Abstract: The evaluation of the nutritional state of the plants is made through chemical analysis or visual diagnosis and for this it is necessary to know the characteristic patterns of nutritional deficiency of each element. Intensive farming depends on the use of modern inputs and technologies. Digital image processing (PDI) is an example of the use of technology. The objective of this work was to apply the PDI to identify the symptomatology of deficiency in digital images of banana leaf, induced to the deficiency of N, P and K nutrients. The experiment was carried out in two stages. The first one was conducted in a greenhouse at Unesp, Registro - SP, with micropropagated seedlings of the 'Grande Naine' cultivar, which were submitted to a randomized complete block design in a 5x5 factorial scheme, with three replicates for each treatment. The factors were nutritional variation (complete solution, individual omissions of N, P, K and a control with soil cultivation with adequate saturation and fertilization), and sampling time at 0, 30, 60, 90 and 120 days after the application of the treatments with 100% ionic strength. The other step of the experiment was the PDI, based on a method composed by four distinct phases of operation: collection and digitalization of the samples, segmentation and extraction of the histograms of the images, selection of attributes and, finally, classification. The computational experiment was performed with databases, one for each studied period (0, 30, 60, 90 and 120 days). The highest accuracy rates of the experiment were presented by classifiers with artificial neural networks (RNA) and were equal to 66.7%, 62%, 76.7%, 62.3%, 68.3%, at the times 0, 30 , 60, 90 and 120, respectively. A good performance was found by RNA classifiers, both for the specificity values (90%, 98%, 97%, 97% and 98%, at times 0, 30, 60, 90 and 120, respectively), as well as the of sensitivity (93%, 77%, 93%, 75% and 82% in the 0, 30, 60, 90 and 120 times, respectively) of the models.

Keywords: classification; digital image processing; visual diagnosis of plants; artificial neural networks.