

Efficiency of *Manilkara zapota* seeds as an agricultural biosorbent for the removal of malachite green dye from aqueous solution.

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ABSTRACT

THE ADULTERATION OF MARINE WATER AWAKEN ON THE POLLUTION WHICH HAS TO BE DISCRIMINATE TO SAFE LIVES OF FRESH WATER, MARINE, FLORA N FAUNA OF AQUATIC, USUALLY CREATED BY INDUSTRIAL DYE EFFLUENT. TEXTILE INDUSTRIES PRODUCE IMMENSE AMOUNT OF ORGANIC, INORGANIC COMPOUND, METALS AS WELL AS DYES SALTS THAT ARE INJURIOUS TO HEALTH OR LIFE THREATENING. THERE ARE VARIOUS TECHNIQUES TO TREAT THIS POLLUTED WATER BUT ADSORPTION TECHNIQUE IS SUPERIOR TO ALL OTHER METHODS. IN THIS RESEARCH WORK, *MANILKARA ZAPOTA* SEEDS COMMONLY KNOWN AS CHIKU SEEDS, AN ORGANIC LEFTOVER OF HOUSE HOLD WASTE IS USED TO SEPARATE DYE BEING AN EFFICIENT ADSORBENT FROM AQUEOUS SOLUTION. ADSORPTION STUDY WAS CONDUCTED TO CHECK THE EFFECT OF DIFFERENT EXPERIMENTAL PARAMETERS SUCH AS ADSORBENT DOSAGE, INITIAL CONCENTRATION OF MALACHITE GREEN, CONTACT TIME AND TEMPERATURES. THE OPTIMUM CONDITIONS WERE EVALUATED FROM THE REVISION OF THESE PARAMETERS. STUDY OF ADSORPTION ISOTHERMS WAS CARRIED OUT AT THESE OPTIMUM CONDITIONS WHICH GIVE US THE BEST FITTING ADSORPTION ISOTHERM MODEL. THE EQUILIBRIUM DATA WAS FITTED TO LANGMUIR AND FREUNDLICH MODELS

