The pure rotational spectrum of the four-membered ester ring propiolactone (C₃H₄O₂) has been measured in a supersonic jet between 7 and 22 GHz using Fourier transform microwave (FTMW) spectroscopy. For the normal isotopologue, a total of 19 \( a \)- and \( b \)-type transitions have been recorded. Fifteen transitions due to three different \(^{13}\)C isotopologues have also been observed. The microwave spectrum was analyzed to obtain an improved set of ground state rotational constants in comparison to earlier microwave experiments\(^a\). The new set of rotational parameters was used to predict the rovibrational band structure of the lowest frequency modes of propiolactone. A total of 12 vibrational band origins have been observed between 400 and 1500 cm\(^{-1}\) using the far infrared beamline of the Canadian Light Source coupled to a Bruker IFS125HR spectrometer. The spectra were recorded with a resolution of 0.000969 cm\(^{-1}\) and although the intensities of the bands vary, 9 bands are of sufficient quality for complete rovibrational assignment. The progress of the assignment of this rich spectrum will be discussed.