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**Metadata Information**

<b>Author</b>	<i>Kanika Kaler</i>
<b>Supervisor(s)</b>	<i>Dr. Dinesh Goyal</i>
<b>Title of the Thesis</b>	<i>Extraction of total phenolics from different waste biomass</i>
<b>Language</b>	
<b>Subject Keywords</b> (at least five)	<i>Orange peels, phenolic compounds, antibacterial activity, alkali hydrolysis</i>
<b>Abstract</b> (If required attached a separate sheet)	<i>as enclosed</i>
<b>Name of the Department</b>	<i>Biotechnology</i>
<b>Name of the Degree/ Program</b>	<i>Master of Science in Biotechnology</i>
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## ABSTRACT

Total phenolics were extracted from different waste biomass such as sugarcane bagasse, waste black tea leaves, orange peels, wheat straw and rice straw by solvent extraction and alkali hydrolysis method. Most efficient solvents for extracting phenolic compounds from waste biomass were methanol (60%) > dimethyl sulfoxide > ethanol (60%) > distilled water. The extraction yields were significantly impacted by solvents (ethanol, methanol, and dimethyl sulfoxide) due to varying polarity and concentrations. Extraction of phenolics using 60% methanol yielded highest phenolics (in terms of gallic acid equivalent (GAE) per gram of biomass) in orange peels followed by wheat straw, rice straw, waste black tea leaves and sugarcane bagasse. Alkali hydrolysed extract from orange peels contained  $7.58 \pm 0.33$  mg GAE  $g^{-1}$ . By using the solvent extraction technique, it was observed that 60% methanol is comparatively the best-suited solvent for extracting polyphenolic compounds and gave the maximum yield of  $4.68 \pm 0.47$  mg GAE  $g^{-1}$  in orange peels extract. In addition, DPPH radical scavenging activity and reducing power of orange peels extract was checked, where 60% methanolic extract showed the highest antioxidant activity  $85.50 \pm 0.009\%$  for DPPH and dimethyl sulfoxide (DMSO) extract gave the highest value yield  $1.75 \pm 0.01\%$  for reducing power ability of the orange peels extract. Further, the solvent extracts and the alkali hydrolysed extract were evaluated for their antibacterial activity using agar well diffusion method against Gram-positive *Bacillus subtilis* MTCC441 and Gram-negative *Escherichia coli* MTCC729. Methanolic extract showed the diameter of around  $16.33 \pm 0.47$  mm at  $300 \mu l$  concentration against *Bacillus subtilis*. *Escherichia coli* gave the negative result by using solvent extracts. Further, using broth based turbidometric assay, the antibacterial effect of different volumes of orange peel extracts was determined against *Escherichia coli*. The maximum antibacterial effect was observed when  $200 \mu l$  of extract was used. Characterisation of the polyphenolic compounds was done by using Fourier transformation infrared (FTIR) spectroscopy.

**Keywords:** Orange peels, solvents, alkali hydrolysis, total phenolic content, antioxidant, antibacterial, turbidometric assay

