

Annual soil CO₂ production in Moscow Botanical Garden (Russia).

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Soil respiration is an essential component of the carbon cycle, determining 25-40 % of carbon dioxide in the atmosphere. Urban soils are subject to significant anthropogenic influences. Anthropogenic impact affects both the plants and the soil microbiota. So, soil CO₂ efflux and soil profile CO₂ concentration probably differ in urban and natural soils. Influence of abiotic factors on soil carbon dioxide production is explored insufficiently. The research of their impact on soil carbon dioxide production is necessary to predict soil response to anthropogenic climate change. The aim of this study was estimation of annual soil CO₂ production and the impact of climatic factors on it.

The research took place in Moscow State University Botanical Garden Arboretum (southern taiga). Investigations were carried out at two sites: the areas planted with *Picea obovata* and *Carpinus betulus*. The study was conducted with 1-2 weeks intervals between November 2014 and December 2015. Emission measurement were carried out by closed chamber technique, profile concentration were measured by soil air sampling tubes method.

Annual carbon dioxide soil surface efflux of soil planted with *Picea obovata* was 1370 gCO₂/(m² * year), soil planted with *Carpinus betulus* - 1590 gCO₂/(m² * year). Soil CO₂ concentration increased with depth in average of 3300 to 12000 ppm (at 80 cm depth). Maximum concentration values are confined to the end of vegetation period (high biological activity) and to beginning of spring (spring ice cover of soil prevents CO₂ emission). Soil CO₂ efflux depends on soil temperature at 10 cm depth ($R = 0.89$; $p < 0.05$), in a less degree it correlate with soil surface temperature and with soil temperature at 20 cm depth ($r=0.88$; $p < 0.05$). Soil moisture has a little effect on CO₂ efflux in the annual cycle ($r=-0.16$; $p < 0.05$). However in vegetation period efflux of carbon dioxide largely depends on soil moisture, due to the fact, that soil moisture is limiting factor for soil microbiota activity and plant respiration.