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Methods of computer vision to extract the quantitative characteristics of the wheat spike

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The shape and structure of the wheat spike is one of the most important characteristics of cereals associated with their economically valuable qualities such as productivity, the absence of ear fragility and ease of threshing. The study of the genes controlling these traits will allow us to purposefully create new varieties with improved characteristics in terms of yield, ease of thresh and resistance to environmental factors [1]. Evaluation of wheat spike characteristics in most modern studies is performed by an expert based on the visual analysis and measuring practices, which requires a significant investment of time, despite the fact that in modern experiments tens of thousands of plants are analyzed. Automation of this time-consuming process through the introduction of digital image analysis technologies is relevant for modern science. We propose the method of wheat spike morphometry based on the analysis of digital images. This method allowing extract a number of signs of the spike, such as the spike length, width, area projected on the image, color, awns volume, etc. The proposed approach allowing analyze the shape of the ear, which is an important characteristic that is closely related to the species of the plant, which in turn can be used to identify varieties. In this work, 1454 images of 382 plants were analyzed. The obtained morphometric data were loaded into the SpikeDroidDB database ([2], http://spikedroid.biores.cytogen.ru). The method showed high accuracy for determining the qualitative and quantitative characteristics of wheat spike.

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References

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