

Approximation of the Nitrogen Deficiency in Soybean and Simulation of Soybean Leaf Color Using Neural Networks

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Abstract: Nitrogen is the essential macronutrient and the most important element for vegetative growth. The symptom of nitrogen deficiency is that the old leaf color changed from dark green to yellow then falls off a plant and spreads widely the next leaf order. The young leaf color is trend yellowish green. Knowing that leaf color is affected by nitrogen content thus this present work aims to study the relative of a soybean leaf color and a needed nitrogen content. Experiment was conducted during the growth a period Oct. 18,2004 to Nov. 19,2004 which a soybean (Chiangmai 60) was cultivated in Hoagland's nutrient solution at the differential nitrogen concentration 0, 0.6, 1.2, 1.8, 2.4 and 3.0 millimolar a period 18-33 day with four replications. Neural networks were the model for the unifoliate leaf color base approximation of the needed nitrogen content. Using multilayer perceptions (MLPs) constituting the input data (x) was the difference between the unifoliate leaf color in 3 millimolar concentrated nitrogen and the unifoliate leaf color for examine in RGB color systems and the age of soybean, the output data (y) were the needed nitrogen content (gram/liter). This simulation was tested on the testing data that relative error was 0.0561 thus this simulation can use leaf color base approximation of the needed nitrogen content. Experiment result can simulate the soybean leaf color in RGB color systems affected by nitrogen content in Hoagland's nutrient solution using neural networks. MLPs constituting the input data (x) were 1) the nitrogen content 2) leaf order and 3) age of leaf, the output data (y) were R G and B color value. This simulation was tested on the testing data that relative error of RGB color value were 0.0211, 0.0169 and 0.0254, respectively. The result of simulation can visualization of soybean leaf color by 3D leaf and using L-systems control a soybean structure.

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