Absorption and Mechanism of Peperomia (Peperomia tetraphylla) to Automobile Exhaust

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Automobile exhaust accounts for about one-third of the total amount of air pollutants in cities, which is the main reason for the formation of haze and acid rain. Therefore, the research work with the title of “Research on Absorption and Mechanism of Peperomia to Automobile Exhaust” was carried out. In the self-made environment simulation chamber and cooling system, based on the static fumigation experiments with 29 kinds of plant, peperomia with the better absorption and tolerance to automobile exhaust was screened out through the plant morphology, observation of the guard cell and stoma with microscope, superoxide dismutase (SOD) activity measurement, absorption kinetics of the exhaust components, non-invasive micro-test technique (NMT) and total nitrogen measurement. The results indicate that the absorption rate of peperomia to the exhaust gas in the experimental groups becomes higher at first and then slower. Compared with the control group, the sizes of guard cells and stoma in the experimental groups increase from 39.65 to 43.25 micrometers for cells and from 13.46 to 43.25 for stoma in 24 h, but decrease from 39.65 to 24.9 micrometers for cells and from 13.46 to 10.57 for stoma in 72 h, respectively. It is correlated well with the relative flow flux of K+ measured by NMT, -96.6 and +62.2 pmol/(cm2.s) in 24 h and 72 h, respectively. The K+ inflow (negative value) leads to the stoma opening, and K+ outflow (positive value) causes the stoma close, which agrees well with the K+ theory. Nitrogen oxides in the exhaust gas are absorbed completely in 10 h, after 38 h, the total nitrogen content in the peperomia reaches the highest value up to 5.06%. This research work provides a good reference to the plant selection for urban landscaping and air purification.

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