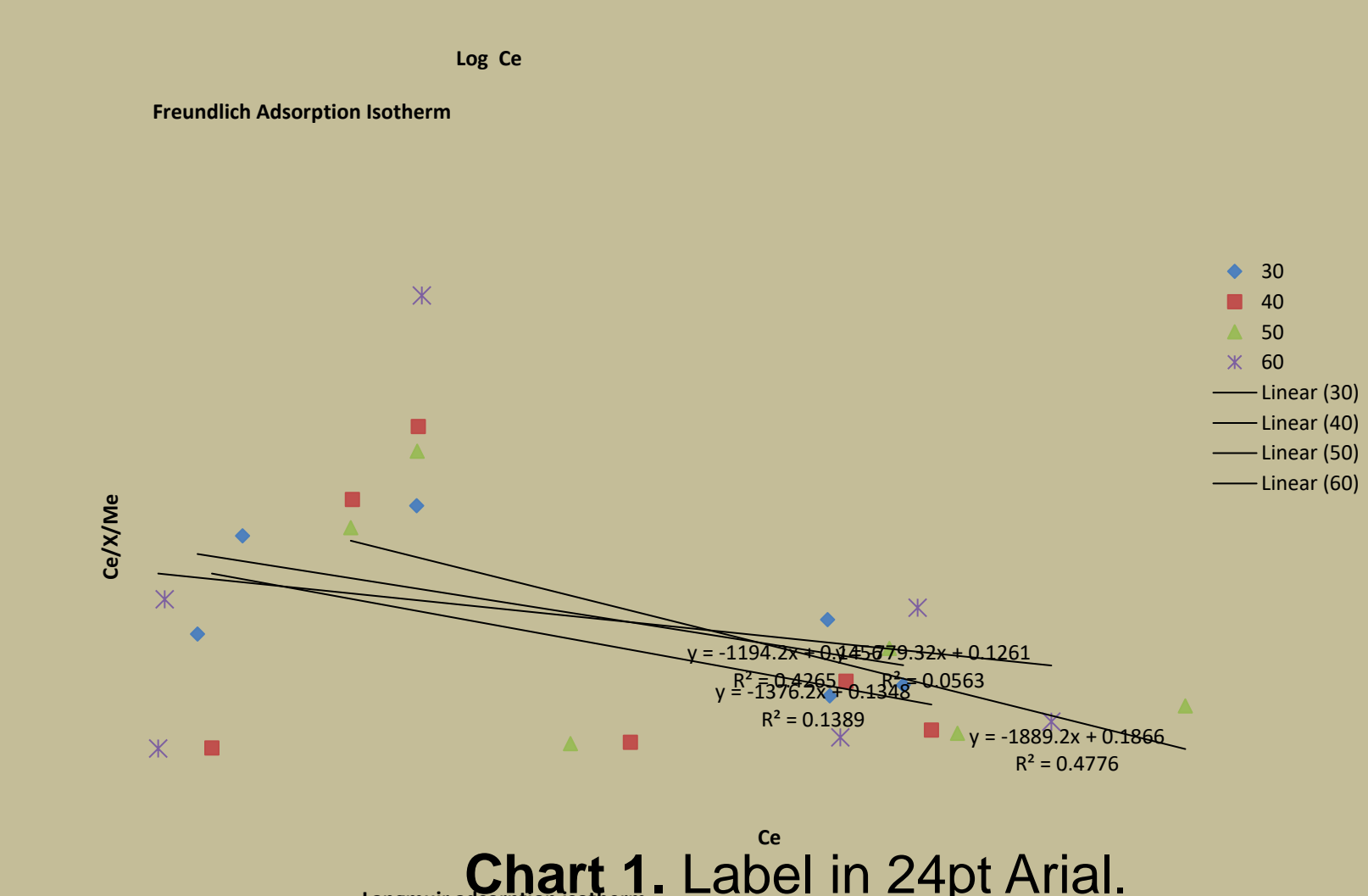
