAL COMPOUNDS IN *AMARANTHUS VIRIDIS* AND *AMARANTHUS SPINOSUS*

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ABSTRACT: *Amaranthus* is a genus, which is cosmopolitan in its distribution. Though many of the species are considered as growing weeds on road sides. *Amaranthus* has been noticed as a highly consumable Genus due to its high nutritional value. The present paper deals with the study of urban air pollution on anatomical traits and phytochemical compounds of two species of *Amaranthus* viz. *A. viridis* L. and *A. spinosus* L. The microscopic studies marked alterations in the anatomical and morphological characters of both the species. The anatomical study was concentrated more on the foliar surface as it is the direct phase of contact between the plant and the atmosphere. There was an increase in the epidermal cell number in the samples of polluted area both on upper and lower epidermis. The increased number of epidermal cell might be a better adaptation of the plant growing in polluted area for detoxification of pollutant. Decline of stomatal frequency was noticed in both the species. Increase in the secondary metabolites like alkaloid flavonoid tannin and phenolic were recorded in the samples of polluted area and the quantity of the compounds of nutritive interest like carbohydrate protein vitamin and fibers showed a rapid decrease in its value compared to control. These parameters are useful as indicators of environmental stress or pollution.

Key Words: *Amaranthus*, *A. spinosus*, stomatal index, urban air pollution

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Amaranthus is a genus belonging to the family Amaranthaceae which is cosmopolitan in its distribution. Most of the *Amaranthus* species are summer annual weeds and is commonly referred to as pigweed. Due to the wide variety of morphological diversity among and within the species, it is considered as a difficult genus (Das, 2011).

The anatomical studies of the genus are effective to resolve the taxonomical complexities (El Ghamery, 2015). Though *Amaranthus* species, especially *A. viridis* and *A. spinosus* could be seen as a growing weed on road side, they have high nutritive values (Carlquist, 2003). Foliar surface is the direct phase of contact between the plant and atmosphere; hence the impact of environmental pollution as stress response by the plant is primarily reflected on the epidermal layer on the foliar surface (Neinhuis, 1988). There is wide range of plant species growing along the road side and are exposed to automobile exhaust pollution. Plant species differ in their ability to mitigate automobile pollution due to difference in their structures like cuticle, epidermis, stomata and trichomes (Aggrawal, 2000). *Amaranthus* species has also shown difference in their foliar stem and root anatomy to cope up with the environmental

stresses (Anita Pawar, 2011). The pollution rate of Trivandrum city is moderate as compared to the other populated cities of India. But the air quality is not satisfactory and it has higher amount of pollutants present than the limit set by National Ambient Air Quality Standards (Suresh Kumar et al, 2011). According to the State pollution control Board the areas of cities near to National Highway (Sreekaryam, kazhakootametc) is at the risk of air pollution while the areas like Aanad, Palode are considered to be less polluted area in Trivandrum with good quality air and less motor vehicle pollution. The increased vehicular load in the areas of National Highways in Trivandrum city possesses a threat to air quality, adversely affecting the road side flora (Biju and Vijayan, 2014).

MATERIALS AND METHODS

Study site

Trivandrum is located on the west coast of India with 1.68 million metropolitan populations making it the fifth most populous urban city in Kerala. The latitude of Thiruvananthapuram, Kerala, India is **8.524139**, and the longitude is **76.936638**. The plant specimen *A. viridis* and *A. spinosus* were collected from four different spots along the road side of Sreekaryam (a place in Thiruvananthapuram city, located 3 km north of