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## ABSTRACT

$\beta$ -carotene is one of the most valuable carotenoids due to its pro-vitamin A activity. To meet the requirement of  $\beta$ -carotene, it is necessary to extract the highest amount from sources that are easily available and cheap, and carrots are one of them. In this research, I have undertaken an ultrasound-enzyme-assisted extraction strategy to enhance the recovery of  $\beta$ -carotene from an easily available agricultural resource *i.e.* carrots. The experiments were carried out by following a partially rotatable central composite design in response surface methodology (RSM) and extraction conditions including enzyme concentration, pH, ultrasound time, and temperature were optimized for optimum yield of  $\beta$ -carotene. In each experiment, manually crushed carrots were with Kemzyme® dry plus were subjected to ultrasound waves and then incubated for 1 hour at a specific temperature. After incubation, the beta-carotene was extracted from the pre-treated sample using petroleum ether. The yield was recorded by measuring absorbance at 450 nm from UV/Vis spectroscope.

The extraction curves obtained helped compare the results of ultrasound-enzyme-assisted extraction with the control experiment and among one another. Enzyme Concentration, pH, ultrasound time, and temperature were the parameters that were optimized using Rotatable Central Composite Design (RCCD). The yield noted for the optimized conditions; 35°C temperature, 1.25% enzyme concentration at pH 7.05 of medium by applying sonication for 7.5 minutes, is 9.9033 mg/L. This method proved the reliability of the model used for the experimentation that provided CV% of 3.49 and of adjusted  $R^2$  value of 0.8728. Kinetic study of the extraction process explained that all experimental runs produce better yields in lesser time, maximum recovery of product time than the control experiment which yield 7.2431 mg/L. Therefore, it was proved that the use of enzymes in combination with ultrasound waves can be more effective for the recovery of  $\beta$ -carotene from carrots and make the process resourceful and economical.