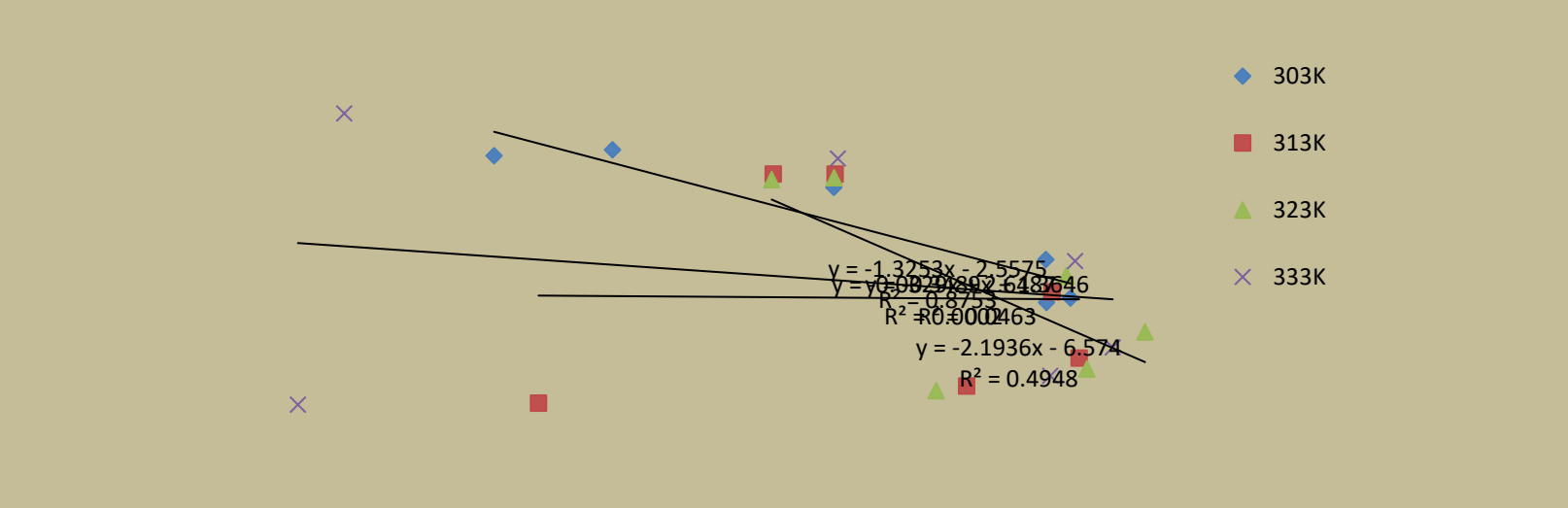
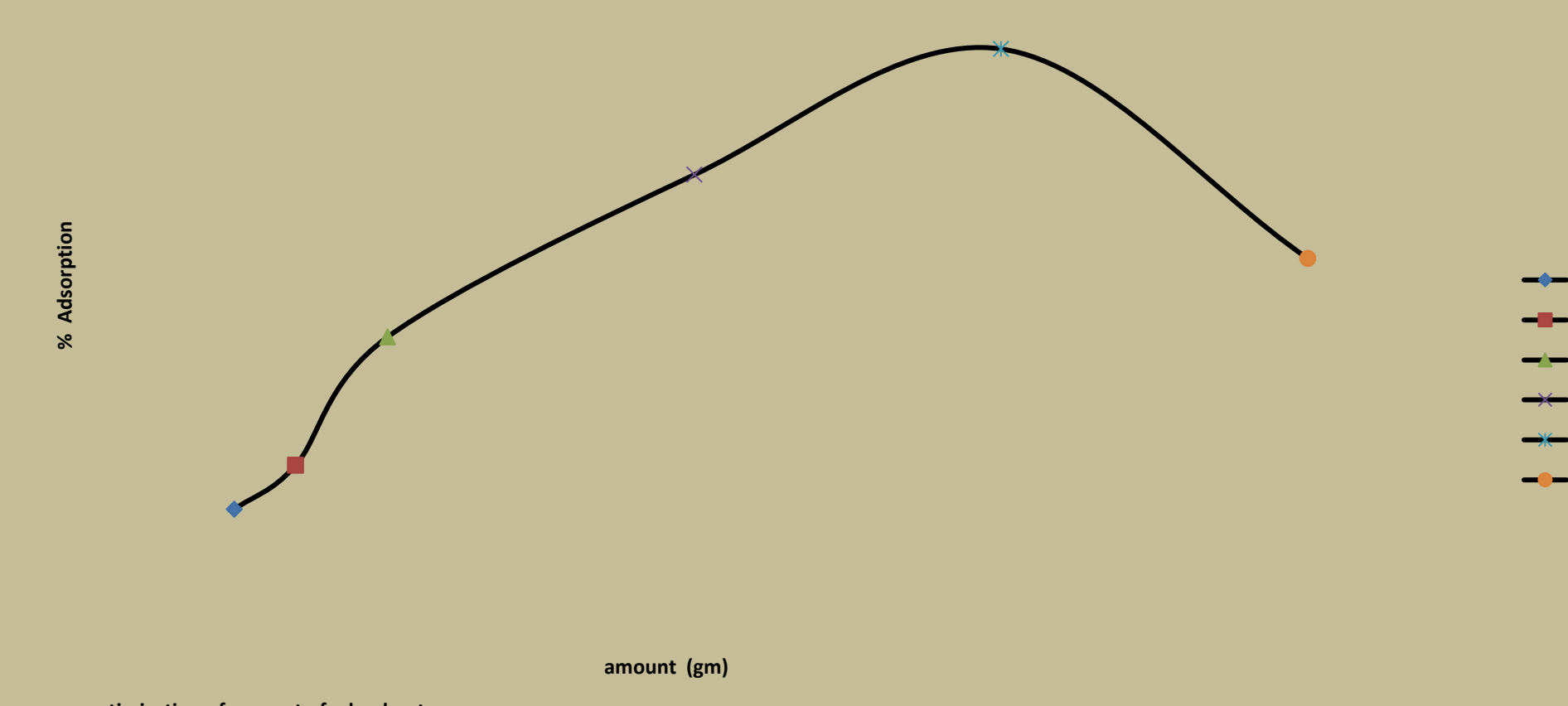
