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Development of Digital Holographic Microscope for 3D Sensing of Biological Surface Morphology

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Sunflower broomrape *Orobanche cumana* Wallr.(*O. cumana*) is a parasitic angiosperm that infects the roots of sunflower plants, causing significant damages to this strategic oilseed crop. Combining microscopy and digital holography (DH) offers the unique advantage of simultaneously capturing complete three-dimensional (3D) information about the biological specimen, and under coherent illumination it has been investigated for computer acquisition and identification of biological specimens. Configuration of the digital holographic microscope optical setup provided with the microscope epi-objective for darkfield illumination by laser beam is described. The aim of this research is to develop microscopy 3D system to enhance the resolution and contrast in imaging of *O. cumana* seeds for they systemizing. Successful application of the modern digital holographic microscope allowed studying the broomrape seed in various layers, like surface and under surface of seed.