ABSTRACT

Common bean (Phaseolus vulgaris L.) is largely consumed among various communities in Kenya. However, its productivity is gradually declining due to infections such as common bacterial blight and halo blight. Zanthoxylum gilletii and Markhamia lutea have been used traditionally in the management of various human bacterial pathogens. In addition, plants are inhabited by fungal endophytes that produce bioactive secondary metabolites. This study therefore, was to determine the bioactivity of secondary metabolites from Z. gilletii, M. lutea and their fungal endophytes against Xanthomonas axonopodis pv. phaseoli and Pseudomonas syringae pv. phaseolicola, the causal agents of bean common bacterial blight and halo blight. The fungal endophytes were isolated from sterilized leaves, plated on Sabourand Dextrose Agar (SDA) media amended with streptomycin sulphate, incubated and subcultured. A total of 51 fungal endophytes were isolated and 50% identified. Fifteen (15) endophytes were active against the test organisms with Fusarium solani producing the best activity in the dual culture assay. The most active endophytes were fermented on rice media and extracted using methanol by ultrasonification. Methanol extract was partitioned between ethyl acetate and hexane to produce ethyl acetate and hexane extracts respectively. Purification of the ethylacetate extract produced 2-hydroxyphenylacetic acid (14), 4-hydroxyphenylacetic acid (13) and (E)-3,8-dimethyl-7-(4-methylhex-2-en-2-yl)- 7,8-dihydro-5Hpyrano[4,3-b]pyridine-2,4,8-triol(Lucinine)(15). Secondary metabolites from the dried leaves were extracted using methanol. Methanol extract was fractionated using methanol, ethyl acetate and hexane to obtain Skimmianine (5) from the methanol extract of Z. gilletii. The pure compounds were analyzed by a combination of mass spectrometry and spectroscopic techniques which included 1D and 2D NMR. All the extracts except methanol crude extract from Z. gilletii were active against X. axonopodis pv. phaseoli while only the Fusarium extracts were active against P. syringae pv. phaseolicola, in the disc agar diffusion assay. Qualitative and quantitative violacein assay were used to assess quorum quenching properties of these extracts. Fusarium solani extracts and Z. gilletii ethyl acetate extract showed a potential activity in the qualitative (overlays) and quantitative violacein assay. These results demonstrate the diversity of endophytic fungal genera inhabiting the two medicinal plants and the potential of these plants and their endophytic fungal extracts as sources of antibacterial and quorum quenching secondary metabolites. This study also provides leads for the control of the bacterial pathogens affecting common bean in Kenya

Keywords : Bean bacterial pathogens