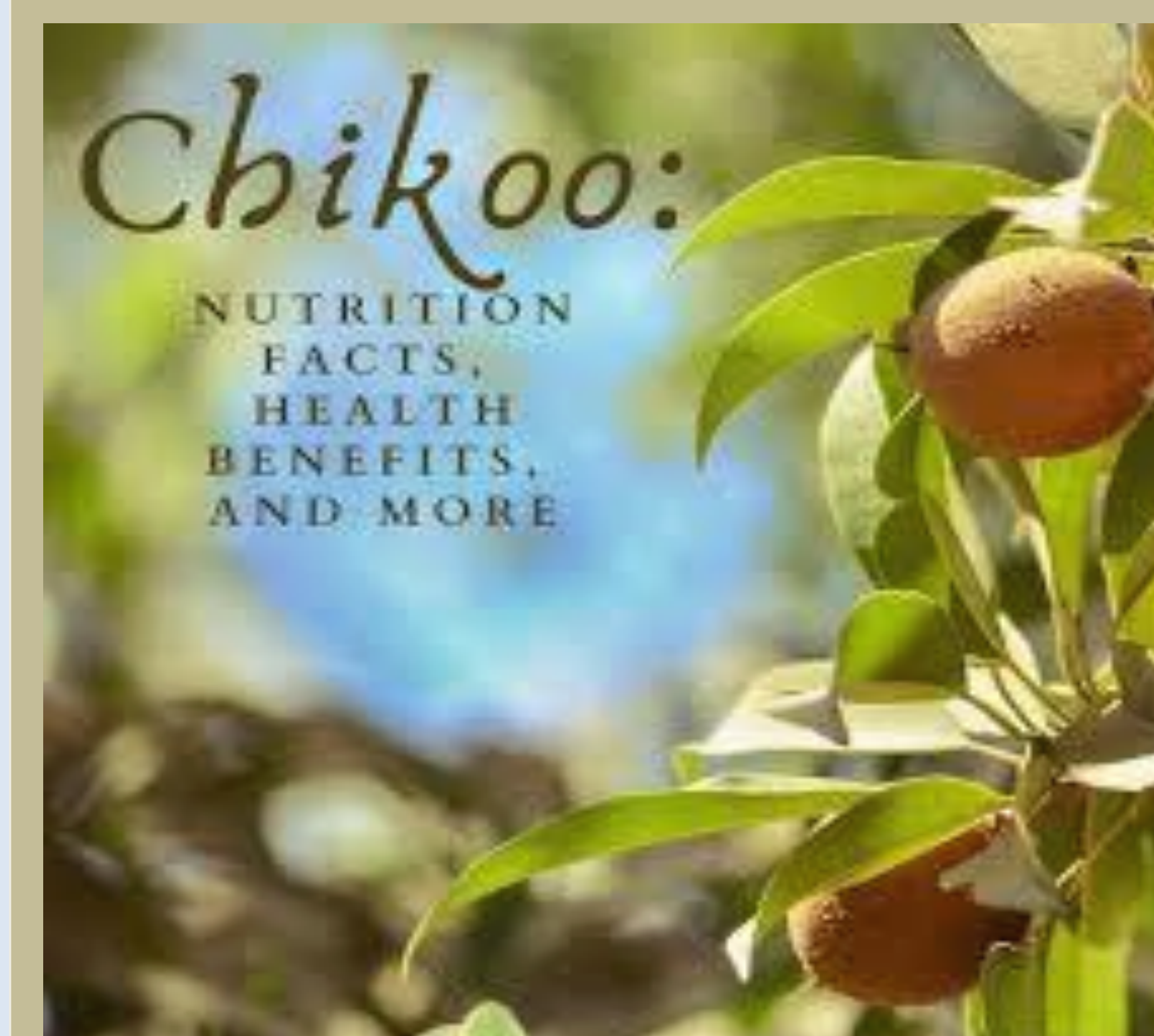
INTRODUCTION

