Abstract

Xanthomonas campestris pv. Campestris **bacterium is one of the most important plant pathogens around the world. Due to the high prevalence of this bacterium among all Brassicaceae family, black rot is one of the most destructive diseases and causes a lot of damage during planting and after harvesting. Concerning very high potential of bacteria for survival, providing an accurate, effective, and specific diagnostic method for detection of the bacteria is essential. Over the last few decades, molecular techniques have been developed for rapid, precise, easy, inexpensive and highly specific and sensitiv detection of plant and animal pathogens. In this study, in order to detect the *Xanthomonas campestris pv. Campestris*, multiple PCR, LAMP and gold nanoparticle-based colorimetric assays were used. In multiple PCR technique, designed primers for *leuS*, *glyS* and *avrXccC* genes were used and the results indicated the amplification of 1030 bp, 938 bp and 484 bp, fragments, respectively. The specificity and sensitivity of the reaction were performed using negative control bacteria and genomic DNA dilution. The results showed 100% specificity and sensitivity of 83.5×10^{-3} ng/µL genomic DNA. Then, the LAMP technique was optimized to detect the bacteria using *XCC007* target gene. The LAMP reaction was done at 63.5 ˚C in a hot water 20 minutes. In this method, the specificity of 100% and sensitivity of 83.5×10^{-7} ng/µL based on the serial dilution were achieved. Finally, probes designed for *leuS* and *glyS* genes, detection of the bacterium was investigated by gold nanoparticles probes and a change in the color of the nanoparticles in presence of the target bacterium was observed and maximum changes in wavelength occurred at 540 to 550 nm. In this method, specificity of 100% and sensitivity of 83.5×10^{-5} ng/µL genomic DNA was reported. The results of this study indicated that the LAMP technique was more sensitive than gold nanoparticle-based colorimetric assay and multiple PCR, respectively.**

Keyword: ***Xanthomonas campestris pv. Campestris*****, Multiple PCR, LAMP, gold nanoparticle probe, *leuS*, *glyS* and *avrXccC* genes**

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