Mathematical model for monitoring carbon dioxide concentration in industrial greenhouses

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Abstract. Processes of monitoring and control the industrial greenhouses microclimate play a decisive role in growing crops under protected cultivation. Providing optimal climatic conditions in the production process of greenhouse agricultural products requires solving the scientific and applied problem of developing and researching a mathematical model for monitoring carbon dioxide concentration in industrial greenhouses. The proposed model takes into account the processes of diffusion and absorption of carbon dioxide, the geometric parameters of greenhouses, as well as the types and vegetation periods of crops grown under protected cultivation. Time characteristics of the carbon dioxide dynamics process under greenhouse conditions are estimated. Quantitative estimates of the diffusion transfer duration and carbon dioxide absorption are made for indeterminate varieties of tomatoes during planting and fruiting periods. Recommendations are given on the development of an adaptive methodology for the functioning and structural and algorithmic organization of computerized monitoring and management system for carbon dioxide top-dressing modes for greenhouse crops. The necessity of improving the proposed mathematical model and confirming the adequacy of its implementation efficiency on yield indicators of greenhouse crops is substantiated.

Key words: *modeling, mass transfer, photosynthesis, dynamics.*