POLLUTION IS GLOBALLY SPREAD ISSUE WHICH IS LOOK AFTER BY SUSTAINABLE DEVELOPMENT GOALS (SDGS) 17 MAJOR ISSUES LOOK AFTER ON IT. POLLUTION INCLUDES AIR POLLUTION, LAND POLLUTION, WATER POLLUTION. WATER POLLUTION IS THE TOP RANKED ISSUE WERE FACING TODAY BECAUSE IT RISING SERIOUS HEALTH RISK FOR FRESH WATER, MARINE LIFE AS WELL AS HUMAN BEING. FRESHWATER IS A SCARCE AND VALUABLE RESOURCE ONE THAT CAN EASILY BE CONTAMINATED. MOSTLY RIVERS, STREAMS, OCEAN WATER ARE POLLUTED BY INDUSTRY. MODERNIZATION IN LIFE AND ECONOMICALLY DEVELOPMENT OF A NATION DEPENDS ON THE NUMBERS OF INDUSTRIES PRESENT IN THE COUNTRY, BESIDE THAT TEXTILE PLAYS VITAL ROLE IN POLLUTION. NATURAL FIBERS INCLUDING WOOL AND COTTON ALONG WITH SYNTHETIC FIBER, CHEMICALS AND PROCESS WATER ARE MAJOR POLLUTED RAW MATTER OF INDUSTRIES. TEXTILE INDUSTRIES ARE CLASSIFIED INTO DRY AND WET PROCESSES WHICH PRODUCED DEHYDRATED AND WET DISSIPATE RESPECTIVELY. WET PROCESS CONSISTS OF A SERIES OF STEPS INCLUDING SIZING, DE-SIZING, SCOURING, BLEACHING, MERCERIZING, DYING AND PRINTING. THESE WET OPERATIONS ARE MAJOR CONTRIBUTORS OF WASTEWATER CONTAINING DYES ORANGE 37, DISPERSE VIOLET 93, DISPERSE BLUE 373. A LARGE AMOUNT OF CONTAMINATED WASTEWATER IS ALSO GENERATED DURING THE FORMATION AND DYING OF FIBERS IN TEXTILE INDUSTRY HAVING POISONOUS TOXINS SUCH AS DYES, CHROME, STARCH, ACID, NAOH ETC. THE INDUSTRIAL EFFLUENT CREATES BLADDER CANCER AFTER A LONGTIME OF BEING IN CONTACT WITH AZO DYES. WHITE MEAT OF FISHES ALSO CONTAINS HEAVY METALS. THESE CONDITIONS LED TO LOOK INTO THIS ALARMING CONDITION THAT INDUSTRIAL EFFLUENT NOT ONLY HARMING MARINE BUT ALSO HUMAN BEING AS WELL. TEXTILE INDUSTRY IS HIGHLY CHARACTERIZED BY A HIGH CONTENT OF POLLUTANTS SUCH AS ORGANIC AND INORGANIC MATERIAL, HEAVY METALS, AND COLORANTS. MOST OF THE RESEARCHERS REPEATEDLY CITED THEIR RESEARCH WORK IN DIFFERENT PLATFORMS AS REGARDS THE DYE REMOVAL PROCESS, SUCH AS THE MEMBRANE SEPARATION PROCESS, REVERSE OSMOSIS, THE COAGULATION TECHNIQUE, CHEMICAL OXIDATION, THE ELECTROCHEMICAL PROCESS, THE AEROBIC AND ANAEROBIC MICROBIAL DEGRADATION PROCESS RESPECTIVELY, WHICH WERE SUCCESSFULLY IMPLEMENTED IN THE TEXTILE INDUSTRY. THE ADSORPTION TECHNIQUE IS A SIMPLE AND EFFICIENT METHOD APPLIED IN MOST OF THE WASTEWATER TREATMENT PLANTS FOR REUSE OF WATER. IT IS ALSO THE MOST DEMANDABLE TECHNIQUE BECAUSE AVAILABILITY OF ADSORBENT IS EASIER AND EASIER WAY TO BE PERSUE.

DISCUSSION

Results and discussion;

Influence of Effect of amount of adsorbent, agitation time and initial concentration of malachite green dye on the rate of adsorption was investigated. The results shows that 0.3 gm of adsorbent with 10 minutes of agitation time and $3 \times 10^{-5} M$ of malachite green dye give 92-94% adsorption of dye. The analysis of the isoas compare to Langmuir adsorption isotherm therm data is important to develop an equation, which accurately represents the results and could be used for designing process. The applicability of the isotherm equations was compared by judging the correlation coefficient, R^2 . The freundlich adsorption isotherm is best fitted for the current research work shows the multilayer adsorption of malachite green dye on chikoo seeds powder.



METHODS AND MATERIALS

CHIKOO SEEDS(MANILKARA ZAPOTA) WERE COLLECTED DOMESTICALLY, AS WELL AS FROM JUICERS SHOP. IT IS WASHED SEVERAL TIMES WITH DISTILL WATER THEN SEND IT TO MILL FOR CRUSHING. AS A RESULT, GRANULAR PARTICLES WERE OBTAINED WITH DUSTY COMPONENT. IN ORDER TO REMOVE CONTAMINATION AGAIN WASH WITH DISTILL WATER AND SOAK IN WATER FOR 24 HOURS, THEN DRIED IN AN OVEN AT 80C FOR 2 HOURS.

DIFFERENT CONCENTRATIONS OF MALACHITE GREEN DYE WERE PREPARED FROM THE STOCK SOLUTION TO CHECK THE REMOVAL EFFICIENCY OF ADSORBENT LIKEMANILKARA ZAPOTA. ADSORPTION PARAMETERS LIKE CONCENTRATION OF DYE, AGITATION TIME, AMOUNT OF ADSORBENT AND TEMPERATURE WERE STUDIED.

10-50ML DYE PLACE IN BEAKER THEN 30 MG OF ANALYZING SAMPLE PLACE ON MAGNETIC STIRRER FOR HALF AN HOUR, THEN SAMPLE PASS THROUGH WHATMAN FILTER PAPER AND EFFLUENT ANALYZE UNDER U.V DOUBLE BEAM SPECTROPHOTOMETER WITHIN SPECIFIC RANGE. GRAPHS WERE PLOTTED UNDER THE PRINCIPALS OF FREUNDLICH AND LANGMUIRE ADSORPTION ISOTHERMS.

CONCLUSIONS

ADSORPTION TECHNIQUE IS ONE OF THE BEST TECHNIQUE TO DO WORK IN VIVO, BECAUSE ADSORPTION TECHNIQUE REQUIRE ADSORBATE AND AN ADSORBENT. MANILKARAZAPOTA USE AS AN ADSORBENT IN ORDER TO REDUCE DYE CHROME FROM MALACHITE GREEN AND PROVIDE 80-90% REMOVAL OF DYE TO JUSTIFY ITS EFFICIENCY. ADSORPTION ANALYZE UNDER DIFFERENT PARAMETER LIKE CONCENTRATION, TIME, AMOUNT AS WELL AS TEMPERATURES FOR THERMODYNAMICS OBSERVATION.

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